Welsh Government

M4 Corridor around Newport

Environmental Statement
Volume 3: Appendix 11.1

Appendix 11.1: Land Contamination Assessment Report

At Issue | March 2016

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1 Introduction

1.1 Introduction

1.1.1 This report provides an appraisal of potential areas of land contamination likely to be affected by the proposed M4 Corridor around Newport (M4CaN - the 'Scheme'). It utilises desk based information and data from previous ground investigations together with the Welsh Government supplementary ground investigation to determine whether potential contamination sources resulting from historical/current activities could cause a risk to future site users, construction workers, the general public, controlled waters and the environment during the construction and operation of the Scheme. This risk assessment has been undertaken to identify areas of land contamination that would plausibly cause a risk and thus determine whether control measures or remediation are necessary.

1.1.2 The data for areas of the Scheme outside of the identified potential areas of contamination are also assessed to establish potential impacts for the Scheme. Whilst the results of the soils assessment are provided in this report, the assessment of groundwater and surface water outside the defined areas of potential land contamination is provided in the Baseline Water Environment Report (Appendix 16.2 of the Environmental Statement).

1.2 Legislation and Guidance

1.2.1 The list below, though not exhaustive, includes the main legislative drivers for managing risks to human health and the environment from land contamination:

- Part IIA of the Environmental Protection Act (1990);
- Environment Act (1995);
- Contaminated Land (Wales) Regulations (2006) and Amendment (2012);
- Groundwater Regulations (1998);
- Groundwater (England and Wales) Regulations (2009);
- Water Resources Act (1991);
- Water Act (2003);
- Groundwater Regulations (1998), which transpose the EC Groundwater Directive 80/68/EC into UK law;
- Water Environment (Water Framework Directive) (England and Wales) Regulations (2003), which transpose the Water Directive 200/60/EC into UK law;
- Environmental Permitting (England and Wales) Regulations 2010;
- Waste Framework Directive (2008) as transposed via Waste (England and Wales) Regulations 2011;
- Landfill (England and Wales) Regulations (2002); and
- Hazardous Waste (England and Wales) Regulations (2005);

1.2.2 In Wales, Part IIA of the Environmental Protection Act (EPA), as introduced by Section 57 of the Environment Act 1995, came into effect in September 2001 with the implementation of the Contaminated Land Regulations 2000 (now superseded by the Contaminated Land Regulations 2006 and Amendment 2012). Under Part

IIA of the EPA, sites are identified as 'contaminated land' if they are causing, or if there is a significant possibility of causing, significant harm to human health or significant pollution of controlled waters. 'Controlled Waters' are defined as including both surface waters and groundwaters within an aquifer (Water Act (2003)). In general terms the legislation advocates the use of a risk assessment approach to assessing contamination and remedial requirements. Once a site is determined to be 'contaminated land' the enforcing authority must consider how it should be remediated and, where appropriate, issue a remediation notice to require such remediation. Where a company volunteers to remediate a site, the Local Planning Authority should support this and publish a remediation statement.

National Planning Policy

1.2.3 Planning Policy Wales (PPW) sets out the Welsh Government's national policies on different aspects of land use planning (Welsh Government, 2016). PPW provides general guidance and information with regard to development planning throughout Wales. This document provides extensive information on the planning objectives for the region, and puts particular emphasis on the need for sustainable development in terms of the resources used, the maintenance of the environment, the economic use of land and the consideration of society in the general area. Within the policy, it states the importance for the restoration of derelict and contaminated land.

1.2.4 The current national guidance on planning and pollution control, including development on potentially contaminated land, is outlined in Chapter 13 of PPW Minimising and Managing Environmental Risks and Pollution.

1.2.5 Whilst the environmental legislation is separate to PPW it generally incorporates consistent requirements.

Local Planning Policy

1.2.6 The Local Development Plan for Newport was adopted on 27th January 2015 (Newport City Council, 2015). It sets out a number of objectives to achieve the overall goals of the Plan. Objective 6 relates to Conservation of the Natural Environment while Objective 9 relates to Health and Well-being.

1.2.7 General Development Principle GP7 relates to Environmental Protection and Public Health and states that:

'Development will not be permitted which would cause or result in unacceptable harm to health because of land contamination, dust, instability or subsidence, air, heat, noise or light pollution, flooding, water pollution, or any other identified risk to environment, local amenity or public health and safety.'

1.2.8 The Monmouthshire Local Development Plan 2011-2021 was adopted in February 2014 (Monmouthshire County Council, 2014). It confirms that no sites have been identified as contaminated.

Relevant Key Guidance and Standards

1.2.9 This assessment is undertaken with due consideration of the following key guidance and standards:

- British Standards Institution (2010) BS5930: Code of Practice for Site Investigations including Amendment 2, issued August 2010.

- British Standards Institution (2013a) BS10175: Code of Practice for Investigation of Potentially Contaminated Sites.
- British Standards Institution (2013b) Eurocode 7 (BS EN 1997-1 & EN 1997-2 (British Standards Institution 2007)) and all relevant Normatives.
- British Standards Institution (2013c) BS8576: Guidance on investigations of ground gas. Permanent gases and Volatile Organic Compounds (VOCs).
- CIRIA (1996) Construction Industry Research and Information Association R132: A Guide for Safe Working on Contaminated Sites.
- CIRIA (2007) Assessing risks posed by hazardous ground gases to buildings (C665).
- CIRIA (2014) Asbestos in soil and Made Ground: a guide to understanding and managing risks (C733).
- CL:AIRE (2011) The Definition of Waste: Development Industry Code of Practice v2.
- Environment and Defra (2004) Model Procedures for the Management of Land Contamination (CLR11).
- Environment Agency (2013) Groundwater Protection: Principles and Practice (GP3).
- Highways Agency (1993) DMRB Volume 11, Section 3, Part 11 Geology and Soils.
- Highways Agency *et al.* (2008a) DMRB Volume 4, Section 1, Part 2, HD22/08 Managing Geotechnical Risk.
- Highways Agency *et al.* (2008b) DMRB Volume 11, Section 2, Part 5 HA 205/08 Assessment and Management of Environmental Effects
- Highways Agency (1995) DMRB Volume 4, Section 1, Part 7, HD73/95 Site Investigation for Highway Works on Contaminated Land.
- Interim Advice Note 125/09(W) (2010) Supplementary guidance for users of DMRB Volume 11 'Environmental Assessment.
- Welsh Local Government Association (WLGA) and Environment Agency (2012) Development of Land Affected by Contamination: A Guide for Developers.

1.3 Structure of Remainder of the Report

1.3.1 The remainder of this report is structured as follows:

- **Section 2: Data Sources** - This section describes the sources and types of data used to assess potential land contamination.
- **Section 3: Assessment Methodology** - This section describes the risk assessment approach taken and methodologies adopted to assess potential land contamination affecting the Scheme. It also sets out previously identified areas of potential land contamination as identified in the 2014 Preliminary Sources Study Report (2014 PSSR) and other potential areas of contamination that have been subsequently identified. It summarises the methods used for the Tier 1 risk assessment.
- **Section 4: Generic Risk Assessment Methodology** - This section describes the Tier 2 risk assessment methodologies adopted.

- **Section 5: Conclusions and Recommendations** - This section summarises the risks and need for remedial measures required, at each area of potential land contamination, to facilitate the construction of the Scheme.

2 Data Sources

2.1 Introduction

2.1.1 An overview of the general methodology and key information data sets used in preparing this report is provided within this section. The 2014 Preliminary Sources Study Report (2014 PSSR) (Ove Arup and Partners, 2014), a primarily desk based study, forms the majority of the work undertaken to date in relation to land contamination. This utilises information obtained from the following sources:

- Factual Report on Ground Investigation for the Welsh Government (Geotechnical Engineering, 2015);
- previous ground investigation data collected for the Scheme;
- the additional investigations local to the Scheme available in the archives of the British Geological Survey (BGS);
- previous geotechnical desk study and interpretative reports;
- reports on unexploded ordnance (UXO);
- GroundSure MapInsight report (including historic Ordnance Survey (OS) mapping of the docks area);
- published geological information including geological maps, memoirs and technical papers;
- other historic ground investigation data;
- information from Natural Resources Wales (NRW);
- walkover surveys; and
- local planning authority records.

2.2 Information Data Sets

2.2.1 The information contained within the 2014 PSSR has been validated and updated where appropriate. The assessment methodology and supplementary information used to validate the existing, and provide updated, information is discussed in the following sections.

Land Use

2.2.2 Consideration of land use establishes the former and current uses of the sites, which could have caused land contamination. Significant issues associated with current and past activities, neighbouring land uses and other key environmental issues have been identified and considered. Information was obtained from the following sources:

- high resolution 2013/2014 aerial imagery and LiDAR data;
- current and historical Ordnance Survey mapping along the route obtained from the Welsh Government;
- historical aerial photography along the route obtained from the Welsh Government;

- environmental information obtained from NRW including historical and authorised landfills, environmental pollution incidents ('major' and 'significant' only), industrial and waste sites, sites with current exemptions, licensed water abstractions and consented discharges to controlled waters presented in Annex A;
- local planning authority records (including contaminated land) presented in Annex B; and
- walkover surveys of selected sites along the Scheme.

Environmental Setting

2.2.3 It is important to establish the environmental setting because, irrespective of the level of contamination at a site, if its location is not 'sensitive' to this contamination, there is a reduced risk of an environmental impact to a receptor.

2.2.4 The geological sequence underlying the sites and the hydrogeological classification has been established. The vulnerability of groundwater has been determined from this mapping and geological information. The locations of surface watercourses were identified along with the groundwater regime. Information from the following sources was obtained:

- published BGS geological mapping;
- published BGS RIGS audit report;
- recent OS mapping;
- environmental information obtained from NRW including historic and authorised landfills, environmental pollution incidents ('major' and 'significant' only), industrial and waste sites, sites with current exemptions, licensed water abstractions and consented discharges to controlled waters;
- local planning authority records (including contaminated land);
- Newport City Council and Monmouthshire County Council websites;
- walkover surveys of selected sites along the Scheme;
- NRW aquifer classification database; and
- ground conditions based on information provided by intrusive ground investigations, where available (see below).

2.2.5 Details of sensitive ecosystems/habitats are set out in Chapter 10 of the Environmental Statement.

Ground Conditions

2.2.6 Ground conditions pertaining to the Scheme have been obtained from ground investigation reports. The key ground investigations reviewed and relied upon are set out below.

Ground Investigation (Norwest Holst Soil Engineering Ltd., 1998)

2.2.7 Details are provided in a factual report presenting the results of a detailed ground investigation carried out between Castleton and Magor along the 1995 alignment of

the then 'M4 Relief Road' by Norwest Holst between October and December 1997. The alignment is within an approximate 150 m buffer of the current alignment. The report includes logs from 87 cable percussion boreholes, of which 30 were extended by rotary coring techniques, 50 rotary cored boreholes, 15 rotary open hole boreholes (undertaken to facilitate groundwater monitoring installations), 11 machine dug trial pits and geophysical surveys in the vicinity of Castleton and Magor. The results from *in situ* and geotechnical and chemical laboratory testing are also included in the report.

Preliminary Chemical Investigation (Exploration Associates, 2000)

2.2.8 Details are provided in a factual report presenting the results of a preliminary chemical investigation carried out at ten separate sites along the then 'M4 Relief Road' alignment by Exploration Associates between January and February 2000. This alignment is within an approximate 170 m buffer of the current alignment (although there was no investigation around Castleton). The report includes the logs of 33 window sampler boreholes and 29 trial pits. The results from *in situ* and chemical laboratory testing are also included in the report.

Second Preliminary Ground and Chemical Investigation (Norwest Holst Soil Engineering, 2008)

2.2.9 Details are provided in a factual report including the results of the detailed ground investigation carried out between Magor and Castleton along the alignment of the 2006 'M4 South of Newport' and the current alignment. The investigation was undertaken between November 2007 and January 2008. The report includes logs from 53 cable percussion boreholes, 33 rotary cored boreholes, 51 window sampler probe holes, 10 cone penetration tests, 56 machine dug trial pits and 2 surface samples. The results from *in situ* and geotechnical and chemical laboratory testing are also included in the report.

2.2.10 In addition to the above investigations, data obtained from the supplementary phase of intrusive investigation for the Welsh Government was utilised.

Factual Report on Ground Investigation (Geotechnical Engineering, 2015)

2.2.11 Details are provided in the report for the supplementary phase of intrusive investigation undertaken for the Welsh Government in 2015, presenting the results of a detailed ground investigation carried out along the route for the new section of motorway. The investigation was undertaken between January and April 2015 and included 138 boreholes, 45 trial pits and associated *in situ* testing. The report includes the results of chemical and geotechnical laboratory testing of soils, rocks and water samples. A programme of gas and groundwater monitoring during February to May 2015 was also undertaken, with each borehole monitored on four occasions at approximately weekly intervals. For the purposes of this report, this investigation is referred to as the 2015 Supplementary Ground Investigation. It was designed to obtain further information on the ground conditions along the proposed new section of motorway to supplement the 2014 PSSR.

Other Ground Investigations

2.2.12 Other ground investigations undertaken at specific locations along the route alignment for the new section of motorway have been undertaken by third parties associated with ongoing environmental liability management and regulatory obligations (e.g. at Tata Steel and Docks Way Landfill) and other new

developments. Details of these other ground investigations are provided in the individual land contamination assessment reports contained within Annex D.

3 Assessment Methodology

3.1 Introduction

3.1.1 Based upon guidance within Contaminated Land Report 11 (CLR11) (Environment Agency and Defra, 2004), a risk assessment approach has been adopted to assess the risks associated with historical/current land contamination that may be present along the proposed route of the new section of motorway. The findings of the risk assessment have been used to enable management decisions to be taken on whether immediate action is needed or control measures implemented to mitigate potential risks to the environment and human health.

3.1.2 The tiers of the assessment are:

1. Preliminary Risk Assessment and Defining Outline Conceptual Site Model (CSM).
2. Generic Site Specific Risk Assessment (screening) and Subsequent Refinement of CSM.
3. Site Specific Detailed Risk Assessment.
4. Remediation Strategy Design.

3.1.3 The above tiered approach has been adopted for the areas of potential land contamination identified in the 2014 PSSR, which as the potential to affect or be affected by the new section of motorway, along with other areas of interest identified during this subsequent assessment. A total of 27 specific potentially contaminated sites have been considered along with other data, such as ground investigation reports and historic maps, along the proposed route of the new section of motorway.

3.1.4 The need for progression from tier to subsequent tier is driven by the findings of the previous tier with respect to the level and nature of risk identified and the type of likely remedial action or control measures needed to manage the risks identified. The Tier 2 (Generic Site Specific Risk Assessment) methodology is described in Section 4 of this report. This report does not include Tier 3 (Detailed Site Specific Risk Assessment) and Tier 4 (Remediation Strategy Design), however recommendations are made on whether further detailed risk assessment or remedial action is needed.

3.2 Preliminary Risk Assessment (Tier 1)

3.2.1 The Preliminary Risk Assessment consists of an appraisal of the source-pathway-receptor 'contamination linkages' which is central to the approach used to determine the existence of 'contaminated land' according to the definition set out under Part IIA of the Environmental Protection Act 1990. For a risk to exist (under Part IIA), all three of the following components must be present to facilitate a potential 'contamination linkage'.

- Source of contamination (Hazard).
- Pathway for the contaminant to move from the source(s) to receptor(s).
- Receptor (Target) that could be affected by the contaminant(s).

3.2.2 The mere presence of a contaminant source/hazard at a site does not mean that there will necessarily be attendant risks or that the site will be designated as 'contaminated land'.

3.3 Identification of Potential Contamination Sources

3.3.1 The 2014 PSSR identified potential sources of contamination based on information including the site's historical land use, the Newport City Council GIS database, pollution incidents/discharge consents, presence of waste management facilities and, where available, chemical testing undertaken as part of previous ground investigations and ground gas monitoring data.

3.3.2 The 2014 PSSR identified 43 areas of potential land contamination located within 150 m of the six different route alignments identified at that time. These are listed in Table 3.1. Based upon the route of the new section of motorway, 16 of the source areas would not be impacted as the route does not pass within 10 m of the potential contamination source area. Given the nature of the areas identified within the PSSR they have been screened out from further assessment. The remaining 27 sites were considered necessary for further detailed assessment including incorporation of the supplementary data on land contamination arising since the 2014 PSSR was issued (see section 3.4). All sites of potential land contamination are shown in Figure 1. The site screening outcome is provided in Table 3.1:

Table 3.1: Scoped Out Areas of Potential Land Contamination Identified within the PSSR (2014)

CL Site	PSSR Description	Site Scoped Out of Further Assessment	Comment
CL-1 Castleton Interchange Spoil Heaps	Anecdotal evidence suggests that the spoil heaps were formed from the excavation of surplus suitable fill and unsuitable marshy material and topsoil during A48 (M) construction, during the late 1970s.	No	-
CL-2 Former Construction Storage Compound	Use as storage compound for machinery and materials used for M4/A48 (M) and later M4 construction and maintenance work.	No	-
CL-3 Pound Hill	A backfilled pit.	No	-
CL-4 Cefn Llogell Farm	A historical landfill which reportedly accepted inert waste.	No	-
CL-5 Church Road	An area of infilling and historical fly-tipping.	No	-
CL-6 Radiator Manufacturers and Adjacent Land	Large areas of disturbed ground and ponded areas.	No	-

CL Site	PSSR Description	Site Scoped Out of Further Assessment	Comment
CL-7 Electricity Sub-station	Electricity sub-station assumed to be free from PCBs.	Yes	Off route alignment. Any potential spills on hard standing – run-off to surface water drainage/ditches. Use of PCBs unlikely given recent construction. Significant thickness of low permeability alluvium between hard standing and underlying deposits.
CL-8 Former Railway Bridge	Made Ground and former railway bridge and embankments approach.	No	-
CL-9 Green Lane Landfill	Licensed inert landfill with prior use for refuse tipping.	No	-
CL-10 Made Ground	Area of Made Ground.	No	Stockpiles to the north are scoped out.
CL-11 Pencarn Lane Fly-tipping	Fly-tipping in 2003 classified as a significant pollution incident with respect to impact on land.	Yes	Off route alignment. (Presence of asbestos containing materials not substantiated from walkover survey).
CL-12 West Ebbw Bank Landfill	Area of landfilling identified from aerial photographs.	Yes	Off route alignment. Groundwater quality assessed as part of CL-13.
CL-13 Docks Way Landfill	Area 1 – historical landfill (now restored) accepting inert, household, commercial and industrial waste. Area 2 – active landfill receiving domestic refuse and industrial / commercial waste.	No	-
CL-14 Newport Docks	Industrialised area with many industrial and commercial uses. Also includes infilled historical River Ebbw channel.	No	-
CL-15 Stephenson Street Industrial Estate	Industrial area and docks.	No	-
CL-16 Infilled River Ebbw	Infilled River Ebbw. Included within CL-14.	No	-
CL-17 Solutia Chemical Works	Chemical works.	No	-
CL-18 River Usk Pier Location	Mudflats of the River Usk.	No	-
CL-19 Reevesland Industrial Estate	Area subject to various industrial usages.	Yes	Off route alignment. Groundwater quality assessed as part of other CL sites down gradient of CL-19.
CL-20 Mir Steel Works and Waste Disposal Site	Steel Works site. Included within CL-15.	No	-
CL-21 Nash Mead Unauthorised Waste Management Activity	Part of Lee Way Industrial Estate with several recorded pollution incidents.	Yes	Off route alignment. No significant works in vicinity of CL-21 likely to be impacted by the site.

CL Site	PSSR Description	Site Scoped Out of Further Assessment	Comment
CL-22 Former Llanwern Research Laboratories	Former research laboratories.	No	-
CL-23 Pye Corner Military Base and Gun Battery	Former military base and gun battery.	Yes	-
CL-24 Area of fill west of electricity sub-station	Indicated to comprise small local area of fill.	Yes	Off route alignment. No significant works in vicinity of CL-24 likely to be impacted by the site.
CL-25 Whitson Electricity Sub-station	Electricity sub-station.	Yes	Off route alignment. No significant works in vicinity of CL-25 likely to be impacted by the site.
CL-26 Llanwern Steelworks including Lagoons	Steelworks.	No	-
CL-27 Elver Pill Reen and Green Moor Landfill	Historical landfill, known infilling in the vicinity of Elver Pill Reen, 3 locations of buried steel works waste.	No	-
CL-28 Llandevenny Fields	Area of fill.	Yes	Off route alignment. Very low risk associated with inhalation of soil derived dust generated by by the site on construction workers.
CL-29 Spoil Heaps and Old Quarry, Llanwern Approach Road	Spoil mounds.	No	-
CL-30 Green Moor Quarry Landfill	Historical backfilling of quarry indicated as a refuse tip.	No	-
CL-31 Green Moor Field	Identified as an area of infilling.	Yes	Off route alignment. Low risk to construction workers from potentially impacted surface waters.
CL-32 Magor Depot (Wilcrick Depot)	Trunk Road Agency depot.	No	-
CL-33 B4245 Quarry	Partially backfilled quarry.	No	-
CL-34 Queens Gardens Old Quarry Landfill	Backfilled quarry.	Yes	Off route alignment. No significant works in vicinity of CL-34 likely to be impacted by the site.
CL-35 Magor Services	Service station including petrol filling station, car/HGV parking.	No	-
CL-36 Dinch Hill Quarry Landfill	Former backfilled quarry.	Yes	Off route alignment. No significant works in vicinity of CL-36 likely to be impacted by the site.
CL-37 Dancing Hill Landfill	Area of a backfilled pit.	Yes	Off route alignment. No significant works in vicinity of CL-37 likely to be impacted by the site.
CL-38 Knollbury Cesspits	Three cess pits.	No	-

CL Site	PSSR Description	Site Scoped Out of Further Assessment	Comment
CL-39 The Elms Road Old Quarry and Lime Kiln	Partially backfilled quarry.	No	-
CL-40 Rockfield Road Old Quarry and old lime kiln	Former quarry and limekiln.	Yes	Off route alignment. No significant works in vicinity of CL-40 likely to be impacted by the site.
CL-41 Severn Junction Tunnel Yard	Former railway land.	No	-
CL-42 Tesco Distribution Depot	Two distribution depots.	Yes	Off route alignment. Low risk to construction workers from surface waters. Potential drainage to impact surface waters.
CL-43 Dinch Hill Quarry	An area of a former quarry.	Yes	Off route alignment. No significant works in vicinity of CL-43 likely to be impacted by the site.

3.3.3 A detailed Land Contamination Assessment Report has been prepared for those sites identified in the above table as requiring further assessment. Each report is provided within Annex D. Key additional data sources are identified below.

Historical Mapping and Aerial Photography

3.3.4 Additional mapping records have been reviewed. Whilst this has not lead to major alterations to the previous assessments the extent of the quarry/associated activities (CL-30) is greater than that defined within the 2014 PSSR and it now encroaches within the alignment of the new section of motorway. It has therefore not been screened out for assessment (Table 3.1).

Environmental Incidents

3.3.5 A number of environmental incidents have been identified from a search conducted by NRW. One incident was classed as category 1 (major) in relation to impact on the water environment. This incident relates to an unidentified pollutant entering Cold Harbour Pill (August 2013) through natural processes.

3.3.6 The incident is down gradient and remote from the Scheme and is therefore not considered further.

Historical and Permitted Landfills

3.3.7 No further landfills have been identified as being potentially affected by the Scheme.

Permitted Industrial and Waste Management Sites

3.3.8 Sites that hold an Environmental Permit are shown on Figure 2 and those sites which the new motorway passes through are summarised in Table 3.2 . Each of the permitted sites is discussed in detail within the individual contamination assessment reports contained within Annex D.

Table 3.2: Permitted Sites

Permit Ref	Regulated Facility	Permit Reference	Status
EP1	Newport Docks Way (Area 2) Landfill	EPR/DP3733BK	Active Permissions
EP4	Newport Chemical Works	EPR/BR9715IB	Active Permissions
EP5	Llanwern South Side of Queensway Landfill	EPR/HP3899FC	Working towards a state of closure
EP6	South Side Queensway Non-Hazardous Landfill	EPR/GP3331SV	Active Permissions
EP7	Tata Stell Strip Products UK (Llanwern Steelworks)	EPR/BS3905IP	Active Permissions
EP9	Newport Docks Way (Area 1)	EPR/HP3899FC/V003	State of Closure
EP10	A1 Skip Hire	EPR/FP3295FN	Active Permissions

Part IIA Newport City Council Contaminated Land Register

3.3.9 There are no Part IIA sites appearing on the contaminated land register which would affect the Scheme.

Unexploded Ordnance Survey (UXO)

3.3.10 Parts of the route alignment are considered to be in areas that were subjected to significant historical bombing, in particular Newport Docks. A desktop study undertaken by Bactec Limited as part of the 2015 Supplementary Ground Investigation for Welsh Government. This concluded that the route contained areas of low, low-medium, medium and medium-high risk from unexploded ordnance requiring UXO mitigation and control measures to be used in medium and medium-high risk areas during the ground investigation

3.3.11 Down-hole magnetometry was undertaken at 50 (out of 138) borehole locations and a UXO watching brief was provided for 21 trial pit locations along the route alignment. No anomalies were encountered. However metal fragments were noted during the advancement of BH420 (located within Newport Docks) within the Tidal Flat Deposits at between 6 and 7.4 mbGL.

3.3.12 These two sites are located within existing areas of potential land contamination and are therefore discussed within the relevant Annex D reports.

3.4 Identification of Potential Receptors

3.4.1 Receptors include humans, other living organisms, crops and controlled waters. For each of the potential contamination source areas identified along the alignment of the Scheme, a number of key receptors have been considered which include:

- General public users on land adjacent to the Scheme during construction.
- Construction workers, including site visitors.
- Controlled waters.

- Aquatic ecology.
- Future general public (motorway users).
- Future maintenance workers.
- Buildings/structures (risk of ingress of hazardous ground gases).

3.4.2 The following potential controlled water receptors are taken into account:

- Rivers and streams (including River Usk and River Ebbw).
- Land drainage, including reens and ditches, particularly if part of the Gwent Levels Sites of Special Scientific Interest (SSSIs).
- Aquifers designated by NRW (Environment Agency website and NRW e-mail correspondence, 2015 – Annex A) (including Secondary and Principal Aquifers).

3.4.3 In the context of the assessment, the existing and proposed highway drainage have not been considered as receptors.

3.5 Identification of Potential Pathways

3.5.1 There are a number of primary pathways through which contaminants could impact receptors and these include:

- Ingestion, dermal contact and inhalation of soils and dusts, and inhalation of vapours (construction workers, future motorway users and maintenance workers). It is expected that any contaminated soils within the majority of the study area would be encapsulated by either the motorway embankment or structures, thus severely limiting potential exposure to contamination by humans. However, in areas of cut or where soils are reused to construct the embankment and in any landscaping areas there is potential for future motorway users and maintenance workers to be exposed to shallow soils.
- Ingestion, dermal contact and inhalation of dusts (adjacent site users). During construction in the absence of control measures, dusts and soils may migrate offsite and impact nearby members of the public.
- Ingestion and dermal contact with potentially contaminated surface waters and groundwaters (construction workers and maintenance workers).
- Inhalation and accumulation of hazardous ground gases (humans and structures). Ground gases, such as methane or carbon dioxide, may migrate into confined places such as manholes or beneath/into buildings during the operational phase of the Scheme. Piled foundations may create preferential flow paths for ground gas.
- Lateral and vertical migration of contaminants (controlled waters). Contaminants within soils and groundwaters may migrate vertically or laterally through the underlying strata. The design of foundations and construction methods may also create preferential flow paths for vertical migration to underlying aquifers and potentially surface waters (e.g. piled foundations).

3.5.2 The above pathways and other potential pathways specific to a potential contamination source area have been considered in this assessment.

3.6 Risk Evaluation

3.6.1 For each of the 27 areas of potential land contamination, the sources, pathways and receptors and risk evaluation set out in the 2014 PSSR have been reviewed using new data arising since the 2014 PSSR and the Scheme design.

3.6.2 For each of the contamination areas and potential contaminants, source-pathway-receptor linkages are considered, with the likelihood, severity and risk level assigned in accordance with the definitions in Table 3.3 and Table 3.4. The assessment of probability, a modified risk table and certain consequence (severity) definitions are based on CIRIA C552 (CIRIA, 2001) and others informed by CLR11.

Table 3.3: Consequence, Probability and Risk

Probability	Consequence	Risk
Likely – there is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.	**High** – Severe or irreversible effect on human health. Temporary severe or irreversible effect on ground/surface water quality. Reduction of water quality rendering groundwater or surface water unfit to drink and/or substantial adverse impact on groundwater dependant environmental receptors.	**High** – there is a high potential that the source-pathway-receptor scenarios assigned this designation may give rise to harm to human health or the environment and remedial action is likely to be required.
Low – there is a pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.	**Moderate** – Long term or short term moderate effect on human health. Moderate effect on ground/surface water quality, reversible with time. Reduced reliability of a supply at a groundwater or surface water abstraction source.	**Moderate** – it is possible, but not certain, that the source-pathway-receptor scenarios assigned this designation may give rise to an impact on human health or the environment, which may require remediation and/or control measures to mitigate risks.
Unlikely – there is pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.	**Low** – Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.) Slight effect on ground/surface water quality, reversible with time. Marginal reduced reliability of a supply at a groundwater or surface water abstraction source.	**Low** – it is possible that the source-pathway-receptor scenarios assigned this designation may give rise to an impact on human health or the environment, however it is considered unlikely that remediation and/or control measures would be required.
		Very Low – it is considered unlikely that the source-pathway-receptor scenarios assigned this risk designation will give rise to an impact on human health or the environment.

3.6.3 A comparison of consequence against probability is provided in Table 3.4:

Table 3.4: Estimation of Level of Risk by Comparison of Consequence and Probability

		Consequence		
		High	**Moderate**	**Low**
Probability	**Likely**	High risk	Moderate risk	Low risk
	Low likelihood	Moderate risk	Moderate to low risk	Very low risk
	Unlikely	Moderate to low risk	Low risk	Very low risk

3.6.4 These risk designations are used following completion of the Tier 2 risk assessment to refine the conceptual site model and are used as a basis to determine whether mitigation is needed for each of the contaminant source- pathway-receptor linkages identified.

4 Generic Risk Assessment (Tier 2) Methodology

4.1 Introduction

4.1.1 The purpose of the Tier 2 generic risk assessment is to further evaluate potential risks identified in the Tier 1 preliminary risk assessment.

4.2 Generic Quantitative Risk Assessment (GQRA) - Screening Criteria (Human Health)

4.2.1 The GQRA aims to identify contaminants of concern and their spatial distribution and requires benchmarks against which to compare the concentrations of measured soil contaminants. This requires the comparison of contaminant concentrations in soil samples with Generic Assessment Criteria (GAC).

4.2.2 Soil Guideline Values (SGVs) published by the Environment Agency (EA) were produced for benzene, toluene, xylene, ethylbenzene, mercury, selenium, arsenic, nickel, cadmium, phenols and dioxins, furans and dioxin-like polychlorinated biphenyls (PCBs). GAC for a range of other contaminants have been produced by LQM/CIEH using the Contaminated Land Exposure Assessment (CLEA) framework (LQM/CIEH, 2015). The SGVs and GAC have been produced for three standard land use scenarios allotments, residential and commercial uses.

4.2.3 Since completion of the 2014 PSSR, LQM/CIEH have issued replacement GAC for 82 substances in addition to deriving values for those contaminants for which SGVs were derived. These are termed Suitable 4 Use Levels (S4ULs) and have been produced using the most recent version of the CLEA model (v1.06) and in accordance with EA documentation (Environment Agency 2009a, b). The S4ULs have been produced for two additional land use scenarios namely public open space (POS) residential and POS park.

4.2.4 S4ULs have been used in the screening assessment where these are available given that they include land use scenarios which more closely reflect that of the Scheme. These criteria also utilise health criteria that represent minimal or tolerable levels of risk to health (Environment Agency 2009a).

4.2.5 Additionally S4ULs have been subject to more recent toxicological data review and updates in exposure parameters than the aforementioned SGVs. Nevertheless for dioxins, furans and dioxin-like Polychlorinated biphenyls (PCBs) where no S4UL exists the SGV is used.

4.2.6 Specifically for lead, taking consideration of the withdrawn status of the SGV for this contaminant and no published S4UL, consideration has been given to the use of the Category 4 Screening Levels (C4SLs) that have been published by CL:AIRE (CL:AIRE, 2013). The C4SLs are considered to represent the concentration at which a contaminant does not pose a Significant Possibility of Significant Harm (SPOSH) to human health (i.e. requiring no further assessment under Part IIA). These screening levels utilise health criteria that represent a Low Level of Toxicological Concern. Whilst the C4SLs are higher than the previously adopted GAC / SGV for all other contaminants, this is not the case for lead where the C4SL is substantially lower. On this basis, the C4SL for lead has been adopted for this assessment.

4.2.7 Where the concentrations of contaminants are less than the S4ULs, the risks to human health are considered to be at minimal or tolerable risk levels and thus remediation is not required. Where concentrations are above S4ULs this indicates that a risk to human health may exist warranting further assessment and potentially remediation.

4.2.8 For the end users of the Scheme (general public and maintenance workers) the chemical test results for soil samples, where available, have been screened against the lower of the S4UL POS park land use scenario and commercial land use scenarios. It is considered that the combination of the two will provide suitably stringent criteria for the Scheme and represent a conservative approach. For organic contaminants, those values corresponding to a Soil Organic Matter (SOM) of 1 % are used, adding to the conservative approach to the assessment. The screening criteria (GAC) that were used in the assessment are presented in Table C1 of Annex C.

4.2.9 One exception to the above selection of land use scenarios relates to the proposed Glan Llyn replacement highways depot to be located within the existing Llanwern Steelworks site. For this end use the relevant S4UL criteria for a commercial land use scenario will be used.

4.2.10 Due to small soil data population sizes, often sourced from numerous, disparate phases of site investigation, statistical treatment of the soil data is considered unjustified. Therefore, screening of soil data against soil criteria has been undertaken in the main utilising the maximum recorded concentrations rather than utilising the 95th percentile of the mean measured concentrations (95UCL). It is recognised that such an approach may provide an underestimation for small data populations as the 95UCL may exceed the maximum recorded concentration. However, the effect of this on individual site assessments is not likely to be significant for the purposes of risk screening.

4.2.11 Notwithstanding this, where considered appropriate, the 95th percentile of the mean measured soil concentrations has been derived. This has been undertaken for total chromium concentrations encountered outside areas of identified potential land contamination, further discussed below.

Chromium in Soils

4.2.12 Soil analysis for chromium in the large majority of cases has been scheduled for total chromium. Only 12 out of more than 600 samples historically within the alignment of the new section of motorway have been scheduled for hexavalent chromium (Cr(VI)). As soil screening for the protection for human health is prescribed for Cr(VI) rather than total chromium, it is not possible to screen soil samples for this heavy metal. However, to provide assurances that elevated chromium likely to cause a risk to human health is not present within the footprint of the new section of motorway, analytical data for total chromium in soil samples has been compared to the published results of background metal concentrations published in the FOREGS Geochemical Atlas of Europe (Salminen *et al.,* 2005). Weighted median background concentrations of total chromium in south Wales for topsoil and subsoil have been calculated to be in the ranges 76-88 mg/kg and 82-95 mg/kg respectively. Reported concentrations have been compared with these background levels and this is discussed further in section 5.2.

4.3 Generic Quantitative Risk Assessment (GQRA) - Screening Criteria (Ground Gas)

4.3.1 The emission of soil gases may occur either from Made Ground, buried waste and soils and rocks or from other organic contamination.

4.3.2 Using guidance provided in CIRIA C665 'Assessing risk posed by hazardous ground gases to buildings' (CIRIA, 2007) and reference to the Workplace Exposure Limits (WELs) (HSE, 2011), ground gas monitoring results from ground investigations have been compared with screening threshold values as follows:

- methane >1 volume/volume percent (%v/v);
- carbon dioxide >5 % v/v;
- carbon monoxide >30 parts per million (ppm); and
- hydrogen sulphide >5 ppm.

4.3.3 Where gas concentrations exceeded the above criteria further detailed risk assessment has been undertaken based upon CIRIA C665 (CIRIA, 2007). It is of note that this guidance is used to inform the gas risk assessment for buildings only rather than for new highways. Therefore, the above values have been used as a conservative screening assessment given that for the majority of the Scheme, buildings are not being constructed.

4.3.4 The classification of a site's gas regime is governed by the concentration of the soil gas and flow rate. This is reflected by the limiting volume flow rate of the gas, which is calculated as the concentration of gas (expressed as a volumetric fraction) multiplied by the borehole flow rate. The limiting borehole gas volume flow is referred to as the gas screening value (GSV) in CIRIA C665. Stabilised concentrations are more representative of persistent site conditions however peak concentrations are also considered. This GSV is applied to the six characteristic situations and the threshold criteria for which are listed in Table 4.1.

Table 4.1: Modified Wilson and Card Classification

Characteristic Situation (CIRIA C149)	Comparable Partners in Technology Gas Regime	Risk Classification	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]	Additional Limiting Factors	Typical Source of Gas Generation
1	A	Very low risk	<0.07	Methane <1 % and Carbon Dioxide <5 % Otherwise consider increase to Situation 2.	Natural soils with low organic content
2	B	Low risk	<0.7	Borehole air flow rate >70 l/hr increase to Characteristic Situation 3	Natural soil, high peat/organic content

Characteristic Situation (CIRIA C149)	Comparable Partners in Technology Gas Regime	Risk Classification	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]	Additional Limiting Factors	Typical Source of Gas Generation
3	C	Moderate risk	<3.5	-	Old landfill, inert waste, mine working flooded
4	D	Moderate to high risk	<15	Quantitative risk assessment required to evaluate scope of protection measures	Mine working susceptible to flooding, completed landfill (WMP 26B criteria)
5	E	High risk	<70	-	Mineworking unflooded inactive with shallow workings near surface
6	F	Very high risk	>70	-	Recent landfill site

[1] Gas Screening Value = (Litres of gas/hour) is calculated by multiplying the maximum gas concentration (%) by the maximum measured borehole flow rate (l/hr)

4.3.5 The above classifications have been used as an initial screen to allow an assessment of the following gas risks:

- Gas ingress or accumulation in new buildings to be constructed as part of the Scheme.
- Gas ingress or accumulation into buildings adjacent to the Scheme.
- Gas explosion or asphyxiation or toxic risks to construction workers and the general public during construction.

4.4 Generic Quantitative Risk Assessment (GQRA) - Screening Criteria (Groundwater)

Water Quality Assessment Criteria

4.4.1 Preliminary evaluation of potential impacts to surface water and groundwater quality data typically involves a screening assessment that compares observed water quality data with appropriate water quality Assessment Criteria (AC). The selection of AC depends on the conceptual model developed for the site and in particular the nature and sensitivity of controlled water receptors for which active contamination linkages are considered likely to exist. Two sources of statutory and non-statutory water quality AC are typically used for the purpose of such screening assessments.

- Environmental Quality Standards (EQS) defined for the protection of the ecology of surface water environments.
- Drinking Water Standards (DWS) defined on the basis of health for water intended for human consumption.

4.4.2 A summary of all water quality AC used in this assessment is provided in Table C2 of Annex C.

Environmental Quality Standards (EQS)

4.4.3 Statutory EQS have been defined for Priority Substances under the Water Framework Directive (Directive 2000/60/EC) through Annex II of Directive 2013/39/EU. These EQS are summarised in H1 Annex D1: Assessment of hazardous pollutants within surface water discharges (EA, 2014b) and presented in Table C2 of Annex C. Directive 2013/39/EC updates Directive 2008/105/EC (the Environmental Quality Standards Directive) and although many of the new EQS in the former do not come into force until 22 December 2015 they have been used as AC for this assessment.

4.4.4 In addition to Priority Substances, the statutory limits for defining 'high' or 'good' chemical status of surface waters (rivers) under the Water Framework Directive (WFD) have also been used as water quality AC in this assessment. These standards relate to '*general physico-chemical'* parameters that include Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), ammonia and phosphorous and a variety of specific pollutants defined for the WFD. These standards are described in Part 3 and Part 4 of The River Basin Districts Typology, Standards and Groundwater threshold values (Water Framework Directive) (England and Wales) Directions 2010; H1 Annex D1: Assessment of hazardous pollutants within surface water discharges (EA, 2014b); and are included in Table C2 of Annex C.

4.4.5 The UK Technical Advisory Group (UKTAG) on the WFD has undertaken an extensive review of water quality standards derived for specific pollutants under the WFD, most notably in their reports dated 2008 and 2012 (WFD UKTAG, 2008 and WFD UKTAG, 2012a). The result of the review undertaken by WFD UKTAG was reported by Defra (2014) to inform interested parties of the details of new and updated environmental standards to be used in the second cycle of Water Framework Directive (2000/60/EC) river basin management planning process in England and Wales. The report summarises the review of standards for a total of 30 specific pollutants and recommends:

- the adoption of new Predicted No Effect Concentrations (PNEC) as EQS for 26 specific pollutants; and
- the retention of existing standards for the remaining four pollutants.

4.4.6 As such, new PNECs currently remain non-statutory. However, where relevant, the new PNECs have been used as AC in this assessment and are included in Table C2 of Annex C.

4.4.7 Other EQS have historically been defined for other 'List II Substances' under Directive 76/464/EEC (i.e. the 'Dangerous Substances Directive') and have both statutory and non-statutory status. Where these EQS have not been classified under the WFD by other legislation (as outlined above) they have been used as AC in this assessment. These standards are summarised in H1 Annex D1: Assessment of hazardous pollutants within surface water discharges (EA, 2014b), where they are commonly termed 'operational EQS' (EA, 2014b), and are also presented on the EA chemical standards database. This includes 12 of the substances for which limits were prescribed in the Surface Waters (Dangerous Substances) (Classification) Regulations 1998 that were reviewed by the UKTAG and were not carried forward as specific pollutants under the WFD (WFD UKTAG, 2012b). These operational EQS are included in Table C2 of Annex C.

4.4.8 Finally, the former Countryside Council for Wales (CCW now part of NRW) developed water quality trigger levels for use in the Gwent Levels SSSIs, to determine when further investigations and/or remedial works are required on the basis of impact on surface water quality within the reen system. Although these trigger levels have no statutory status they have underpinned the management of water quality within the Gwent Levels since the 1990s. The use of the CCW Trigger Levels as the compliance targets within the Gwent Levels has been agreed with NRW given the natural characteristics of the water system within the reen network (RPS, 2015).

Drinking Water Standards (DWS)

4.4.9 The UK Drinking Water Standards (DWS) used as AC in this assessment are those defined in the Water Supply (Water Quality) Regulations 2000 (as amended). These DWS are of particular relevance where potable water supplies are identified as a viable receptor. However it is notable that the groundwater areas of the new section of motorway is naturally saline and is thus unsuitable as a potable water supply.

5 Risk Assessment Findings

5.1 Introduction

5.1.1 The following sections outline the findings of Human Health, Controlled Water and Ground Gas Risk screening assessments of the data available for areas lying outside of the identified sites of potential land contamination.

5.1.2 Detailed risk assessments of the 27 potentially contaminated sites identified in the 2014 PSSR following the assessment of additional data along the route of the new section of motorway are provided as individual Land Contamination Reports presented in Annex D1 to D26.

5.2 Human Health Risk Assessment

5.2.1 The findings of a screening assessment of data for sites lying outside identified potential known sources of land contamination indicate results below the relevant screening criteria with the exception of chromium and pH as summarised in Annex D23. These two contaminants are considered in detail in the following sections.

Chromium

5.2.2 The chromium data set has been split into Made Ground and natural ground for the performance of basic statistical assessment as it is assumed the two datasets would represent different populations. The results of this assessment are summarised within Tables 5.1 and 5.2. As previously discussed in section 4.2.12 total chromium concentrations are compared with chromium VI screening criterion in the absence of speciated analytical data.

Table 5.1: Basic Statistical Data – Chromium (Made Ground)

Determinant	Units	Screening Criterion	Range / (No. of Samples)	95 UCL	No. of Outliers	Location of Outlier - Depth mBGL) and Concentration	Recalculated 95UCL
Chromium	mg/kg	33	3.8 – 720 (40)	115	3	BH304 – 0.4 (720) BH411 – 0.5 (120) BH411 – 1.0 (77)	33

5.2.3 The outlier locations are situated alongside the existing M4 at Castleton (BH304) and the banks of the River Ebbw (BH411).

Table 5.2: Basic Statistical Data – Chromium (Natural Ground)

Determinant	Units	Screening Criterion	Range / (No. of Samples)	95UCL	No. of Outliers	Location of Outlier - Depth mBGL) and Concentration	Recalculated 95UCL
Chromium	mg/kg	33	12 – 110 (94)	46	2	TP503 – 1.0 (110) BH405 – 0.3 (93)	40

5.2.4 The outlier locations are situated in the west of the alignment (BH405) and south of Llanwern Steelworks (TP503).

5.2.5 The recalculated 95UCLs for Made Ground and natural ground are at similar concentrations (at or very close to the screening criterion) indicating the likelihood that the concentrations are naturally occurring.

5.2.6 Only 12 soil samples from two potential land contamination sites, CL-26 (Llanwern Steelworks, Lagoon 12) and CL-15 (Stephenson Street Industrial Estate), have further speciated chromium laboratory data. The total chromium concentrations from this data set indicate ranges that fall within the background ranges for this heavy metal (see Section 4.2.12). A maximum concentration of Cr(VI) of 1.9 mg/kg was identified. This strongly indicates that these soils are not likely to be enriched with respect to human health risk and furthermore the likelihood of elevated Cr(VI) is very low. It is therefore concluded that total chromium concentrations in natural soils are not of concern for the areas outside those identified as potentially contaminated.

5.2.7 Outlier concentrations have been identified within BH304, BH405 and TP503. The soils at locations BH405 and TP503 will be encapsulated by the proposed alignment locations and therefore, will not pose unacceptable risk to human health. The soils at location BH304 lie adjacent to the existing M4 and will therefore require assurance that the material is suitable for use.

5.2.8 Given that BH411 is located within the tidal mudflats of the River Ebbw and the soils will be encapsulated by the proposed alignment, it is not considered that this will pose unacceptable risk to human health. Health and safety procedures will be required to be implemented during construction to protect construction workers from exposure to contaminated soils and dusts in this area.

pH

5.2.9 Alkaline soil conditions have been identified in half of the samples analysed, mainly within the Made Ground. The pH range within Made Ground samples was 6.6 – 12 and within natural soil samples 5.7 – 10.3.

5.2.10 These elevated values are identified particularly in the eastern and western parts of the new section of motorway mainly associated with the existing M4 junctions at Castleton and Magor.

5.2.11 It is considered that during the operational phase any associated risks to human health will be minimal and risks to construction workers would be suitably mitigated through the implementation of standard health and safety procedures.

Other Contaminants

5.2.12 A single exceedance of arsenic was identified within soils encountered within BH304 at 200 mg/kg (screening criterion 170 mg/kg). This is the same soil sample in which the maximum concentration of chromium was identified (720 mg/kg) indicating a potential hotspot of heavy metal contamination.

5.2.13 The soils at location BH304 if to remain uncovered may require removal to mitigate any unacceptable risk to human health. This will be addressed within the remediation strategy (Outline Remediation Strategy provided within Appendix 11.2).

5.2.14 The overall risk level to human health from soils in areas outside the identified areas of potential land contamination areas is concluded to be low.

5.3 Ground Gas Risk Assessment

5.3.1 Ground gas data was obtained from borehole monitoring wells installed during the 2015 supplementary ground investigation.

5.3.2 As part of this investigation between three and four monitoring rounds were typically undertaken at each monitoring well during the period February to May 2015.

5.3.3 Generally the response zones in the monitoring wells have targeted the natural soils. Where Made Ground was encountered it was typically not of significant thickness with no visual/olfactory evidence of contamination identified. Therefore, although limited data is available the Made Ground is not considered a significant source of ground gas.

5.3.4 The full gas data set (including data associated with identified areas of potential land contamination) has been assessed separately for the geological units outside of potential sites of land contamination.

5.3.5 Those boreholes with recorded ground gas concentrations above the screening criteria defined within Section 4.3 are discussed below. Calculated Gas Screening Values (GSVs) are based on peak conditions (concentration and flow) for an individual monitoring round. All other GSVs indicate characteristic situation 1 based on CIRIA C665.

5.3.6 Generally zero or low levels of VOCs were recorded up to a maximum of 14.6 ppm within BH412. No indication of any significant source has been identified and the levels are generally considered to be naturally occurring. As such VOCs have not been considered further.

5.3.7 It is considered that for boreholes in which depleted oxygen levels (<18 %) are recorded, with no other gases showing elevated concentrations, that these may be associated with natural biological activity given the absence of any identified gas sources.

Made Ground

5.3.8 Well installations within eight boreholes have been installed within the Made Ground. Elevated gas concentrations were recorded within four wells. This data is summarised within Table 5.3. Those concentrations which exceed the screening threshold criteria are highlighted in red.

Table 5.3: Gas Monitoring Data – Made Ground

BH No.	No. of Monitoring Rounds	Peak and (Stabilised) CH4 (%)	Peak and (Stabilised) CO2 (%)	Minimum and (Stabilised) O2 (%)	Peak and (Stabilised) H2S (ppm)	Peak and (Stabilised) CO (ppm)	Peak Gas Flow (l/hr)	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]
BH413	4	**48.1 (48.1)**	**5.4 (5.4)**	0.1 (0.1)	0 (0)	27 (16)	1.6	0.656
BH426	1	**74.1 (74.1)**	0.3 (0.3)	0.2 (0.2)	0 (0)	0 (0)	0	0
BH515	4	**3.9 (2.3)**	0.1 (0.0)	0.0 (0.0)	**200 (200)**	**935 (935)**	0	0
BH525	4	**9.9 (4.6)**	0.0 (0.0)	0.0 (5.6)	0 (0)	4 (3)	1.2	0.0444

5.3.9 BH413 is located south of Docks Way Landfill (CL-13). Consistently elevated CH_4 and slightly elevated CO_2 are recorded within this borehole well with no reduction in concentration reported over the monitoring period. This, along with the lack of

visual/olfactory evidence of contamination within the Made Ground, may indicate gas is originating from off-site migration from the landfill.

5.3.10 Frequent organic material is noted within the Made Ground encountered at BH426 located within CL-15 (Stephenson Street Industrial Estate) which could be the origin of the elevated CH_4 levels. However given the limited data set available for this borehole (due to high water levels) the source of the elevated CH_4 concentrations is inconclusive.

5.3.11 BH515 and BH525 are located within Llanwern Steelworks (CL-26). Slightly elevated CH_4 concentrations recorded within these boreholes of up to 9.9 % are shown to reduce with time. Consistently elevated H_2S and CO concentrations in BH515 show no reduction with time potentially indicating a more significant gas source for these gases. The source of the H_2S and CO is uncertain however it appears to be associated with the slag/sludge which is likely to contain high concentrations of lime and sulphur.

5.3.12 Typically all calculated GSVs for the Made Ground indicate a very low generation gas source equivalent to characteristic situation 1 (very low risk) albeit potentially increased to characteristic situation 2 where elevated CH_4/CO_2 concentrations are identified within Table 5-3. The exception is BH413 located south of Docks Way Landfill where the GSV indicates characteristic situation 2 (low risk).

5.3.13 In terms of elevated H_2S and CO further monitoring is required to design robust controls to ensure construction workers are not exposed and H_2S and CO during construction is not an unacceptable level of risk. However, BH515 is not to be disturbed based upon the permanent and temporary land take.

Tidal Flat Deposits

5.3.14 Well installations within eighteen boreholes have been screened within the Tidal Flat Deposits (commonly including peaty inclusions and/or discrete peat horizons). Elevated gas concentrations were recorded within the majority of wells. This data is summarised within Table 5.4. Those concentrations which exceed the screening threshold criteria are highlighted in red.

Table 5.4: Gas Monitoring Data – Tidal Flat Deposits

BH No.	No. of Monitoring Rounds	Peak and (Stabilised) CH4 (%)	Peak and (Stabilised) CO2 (%)	Minimum and (Stabilised) O2 (%)	Peak and (Stabilised) H2S (ppm)	Peak and (Stabilised) CO (ppm)	Peak Gas Flow (l/hr)	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]
BH325C	4	**4.3 (2.6)**	3.9 (2.2)	9.9 (13.9)	0 (0)	0 (0)	3.0	0.129
BH408	3	0.0 (0.0)	0.4 (0.2)	19.5 (19.8)	**25 (0)**	28 (0)	0.0	0
BH411	3	**65.2 (24.6)**	**5.1 (2.2)**	4.7 (14.3)	0 (0)	0 (0)	1.6	1.0432
BH527	4	**3.4 (0.8)**	0.0 (0.0)	19.6 (19.7)	0 (0)	0 (0)	1.3	0
BH506	4	**18.7 (6.5)**	**5.6 (1.9)**	11.2 (18.5)	0 (0)	1 (1)	0.0	0
BH509	4	**4.4 (4.2)**	2.9 (0.0)	15.1 (15.2)	0 (0)	0 (0)	0.4	0.0144
BH510	4	**28.4 (28.4)**	**6.1 (6.1)**	11.2 (11.7)	0 (0)	0 (0)	0.8	0.0696
BH521	4	**5.0 (0.4)**	0.3 (0.0)	19.0 (19.9)	0 (0)	2 (0)	0.4	0.005
BH528	4	**31.0 (0.0)**	**8.1 (0.0)**	11.8 (12.1)	0 (0)	4 (0)	0.4	0
BH530	4	**14.8 (13.0)**	**5.3 (4.7)**	15.0 (15.4)	0 (0)	10 (4)	0.0	0
BH533	4	**1.5 (0.1)**	1.2 (0.1)	19.5 (19.6)	0 (0)	0 (0)	0.9	0.006

BH No.	No. of Monitoring Rounds	Peak and (Stabilised) CH4 (%)	Peak and (Stabilised) CO2 (%)	Minimum and (Stabilised) O2 (%)	Peak and (Stabilised) H2S (ppm)	Peak and (Stabilised) CO (ppm)	Peak Gas Flow (l/hr)	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]
BH534	4	0.2 (0.0)	3.7 (3.3)	18.3 (17.9)	0 (0)	0 (0)	0.8	0.0148
BH519	4	**8.6 (2.4)**	0.0 (0.0)	0.6 (14.6)	0 (0)	**248 (193)**	0.4	0.0228

5.3.15 Typically elevated CH_4 concentrations are identified for the Tidal Flat Deposits, occasionally with slightly elevated CO_2 concentrations. Typically low or absent flows are recorded.

5.3.16 Though no definitive correlation is made between the thickness of peat and elevated CH_4 concentrations, those boreholes with concentrations showing minimal reduction with time (BH509, BH510 and BH530) are associated with relatively thick peat horizons i.e. ≥1.5 m thickness.

5.3.17 The majority of the calculated GSVs for the Tidal Flat Deposits indicate a relatively low generation gas source equivalent to characteristic situation 1 (very low risk), albeit potentially increased to characteristic situation 2 where elevated CH_4 and CO_2 concentrations are identified within Table 5.4.

5.3.18 Characteristic situation 2 (low risk) is indicated for BH325C due to the low O_2 and flow. Characteristic situation 3 is indicated for BH411. It is of note that a release of ground gas was noted during the advancement of CPT408 located approximately 640 m west of BH411 (no monitoring data is available for this location). The concentrations within these boreholes are shown to reduce with time. Calculated GSVs using stabilised concentrations indicate a characteristic situation 2 for both boreholes.

5.3.19 A single spike of elevated H_2S was recorded for BH408 on one monitoring occasion, rapidly reducing and stabilising to zero.

5.3.20 Elevated CO was recorded for BH519 located within CL-26 showing minimal reduction with time. It is of note that elevated CO concentrations were recorded for two other boreholes located in the same area associated with the Made Ground.

Superficial Deposits (Excluding Tidal Flat Deposits)

5.3.21 Ten monitoring wells were installed within the superficial deposits including the Glaciofluvial Deposits, Head Deposits, Glacial Till and River Terrace Deposits. Elevated gas concentrations were not typically recorded within these installations. This data is summarised within Table 5.5. Those concentrations which exceed the screening threshold criteria are highlighted in red.

Table 5.5: Gas Monitoring Data – Superficial Deposits

BH No.	No. of Monitoring Rounds	Peak and (Stabilised) CH4 (%)	Peak and (Stabilised) CO2 (%)	Minimum and (Stabilised) O2 (%)	Peak and (Stabilised) H2S (ppm)	Peak and (Stabilised) CO (ppm)	Peak Gas Flow (l/hr)	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]
BH505	4	**2.2 (1.8)**	3.6 (2.9)	18.6 (19.0)	0 (0)	1 (0)	0.8	0.0024
BH315	4	0.0 (0.0)	**12.7 (12.7)**	0.0 (0.3)	0 (0)	10 (0)	0.0	0
BH320	3	0.0 (0.0)	**10.0 (9.4)**	0.0 (3.2)	0 (0)	10 (0)	0.0	0
BH425	4	**67.5 (26.9)**	3.3 (1.6)	5.3 (14.3)	0 (0)	22 (0)	0.0	0

BH No.	No. of Monitoring Rounds	Peak and (Stabilised) CH4 (%)	Peak and (Stabilised) CO2 (%)	Minimum and (Stabilised) O2 (%)	Peak and (Stabilised) H2S (ppm)	Peak and (Stabilised) CO (ppm)	Peak Gas Flow (l/hr)	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]
BH553	4	0.0 (0.0)	**5.3 (5.3)**	13.1 (13.1)	0 (0)	1 (0)	0.4	0.0184

5.3.22 Elevated ground gases within the superficial deposits are typically confined to slightly elevated CO_2 concentrations. Low or absent flows are recorded.

5.3.23 Significantly elevated concentrations of CH_4 within BH425 (recorded on three monitoring occasions) appear to be associated with a thin horizon of River Terrace Deposits described as 'coarse gravel with wood'. No flow is recorded for this well.

5.3.24 Slightly elevated CH_4 was recorded on one monitoring occasion within BH505 which was installed principally within the Glaciofluvial Deposits and partially the base of the Tidal Flat Deposits and thus the gas may be from organic constituents of the Tidal Flat Deposits.

5.3.25 The superficial deposits assessed above are indicated to be a very low generation gas source equivalent to characteristic situation 1 (very low risk) albeit potentially increased to characteristic situation 2 where elevated CH_4 and CO_2 concentrations are identified in Table 5.5.

Bedrock

5.3.26 Fourteen monitoring wells were installed within the bedrock including the Carboniferous Limestone, Avon Group, Marginal Facies of the Mercia Mudstone, Tintern Sandstone and St Maughans Formation. Elevated gas concentrations were not typically recorded within these installations. This data is summarised within Table 5.6. Those concentrations which exceed the screening threshold criteria are highlighted in red.

Table 5.6: Gas Monitoring Data – Bedrock

BH No.	No. of Monitoring Rounds	Peak and (Stabilised) CH4 (%)	Peak and (Stabilised) CO2 (%)	Minimum and (Stabilised) O2 (%)	Peak and (Stabilised) H2S (ppm)	Peak and (Stabilised) CO (ppm)	Peak Gas Flow (l/hr)	Gas Screening Value (CH_4 or CO_2) (l/hr)[1]
BH560	3	0.1 (0.1)	**8.1 (8.0)**	9.6 (10.1)	0 (0)	2 (2)	0.0	0
BH541	4	0.1 (0.1)	1.0 (1.0)	19.2 (19.2)	0 (0)	**64 (52)**	0.0	0
BH542	3	0.1 (0.1)	**6.6 (6.6)**	0.2 (4.5)	0 (0)	13 (3)	0.2	0.0132
BH546	4	0.1 (0.1)	0.6 (0.1)	18.9 (19.8)	0 (0)	**536 (386)**	1.6	0.0096
BH313	4	0.0 (0.0)	**11.0 (11.0)**	2.2 (2.4)	0 (0)	10 (0)	0.6	0.066

5.3.27 Elevated ground gases within the bedrock are typically confined to slightly elevated CO_2 concentrations.

5.3.28 Elevated CO recorded within BH541 on one monitoring occasion and BH546 on two monitoring occasions show a slight reduction in concentration with time. It is possible these locations are affected by ambient vehicle emissions.

5.3.29 The bedrock is indicated to be a very low generation gas source equivalent to characteristic situation 1 (very low risk), albeit potentially increased to characteristic situation 2 where elevated CO_2 concentrations are identified in Table 5-6.

Evaluation of Baseline Ground Gas Conditions

5.3.30 It is of note that only one monitoring round (May 2015) was undertaken during periods of low barometric pressure (less than 1000 mb), with the lowest conditions recorded being 992 mb. As such worst case atmospheric conditions may have not been monitored for many locations. Nevertheless valuable gas data is considered to have been collected for Made Ground and natural soils along the route of the proposed new section of motorway and the findings of the gas risk assessment are summarised below.

5.3.31 Gas flows were generally recorded as being absent or with low flows, with the peak flow of 4.5 l/hr recorded for BH417.

5.3.32 Calculated GSVs for CH_4 and CO_2 indicate typically very low or low risk classifications (one borehole indicating a moderate risk using peak concentrations). The low and moderate risk classifications are mainly associated with the peat horizons within the Tidal Flat Deposits. An exception is BH413 where the gas regime within the Made Ground may be associated with landfill gas migration.

5.3.33 The available data identifies consistently raised CO and H_2S levels present in apparently localised locations within CL-26, indicating a potentially hazardous gas source of these gases. Although BH515, which has elevated H_2S will not be disturbed during construction. This is discussed further in Annex D16.

5.3.34 The Scheme construction has the potential to increase the gas risk associated with the Tidal Flat Deposits through the following:

- Increased gas flux through surcharge loading across the Gwent Levels.
- Installation of band drains and piles providing preferential pathways for vertical gas migration.

5.3.35 This will require specific risk assessment, gas control measures and use of appropriate PPE during the construction phase. Additionally suitable ventilation will be required to be incorporated within the motorway construction.

5.3.36 For those areas where additional gas sources are indicated, i.e. within CL-26 and adjacent to CL-13, it is considered gas monitoring should be undertaken during the construction phase.

5.3.37 Table 5.7 sets out a summary of the typical potential risk associated with ground gas during the construction and operation of the proposed new section of motorway.

Table 5.7: Assessment of General Ground Gas Risk

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Construction Phase						
Peat horizons and organic soils	Construction workers	Inhalation of ground gas / explosion	Likely	High	High	Peat horizons likely to be associated with high methane content but with typically low or absent flux. Gas flux likely to increase during surcharge loading. Construction works to be largely within open space.
	Off-site users during construction works		Unlikely	High	Moderate to Low	Peat horizons likely to be associated with high methane content but with typically low or absent flux. Gas flux likely to increase during surcharge loading. Limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits.
Operational Phase						
Peat horizons and organic soils	Maintenance workers	Inhalation of ground gas / explosion	Unlikely	High	Moderate to Low	Peat horizons likely to be associated with high methane content but with typically low or absent flux. Embankments may allow methane rich gas pockets to accumulate if not suitably ventilated. Entry into confined spaces will be controlled through compliance with health and safety legislation.
	Motorway users		Unlikely	High	Moderate to Low	Peat horizons likely to be associated with high methane content but with typically low or absent flux. Embankments may allow methane rich gas pockets to accumulate if not suitably ventilated.
	Off-site users		Unlikely	High	Moderate to Low	Peat horizons likely to be associated with high methane content but with typically low or absent flux. Limited potential for lateral gas migration givent he presence of low permeability Tidal Flat Deposits.

5.3.38 Specific gas risks associated with landfills and other potentially contaminated sites are assessed in further detail within the respective individual contamination assessment reports in Annex D.

5.3.39 Although elevated concentrations of CH_4 and CO_2 have been identified, the available data suggests that only limited gas protection and control measures will be required to be incorporated into the proposed new section of motorway as gas emissions (flows) are likely to be low and only a limited number of receptors exist that have viable pathways for gases to migrate Such measures would include:

- Safe systems of working to protect construction staff during installation of piles, band drains and entry into confined spaces.
- A specific safe system of work within the lagoons area (CL26) where elevated H_2S may be encountered.
- Further detailed gas risk assessment supported by monitoring to determine the level of gas controls needed to prevent an increase in risk of migration of landfill gases from Docks Way Landfill affecting adjacent properties.

5.4 Controlled Waters Screening Assessment

5.4.1 The Baseline Water Environment Report (RPS, 2015) provides an overarching description of the water environment and the quantitative data set outlining the baseline groundwater and surface water conditions relative to the new section of motorway.

5.4.2 The simplified conceptual site model for the route alignment identifies two main groundwater bodies: a shallow perched groundwater body within the superficial geology and a deeper groundwater aquifer within the bedrock.

Groundwater

5.4.3 The findings of a screening assessment of groundwater aquifer data for areas lying outside identified land contamination sites indicate results generally below the relevant screening criteria with the exception of chloride and certain metals (arsenic, boron, chromium and nickel) in the Caldicot Levels and Newport Crossing areas, and total ammoniacal nitrogen across the new section of motorway. The data is provided in Annex D23.

5.4.4 The findings of a screening assessment of perched groundwater data from within the Tidal Flat Deposits from areas outside the identified land contamination sites indicate results generally below the relevant screening criteria with the exception of chloride, ammoniacal nitrogen and metals (arsenic, boron and selenium). The data is provided in Annex D23.

5.4.5 Review of the Baseline Water Environment Report (RPS,2015) identifies the concentrations of metals, chloride and ammoniacal nitrogen to be in keeping with the baseline characteristics of the bedrock aquifer and perched groundwater in respect to the five drainage sections of the route, most notably that the higher concentrations of contaminants are found around the Caldicot Levels and Newport Crossing, areas in proximity to the River Usk and River Ebbw estuaries and with a large number of potentially contaminated land sites.

Surface Water

5.4.6 Review of historical and ongoing surface water monitoring has been undertaken in the areas lying outside the identified land contamination sites.

5.4.7 In light of these results, and the potential for the creation of new pathways during construction, it is recommended that all construction works include a suitable water management strategy to protect controlled waters.

5.4.8 The overall risk level to controlled waters for areas outside the designated potential land contamination areas is concluded as low.

5.5 Conclusions

5.5.1 The risk levels associated with the study area outside areas of potential land contamination following the Tier 2 screening risk assessment is provided in Table 5.8. The need for further assessment, control measures and remediation are also summarised.

Table 5.8: Risk Assessment Summary

CL Site	Overall Risk Level	Requirement for Further Assessment, Control Measures or Remediation
Corridor outside identified areas of potential land contamination	Low	Materials Management verification (except for pH in the areas of the existing Castleton and Magor junction works)

5.6 Summary Findings for Sites of Potential Land Contamination

5.6.1 The findings of the risk assessments of the 27 potentially contaminated sites identified in the 2014 PSSR following the assessment of additional data along the route of the new section of motorway are summarised in the risk matrix provided in Annex E.

5.6.2 Table 5.9 shows the range of risk levels associated with each site following the Tier 2 screening risk assessment along with any key potential contaminant linkages that require control measures and remediation to break the potential linkages identified.

Table 5.9: Potential Land Contamination Sources and Overall Risk

Site Name	Potential Contaminant Source	Potential Contaminants of Concern	Potential Receptors	Risk Range (lowest – highest)	Key Potential Contaminant Linkages
CL-1 Castleton Interchange Spoil Heaps	Spoil heaps; from flytipping and marshy soils [1]	Heavy metals and hydrocarbons. Possible ground gas.	Human health, Secondary A aquifer, surface waters	Very low - Low	None identified.
CL-2 Former Construction Storage Compound	Leaks/ spillages [1]	Possible hydrocarbons	Human health, Secondary A aquifer	Very low - Moderate to low[2]	Leaching of potentially contaminated soils to Secondary A aquifer

Site Name	Potential Contaminant Source	Potential Contaminants of Concern	Potential Receptors	Risk Range (lowest – highest)	Key Potential Contaminant Linkages
CL-3 Pound Hill	Backfilled quarry pit	None identified	Human health, Secondary A aquifer, surface water drainage	Very low – Low[2]	Abnormal gas regime recorded off site may indicate presence of waste currently not identified by supplementary ground investigation.
CL-4 Cefn Llogel Farm	Possible inert waste associated with landfill [1]	Possible heavy metals and hydrocarbons with waste and perched water. Possible ground gas from waste.	Human health, surface waters	Very low - Moderate to low[2]	Dermal, ingestion and inhalation of potentially contaminated soils/dusts and ground gas or vapours to construction workers. Potentially contaminated surface water runoff / leaching of Made Ground to controlled surface waters.
CL-5 Church Road	Buried fly-tipping	Elevated hydrocarbons in soils, Heavy metals in groundwater	Human health, Secondary A and B aquifers, surface water drainage	Very low – Low	None identified
CL-6 Radiator Manufacturers and Adjacent Land	Made Ground, contaminated groundwater, peat (no historical ground investigation data available for temporary land take associated with construction compound)	Ground gas associated with peat; groundwater saline and with inorganic contaminants. Potential contaminants within the Made Ground. Additionally, possible solvents and paints within the proposed temporary land take.	Human health, Secondary A and B aquifers, surface waters	Very low – High[2]	Risk of potential ground gas (explosion) to construction workers. Leaching of potential contaminants from Made Ground and saturated flow from perched water migrating into surface water. Potential new pathways created through band drains.
CL-8 Former Railway Bridge	Made Ground	Limited information. Various possible including heavy metals and hydrocarbons	Human health/ groundwater aquifers, surface waters	Very low – Low[2]	None identified

Site Name	Potential Contaminant Source	Potential Contaminants of Concern	Potential Receptors	Risk Range (lowest – highest)	Key Potential Contaminant Linkages
CL-9 Green Lane Landfill	Waste from historic landfilling, peat	Heavy metals, organic and inorganic contaminants, ground gas	Human health/ groundwater aquifers, surface waters	Very low - Moderate	Risk of potential ground gas (explosion) to construction workers.
CL-10 Made Ground	Made Ground	Limited information. Various possible including heavy metals and hydrocarbons though indicated to be predominantly inert	Human health/ groundwater aquifers, surface waters	Very low – Moderate[2]	Potential new pathways created through band drains allowing contamination of surface water and aquifer.
CL-13 Docks Way Landfill	Made Ground, peat (Scheme land take excludes landfill areas) (Landfilled material extending beyond Site boundary considered in CL-15 Stephenson Street Industrial Estate).	Organics in Made Ground and ground gas.	Human health, Secondary B aquifer, surface waters	Very low – High[2]	Elevated ground gas (explosion) to construction workers during piling. Piling and construction affecting current gas regime leading to risks to adjacent properties. Leaching potential from Made Ground and saturated flow from perched water migrating into surface water. Potential new pathways created through piles allowing contamination of surface water and aquifer.
CL-14 Newport Docks	Various industrial usage, peat	Various possible including heavy metals, organics/inorganics, asbestos and ground gas.	Human health, Secondary B aquifer, surface waters	Very low – Moderate[2]	Hydrocarbon and inorganic impacted soils impacting on construction workers. Migration of contaminants in soils and perched waters into aquifers and surface waters through piling. Elevated ground gas (explosion) to construction workers during piling.
CL-15 Stephenson Street Industrial	Various industrial usage, peat, historical	Various possible including heavy metals,	Human health, Secondary B aquifer,	Very low – Moderate[2]	Risk of potential ground gas (explosion) to construction workers. Localised

Site Name	Potential Contaminant Source	Potential Contaminants of Concern	Potential Receptors	Risk Range (lowest – highest)	Key Potential Contaminant Linkages
Estate	landfilled material associated with adjacent Docks Way Landfill.	organics/inorganics and ground gas.	surface waters		hydrocarbon impaction of soils. Impacted shallow and deep aquifers and potential new pathways through piling.
CL-16 Infilled River Ebbw (included in CL-14 above)					
CL-17 Solutia Chemical Works	Chemical works, inert and industrial waste landfills	Organochlorines and aromatic based organic compounds including PCBs. Widespread elevated PCBs and pH in soils. Ground gas.	Human health, Secondary B aquifer, surface waters	Very low – High[2]	Migration of contaminants in soils and perched waters into aquifers and surface waters through piling. Elevated ground gas (explosion) to construction workers during piling.
CL-18 River Usk Pier Location	Contaminated river sediments	Various including hydrocarbons, heavy metals and other inorganics.	Human health/ Secondary B aquifer, surface waters, River Usk	Very low – Moderate[2]	Inhalation of ground gas or hydrocarbon vapours from superficial deposits during construction. Dermal contact with, and ingestion of contaminated perched groundwaters/aquifer.
CL-20 Mir Steelworks and Associated Waste Disposal Site (included in CL-15 above)					
CL-22 Former Llanwern Research Laboratories	Made Ground comprising ash, slag and demolition rubble. Benzene pipeline	Various including heavy metals, hydrocarbons (including benzene)	Secondary B aquifer, human health	Very low – Moderate[2]	Potential new pathways created through band drains allowing contamination to surface water and aquifer.
CL-26 Llanwern Steel Works - Including Lagoons Areas	Made Ground comprising slag with impacted perched water	Various including heavy metals, inorganics and, hydrocarbons	Human health, Secondary B aquifer, surface waters	Very low - High[2]	Dermal, ingestion and inhalation of potentially contaminated soils/dusts and ground gas to construction workers. Potential new pathways created through band drains allowing contamination to surface water and aquifer.
CL-26 Llanwern Steel Works – Reedbed 1 and Metal recovery	Made Ground comprising slag and reedbed sediment with impacted	Various including heavy metals, inorganics and, hydrocarbons	Human health, groundwater aquifers, surface waters	Very low – High[2]	Dermal, ingestion and inhalation of potentially contaminated soils/dusts and ground gas to construction/maintena

Site Name	Potential Contaminant Source	Potential Contaminants of Concern	Potential Receptors	Risk Range (lowest – highest)	Key Potential Contaminant Linkages
Areas (main alignment)	perched water				nce workers and general public. Potential new pathways created through band drains allowing contamination to surface water and aquifer.
CL-27 Elver Pill Reen and Green Moor Landfill	Slag and industrial wastes	Various including heavy metals, hydrocarbons	Human health, Secondary B aquifer, surface waters	Very low - High[2]	Potential new pathways created through band drains allowing contamination of surface water and aquifer.
CL-29 Spoil Heaps and Old Quarry, Llanwern Approach Road	Spoil materials	Various including hydrocarbons, heavy metals and other inorganics	Human health, superficial and bedrock aquifers	Very low - Low[2]	None identified
CL-30 Green Moor Quarry Landfill	Quarry infill materials	Limited information. Various possible	Human health, Principal aquifer	Very low – Moderate[2]	Dermal, ingestion and inhalation of potentially contaminated soil/dusts and vapours to construction workers
CL-32 Magor Depot (Wilcrick Depot)	Leaks/ spillages including underground storage tanks. Made Ground	Hydrocarbons, Volatile Organic Compounds (VOCs),Semi Volatile Organic Compounds (SVOCS)	Human health, Secondary A aquifer	Very low - Moderate	Inhalation of hydrocarbon vapours, soil dust, dermal contact with and ingestion of contaminated soils by construction workers. Leaching/migration of contaminants from Made Ground, buried tank or fuel spills to aquifer.
CL-33 B4245 Quarry	Infill materials	Limited information. Various possible including heavy metals and hydrocarbons	Human health, superficial and bedrock aquifers	Very low– Moderate[2]	Dermal contact, ingestion and inhalation of soils/dusts and ground gas or vapours from quarry in-fill materials by construction workers. Leaching/migration of contaminants into aquifer.
CL-35 Magor Services	Leaks / spillages	Hydrocarbons	Human health, groundwaters and surface waters	Low - Moderate to low[2]	Migration of hydrocarbon contamination via groundwaters and subsequent inhalation

Site Name	Potential Contaminant Source	Potential Contaminants of Concern	Potential Receptors	Risk Range (lowest – highest)	Key Potential Contaminant Linkages
					of vapours by human receptors, contamination of groundwaters and surface water.
CL-38 Knollbury Cesspits	Cess pits	Sewage	Human health	Very low	None identified
CL-39 The Elms Road Old Quarry and Lime Kiln	Made Ground	Various including heavy metals and hydrocarbons	Human health, groundwaters and surface waters	Low - Moderate	Dermal, ingestion and inhalation of potentially contaminated soils/dusts and vapours to construction workers. Potential new pathways created through band drains allowing contamination to aquifer.
CL-41 Severn Junction Tunnel Yard	Made Ground	Various including heavy metals	Human health, groundwaters and surface waters	Very low - Moderate to low[2]	Leaching of Made Ground during construction works into surface waters. Possible soil-water linkage identified for TPH.

Note 1: No historical ground investigation data available.

Note 2: (risk): risk level to be updated following findings of supplementary ground investigation.

6 Conclusions

6.1 Conclusions

6.1.1 An assessment of data collected from sampling points along the proposed new section of motorway lying outside known areas of potential sources of land contamination has also been undertaken. This assessment indicates a low risk in relation to land contamination with the exception of alkaline pH identified at existing junctions of Castleton and Magor where further assessment will be necessary.

6.1.2 An assessment of areas of potential land contamination along the alignment of the new section of motorway has been undertaken using guidance provided in CLR11 and other relevant standards and guidance. The assessment was based on the 2014 PSSR, the 2015 Supplementary Ground Investigation and additional data sources. The 2014 PSSR identified 43 areas of potential land contamination that could be impacted by the Scheme. Based upon the design, 27 of the 43 sites were identified as likely to be affected by the new section of motorway and these have been subject to a site specific risk assessment. Detailed individual reports have been prepared for each identified site of potential land contamination.

6.1.3 The Tier 1 preliminary risk assessment has been undertaken, followed by a more detailed Tier 2 site specific generic risk assessment to consider risks to human health and the environment.

6.1.4 The findings indicate that, although some potential contaminant sources may be present, the vast majority of the sites do not require extensive remediation to enable construction of the Scheme. However, for some sites such as CL-26 Llanwern Steelworks Lagoons and CL-17 Solutia Chemical Works remediation will be necessary. The need for additional assessment, control measures and remediation is set out in Table 5.1 of this report.

6.1.5 A remediation strategy will be prepared for the proposed new section of motorway to ensure that risks identified are managed appropriately. This document will be agreed with the local planning authority's Contaminated Land Officer and NRW's Environment Officer.

6.1.6 A Materials Management Plan will also be prepared as part of the remediation strategy to ensure that all soil materials to be excavated, treated, reused or imported into the Scheme are appropriately managed in line with the CL:AIRE Industry Code of Practice (CL:AIRE, 2011).

6.1.7 As well as setting out the control measures required to deal with specific risks arising from each of the areas of potential land contamination, the remediation strategy will set out procedures for the following:

- Encountering previously unidentified or unexpected contamination (discovery strategy).
- Verification, inspection, sampling and analysis to ensure confirm expected contamination and ground conditions.
- Verification, inspection, sampling and analysis to enable material arisings to be checked for suitability for reuse with or without treatment.
- Ground gas protection and mitigation requirements during construction and any measures to be incorporated into the detailed design.

6.1.8 The remediation strategy will be set out in a Remediation Strategy Report that will include a Remedial Options Appraisal, a Remediation Implementation Plan and a Remediation Verification Plan in line with CLR11. On completion of remediation, a Remediation Verification Report is to be prepared to verify that the remediation has been successfully completed.

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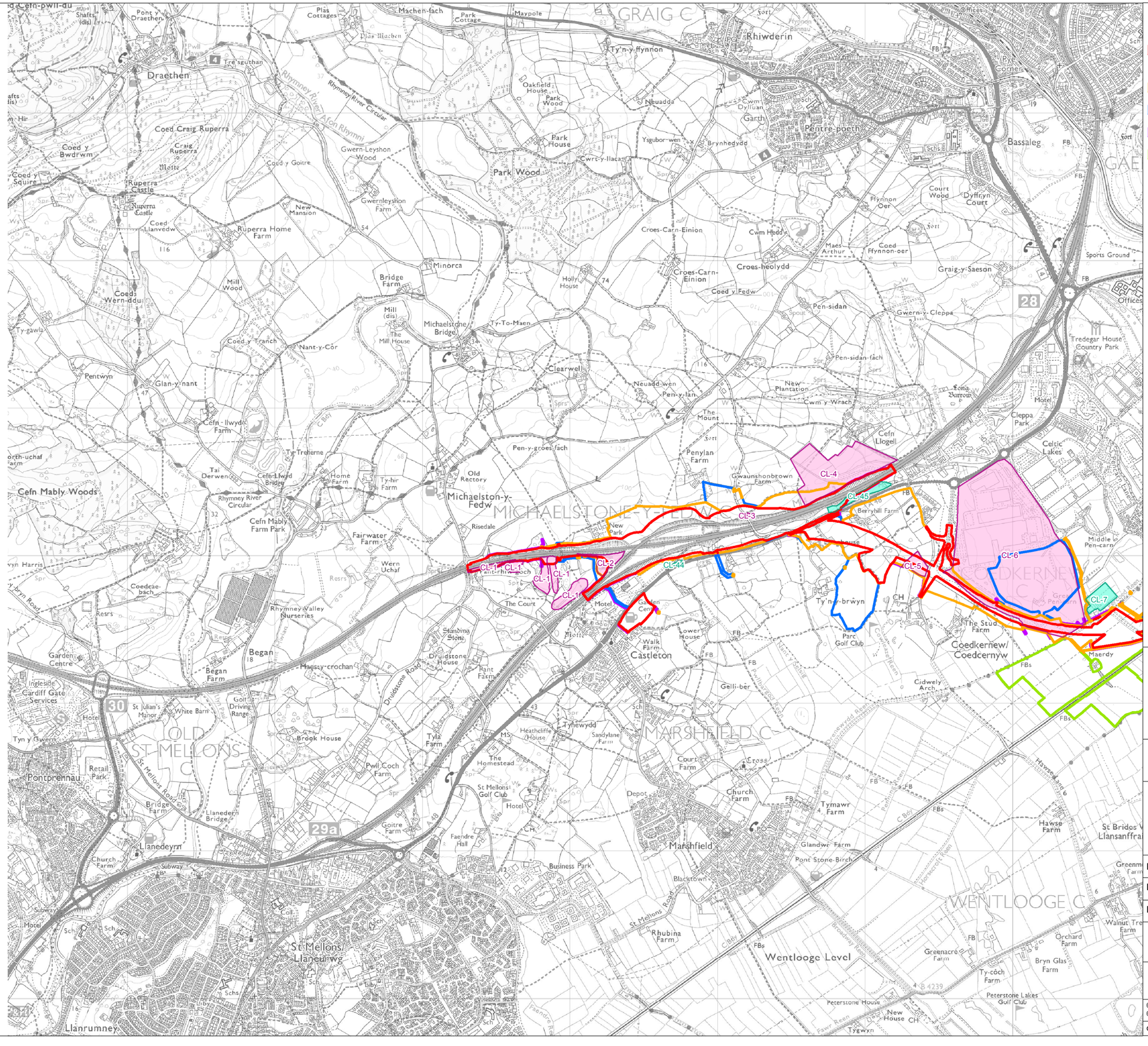
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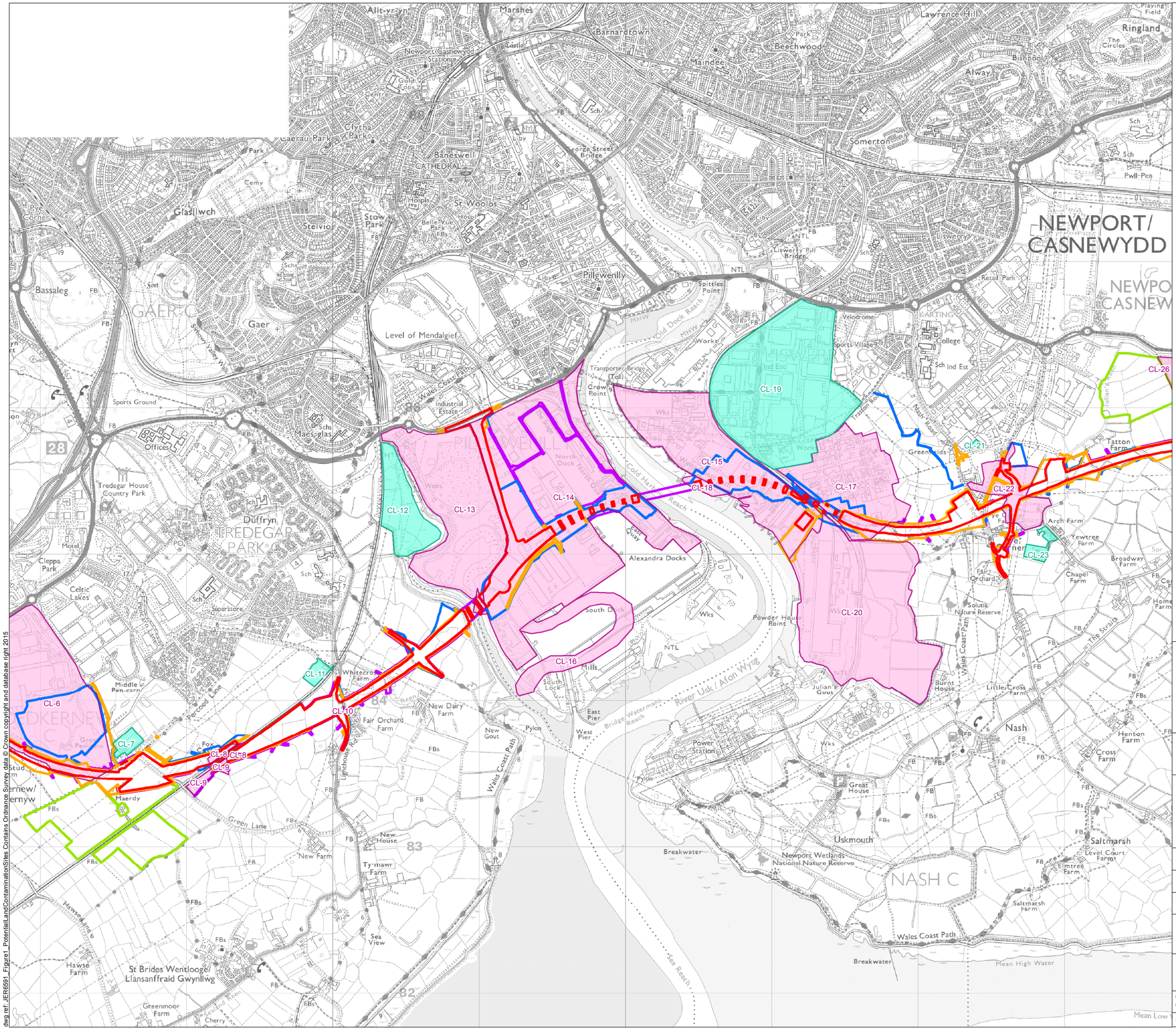
Salminen R. (Chief-editor), Batista M.J., Bidovec M., Demetriades A., De Vivo B., De Vos W. Duris M., Gilucis A, Gregorauskiene V., Halamic J., Heitzmann P., Lima A., Jordan G., Klaver G, Klein P., Lis J.17, Locutura J., Marsina K., Mazreku A., O'Connor P.J., Olsson S.Å., Ottesen R..-T., Petersell V., Plant J.A., Reeder S., Salpeteur I., Sandström H., Siewers U., Steenfelt A., Tarvainen T. (FOREGS) (2005) Geochemical Atlas of Europe. The Association of the Geological Surveys of The European Union (EuroGeoSurveys)/ the Geological Survey of Finland. http://www.gtk.fi/publ/foregsatlas/.

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Figures


CL-1
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CL-7
Draethen
Rhiwderin
Pentre-poeth
Bassaleg
Coed Craig Ruperra
Ruperra Castle
Park Wood
Croes-Carn-Einion
Croes-heolydd
Graig-y-Saeson
Pen-sidan
Gwern-y-Cleppa
Clearwell
Pen-sidan-fach
Cefn Mably Woods
Michaelston-y-Fedw
MICHAELSTONE-Y-FEDW C
Castleton
Marshfield
MARSHFIELD C
OLD ST MELLONS C
COEDKERNEW C
WENTLOOGE C
Wentlooge Level
St Mellons/ Llaneurwg
Llanrumney
Pontprennau
Coedkernew/ Coedcernyw
Tredegar House Country Park
Celtic Lakes
Cefn Mably Farm Park
Rhymney River
Rhymney River Circular
Afon Rhymni
Rhymney Valley Nurseries
Cardiff Gate Services
St Mellons Golf Club
Parc Golf Club
Llanedeyrn
Business Park
Peterstone Lakes Golf Club
Tredegar House Country Park
Sports Ground
Offices
Motel
Hotel
Garden Centre
Golf Driving Range
Retail Park
Subway
Church
Chapel
Sch
Schs
Fm
Farm
Resrs
Quarry
Pol Sta
Tuby
Coll
CH
FB
FBs
Motel
Long Barrow
Cidwely Arch
Tynewydd
Heathcliffe House
Sandylane Farm
Tymawr Farm
Glandwr Farm
Pont Stone-Birch
Blacktown
Rhubina Farm
Greenacre Farm
Bryn Glas Farm
Ty-coch Farm
Peterstone House
New House CH
Tygwyn
Hawse Farm
Middle Pen-carn
Maerdy
The Stud Farm
Ty'n-y-brwyn
Berryhill Farm
Gwaunshonbrown Farm
Penylan Farm
Pen-y-groes-fach
Pen-y-lan
Neuadd-wen
Cwm-y-Wrach
New Plantation
Cefn (Llogell)
Cefn-llwyd Farm
Ty-gawla
Pentwyn
Glan-y-nant
Coed-y-Tranch
Nant-y-Cŏr
Coed Wern-ddu
Coed Llanvedw
Ruperra Home Farm
New Mansion
Gwernleyshon Farm
Gwern-Leyshon Wood
Coed-y-Goitre
Coed y Bwdrwm
Coed-y Squire
Craig Ruperra
Motte
Minorca
Bridge Farm
Mill Wood
Mill (dis)
The Mill House
Michaelstone Bridge
Ty-To-Maen
Holly House
Coed-y-Fedw
Coed Ffynnon-oer
Maes Arthur
Cwm Hedd
Flynnon Oer
Court Wood
Dyffryn Court
Ty'n-y-ffynnon
Neuadda
Oakfield House
Park House
Park Wood
Ysgubor-wen
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Cwm-Dyllŷan
Garth
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Tre'sguthan
Pont y Draethen
Plas Cottages
Plas Machen
Machen-fach
Park Cottage
Maypole
Shafts (dis)
Tai Derwen
Cefn-Llwyd Bridge
Home Farm
Ty-hir Farm
Old Rectory
Rhymney River Circular
Fairwater Farm
Wern Uchaf
Coedcae-bach
Rhymney Valley Nurseries
Stambha Stone
Druidstone House
Druidstone Road
Began
Began Farm
Maesy-crochan
Pant Farm
Pwll Coch Farm
Tyla Farm
Brook House
St Julian's Manor
White Barn
The Homestead
Court Farm
Church Farm
Depot
Faendre Hall
Goitre Farm
Llanedeyrn Bridge
Bridge Farm
Ty-Trehierne
Tai Derwen
Cefn-Llwyd Bridge
Nant Coch Fawr
Nant Coch
Nant Rhymni
Nant-y-Cŏr
Rhymney Valley Road
St Mellons Road
Broadway Reen
Fawr Reen
Tŵr Reen
Hawse Reen
Coedkernew Reen
Marshfield Reen
Pentrebach
The Court
The Walk
The Mount
Lower House
New Park
Risedale
Fairwater Farm
Wern Uchaf
Ty-hir Farm
Home Farm
Cefn Mably Farm Park
Rhymney River Circular
Afon Rhymni
Rhymney Valley Road
Cardiff Gate Services
Garden Centre
Golf Driving Range
Retail Park
Subway
Church Farm
Llanedeyrn
Business Park
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Fawr Reen
Tŵr Reen
Hawse Reen
Coedkernew Reen
Marshfield Reen
Pentrebach
The Court
The Walk
The Mount
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New Park
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Cefn Mably Farm Park
Rhymney River Circular
Afon Rhymni
Rhymney Valley Road
Cardiff Gate Services
Garden Centre
Golf Driving Range
Retail Park
Subway
Church Farm
Llanedeyrn
Business Park



Llywodraeth Cymru
Welsh Government

Appendix 11.1

Sites with Potential Land Contamination Source Areas

Figure: 1b	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:25,000

0 500 1,000 m

N

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Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Ecological Mitigation
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme

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Welsh Government

Appendix 11.1

Sites with Potential Land Contamination Source Areas

Figure: 1c	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

Scale: A3 @ 1:25,000
0 500 1,000 m

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Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Ecological Mitigation
- Sites of Potential Land Contamination Sources Affected by the Scheme
- Sites of Potential Land Contamination Sources Unlikely to be Affected by the Scheme

Llywodraeth Cymru
Welsh Government

Appendix 11.1

Sites with Potential Land Contamination Source Areas

Figure: 1d	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: AJC

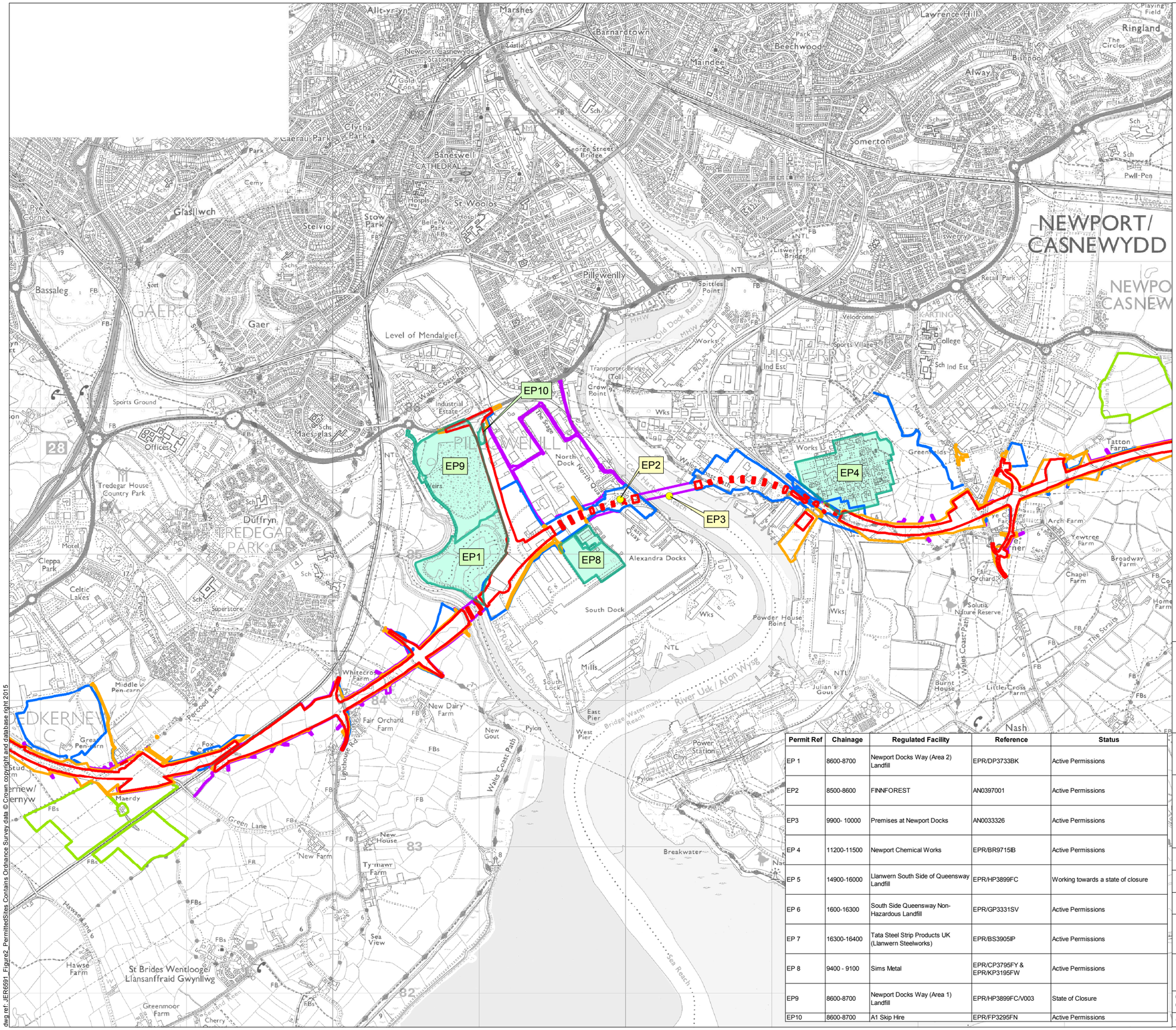
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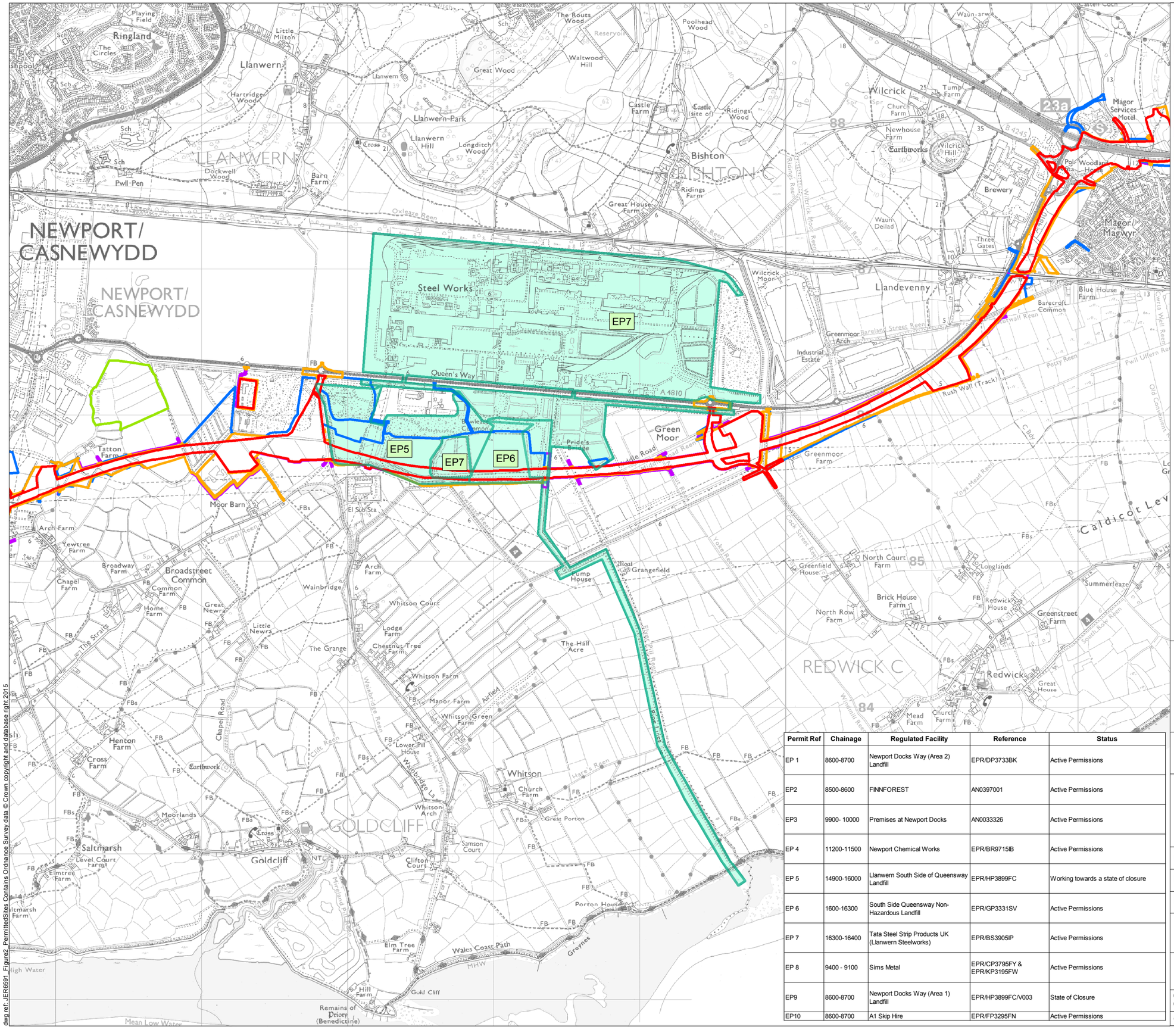
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EP10
EP9
EP2
EP3
EP4
EP1
EP8
NEWPORT/
CASNEWYDD
Pillgwenlly
Maesglas
Tredegar House
Country Park
Duffryn
Celtic
Lakes
Alexandra Docks
South Dock
Llansanffraid Gwynllwg
Nash
Tatton
Farm
Arch Farm
Yewtree
Farm
Broadway
Farm
Chapel
Farm
Solutia
Nature Reserve
Burnt
House
Little Cross
Farm
Fair
Orchard
Whitecross
Farm
New Dairy
Farm
Fair Orchard
Farm
New
House
Tyrmawr
Farm
New
Farm
Hawse
Farm
Greenmoor
Farm
Sea
View
Maerdy
Great
Pen-carn
Middle
Pen-carn
Pencarn
Lane
Percoed Lane
Green Lane
Hawse Lane
Fox
Cross
Lighthouse Road
Wales Coast Path
River Usk / Afon Wysg
Sea Reach
Breakwater
Power
Station
Powder House
Point
Mills
South
Lock
East
Pier
West
Pier
New
Gout
Julian's
Gout
Pylon
Spittles
Point
Transporter
Bridge
Old Dock Reach
Liswerry Pill
Bridge
Liswerry
Pill
Somerton
Lawrence Hill
Ringland
Alway
Bishpool
Pwll-Pen
Retail Park
Velodrome
Sports Village
College
Ind Est
Works
Wks
Offices
Sports Ground
Industrial
Estate
Level of Mendalgief
Gaer
Bassaleg
Glasllwch
Stelvio
Stow
Park
St Woolos
Baneswell
CATHEDRAL
George Street
Bridge
Barnardtown
Marshes
Allt-yr-yn
Newport/Casnewydd
Station
Clytha
Park
Caerau Park
Beechwood
Maindee
Llanwern
Steelworks
Llanwern
Village
Llanwern
Golf Club
Llanwern
Park
Wentlooge
Level
Wentlooge
Level
Wentlooge
Level


NEWPORT/
CASNEWYDD
LLANWERN C
BISHTON C
REDWICK C
GOLDCLIFF C
Steel Works
EP7
EP5
EP6
Queen's Way
A 4810
Green Moor
Llandevenny
Wilcrick
Bishton
Ringland
Llanwern
Whitson
Goldcliff
Redwick
Broadstreet Common
Saltmarsh
Wales Coast Path
MHW
Mean Low Water
High Water
Rush Wall (Track)
Greenmoor Arch
Industrial Estate
Greenmoor Farm
Barecroft Common
Blue House Farm
Magor Services Motel
Magor/ Magwyr
Brewery
Three Gates
Waun Deilad
Wilcrick Moor
Earthworks
Newhouse Farm
Church Farm
Tump Farm
Ridings Wood
Castle Farm
Castle (site of)
Great House Farm
Ridings Farm
Oxleaze Reen
Village Reen
Ridings Reen
Wilcrick Wood Reen
Waun Deilad Reen
Barecroft Street Reen
Petty Reen
Pwll Uffern Reen
Rush Wall Reen
Yows Mead Reen
Old Command
Caldicot Lev
Llanwern Park
Llanwern Hill
Longditch Wood
Great Wood
Waltwood Hill
Poolhead Wood
The Routs Wood
Hartridge Wood
Little Milton
Playing Field
The Circles
Dockwell Wood
Barn Farm
Pwll-Pen
Cross
Sch
Reservoir
Waun-arwel
Waun-arw
Pol
Woodland House
Three Gates
Blue House Farm
Barecroft Common
Greenmoor Arch
Industrial Estate
Greenmoor Farm
Rush Wall (Track)
Petty Reen
Pwll Uffern Reen
Old Command
Caldicot Lev
Yows Mead Reen
Longlands
Summerleaze
Greenstreet Farm
Redwick House
Brick House Farm
North Court Farm
North Row Farm
Greenfield House
Mead Farm
Church Farm
Great House
Redwick
South Sow Reen
Wrodonill Reen
Cook Street Reen
Yokre Reen
Wainbridge
Whitson Court
Lodge Farm
Chestnut Tree Farm
The Grange
The Half Acre
Whitson Farm
Manor Farm
Whitson Green Farm
Lower Pill House
Whitson Arch
Church Farm
Great Porton
Porton House
Samson Court
Clifton Court
Elm Tree Farm
Hill Farm
Gold Cliff
Remains of Priory (Benedictine)
Meadrland Reen
Goldcliff Pill
Wainbridge Reen
Cliff Reen
Hares Reen
Monks Ditch
Wainbridge La
Airfield Reen
Parrett Reen
Pyke Lines Reen
Elver Reen
Chapel Road
The Straits
Chapel Reen
Moor Barn
Arch Farm
Yewtree Farm
Broadway Farm
Chapel Farm
Common Farm
Home Farm
Great Newra
Little Newra
Henton Farm
Cross Farm
Earthwork
Meorlands
Level Court Farm
Elmtree Farm
Tatton Farm
Julians
Pridle Road
Pride's Lane
Bowles Common
El Sub Sta
FB
FBs
NTL
Cross
Moat
Grangefield
Pump House
Greystones
Porton House
Caldicot Lev
Sch
Spr
Cross
Earthworks
Brewery
Magor/ Magwyr

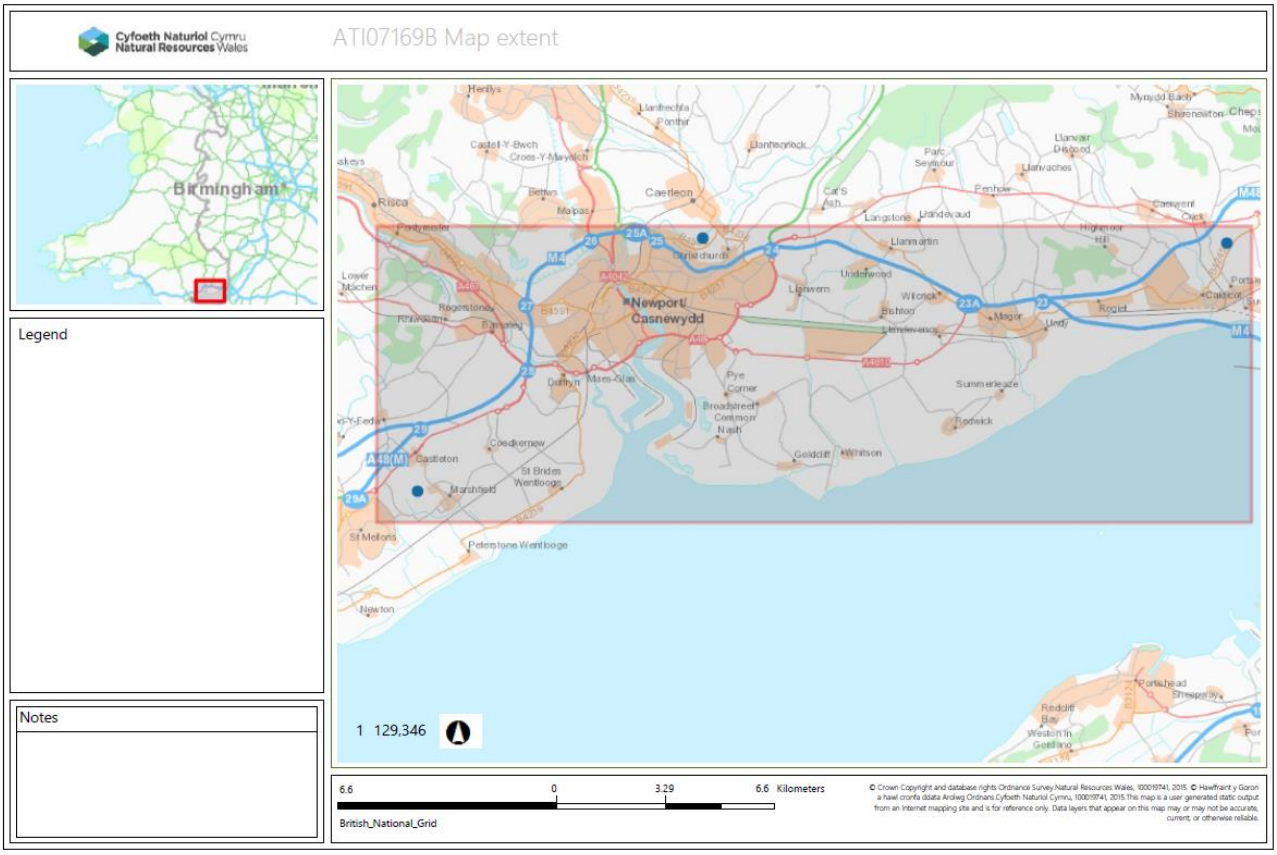
Annex A

NRW Data

ATI07169B Monmouthshire Groundwater & Surface water Marshfield - Caldicot

Details of any known abstraction licences on some NGRs provided. East to West are ST2528782209 to ST4960789669 to a maximum northern extent of ST3386089820.

The request was carried out using the NGRs provided – and the extent outlined on the map below:



Deregulated Licence
Licences were deregulated in 31st March 2005. Deregulated licences include any abstraction of less than 20 cubic metres per day from a surface water source (e.g. stream or drain) or from underground strata (via borehole or well) for any particular purpose.

It is possible that there are other unlicensed abstractions present, particularly for domestic and / or agricultural use. Or that deregulated licences known before 31st March 2005 are now no longer active.

Private Water Supply
Certain private water supplies do not require a licence; therefore Natural Resources Wales is not necessarily aware of their existence. The locations of private domestic sources may be held by the local authority on the register required by the Private Water Supplies Regulations 1992.

Please note
Information provided on live water abstraction licences is based on that available at the time of preparation (12/05/15). Timing of licence renewals and updates to the dataset may mean at any one point in time not all live licences are listed.

Licence No	Holder Name	Purpose Description	Use Description	Source Description	Point Name	NGR
20/56/11/0005	Dwr Cymru Cyfyngedig	Water Supply	Potable Water Supply	Surface Water	Ynys-y-fro reservoir	ST2888
20/56/11/0016	Canal and River Trust	Industrial, Commercial And Public Services	Make-Up Or Top Up Water	Surface Water	Malpas Brook Canal feeder	ST30 90
20/56/11/0018	Newport Angling Association	Industrial, Commercial And Public Services	Make-Up Or Top Up Water	Surface Water	Unnamed trib of Malpas Brook at Bettws, Newport	ST29 89
20/56/11/0023	Tredegar Park Golf Club Ltd	Industrial, Commercial And Public Services	Lake & Pond Throughflow	Surface Water	Stream at Allt-yr-yn	ST28 88
20/56/11/0023	Tredegar Park Golf Club Ltd	Industrial, Commercial And Public Services	Transfer Between Sources	Surface Water	Stream at Allt-yr-yn	ST28 88
20/56/11/0023	Tredegar Park Golf Club Ltd	Industrial, Commercial And Public Services	Spray Irrigation	Surface Water	Pond at Allt-yr-yn	ST28 88
20/56/61/0017	Newbridge Construction Ltd	Industrial, Commercial And Public Services	Spray Irrigation	Surface Water	Stream in Rogerstone	ST28 86
20/56/61/0024	Newport Golf Club	Industrial, Commercial And Public Services	General Washing	Ground water	Borehole at Newport Golf Club	ST26 89
20/56/61/0024	Newport Golf Club	Industrial, Commercial And Public Services	Spray Irrigation	Ground water	Borehole at Newport Golf Club	ST26 89
20/56/71/0008	St Mellons Golf Club (1964) Ltd	Industrial, Commercial And Public Services	Spray Irrigation	Ground water	Borehole at Newport Golf Club	ST24 82
20/56/72/0029	Phillips	Agriculture	General Farming & Domestic	Ground water	Borehole at Green Farm	ST44 88
20/56/72/0030	Broome & Co Ltd	Agriculture	General Farming & Domestic	Ground water	Borehole at Mount Ballan Manor	ST49 89
20/56/72/0030	Broome & Co Ltd	Agriculture	Spray Irrigation	Ground water	Borehole at Mount Ballan Manor	ST49 89
20/56/72/0033	Celtic Manor Resort	Industrial, Commercial And Public Services	Spray Irrigation	Surface Water	Pond at Caerleon	ST35 90
20/56/72/0033	Celtic Manor Resort	Industrial, Commercial And Public Services	Spray Irrigation	Surface Water	Pond at Caerleon	ST35 90
20/56/72/0035	Celtic Manor Resort	Industrial, Commercial And Public Services	Transfer Between Sources	Surface Water	Pond near Catsash Road	ST35 89
20/56/72/0038	Monmouthshire County Council	Amenity	Make-Up Or Top Up Water	Surface Water	Nedern Brook	ST48 88
21/57/12/0100	Richards & Partners	Agriculture	Spray Irrigation	Ground water	Well near Ty-Hir Farm	ST24 85

WA/056/0072/001	Natural Resources Wales	Environmental	Make-Up Or Top Up Water	Surface Water	Monks Ditch	ST36 82
WA/056/0072/001	Natural Resources Wales	Environmental	Make-Up Or Top Up Water	Surface Water	Chapel Reen	ST36 83

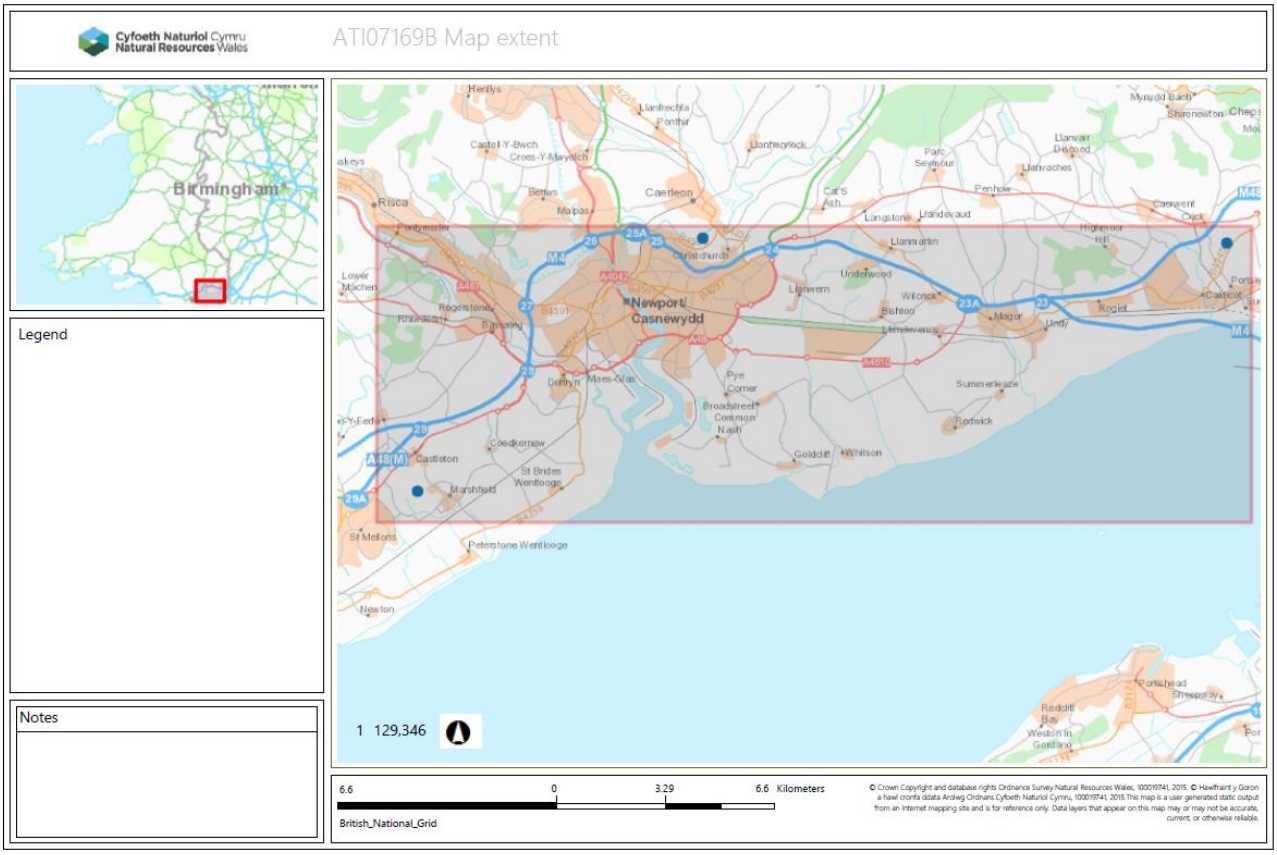
Date: 12/05/15

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Natural Resources Planning
12/05/15

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Natural Resources Planning
12/05/15

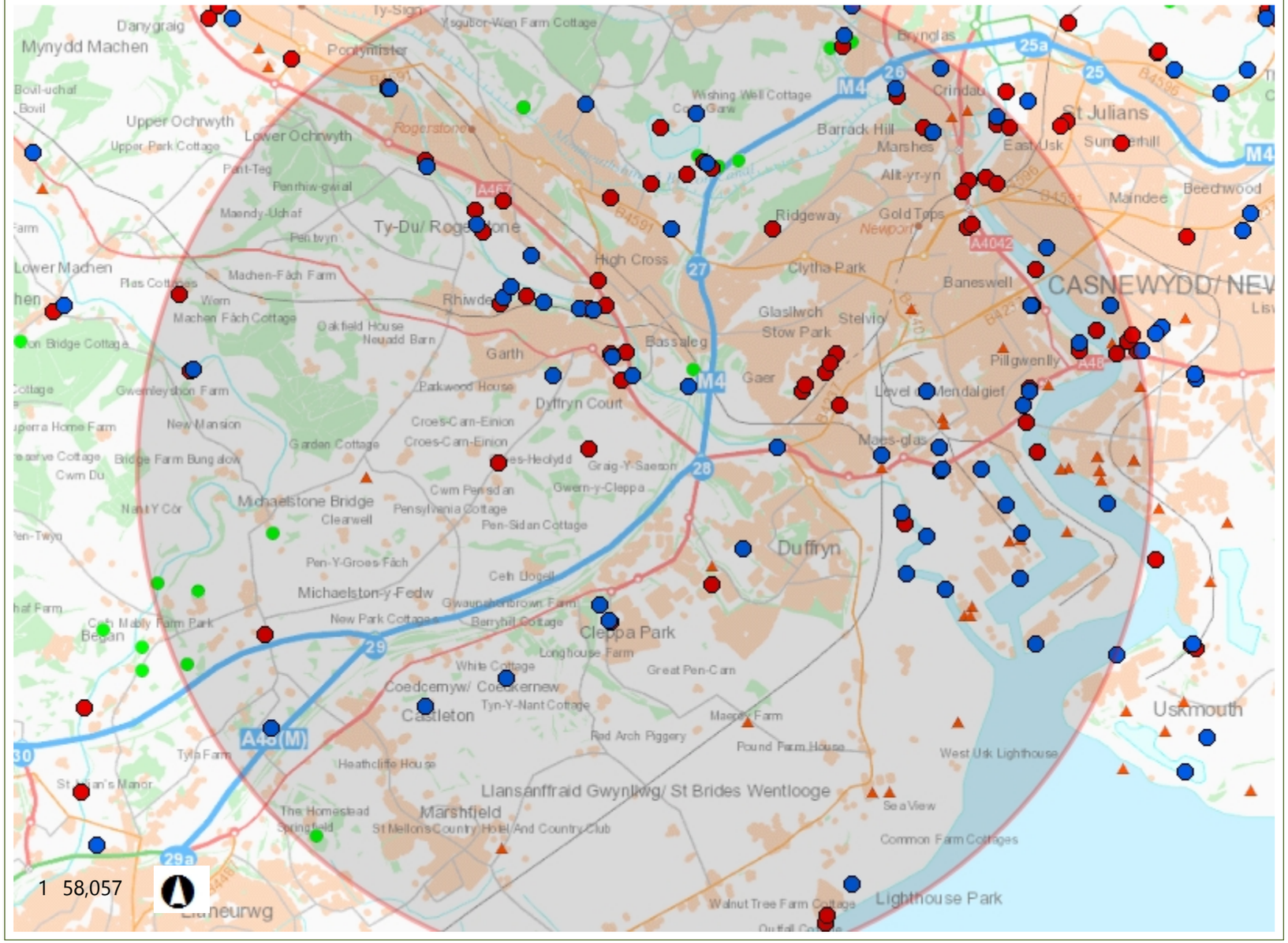
Cyfoeth Naturiol Cymru
Natural Resources Wales



Legend

- WIMS Active Discharge Consents
- WIMS DCWW Discharges
- REGIS Waste Licences
- NALD Licence Abstraction Points

Notes



2.9 0 1.47 2.9 Kilometers

British_National_Grid

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Substantiated Environmental Incidents along M4 corridor - Castleton to Caldicot - since 2010

Event No.	Reported Date and Time	Location	Incident Catchment	Incident Unitary	6 fig NGR	Air Env. Impact Level	Land Env. Impact Level	Water Env. Impact Level	Pollutant_1	Pollutant_2	Cause Type (Tier1)	Cause (Tier2)	Source Identified (Y/N) ?	Premises Type (Tier1)	Premises (Tier2)
743978	05/01/10 10:42	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST440855	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Unidentified Oil	Cause Not Identified	Not Identified	No		
744965	12/01/10 10:21	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST321867	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Oils and Fuel	Diesel	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Other Waste Management Source
745099	12/01/10 16:46	Great Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST383891	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer
745622	15/01/10 13:49	M4 J24	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST362897	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Other Specific Waste Material	Unauthorised Activity	Other Unauthorised Activity	No		
746590	19/01/10 09:37	M4 J24	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST362897	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Batteries	Unauthorised Activity	Unauthorised Discharge or Disposal	No		
746762	19/01/10 15:26	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST243898	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Waste Management	Metal Recycling
747378	21/01/10 16:04	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST339860	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Oils and Fuel	Unidentified Oil	Cause Not Identified	Not Identified	No		
747782	22/01/10 17:02	Bishton	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST390873	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer
748353	25/01/10 13:42	Gwernleyshon	Rhymney	CASNEWYDD - NEWPORT	ST235868	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Combined Sewer Overflow (CSO)	Yes	Water Industry	Combined Sewer Overflow
749242	28/01/10 13:09	Coedkernew	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST274827	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Multiple Pollutants	3 Pollutants Include Soils and Clay	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Agriculture	Other Agricultural Source
749491	29/01/10 13:59	INFO REMOVED	Wye (H&W) d/s Lugg	SIR FYNWY - MONMOUTHSHIRE	ST505905	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Oils and Fuel	Mixed/Waste Oils	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Other Waste Management Source
751496	06/02/10 20:55	Newport	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST328858	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Diesel	Fires	Other Fire	Yes	Transport	Road
752443	10/02/10 17:21	Deepweir	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST480868	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Containment and Control Failure	Accidental Spillage	Yes	Water Industry	Pumping Station
753137	14/02/10 19:28	Somerton	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST330868	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	Yes	Service Sector	Storage and Distribution
753846	17/02/10 03:33	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST310864	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Other Specific Waste Material	Fires	Other Fire	Yes	Retail Sector	Other Retail Sector Premises
753965	17/02/10 11:23	Newport Dock	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST313854	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Electrical Equipment	Unauthorised Activity	Illegal Waste Site	Yes	Waste Management	Metal Recycling
754058	17/02/10 14:05	Lower Llanmellin	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST461912	Category 3 (Minor)	Category 4 (No Impact)	Category 2 (Significant)	Specific Waste Materials	Other Specific Waste Material	Containment and Control Failure	Drainage Failure	Yes	Waste Management	Composting Facility
754521	19/02/10 09:24	Causeway	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST434860	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Transport	Road
754713	19/02/10 15:52	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST243892	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	6 Pollutants Include Soils and Clay	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Agriculture	Stables
755706	23/02/10 13:25	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST302846	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Fly-Tipping	No		
757499	01/03/10 09:50	New Gout	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST319842	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Unauthorised Activity	Other Unauthorised Activity	Yes	Waste Management	Transfer Station
757766	01/03/10 16:41	Caldicot Pill	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST490879	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Storm Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Rising Main
759800	08/03/10 19:22	Causeway	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST434860	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Authorised Activity	Other Authorised Activity	Yes	Agriculture	Stables
760936	12/03/10 10:26	Crick	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST488901	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Final Effluent	Containment and Control Failure	Process Plant Failure (gradual)	Yes	Domestic and Residential	Nursing and Residential Homes
761896	16/03/10 08:40	Caerleon or Caerllion	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST327906	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer
763022	18/03/10 21:12	Bettws	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST296910	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer
767391	06/04/10 12:01	Langstone Court	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST368897	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Domestic and Residential	Private Dwellings
768924	10/04/10 16:51	Castell Coch	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST423885	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer
769129	12/04/10 08:41	INFO REMOVED	Wye (H&W) d/s Lugg	SIR FYNWY - MONMOUTHSHIRE	ST505904	Category 3 (Minor)	Category 2 (Significant)	Category 3 (Minor)	Oils and Fuel	Lubricating Oils	Unauthorised Activity	Illegal Waste Site	Yes	Waste Management	Other Waste Management Source
771660	19/04/10 14:40	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST348863	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Cause Not Identified	Not Identified	No		
773056	22/04/10 20:55	Christchurch	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST345896	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No		
773381	23/04/10 15:22	Llanbeder	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST383899	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Oils and Fuel	Diesel	Containment and Control Failure	Accidental Spillage	No		
773948	26/04/10 11:27	Whitewall Common	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST422868	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Soils and Clay	Unauthorised Activity	Unauthorised Discharge or Disposal	No		
774199	26/04/10 18:25	M4 J24	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST360896	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Inorganic Chemical Wastes	Unauthorised Activity	Fly-Tipping	No		
774452	27/04/10 11:47	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST264868	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Authorised Activity	Other Authorised Activity	Yes	Domestic and Residential	Private Dwellings
774647	27/04/10 16:47	INFO REMOVED	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST249815	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Service Sector	Other Service Sector Premises
775327	29/04/10 11:33	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST243898	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Vehicles and Vehicle Parts	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling
778824	11/05/10 16:44	INFO REMOVED	Llwyd	CASNEWYDD - NEWPORT	ST337916	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Specific Waste Materials	Other Specific Waste Material	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Manufacturing	Building Products
780803	18/05/10 09:10	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST433854	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No		
782098	21/05/10 11:25	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST435850	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Other Atmospheric Pollutant or Effect	Other Cause	Other	Yes	Water Industry	Sewage Treatment Works
783440	25/05/10 11:23	Broad Mead	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST396830	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Soils and Clay	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Dairy
785946	02/06/10 11:36	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST339862	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Oils and Fuel	Other Oil or Fuel	Containment and Control Failure	Control Measure Failure	No		
787439	07/06/10 08:23	Ty-c?ch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST278813	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No		
787636	07/06/10 13:23	Rogerstone	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST272874	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Inert Materials and Wastes	Soils and Clay	Containment and Control Failure	Control Measure Failure	Yes	Other Source	Other
788533	09/06/10 15:56	INFO REMOVED	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST249814	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Commercial Waste	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Other Source	Other
789687	13/06/10 11:58	INFO REMOVED	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST249814	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Metal Wastes	Unauthorised Activity	Other Unauthorised Activity	Yes	Service Sector	Other Service Sector Premises
793007	22/06/10 15:12	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST252814	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No		
793959	24/06/10 16:17	Pillgwenlly	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST314872	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Organic Chemicals/Products	Other Organic Chemical or Product	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Service Sector	Catering and Accommodation
795129	28/06/10 10:41	Causeway	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST430863	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No		
796363	30/06/10 15:52	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST346864	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No		
797172	02/07/10 11:03	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST291810	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Metal Wastes	Unauthorised Activity	Fly-Tipping	No		
800936	12/07/10 09:39	Ty-c?ch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST276812	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Other Pollutant	Other	Unauthorised Activity	Vandalism	Yes	Public Administration	Environment Agency
802537	15/07/10 14:31	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST325859	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Electrical Equipment	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Transport	Road
804270	20/07/10 17:59	Liswerry	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST340868	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Noise	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Power Generation and Supply	Gas-Fired
805746	24/07/10 12:24	Liswerry	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST344874	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Noise	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Power Generation and Supply	Gas-Fired
806862	27/07/10 15:14	Crick	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST489903	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Diesel	Cause Not Identified	Not Identified	No		
807149	28/07/10 10:44	Crick	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST488900	Category 4 (No Impact)	Category 4 (No Impact)	Category 2 (Significant)	Sewage Materials	Grey Water	Containment and Control Failure	Septic Tank or Sewage Treatment Plant Failure	Yes	Domestic and Residential	Nursing and Residential Homes
814677	19/08/10 11:32	Portskewett	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST487883	Category 4 (No Impact)	Category 4 (No Impact)	Category 2 (Significant)	Sewage Materials	Crude Sewage	Cause Not Identified	Not Identified	No		
814950	20/08/10 09:59	Goldcliff	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST367830	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Soils and Clay	Authorised Activity	Consented In-River Works	Yes	Public Administration	Environment Agency
815230	21/08/10 09:05	Samson Court	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST375837	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No		
815511	22/08/10 21:17	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST348840	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Pumping Station
815584	23/08/10 09:19	New Gout	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST324836	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Noise	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Power Generation and Supply	Gas-Fired
817331	27/08/10 17:24	INFO REMOVED	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST246817	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inorganic Chemicals/Products	Other Inorganic Chemical or Product	Containment and Control Failure	Control Measure Failure	Yes	Manufacturing	Other Manufacturing Sector Source
819249	03/09/10 15:43	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST314908	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Sheep
819952	06/09/10 15:43	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST319858	Category 3 (Minor)	Category 2 (Significant)	Category 2 (Significant)	Oils and Fuel	Crude Oil	Containment and Control Failure	Accidental Spillage	Yes	Other Source	Other
821256	09/09/10 18:03	Goldcliff Pill	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST367828	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Soils and Clay	Other Cause	Other	Yes	Natural Source	Other Natural Source
822047	13/09/10 11:42	M4 J25a	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST314906	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Other Inert Material or Waste	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Other Waste Management Source

822336	14/09/10 09:30	Somerton	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST325836	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Noise	Containment and Control Failure	Control Measure Failure	Yes	Power Generation and Supply	Gas-Fired
824115	20/09/10 13:49	INFO REMOVED	Llwyd	CASNEWYDD - NEWPORT	ST337916	Category 4 (No Impact)	Category 4 (No Impact)	Category 2 (Significant)	Multiple Pollutants	2 Pollutants Include Rocks and Gravel	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Manufacturing	Building Products
824351	21/09/10 11:24	Coed y Squire	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST252894	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Noise	Other Cause	Other	Yes	Other Source	Other
824635	22/09/10 09:13	Somerton	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST324836	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Noise	Containment and Control Failure	Control System Failure	Yes	Power Generation and Supply	Gas-Fired
825625	25/09/10 09:05	Pilldu	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST245802	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Cause Not Identified	Not Identified	No		
825822	27/09/10 08:46	Pilldu	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST245802	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Cause Not Identified	Not Identified	No		
828904	07/10/10 10:26	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST473905	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Pipe Failure above ground	Yes	Water Industry	Foul Sewer
828915	07/10/10 11:02	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST257808	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Oils and Fuel	Mixed/Waste Oils	Unauthorised Activity	Fly-Tipping	No		
829993	11/10/10 18:33	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST478892	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Ammonia/Amine Odour	Authorised Activity	Consented Works on Land	Yes	Agriculture	Arable
830131	12/10/10 10:34	M4 J24	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST361897	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Metal Wastes	Unauthorised Activity	Other Unauthorised Activity	Yes	Domestic and Residential	Private Dwellings
830164	12/10/10 11:13	M4 J24	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST361897	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Service Sector	Construction and Demolition
832317	20/10/10 13:52	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST343857	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No		
833111	25/10/10 08:10	Magor	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST425874	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Suspended Solids	Natural Causes	Other Extreme Weather Conditions	Yes	Water Industry	Rising Main
834057	28/10/10 12:20	Ty-c?ch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277817	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Soils and Clay	Authorised Activity	Consented Works on Land	Yes	Agriculture	Other Agricultural Source
834413	29/10/10 14:52	Ballan Moor	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST488893	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Unauthorised Activity	Other Unauthorised Activity	Yes	Service Sector	Recreation and Sports
834810	01/11/10 11:27	Barecroft Common	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST411869	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Agriculture	Other Agricultural Source
837625	11/11/10 12:01	Garth	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST267875	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Combined Sewer Overflow
839067	17/11/10 11:42	Somerton	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST338876	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Vehicles and Vehicle Parts	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Other Waste Management Source
839688	19/11/10 14:30	Caldicot	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST473883	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No		
841352	28/11/10 13:13	New Gout	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST324836	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Containment and Control Failure	Control System Failure	Yes	Power Generation and Supply	Gas-Fired
841377	28/11/10 16:53	Siemens (Severn Power)	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST325836	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Organic Chemicals/Products	Alcohols/Aldehydes	Containment and Control Failure	Pipe Failure above ground	Yes	Power Generation and Supply	Gas-Fired
841786	01/12/10 09:34	Wentlooge Level	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277817	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Suspended Solids	Authorised Activity	Other Authorised Activity	Yes	Agriculture	Arable
844170	14/12/10 09:50	Coed y Squire	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST253895	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	General Biodegradable Materials and Wastes	Food and Drink	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Manufacturing	Food Processing
845291	20/12/10 22:30	New Gout	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST324836	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Other Contaminated Water	Containment and Control Failure	Overfilling of Tank or Container (Bunded)	Yes	Power Generation and Supply	Gas-Fired
847827	06/01/11 17:09	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST445854	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Multiple Pollutants	2 Pollutants Include Soils and Clay	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Sheep
848448	10/01/11 09:30	Sudbrook	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST500876	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Pumping Station
849235	12/01/11 13:31	Malpas	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST301902	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Natural Causes	Other Extreme Weather Conditions	No		
851868	20/01/11 17:12	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST292810	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No		
854181	31/01/11 09:24	Coed Bald	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST276904	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	3 Pollutants Include Other General Biodegradable Material or Waste	Unauthorised Activity	Fly-Tipping	No		
854584	01/02/11 11:04	Clearwell	Rhymney	CASNEWYDD - NEWPORT	ST260852	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Premises Type Not Identified	Not Identified
855713	04/02/11 18:45	Causeway	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST431862	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Rising Main
856496	07/02/11 16:47	Duffryn	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST298852	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Specific Waste Materials	Household Waste	Unauthorised Activity	Other Unauthorised Activity	No		
857644	11/02/11 10:59	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST290814	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Beef
857686	11/02/11 12:01	M4 J26	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST307898	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No		
857938	12/02/11 10:58	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST261826	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Other Agricultural Source
858497	14/02/11 21:15	Lodge Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST325909	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer
858698	15/02/11 14:45	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST291810	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Multiple Pollutants	2 Pollutants Include Other General Biodegradable Material or Waste	Unauthorised Activity	Fly-Tipping	No		
860555	22/02/11 15:37	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST339860	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Transport	Road
861852	28/02/11 12:43	Cold Harbour Pill	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST430842	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Final Effluent	Other Cause	Other	Yes	Premises Type Not Identified	Not Identified
862553	02/03/11 14:25	Duffryn	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST295856	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	3 Pollutants Include Unidentified Oil	Unauthorised Activity	Fly-Tipping	No		
864694	10/03/11 12:23	Maerdy	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST285835	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Specific Waste Materials	Other Specific Waste Material	Unauthorised Activity	Fly-Tipping	No		
866549	17/03/11 08:31	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST337863	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Metal Wastes	Fires	Burning of Waste	No		
867103	18/03/11 14:18	Barnardtown	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST314884	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Other Oil or Fuel	Unauthorised Activity	Unauthorised Waste Management Activity	No		
867955	21/03/11 17:00	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST435850	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Chemical Odour	Containment and Control Failure	Control Measure Failure	Yes	Waste Management	Composting Facility
868160	22/03/11 11:51	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST348916	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Discharge or Disposal	No		
869229	24/03/11 16:34	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST291810	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No		
870792	29/03/11 12:49	Malpas	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST304908	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Unauthorised Activity	Unauthorised Discharge or Disposal	No		
870930	29/03/11 16:05	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST341857	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Other Source	Other
871059	30/03/11 08:43	Pontymister	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST246900	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No		
872481	04/04/11 14:00	Uskmouth	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST336834	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Agricultural Materials and Wastes	Other Agricultural Material or Waste	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Agriculture	Dairy
872484	04/04/11 14:00	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST350835	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Agricultural Materials and Wastes	Other Agricultural Material or Waste	Containment and Control Failure	Control Measure Failure	No	Agriculture	Dairy
872517	04/04/11 14:57	Coed Garw	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST287893	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	Sewage Materials	Final Effluent	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Service Sector	Recreation and Sports
872576	04/04/11 16:55	Blacktown	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST263813	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Contaminated Construction & Demolition Mat & Waste	Unauthorised Activity	Illegal Waste Site	Yes	Agriculture	Beef
873870	08/04/11 12:02	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST299816	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Gas and Fuel Oils	Containment and Control Failure	Storage Tank or Container Failure (Unbunded)	Yes	Domestic and Residential	Private Dwellings
875782	14/04/11 10:45	Fair Orchard	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST302829	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Unauthorised Activity	Unauthorised Discharge or Disposal	No		
876537	16/04/11 10:52	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST244897	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Containment and Control Failure	Wrong Connection	No		
877691	19/04/11 16:06	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST328860	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Sulphide Odour	Other Cause	Other	Yes	Waste Management	Other Waste Management Source
879516	26/04/11 03:18	New Gout	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST319842	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Smoke	Fires	Other Fire	Yes	Waste Management	Metal Recycling
881869	04/05/11 12:44	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST320858	Category 4 (No Impact)	Category 2 (Significant)	Category 2 (Significant)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No		
882379	05/05/11 17:19	Cold Harbour Pill	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST435849	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Other Atmospheric Pollutant or Effect	Unauthorised Activity	Vandalism	Yes	Waste Management	Composting Facility
883190	09/05/11 08:03	Cold Harbour Pill	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST435849	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Other Atmospheric Pollutant or Effect	Unauthorised Activity	Vandalism	Yes	Waste Management	Composting Facility
883433	09/05/11 15:45	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST242899	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Vehicles and Vehicle Parts	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Premises Type Not Identified	Not Identified
884045	11/05/11 12:36	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST345851	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Contaminated Water	Vehicle and Plant Washings	Containment and Control Failure	Control Measure Failure	Yes	Other Source	Other
887538	23/05/11 17:27	Blacktown	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST263813	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Beef
887659	24/05/11 10:14	Coed Bald	Usk d/s Abergavenny	TOR-FAEN - TORFAEN	ST272909	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Unauthorised Activity	Other Unauthorised Activity	No		
888311	25/05/11 20:03	Bettws	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST299905	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Storm Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Combined Sewer Overflow
894369	16/06/11 05:28	Maindee			ST327882	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Fires	Other Fire	No		
894544	16/06/11 14:27	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST243898	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Metal Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling
896993	27/06/11 09:11	Draethen	Rhymney	CAERFFILI - CAERPHILLY	ST229872	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Inert Materials and Wastes	Soils and Clay	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Domestic and Residential	Private Dwellings
902439	13/07/11 11:12	Peterstone Wentlooge	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST269802	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Control Measure Failure	No		
905395	22/07/11 10:25	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST312893	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Tyres	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Transport	Other Transport Source

906409	26/07/11 09:09	M4 J26	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST307897	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Firefighting Run-Off	Fires	Other Fire	No			
910152	04/08/11 10:29	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST473874	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No			
912626	11/08/11 16:53	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST321858	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Organic Chemicals/Products	Hydrocarbons	Containment and Control Failure	Process Plant Failure (sudden)	Yes	Waste Management	Other Waste Management Source	
914733	18/08/11 14:14	Summerleaze	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST427849	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No			
920213	05/09/11 18:10	Penrhiw	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST239912	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Electrical Equipment	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Domestic and Residential	Private Dwellings	
921951	12/09/11 11:50	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST366876	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No			
923211	16/09/11 09:48	Coed y Squire	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST251894	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Other Atmospheric Pollutant or Effect	Containment and Control Failure	Control Measure Failure	Yes	Manufacturing	Food Processing	
929038	03/10/11 16:12	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST325859	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Other Inert Material or Waste	Fires	Burning of Waste	Yes	Transport	Road	
930758	10/10/11 09:27	Garth	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST264872	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
932619	15/10/11 12:14	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST325857	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Waste Management	Transfer Station	
933601	19/10/11 12:08	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST322858	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Other Atmospheric Pollutant or Effect	Containment and Control Failure	Control Measure Failure	Yes	Waste Management	Transfer Station	
933923	20/10/11 13:30	Level of Mendalgief	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST301867	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Illegal Waste Site	No			
936946	31/10/11 14:22	Gwernleyshon	Rhymney	CASNEWYDD - NEWPORT	ST235867	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Storm Sewage	Containment and Control Failure	Combined Sewer Overflow (CSO)	Yes	Water Industry	Combined Sewer Overflow	
937470	02/11/11 09:25	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST344857	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Other Contaminated Water	Other Cause	Other	Yes	Waste Management	Transfer Station	
938267	04/11/11 12:39	Uskmouth	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST329839	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Steam	Natural Causes	Natural Process	Yes	Power Generation and Supply	Coal-Fired	
938300	04/11/11 13:44	The Village	Llwyd	CASNEWYDD - NEWPORT	ST343906	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Agricultural Materials and Wastes	Other Agricultural Material or Waste	Unauthorised Activity	Other Unauthorised Activity	No			
945679	05/12/11 11:15	Caerleon or Caerllion	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST332897	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No			
946951	10/12/11 12:25	Corporation Road, Newport, NP19 4XF	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST333857	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	Atmospheric Pollutants and Effects	Chemical Odour	Containment and Control Failure	Control Measure Failure	Yes	Manufacturing	Chemical Manufacturing	
947089	12/12/11 00:49	Pwll-Pen	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST351868	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Smoke	Fires	Other Fire	Yes	Manufacturing	Iron and Steel	
947655	13/12/11 14:48	Fair Orchard	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST308841	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Agriculture	Dairy	
948812	19/12/11 12:05	Cleppa Park	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST272844	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Service Sector	Construction and Demolition	
949145	20/12/11 15:20	M4 J25a	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST313906	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Treatment Facility	
950665	30/12/11 13:15	Christchurch	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST344894	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Pipe Failure below ground	Yes	Water Industry	Foul Sewer	
951112	03/01/12 11:08	Great Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST383891	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
951587	04/01/12 12:42	Duffryn	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST293859	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Multiple Pollutants	2 Pollutants Include Unidentified Oil	Containment and Control Failure	Road Traffic Accident (RTA)	Yes	Retail Sector	Supermarkets	
952512	07/01/12 09:52	Somerton	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST334872	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No			
954287	13/01/12 17:55	Christchurch	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST338895	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Authorised Activity	Other Authorised Activity	No			
954544	15/01/12 17:03	Great Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST379888	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Pumping Station	
955229	17/01/12 16:57	M4 J25a	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST313908	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Household Waste	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Beef	
955323	18/01/12 10:09	M4 J25a	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST313906	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Agriculture	Dairy	
955439	18/01/12 13:37	Peterstone Wentlooge	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST267807	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Waste Management	Transfer Station	
958882	01/02/12 16:11	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST243839	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Asbestos	Unauthorised Activity	Fly-Tipping	No			
959774	06/02/12 09:15	Ty-c?ch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST278817	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Authorised Activity	Other Authorised Activity	Yes	Agriculture	Other Agricultural Source	
960510	08/02/12 14:14	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST313894	Category 3 (Minor)	Category 2 (Significant)	Category 3 (Minor)	Specific Waste Materials	Tyres	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Premises Type Not Identified	Not Identified	
961021	10/02/12 13:43	Cefn Llogell	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST263851	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Tyres	Authorised Activity	Consented Works on Land	Yes	Agriculture	Stables	
961447	13/02/12 11:44	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST313897	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Tyres	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Transport	Other Transport Source	
962455	16/02/12 16:10	Great Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST384892	Category 3 (Minor)	Category 3 (Minor)	Category 2 (Significant)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
965460	28/02/12 10:21	Ty-c?ch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST276812	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Metal Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Other Agricultural Source	
969546	12/03/12 13:16	INFO REMOVED	Rhymney	CASNEWYDD - NEWPORT	ST237840	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No	Agriculture	Other Agricultural Source	
970072	13/03/12 16:16	Great Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST385892	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Fly-Tipping	No			
971121	16/03/12 12:08	Llanbeder	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST390907	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
972622	21/03/12 12:00	Portskewett	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST498881	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Domestic and Residential	Private Dwellings	
973462	23/03/12 12:43	Coed y Squire	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST258893	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Pipe Failure above ground	Yes	Water Industry	Foul Sewer	
973832	24/03/12 14:25	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST292810	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Multiple Pollutants	2 Pollutants Include Other Specific Waste Material	Unauthorised Activity	Fly-Tipping	No			
974792	27/03/12 12:05	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST471911	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	General Biodegradable Materials and Wastes	Composted Material	Other Cause	Other	Yes	Waste Management	Composting Facility	
975496	28/03/12 14:08	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST311891	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Commercial Waste	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Premises Type Not Identified	Not Identified	
975523	28/03/12 14:47	Cefn	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST278884	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Specific Waste Materials	Vehicles and Vehicle Parts	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Domestic and Residential	Private Dwellings	
977160	02/04/12 09:20	Maindee	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST329884	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Petrol	Other Cause	Other	Yes	Other Source	Other	
977847	03/04/12 14:59	M4 J25	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST331898	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Household Waste	Unauthorised Activity	Fly-Tipping	No			
978124	04/04/12 12:01	Rogerstone	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277871	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Storm Sewage	Containment and Control Failure	Sewer Failure or Overflow	No			
978584	05/04/12 14:09	Danygraig	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST233905	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	4 Pollutants Include Vegetable Cuttings and Deposits	Unauthorised Activity	Fly-Tipping	No			
979324	09/04/12 20:03	Gaer	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST296861	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
981038	14/04/12 16:33	Bettws	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST291906	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	No	Water Industry	Foul Sewer	
981503	16/04/12 15:46	Fair Orchard	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST302829	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Domestic and Residential	Private Dwellings	
983994	25/04/12 11:11	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST266820	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Manufacturing	Timber	
984580	26/04/12 14:54	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST325859	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Fires	Burning of Waste	No			
986333	30/04/12 17:33	INFO REMOVED	Wye H&W downstream of Lugg - Wales		ST506905	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Overfilling of Tank or Container (Bunded)	Yes	Retail Sector	Food	
986745	01/05/12 14:30	Great Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST384893	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
988890	08/05/12 14:30	Whitewall Common	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST422868	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Other Inert Material or Waste	Cause Not Identified	Not Identified	No			
989510	10/05/12 11:44	Gwernleyshon	Rhymney	CASNEWYDD - NEWPORT	ST236867	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Other Sewage Material	Containment and Control Failure	Combined Sewer Overflow (CSO)	Yes	Water Industry	Foul Sewer	
990279	12/05/12 17:42	Glasllwch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST283875	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Oils and Fuel	Diesel	Fires	Other Fire	Yes	Transport	Road	
990729	14/05/12 16:36	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST471911	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Other Odour	Containment and Control Failure	Control System Failure	Yes	Waste Management	Composting Facility	
991708	17/05/12 16:12	Gwernleyshon	Rhymney	CASNEWYDD - NEWPORT	ST236868	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Other Sewage Material	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Water Industry	Combined Sewer Overflow	
993469	23/05/12 12:33	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST341860	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Organic Chemicals/Products	Other Organic Chemical or Product	Containment and Control Failure	Accidental Spillage	Yes	Transport	Road	
994005	24/05/12 15:32	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST315864	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Tyres	Unauthorised Activity	Fly-Tipping	No			
996649	31/05/12 13:46	Alway	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST347888	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Oils and Fuel	Diesel	Containment and Control Failure	Underground Storage Tank Failure	Yes	Other Source	Other	
997554	03/06/12 10:03	Liswerry	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST340876	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Natural Causes	Natural Process	No			
998729	07/06/12 14:27	Gwernleyshon	Rhymney	CASNEWYDD - NEWPORT	ST236868	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Authorised Activity	Other Authorised Activity	Yes	Water Industry	Combined Sewer Overflow	
999511	10/06/12 10:58	Liswerry	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST342868	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Diesel	Containment and Control Failure	Road Traffic Accident (RTA)	Yes	Transport	Road	
1001588	14/06/12 14:31	Barrack Hill	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST305895	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Other Pollutant	Other	Natural Causes	Natural Process	No			
1004451	22/06/12 15:59	Fourteen Locks	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST283886	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Rocks and Gravel	Unauthorised Activity	Unauthorised Waste Management Activity	No			

1009024	05/07/12 10:09	Ty-c?ch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST279813	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Tyres	Unauthorised Activity	Illegal Waste Site	Yes	Waste Management	Transfer Station
1009134	05/07/12 12:21	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST312892	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No		
1011425	09/07/12 13:54	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST471911	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	Multiple Pollutants	2 Pollutants Include Smoke	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Composting Facility
1011466	09/07/12 14:35	Castell Coch	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST422886	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Manufacturing	Timber
1012235	10/07/12 19:11	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST346823	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No		
1012938	12/07/12 10:51	Coed y Squire	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST251894	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Other Cause	Other	Yes	Other Source	Other
1013216	12/07/12 17:03	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST471911	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	General Biodegradable Materials and Wastes	Other General Biodegradable Material or Waste	Fires	Other Fire	Yes	Waste Management	Composting Facility
1015125	18/07/12 09:42	Ringland	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST356888	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Asbestos	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Treatment Facility
1015599	19/07/12 11:31	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST322858	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Other Inert Material or Waste	Unauthorised Activity	Unauthorised Waste Management Activity	No		
1016019	20/07/12 11:11	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST267825	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Specific Waste Materials	Asbestos	Unauthorised Activity	Fly-Tipping	No		
1016121	20/07/12 14:09	Rogerstone	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277875	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	Oils and Fuel	Diesel	Other Cause	Other	Yes	Transport	Road
1016730	23/07/12 08:01	Liswerry	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST343869	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Mixed/Waste Oils	Containment and Control Failure	Road Traffic Accident (RTA)	Yes	Waste Management	Other Waste Management Source
1018927	27/07/12 08:42	Sea Reach	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST323831	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No		
1019052	27/07/12 10:49	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST471895	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Soils and Clay	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Other Source	Other
1019208	27/07/12 15:00	Pillgwenlly	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST311877	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Containment and Control Failure	Pipe Failure below ground	Yes	Water Industry	Water Distribution System
1019328	27/07/12 18:49	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST267825	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Asbestos	Unauthorised Activity	Fly-Tipping	No		
1019657	29/07/12 15:48	New Gout	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST312841	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Oils and Fuel	Unidentified Oil	Containment and Control Failure	Other Inadequate Control or Containment	No		
1019740	29/07/12 22:43	Level of Mendalgief	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST306855	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Waste Management	Transfer Station
1020219	31/07/12 09:14	M4 J26	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST303900	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Other Inert Material or Waste	Unauthorised Activity	Fly-Tipping	No		
1022008	04/08/12 13:56	Fourteen Locks	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST287884	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Tyres	Unauthorised Activity	Fly-Tipping	No		
1025107	12/08/12 18:53	Pilldu	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST243813	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	No		
1025719	14/08/12 09:34	Caerwent	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST469908	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Flies	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Waste Management	Composting Facility
1025742	14/08/12 09:53	Summerleaze	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST422837	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Organic Chemicals/Products	Solvents	Unauthorised Activity	Unauthorised Discharge or Disposal	No		
1027916	18/08/12 17:31	Coed y Squire	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST252894	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	General Biodegradable Materials and Wastes	Other General Biodegradable Material or Waste	Containment and Control Failure	Storage Tank or Container Failure (Bunded)	Yes	Other Source	Other
1028446	20/08/12 11:51	Ringland	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST357886	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Sewage Materials	Grey Water	Cause Not Identified	Not Identified	No		
1028926	21/08/12 09:51	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST263825	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Illegal Waste Site	Yes	Agriculture	Other Agricultural Source
1032643	31/08/12 13:19	A48(M) J29a	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST236818	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	No		
1033656	04/09/12 09:27	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST281813	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Asbestos	Unauthorised Activity	Fly-Tipping	No		
1036327	11/09/12 09:45	New Quay Road, Felnex Industrial Estate, Newport	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST322858	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Other Odour	Containment and Control Failure	Normal Operation	Yes	Waste Management	Other Waste Management Source
1036455	11/09/12 13:18	Coed y Squire	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST259892	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Water Industry	Combined Sewer Overflow
1036784	12/09/12 11:50	Castell Coch	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST422887	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Manufacturing	Timber
1036894	12/09/12 15:22	Wentlooge Level	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST281813	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Commercial Waste	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Other Source	Other
1037406	14/09/12 10:33	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST312892	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Waste Management	Metal Recycling
1039146	20/09/12 12:31	Coed y Squire	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST257894	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Water Industry	Combined Sewer Overflow
1039452	21/09/12 11:00	Coed Garw	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST282891	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Other Water Industry Premises
1041651	26/09/12 02:14	Priory Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST369906	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Diesel	Other Cause	Other	Yes	Transport	Road
1042242	27/09/12 10:31	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST471895	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Rocks and Gravel	Unauthorised Activity	Unauthorised Waste Management Activity	No		
1042599	28/09/12 09:30	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST313894	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Other Pollutant	Other	Unauthorised Activity	Fly-Tipping	No		
1043716	02/10/12 13:15	INFO REMOVED	Rhymney	CAERDYDD - CARDIFF	ST231823	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Commercial Waste	Unauthorised Activity	Unauthorised Waste Management Activity	No		
1044356	04/10/12 13:45	Mariner Way, Newport, NP19 4PQ	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST323859	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Other Odour	Authorised Activity	Other Authorised Activity	No		
1044545	05/10/12 09:32	Rogerstone	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST278876	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No		
1047907	16/10/12 12:02	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST321863	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Cause Not Identified	Not Identified	Yes	Water Industry	Pumping Station
1048011	16/10/12 15:36	Peterstone Wentlooge	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST260803	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No		
1048012	16/10/12 15:39	Peterstone Wentlooge	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST260803	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Inert Materials and Wastes	Other Inert Material or Waste	Unauthorised Activity	Unauthorised Discharge or Disposal	No		
1050450	24/10/12 16:54	Sudbrook	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST508876	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Other Specific Waste Material	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Waste Management	Treatment Facility
1050665	25/10/12 14:06	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST317866	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Vehicles and Vehicle Parts	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling
1051774	30/10/12 16:13	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST323859	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Pumping Station
1054140	07/11/12 11:37	Causeway	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST436864	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	Oils and Fuel	Gas and Fuel Oils	Unauthorised Activity	Vandalism	Yes	Domestic and Residential	Private Dwellings
1054163	07/11/12 12:23	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST243897	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Unidentified Oil	Unauthorised Activity	Unauthorised Discharge or Disposal	No		
1056245	15/11/12 10:58	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST317866	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Other Specific Waste Material	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling
1059271	23/11/12 10:23	Eastern Dry Dock, Newport, NP19 4RE	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST331853	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Metal Wastes	Unauthorised Activity	Other Unauthorised Activity	Yes	Waste Management	Exempt Spreading/Recovery Facility
1064255	30/11/12 11:27	Malpas	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST308909	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Rising Main
1064412	30/11/12 15:13	Deepweir	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST476874	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Rising Main
1065202	03/12/12 16:00	Newport	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST331854	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Transfer Station
1065213	03/12/12 16:24	Caerleon or Caerllion	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST332898	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Soils and Clay	Unauthorised Activity	Unauthorised Waste Management Activity	No		
1066061	06/12/12 14:25	Caerau Park	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST292876	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Pipe Failure below ground	Yes	Water Industry	Foul Sewer
1066996	10/12/12 16:23	Common-y-coed	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST429897	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Other Inert Material or Waste	Unauthorised Activity	Unauthorised Waste Management Activity	No		
1069627	19/12/12 15:08	Bowleaze Common	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST371854	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Insulating and Cable Oils	Containment and Control Failure	Accidental Spillage	Yes	Power Generation and Supply	Electricity Supply and Distribution
1069986	20/12/12 11:29	Llanbeder	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST385903	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Grey Water	Natural Causes	Other Extreme Weather Conditions	Yes	Water Industry	Foul Sewer
1074091	31/12/12 12:11	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST471909	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Adopted Foul Sewer
1078893	17/01/13 11:54	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST474910	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Soils and Clay	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Transfer Station
1080054	23/01/13 11:51	St Mellons	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST235817	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Metal Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	No		
1080485	24/01/13 18:30	Garth	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST266875	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Combined Sewer Overflow (CSO)	Yes	Water Industry	Combined Sewer Overflow
1081511	28/01/13 10:45	Ty-c?ch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST270813	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Asbestos	Unauthorised Activity	Fly-Tipping	No		
1083266	02/02/13 03:23	Barnardtown	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST314884	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No		
1083740	04/02/13 14:51	Leechpool	Wye H&W downstream of Lugg - Wales		ST509897	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Domestic and Residential	Private Dwellings
1086250	13/02/13 15:20	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST340860	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Lubricating Oils	Unauthorised Activity	Unauthorised Discharge or Disposal	No		
1086566	14/02/13 13:42	INFO REMOVED	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST255809	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Inert Materials and Wastes	Other Inert Material or Waste	Other Cause	Other	No		
1086810	15/02/13 11:26	Rogerstone	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277874	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Other Cause	Other	No		
1086848	15/02/13 12:49	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST242899	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Waste Management	Metal Recycling
1087870	19/02/13 10:33	Langstone Court	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST368898	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Domestic and Residential	Private Dwellings

1087925	19/02/13 12:07	Great Porton	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST383832	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Agricultural Materials and Wastes	Slurry and Dilute Slurry	Containment and Control Failure	Storage Tank or Container Failure (Unbunded)	Yes	Agriculture	Beef	
1087979	19/02/13 14:23	Pilldu	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST246808	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Soils and Clay	Unauthorised Activity	Fly-Tipping	No			
1088590	21/02/13 14:20	Eastern Dry Dock, Newport, NP19 4RE	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST332853	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Vehicles and Vehicle Parts	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling	
1090747	01/03/13 17:22	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST247894	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Oils and Fuel	Diesel	Containment and Control Failure	Accidental Spillage	Yes	Transport	Transport Depots/Cargo Handling	
1090787	02/03/13 06:35	Caldicot	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST480881	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No			
1091767	05/03/13 12:22	Rogerstone	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277874	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Cause Not Identified	Not Identified	No			
1092554	07/03/13 14:41	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST348863	Category 3 (Minor)	Category 2 (Significant)	Category 4 (No Impact)	Sewage Materials	Grey Water	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Manufacturing	Food Processing	
1092558	07/03/13 14:42	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST347861	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inorganic Chemicals/Products	Other Inorganic Chemical or Product	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Manufacturing	General Engineering	
1092659	07/03/13 20:57	Gaer	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST294868	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Service Sector	Catering and Accommodation	
1094916	16/03/13 12:07	Pilldu	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST244803	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Grey Water	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Water Industry	Foul Sewer	
1096166	20/03/13 10:48	Ballan Moor	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST484894	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Multiple Pollutants	2 Pollutants Include Soils and Clay	Containment and Control Failure	Control Measure Failure	Yes	Service Sector	Construction and Demolition	
1097428	25/03/13 14:43	Ty-c?ch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST271812	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Asbestos	Unauthorised Activity	Fly-Tipping	No			
1097490	25/03/13 17:39	Lodge Wood	Llwyd	CASNEWYDD - NEWPORT	ST326909	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Cause Not Identified	Not Identified	Yes	Water Industry	Rising Main	
1098520	30/03/13 14:34	Moor Barn	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST360851	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Oils and Fuel	Diesel	Other Cause	Other	Yes	Domestic and Residential	Private Dwellings	
1100799	09/04/13 09:02	Stephenson Industrial Estate, Unit 6-9, Stephenson Street,	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST327863	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Transport	Road	
1100875	09/04/13 11:38	Caerleon or Caerllion	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST338900	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Beef	
1103365	16/04/13 21:11	Langstone Court	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST369897	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
1104347	19/04/13 15:10	Danygraig	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST236905	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Containment and Control Failure	Pipe Failure above ground	Yes	Water Industry	Foul Sewer	
1104784	21/04/13 13:08	Sudbrook	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST508876	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No			
1105011	22/04/13 11:15	Magor	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST426872	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Multiple Pollutants	2 Pollutants Include Vegetable Cuttings and Deposits	Unauthorised Activity	Fly-Tipping	No			
1106293	25/04/13 09:53	Fourteen Locks	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST286882	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Unauthorised Activity	Illegal Waste Site	No			
1106933	26/04/13 15:17	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST272803	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Fly-Tipping	No			
1108505	01/05/13 17:21	Rogerstone	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277874	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
1109651	05/05/13 08:09	Vinegar Hill	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST432870	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Gas and Fuel Oils	Other Cause	Other	Yes	Domestic and Residential	Private Dwellings	
1112109	13/05/13 09:43	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST248823	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Grey Water	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Service Sector	Catering and Accommodation	
1112145	13/05/13 10:37	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST317866	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Metal Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling	
1112662	14/05/13 15:52	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST310860	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Fly-Tipping	No			
1113325	16/05/13 11:50	Pontymister	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST240900	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Vehicles and Vehicle Parts	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling	
1113560	17/05/13 08:49	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST313894	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	General Biodegradable Materials and Wastes	Other General Biodegradable Material or Waste	Unauthorised Activity	Fly-Tipping	Yes	Manufacturing	General Engineering	
1113680	17/05/13 13:05	New Park	Rhymney	CASNEWYDD - NEWPORT	ST256849	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Authorised Activity	Consented Works on Land	Yes	Agriculture	Arable	
1114240	20/05/13 08:50	Portskewett	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST489881	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	General Biodegradable Materials and Wastes	Other General Biodegradable Material or Waste	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Transfer Station	
1115515	23/05/13 13:11	Caldicot Pill	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST490876	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No			
1115945	25/05/13 02:53	Level of Mendalgief	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST306855	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Waste Management	Transfer Station	
1118816	04/06/13 15:54	M4 J24	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST364896	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Unauthorised Activity	Other Unauthorised Activity	Yes	Other Source	Other	
1119207	05/06/13 14:29	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST266823	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Asbestos	Unauthorised Activity	Fly-Tipping	No			
1119235	05/06/13 15:05	INFO REMOVED	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST244817	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
1119937	07/06/13 11:11	INFO REMOVED	Llwyd	CASNEWYDD - NEWPORT	ST338915	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Contaminated Water	Other Contaminated Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Pumping Station	
1120889	10/06/13 16:00	Coed Garw	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST283891	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Other Pollutant	Microbiological	Natural Causes	Algal Activity	No			
1121873	13/06/13 09:33	Newport	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST349865	Category 3 (Minor)	Category 2 (Significant)	Category 4 (No Impact)	Contaminated Water	Other Contaminated Water	Containment and Control Failure	Wrong Connection	Yes	Manufacturing	Food Processing	
1122507	14/06/13 16:14	Uskmouth	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST329838	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Dust	Containment and Control Failure	Process Plant Failure (gradual)	Yes	Power Generation and Supply	Coal-Fired	
1122826	16/06/13 10:17	Coedkernew	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277829	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Asbestos	Unauthorised Activity	Fly-Tipping	No			
1123259	17/06/13 16:21	M4 J28	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST288860	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Treatment Facility	
1124517	20/06/13 16:08	Birdport	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST327853	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Specific Waste Materials	Other Specific Waste Material	Unauthorised Activity	Other Unauthorised Activity	Yes	Other Source	Other	
1126505	27/06/13 13:35	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST266820	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Vehicles and Vehicle Parts	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling	
1128138	02/07/13 17:32	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST291812	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	General Biodegradable Materials and Wastes	Other Animal Matter	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Other Agricultural Source	
1128389	03/07/13 13:40	Garth	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST266873	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Other Cause	Other	Yes	Water Industry	Foul Sewer	
1128878	04/07/13 15:14	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST317891	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Other Unauthorised Activity	Yes	Other Source	Other	
1129195	05/07/13 11:46	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST312892	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Vehicles and Vehicle Parts	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling	
1129772	07/07/13 14:41	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST343857	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Waste Management	Metal Recycling	
1130230	08/07/13 15:38	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST256815	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No			
1130323	08/07/13 18:31	Cleppa Park	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST274847	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No			
1130701	09/07/13 13:50	Fourteen Locks	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST284885	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Containment and Control Failure	Septic Tank or Sewage Treatment Plant Failure	Yes	Waste Management	Inert Landfill	
1133642	15/07/13 20:38	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST245895	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Specific Waste Materials	Other Specific Waste Material	Other Cause	Other	No			
1135125	18/07/13 12:00	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST304912	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Firefighting Run-Off	Fires	Other Fire	Yes	Transport	Road	
1137668	23/07/13 14:27	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST242899	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Urban Run-Off	Unauthorised Activity	Unauthorised Discharge or Disposal	No			
1138878	25/07/13 12:11	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST311859	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Other Specific Waste Material	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Manufacturing	Timber	
1139430	26/07/13 10:54	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST351832	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Household Waste	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Premises Type Not Identified	Not Identified	
1142481	01/08/13 16:31	Liswerry	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST348869	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Other Source	Other	
1142971	02/08/13 14:28	Pilldu	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST246804	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Other Pollutant	Microbiological	Natural Causes	Algal Activity	No			
1144579	06/08/13 17:22	Cold Harbour Pill	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST430843	Category 4 (No Impact)	Category 4 (No Impact)	Category 1 (Major)	Pollutant Not Identified	Not Identified	Natural Causes	Natural Process	No			
1146243	10/08/13 09:10	Great Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST383890	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No			
1146537	11/08/13 21:20	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST318867	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Containment and Control Failure	Accidental Spillage	No			
1146695	12/08/13 11:35	Danygraig	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST239905	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Service Sector	Construction and Demolition	
1147049	13/08/13 08:17	Level of Mendalgief	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST316850	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Containment and Control Failure	Abnormal Process Operation	Yes	Waste Management	Metal Recycling	
1147833	14/08/13 17:05	Uskmouth	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST334832	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Unauthorised Activity	Fly-Tipping	Yes	Other Source	Other	
1149792	20/08/13 14:40	Rogerstone	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277874	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Unauthorised Activity	Unauthorised Discharge or Disposal	No			
1149823	20/08/13 15:32	Bowleaze Common	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST370851	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Agricultural Materials and Wastes	Other Agricultural Material or Waste	Unauthorised Activity	Fly-Tipping	No			
1151257	23/08/13 13:15	Rogerstone	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277873	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Containment and Control Failure	Pipe Failure below ground	Yes	Water Industry	Foul Sewer	
1151602	24/08/13 12:47	Duffryn	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST300851	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Other Pollutant	Other	Cause Not Identified	Not Identified	No			
1152360	27/08/13 10:57	Trowbridge	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST239802	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Other Contaminated Water	Containment and Control Failure	Wrong Connection	No			
1153455	29/08/13 10:04	Blacktown	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST269813	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No			

1154644	02/09/13 09:10	Castleton	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST252834	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Agricultural Materials and Wastes	Slurry and Dilute Slurry	Containment and Control Failure	Accidental Spillage	No			
1154684	02/09/13 10:20	Caerau Park	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST291875	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
1156029	04/09/13 15:43	Bassaleg	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST275869	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No			
1156681	05/09/13 17:14	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST503901	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Kerosene and Aviation Fuel	Containment and Control Failure	Pipe Failure above ground	Yes	Domestic and Residential	Private Dwellings	
1159913	17/09/13 12:50	Barnardtown	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST308882	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Soils and Clay	Unauthorised Activity	Illegal Waste Site	No			
1161469	23/09/13 14:12	Whitewall Common	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST423868	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Mixed/Waste Oils	Unauthorised Activity	Fly-Tipping	No			
1165071	04/10/13 22:42	Newport	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST317850	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	Yes	Waste Management	Metal Recycling	
1165691	07/10/13 14:30	Allt-yr-yn	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST300883	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Soils and Clay	Containment and Control Failure	Drainage Failure	No			
1167717	15/10/13 09:16	Cefn Llogell	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST264840	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No			
1168106	16/10/13 11:48	INFO REMOVED	Rhymney	CAERFFILI - CAERPHILLY	ST236857	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	Multiple Pollutants	2 Pollutants Include Natural Organic Material	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Service Sector	Recreation and Sports	
1169369	21/10/13 14:08	M4 J25a	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST312906	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Other Sewage Material	Cause Not Identified	Not Identified	No			
1171931	29/10/13 16:53	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST275802	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Agriculture	Stables	
1176230	14/11/13 14:43	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST244898	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Commercial Waste	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Service Sector	Construction and Demolition	
1177625	20/11/13 22:35	INFO REMOVED	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST240820	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No			
1179428	28/11/13 12:29	Pilldu	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST242808	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Agricultural Materials and Wastes	Other Agricultural Material or Waste	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Agriculture	Stables	
1179633	29/11/13 10:37	Portskewett	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST489881	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Household Waste	Other Cause	Other	Yes	Waste Management	Transfer Station	
1180209	02/12/13 11:55	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST317866	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Unauthorised Activity	Other Unauthorised Activity	Yes	Waste Management	Metal Recycling	
1181757	06/12/13 13:09	Killcrow Hill	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST491903	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Exempt Spreading/Recovery Facility	
1183059	12/12/13 08:03	Cleppa Park	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST272846	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Diesel	Containment and Control Failure	Road Traffic Accident (RTA)	Yes	Transport	Road	
1183274	13/12/13 06:27	Coomassie Street, NEWPORT	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST316863	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Fires	Other Fire	No			
1183452	13/12/13 15:48	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST316864	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Tyres	Unauthorised Activity	Fly-Tipping	No			
1184199	17/12/13 14:43	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST484880	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Fires	Burning of Waste	No			
1184845	19/12/13 15:23	St Brides Wentlooge	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST292832	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Other Inert Material or Waste	Unauthorised Activity	Fly-Tipping	No			
1191248	07/01/14 08:31	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST317866	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling	
1195504	17/01/14 15:17	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST314897	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Transport	Transport Depots/Cargo Handling	
1195780	18/01/14 16:40	Barecroft Common	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST419868	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	General Biodegradable Materials and Wastes	Other General Biodegradable Material or Waste	Fires	Burning of Waste	Yes	Other Source	Other	
1196757	21/01/14 14:58	Whitewall Common	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST420867	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Fires	Other Fire	No			
1196976	22/01/14 10:49	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST362858	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Inert Materials and Wastes	Other Inert Material or Waste	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Manufacturing	Building Products	
1197183	22/01/14 16:48	Whitewall Common	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST420867	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No			
1197618	24/01/14 09:03	Tatton Farm	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST353863	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Chemically Contaminated Run-Off	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Waste Management	Transfer Station	
1198903	28/01/14 21:51	Blacktown	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST269813	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Fly-Tipping	No			
1199406	30/01/14 09:34	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST391910	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Household Waste	Unauthorised Activity	Fly-Tipping	No			
1201044	03/02/14 12:24	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST352863	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Illegal Waste Site	Yes	Transport	Transport Depots/Cargo Handling	
1201210	03/02/14 16:25	St Julians	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST332897	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	3 Pollutants Include Household Waste	Unauthorised Activity	Fly-Tipping	No			
1201436	04/02/14 10:55	M4 J25	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST322899	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Diesel	Other Cause	Other	No			
1205304	10/02/14 13:55	Goldcliff	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST373830	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Household Waste	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Other Agricultural Source	
1205350	10/02/14 14:42	Newport Docks	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST323844	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Treatment Facility	
1208987	17/02/14 10:20	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST242899	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Unidentified Oil	Other Cause	Other	No			
1210766	21/02/14 11:46	Peterstone Wentlooge	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST260805	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Other Specific Waste Material	Unauthorised Activity	Fly-Tipping	Yes	Transport	Road	
1210768	21/02/14 11:48	Peterstone Wentlooge	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST258807	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	4 Pollutants Include Soils and Clay	Unauthorised Activity	Fly-Tipping	Yes	Transport	Road	
1211021	22/02/14 10:15	Commercial Lane, Risca, NEWPORT	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST242899	Category 4 (No Impact)	Category 2 (Significant)	Category 3 (Minor)	Oils and Fuel	Mixed/Waste Oils	Unauthorised Activity	Unauthorised Discharge or Disposal	No			
1221402	26/03/14 12:26	Broad Mead	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST406839	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Rocks and Gravel	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Agriculture	Dairy	
1221465	26/03/14 14:34	Somerton	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST335874	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Service Sector	Construction and Demolition	
1222307	28/03/14 21:03	Cefn Llogell	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST267842	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No			
1222806	31/03/14 11:51	Pontymister	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST244906	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
1223378	01/04/14 14:25	Uskmouth	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST338835	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Sewage Materials	Other Sewage Material	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Domestic and Residential	Private Dwellings	
1223804	02/04/14 15:18	Dewstow House	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST464881	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Other Source	Other	
1224519	04/04/14 14:11	Peterstone Wentlooge	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST267802	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Service Sector	Catering and Accommodation	
1227483	15/04/14 13:03	Five Lanes	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST448907	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Soils and Clay	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Arable	
1229355	23/04/14 09:46	Level of Mendalgief	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST305857	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No			
1230274	25/04/14 16:28	Caerwent	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST460907	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Natural Causes	Dry Weather	No			
1232399	02/05/14 20:00	Maerdy	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST285835	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	General Biodegradable Materials and Wastes	Other General Biodegradable Material or Waste	Unauthorised Activity	Fly-Tipping	No			
1233409	07/05/14 12:36	Sealand Reen	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST291810	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No			
1238394	23/05/14 14:01	Killcrow Hill	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST491903	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Soils and Clay	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Other Source	Other	
1239251	27/05/14 12:58	Samson Court	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST376830	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Other Oil or Fuel	Unauthorised Activity	Other Unauthorised Activity	No			
1240756	01/06/14 00:55	Brynhedydd	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST258867	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No			
1241912	04/06/14 11:01	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST266824	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Fly-Tipping	No			
1242283	05/06/14 11:06	Somerton	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST332873	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Specific Waste Materials	Household Waste	Cause Not Identified	Not Identified	No			
1242300	05/06/14 11:36	Cefn Llogell	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST265842	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Smoke	Fires	Burning of Waste	Yes	Other Source	Other	
1242675	06/06/14 11:33	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST348863	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Other Contaminated Water	Cause Not Identified	Not Identified	No			
1244566	12/06/14 09:14	Killcrow Hill	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST491903	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Rocks and Gravel	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Exempt Spreading/Recovery Facility	
1244745	12/06/14 14:12	New House	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST275803	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Multiple Pollutants	3 Pollutants Include Household Waste	Unauthorised Activity	Unauthorised Waste Management Activity	No			
1244991	13/06/14 09:20	Pilldu	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST244804	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Other Pollutant	Other	Natural Causes	Algal Activity	No			
1245760	16/06/14 09:27	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST275831	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	General Biodegradable Materials and Wastes	Other General Biodegradable Material or Waste	Unauthorised Activity	Fly-Tipping	No			
1246614	18/06/14 08:56	Olleco	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST322858	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Other Oil or Fuel	Containment and Control Failure	Accidental Spillage	No			
1246669	18/06/14 10:19	Caldicot Level	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST423854	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Agricultural Materials and Wastes	Solid Manure	Other Cause	Other	Yes	Agriculture	Dairy	
1247086	19/06/14 10:04	Coed y Squire	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST251893	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Containment and Control Failure	Process Plant Failure (sudden)	Yes	Manufacturing	Food Processing	
1248219	23/06/14 09:26	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST413840	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Agricultural Materials and Wastes	Slurry and Dilute Slurry	Containment and Control Failure	Control System Failure	Yes	Agriculture	Dairy	
1250222	27/06/14 13:20	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST265821	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Fly-Tipping	No			
1251260	01/07/14 12:25	Samson Court	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST376830	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Oils and Fuel	Unidentified Oil	Containment and Control Failure	Road Traffic Accident (RTA)	Yes	Transport	Road	
1253865	08/07/14 15:34	A48(M) J29a	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST238819	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Multiple Pollutants	2 Pollutants Include Hydraulic Oils	Other Cause	Other	Yes	Other Source	Other	

1259300	22/07/14 13:03	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST314894	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Unauthorised Activity	Fly-Tipping	No			
1261843	28/07/14 15:23	Portskewett	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST488883	Category 3 (Minor)	Category 4 (No Impact)	Category 2 (Significant)	Sewage Materials	Grey Water	Containment and Control Failure	Drainage Failure	No			
1262384	29/07/14 15:24	Blacktown	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST260816	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No			
1263052	30/07/14 17:20	Maindee	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST325878	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Dust	Containment and Control Failure	Control System Failure	Yes	Other Source	Other	
1263264	31/07/14 10:34	Malpas	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST308909	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Rising Main	
1264813	04/08/14 17:53	Old Speedway	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST351863	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Transport	Road	
1271183	25/08/14 09:20	Great House	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST413843	Category 3 (Minor)	Category 3 (Minor)	Category 2 (Significant)	Oils and Fuel	Diesel	Other Cause	Other	Yes	Domestic and Residential	Private Dwellings	
1273215	01/09/14 15:47	Great Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST379888	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Storm Sewage	Containment and Control Failure	Pipe Failure below ground	Yes	Water Industry	Rising Main	
1276139	10/09/14 10:48	New Park	Rhymney	CASNEWYDD - NEWPORT	ST254847	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Sludge	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Agriculture	Arable	
1276979	12/09/14 13:10	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST254814	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No			
1277506	15/09/14 01:08	St Mellons	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST238814	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No			
1279820	22/09/14 00:24	Cayo, The	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST432911	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Contaminated Water	Firefighting Run-Off	Fires	Other Fire	No			
1279992	22/09/14 11:50	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST470876	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Household Waste	Unauthorised Activity	Fly-Tipping	No			
1283898	03/10/14 14:39	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST313896	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Transport	Transport Depots/Cargo Handling	
1284392	06/10/14 10:34	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST310863	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Diesel	Other Cause	Other	Yes	Other Source	Other	
1284667	06/10/14 18:28	Manhole at Hendre Lakes	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST245803	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
1287343	16/10/14 12:43	Newport or Casnewydd	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST306880	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Commercial Waste	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Domestic and Residential	Private Dwellings	
1287565	17/10/14 09:23	INFO REMOVED	Wye (H&W) d/s Lugg	SIR FYNWY - MONMOUTHSHIRE	ST505905	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Manufacturing	Automotive	
1288089	20/10/14 09:44	Clearwell	Rhymney	CASNEWYDD - NEWPORT	ST256858	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Commercial Waste	Fires	Burning of Waste	Yes	Waste Management	Household Waste Recycling Centre	
1288314	20/10/14 17:03	Stow Park	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST306880	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	General Biodegradable Materials and Wastes	Other General Biodegradable Material or Waste	Unauthorised Activity	Unauthorised Waste Management Activity	No			
1288422	21/10/14 10:41	Clearwell	Rhymney	CASNEWYDD - NEWPORT	ST256859	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Waste Management	Transfer Station	
1289326	24/10/14 15:06	Pontymister	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST248904	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
1292198	05/11/14 17:40	M4 J25	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST331898	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Premises Type Not Identified	Not Identified	
1293970	12/11/14 15:36	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST349841	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Domestic and Residential	Private Dwellings	
1295010	17/11/14 11:23	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST291810	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No			
1295978	20/11/14 16:31	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST360850	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Unauthorised Activity	Fly-Tipping	No			
1296723	24/11/14 10:02	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST363853	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Domestic and Residential	Private Dwellings	
1296748	24/11/14 10:39	Hayes Gate	Wye (H&W) d/s Lugg	SIR FYNWY - MONMOUTHSHIRE	ST507911	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Agricultural Materials and Wastes	Slurry and Dilute Slurry	Containment and Control Failure	Control System Failure	Yes	Agriculture	Dairy	
1296900	24/11/14 14:46	CALDICOT, NP26 5RB	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST481876	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Control Measure Failure	Yes	Water Industry	Rising Main	
1299049	03/12/14 13:52	M4 J25	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST330899	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No			
1299787	08/12/14 08:41	INFO REMOVED	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST244817	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Diesel	Other Cause	Other	Yes	Transport	Road	
1300049	09/12/14 10:37	Great Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST383890	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Pipe Failure below ground	Yes	Water Industry	Rising Main	
1302622	23/12/14 14:20	Level of Mendalgief	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST309860	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Other Pollutant	Other	Unauthorised Activity	Fly-Tipping	No			
1304912	07/01/15 15:49	INFO REMOVED	Wye (H&W) d/s Lugg	SIR FYNWY - MONMOUTHSHIRE	ST511896	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Agricultural Materials and Wastes	Slurry and Dilute Slurry	Containment and Control Failure	Sewer Failure or Overflow	Yes	Agriculture	Dairy	
1307598	19/01/15 12:48	Sealand Reen	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST292810	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	Yes	Other Source	Other	
1307922	20/01/15 13:46	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST275801	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Specific Waste Materials	Other Specific Waste Material	Other Cause	Other	No			
1309918	29/01/15 13:25	Sealand Reen	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST291823	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	Multiple Pollutants	3 Pollutants Include Smoke	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Agriculture	Dairy	
1311135	04/02/15 11:40	Cold Harbour Pill	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST430843	Category 4 (No Impact)	Category 2 (Significant)	Category 3 (Minor)	Agricultural Materials and Wastes	Slurry and Dilute Slurry	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Agriculture	Dairy	
1311463	05/02/15 11:58	Coed Garw	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST285894	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Other Source	Other	
1312061	07/02/15 15:28	Sealand Reen	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST300817	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	Oils and Fuel	Gas and Fuel Oils	Containment and Control Failure	Pipe Failure below ground	Yes	Domestic and Residential	Private Dwellings	
1312540	09/02/15 16:06	Barrack Hill	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST305886	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
1312547	09/02/15 16:23	Newton Green	Wye (H&W) d/s Lugg	SIR FYNWY - MONMOUTHSHIRE	ST511917	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Discharge or Disposal	No			
1312699	10/02/15 09:47	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST432855	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Agricultural Materials and Wastes	Solid Manure	Unauthorised Activity	Other Unauthorised Activity	Yes	Agriculture	Beef	
1313670	13/02/15 14:15	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST314856	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Contaminated Water	Firefighting Run-Off	Fires	Other Fire	Yes	Waste Management	Metal Recycling	
1314675	18/02/15 10:31	Newport or Casnewydd (Newport)	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST321859	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Unidentified Oil	Unauthorised Activity	Unauthorised Discharge or Disposal	No			
1318053	04/03/15 16:33	INFO REMOVED	Rhymney	CASNEWYDD - NEWPORT	ST256859	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Contaminated Construction & Demolition Mat & Waste	Fires	Burning of Waste	No			
1318471	06/03/15 09:57	Five Lanes	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST443910	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	General Biodegradable Materials and Wastes	Other General Biodegradable Material or Waste	Authorised Activity	Other Authorised Activity	Yes	Waste Management	Household Waste Recycling Centre	
1319496	10/03/15 13:57	Magor	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST429870	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Mixed/Waste Oils	Containment and Control Failure	Accidental Spillage	Yes	Domestic and Residential	Nursing and Residential Homes	
1319506	10/03/15 14:14	Coedkernew	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST272835	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Agricultural Materials and Wastes	Solid Manure	Containment and Control Failure	Accidental Spillage	Yes	Agriculture	Stables	
1323776	26/03/15 14:52	Pen-coed Castle	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST401898	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Agricultural Materials and Wastes	Other Agricultural Material or Waste	Fires	Burning of Waste	Yes	Agriculture	Sheep	
1325174	01/04/15 12:23	Ty Coch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST279811	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Septic Tank or Sewage Treatment Plant Failure	Yes	Premises Type Not Identified	Not Identified	
1327455	10/04/15 10:07	Nash	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST347839	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Sewage Materials	Grey Water	Containment and Control Failure	Wrong Connection	Yes	Domestic and Residential	Private Dwellings	
1327683	10/04/15 15:22	Christchurch	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST346893	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Drainage Failure	Yes	Service Sector	Healthcare	
1331833	24/04/15 10:04	Maerdy	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST281835	Category 4 (No Impact)	Category 2 (Significant)	Category 4 (No Impact)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No			
1334523	04/05/15 18:06	Maesglas	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST305859	Category 2 (Significant)	Category 4 (No Impact)	Category 3 (Minor)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Waste Management	Non-Inert Landfill	
1336076	11/05/15 09:19	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST279805	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Agricultural Materials and Wastes	Solid Manure	Cause Not Identified	Not Identified	No			

AG_APL_NUM	AG_ISSUED	AG_REVOCED	DS_SNAME	DS_LNAME	DS_ADD1	DS_ADD2	DS_ADD3	DS_ADD4	DS_PCODE	DS_NGR	DS_TYPE	REVOKED
AN0239701	23/03/2009		BETTWS LANE	BETTWS LANE SPS NEWPORT ,	BETTWS LANE SPS	BETTWS ,		NEWPORT	NP20 7AZ	ST3000490111	Sewerage Network - Pumping Station - water company	Active
AB0038601	13/09/2007		TREDEGAR PAR	TREDEGAR PARK STW , ,	TREDEGAR PARK STW , ,	, ,	, ,	, ,	,	ST2934086050	Sewage Disposal Works - water company	Active
AN0159601	08/09/2010 00:00		CORPORATION	CORPORATION RD/GASKELL STREET NEW	CORPORATION RD/GASKELL STREET	NEWPORT	NEWPORT CBC	WALES	NP19 0GG	ST3263087450	Sewerage Network - Sewers - water company	Active
AN0159701	08/09/2010 00:00		TRANSPORT DE	TRANSPORT DEPOT CORPORATION ROAD N	TRANSPORT DEPOT	CORPORATION ROAD	NEWPORT	NEWPORT CBC	NP19 0BJ	ST3201088020	Sewerage Network - Sewers - water company	Active
AN0158201	08/09/2010 00:00		BRYNGLAS ROA	BRYNGLAS ROAD NEWPORT NEWPORT CBC	BRYNGLAS ROAD	NEWPORT	NEWPORT CBC	WALES	NP20 5QX	ST3096089780	Sewerage Network - Sewers - water company	Active
AC0130201	03/06/2004 00:00		BRTSH STEEL	BRITISH STEEL LTD WHITEHEAD WORKS	BRITISH STEEL LTD WHITEHEAD WRKS	MENDELGEIF ROAD	NEWPORT	WALES	NP20 2NF	ST3082586597	Iron and Steel Industries	Active
AN0389201	21/10/2005		IAWS	IAWS FERTILISERS SOUTH DOCK NEWPORT	IAWS FERTILISERS (UK) LTD	NORTH SIDE	SOUTH DOCK	ALEXANDRA DOCKS NEWPORT	NP20 2NP	ST3100284649	Fertilisers	Active
AN0385201	07/09/2005 00:00		INFO REMOVED	INFO REMOVED	INFO REMOVED	BEACH ROAD	ST BRIDES	NEWPORT	INFO REMOVED	INFO REMOVED	Domestic Property (Single)	Active
AN0134102	27/03/2007		CROESLLANFRO	CROESLLANFRO PS ROGERSTONE	CROESLLANFRO PS	ROGERSTONE	NEWPORT	GWENT		ST2865988846	Sewerage Network - Pumping Station - water company	Active
AN0325702	07/04/2004 00:00		SIMSMETAL	SIMSMETAL NORTHSIDE SOUTH DOCK	SIMSMETAL UK LTD	NORTHSIDE	SOUTH DOCK	ALEXANDRA DOCK NEWPORT	NP20 2WE	ST3176285206	Metal Recycling Sites (mixed MRSS)	Active
AN028770101	01/08/2002 00:00		700M SE PLAS	A CSO 700M SE OF PLAS MACHEN COTAGE	A CSO 700M SE OF	PLAS MACHEN COTTAGE	LOWER MACHEN	NEWPORT		ST2358986810	Sewerage Network - Sewers - water company	Active
AN0325701	30/07/2002		SIMSMETAL	SIMSMETAL NORTHSIDE SOUTH DOCK	SIMSMETAL UK LTD	NORTHSIDE	SOUTH DOCK	ALEXANDRA DOCK NEWPORT	NP20 2WE	ST3176285206	Metal Recycling Sites (mixed MRSS)	Active
AN0329001	15/11/2002		INFO REMOVED	INFO REMOVED	INFO REMOVED	COEDKERNEW	NEWPORT	WALES	INFO REMOVED	INFO REMOVED	Domestic Property (Single)	Active
AN0394701	30/11/2005		BARRACK HILL	CSO AT BARRACK HILL NEWPORT	COMBINED SEWAGE OVERFLOW	BARRACK HILL	NEWPORT	SOUTH WALES	NP20 5FJ	ST3087989159	Sewerage Network - Sewers - water company	Active
AN0031601	28/11/2005		BLACK CLAWSO	THE FACTORY COMPOUND BLACK CLAWSON	THE FACTORY COMPOUND	BLACK CLAWSON	WESTGATE WORKS	EAST DOCK ROAD	NP20 2BT	ST3232087078	Sewerage Network - Sewers - water company	Active
AN0364401	12/06/2004 00:00		METAL RECYCL	METAL RECYCLING SITE SIMS GROUP UK	METAL RECYCLING SITE	SIMS GROUP UK LTD	NORTH SIDE SOUTH DOCK	ALEXANDRA DOCKS	NP20 2WE	ST3175084760	Metal Recycling Sites (mixed MRSS)	Active
AN0364701	30/06/2004		LAING O ROUR	LAING O ROURKE WALES AND WEST LTD	LAING O ROURKE WALES AND WEST LT	WESTWAY ROAD	NEWPORT DOCK	NEWPORT	NP20 2WD	ST3096685817	Const. and Repair of Buildings	Active
AN0251301	22/11/2002		CSO NO.33193	CSO NO.33193 TREDEGAR PARK GOLF CLU	CSO NO.33193	TREDEGAR PARK GOLF CLUB	TREDEGAR	NEWPORT CBC		ST2846886642	Sewerage Network - Sewers - water company	Active
AN0401301	01/09/2006 00:00		DOCKSWAY	NEWPORT WASTE DISPOSAL SITE NPT	PHASE 2	NEWPORT WASTE DISPOSAL SITE	DOCKSWAY	NEWPORT	NP20 2NS	ST3061884802	Household, commercial and industrial waste landfills	Active
AB0073101	23/10/2001		CSO ROGERSTO	CSO ROGERSTONE ADJ THORNHILL GDNS	CSO ROGERSTONE	ADJ THORNHILL GARDENS		GWENT		ST2589088810	Sewerage Network - Sewers - water company	Active
AN0250501	01/11/2001 00:00		CSO OLDGLOBE	CSO OLD GLOBE PUBLIC HOUSE	CSO OLD GLOBE PUBLIC HOUSE		ROGERSTONE	,		ST2639088240	Sewerage Network - Sewers - water company	Active
AN0397001	15/06/2006		FINNFOREST	FINNFOREST BBH LTD NEWPORT	FINNFOREST BBH LTD	ALEXANDRA DOCK	NEWPORT	SOUTH WALES	NP20 2WA	ST3100284650	Sawmilling of Wood	Active
AN0379701	18/03/2005		WESTFIELD WA	WESTFIELD WAY/HUXLEY GREEN CSO	WESTFIELD WAY/HUXLEY GREEN CSO	OFF RUSSELL DRIVE	MALPAS	NEWPORT		ST3007890396	Sewerage Network - Sewers - water company	Active
AN0394301	18/09/2006		DOCKS WAY	DOCKS WAY LANDFILL SITE NEWPORT	DOCKSWAY LANDFILL SITE	DOCKSWAY	NEWPORT	GWENT	NP20 2NS	ST3081885170	Household, commercial and industrial waste landfills	Active
AN0251401	01/11/2001 00:00		CSO FORGE LN	CSO 5/6 FORGE LANE BASSALEG	CSO 5/6 FORGE LANE		BASSALEG	,		ST2792086760	Sewerage Network - Sewers - water company	Active
AB0054601	23/10/2001		CSO NO 6258	CSO FIELD NO 6258 RHIWDERIN	CSO FIELD NO 6258		RHIWDERIN	,		ST2665087520	Sewerage Network - Sewers - water company	Active
AN0314101	15/11/2001		SPS MAESGLAS	SPS MAESGLAS RETAIL PARK DOCKS WAY	SPS MAESGLAS RETAIL PARK	DOCKS WAY	MAESGLAS	NEWPORT	NP20 2NS	ST3095086050	Sewerage Network - Pumping Station - others	Active
AB0044301	09/12/2003 00:00		TT ELECTRONI	CSO 52 TT ELECTRONICS TREGWILYM IND	CSO 52	TT ELECTRONICS	TREGWILYM INDUSTRIAL ES	ROGERSTONE		ST2739687417	Sewerage Network - Sewers - water company	Active
AN0158101	21/11/2003		CSO 48 TREGW	CSO 48 TREGWILYM CLOSE ROGERSTONE	CSO 48	TREGWILYM CLOSE	ROGERSTONE	NEWPORT CBC		ST2753587403	Sewerage Network - Sewers - water company	Active
AN0351101	21/11/2003		CSO 49 32037	CSO 49 NR VICARAGE GLEBE HOUSE	CSO 49 ASSET NUMBER 32037	NR VICARAGE GLEBE HOUSE	BASSALEG	NEWPORT CBC		ST2771686948	Sewerage Network - Sewers - water company	Active
AN0310101	26/07/2001		ALCAN ALLUMI	ALCAN ALLUMINIUM ROGERSTONE NEWPORT	ALCAN ALUMINIUM	ROGERSTONE	NEWPORT	SOUTH WALES	NP10 9YD	ST2672087630	Metal Treatment, Bolts, Nuts, etc	Active
AN0158401	26/03/2002		MALPAS ROAD	MALPAS ROAD CSO	MALPAS ROAD CSO	IMMEDIATELY SOUTH OF JUNCTION 26	M4 MOTORWAY	NEWPORT		ST3052089580	Sewerage Network - Sewers - water company	Active
AN0389101	09/10/2006 00:00		HIGH CROSS	HIGH CROSS ROAD ROGERSTONE	DEVELOPMENT AT HIGH CROSS ROAD	ROGERSTONE	NEWPORT	GWENT		ST2830888195	Sewerage Network - Pumping Station - others	Active
AB0073102	03/03/2004 00:00		CSO 47 ALCAN	CSO 47 ALCAN WORKS ROGERSTONE	COMBINED SEWER OVERFLOW 47	ALCAN WORKS	ROGERSTONE	ASSET NO 31996		ST2703987476	Sewerage Network - Sewers - water company	Active
AN0376901	17/02/2005		INFO REMOVED	INFO REMOVED	INFO REMOVED	INFO REMOVED	COEDKERNEW	GWENT	INFO REMOVED	INFO REMOVED	Domestic Property (Single)	Active
AN0376701	28/01/2005		A1 SKIPS WES	A1 SKIPS WESTWAY ROAD ALEXANDRA DOC	A1 SKIPS	WESTWAY ROAD	ALEXANDRA DOCK	NEWPORT	NP20 2UW	ST3097285840	Trade (Unknown/Other)	Active
AN0031501	08/02/2000 00:00		PILL SOUTH	PILL SOUTH B PUMPING STATION	PILL SOUTH B PUMPING STATION	OFF USK WAY	PILL SOUTH	NEWPORT		ST3178086460	Sewerage Network - Pumping Station - water company	Active
AN030090101	25/10/2000		INFO REMOVED	INFO REMOVED	INFO REMOVED	INFO REMOVED	NERPORT	,	INFO REMOVED	INFO REMOVED	Domestic Property (Single)	Active
AN030020101	13/10/2000		MAESGLAS	MAESGLAS HIGH LEVEL CSO MAESGLAS	MAESGLAS HIGH LEVEL CSO	OFF MAESGLAS AVENUE	MAESGLAS	NEWPORT	NP9 3BW	ST3037085980	Sewerage Network - Sewers - water company	Active
AD0002801	09/12/2004 00:00		A COMBINED S	A COMBINED SEWER OVERFLOW CSO 119	A CSO	CSO 119 RIVERBAND	ALONGSIDE TANYBRYN HOU	RISCA		ST2552589580	Sewerage Network - Sewers - water company	Active
AN0374301	10/12/2004 00:00		JEWSON LTD T	JEWSON LTD TIMBER SUPPLY DEPOT NORT	JEWSON LTD	TIMBER SUPPLY DEPOT	NORTH DOCK	ALEXANDRA DOCK NEWPORT	NP20 2WB	ST3161185477	Wholesale Dist. of Timber	Active
AN0331901	03/03/2003 00:00		INFO REMOVED	INFO REMOVED	INFO REMOVED	INFO REMOVED	OLD ST MELLONS	CARDIFF	INFO REMOVED	INFO REMOVED	Domestic Property (Single)	Active
AB0041901	10/11/1964 00:00		SCA PACKAGIN	SCA PACKAGING ALEXANDRA DOCKS	SCA PACKAGING NEWPORT	ALEXANDRA DOCKS	NEWPORT	WALES		ST3190084120	Conversion of Paper and Board	Active
AN0031701	10/03/2000 00:00		PILL NTH PS	PILL NORTH PS NORTH OCTOPUS RDBT	PILL NORTH PS	NORTH OF OCTOPUS ROUNDABOUT	NEWPORT	NEWPORT CBC		ST3185087450	Sewerage Network - Pumping Station - water company	Active
AN0394201	02/03/2006 00:00		ST JOSEPHS	ST JOSEPHS R C SCHOOL NEWPORT	FORMER ST JOSEPHS R C SCHOOL	DUFFRYN DRIVE	NEWPORT	WALES	NP10 8YS	ST2901385058	Sewerage Network - Pumping Station - others	Active
AN0336701	22/08/2003		INFO REMOVED	INFO REMOVED	INFO REMOVED	ALECANDRA DOCKS	NEWPORT	GWENT	INFO REMOVED	INFO REMOVED	Domestic Property (Single)	Active
AN0395201	02/03/2006 00:00		BULK CARGO	ABP BULK CARGO NORTH SIDE SOUTH	ABP BULK CARGO	NORTH SIDE SOUTH DOCK	ALEXANDRA DOCK	NEWPORT	NP20 2UW	ST3100284648	Support Serv. Sea Transport	Active
AN030030101	13/10/2000		MAESGLAS PS	MAESGLAS PS OFF MAESGLAS AV	MAESGLAS PS	OFF MAESGLAS AV	MAESGLAS	NEWPORT		ST3057085400	Sewerage Network - Pumping Station - water company	Active
AA0025601	04/11/1999 00:00		SHAFTESBURY	CSO ADJ SHAFTESBURY PS NEWPORT	CSO ADJ SHAFTESBURY PS	(MALPAS & BRYNGLAS)	SHAFTESBURY PARK	NEWPORT		ST3152089310	Sewerage Network - Sewers - water company	Active
AN0034301	11/11/1999 00:00		CSO	PILL SOUTH A	STORM SEWER OVERFLOW	LAND SW OF ROUNDABOUT THAT JOINS	CHURCH STREET TO USK WA	NEWPORT		ST3184086610	Sewerage Network - Sewers - water company	Active
AN029730101	13/06/2000		INFO REMOVED	INFO REMOVED	INFO REMOVED	BLACKSMITHS WAY COED KERNEW	NEWPORT	,	INFO REMOVED	INFO REMOVED	Domestic Property (Single)	Active
AN0038301	29/10/1987		BASSALEG BET	BASSALEG BETHEL CHAPEL HSE DEVLP	BETHEL CHAPEL HSE DEVLP	BASSALEG	NEWPORT	GWENT		ST2713086750	Trade (Unknown/Other)	Active
AN0216401	23/04/1990		COEDKERNEW P	COEDKERNEW PS (EMERGENCY)	COEDKERNEW PS (EMERGENCY)	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	ST2769084340	Sewerage Network - Pumping Station - water company	Active
AN0366301	08/08/2004 00:00	08/08/2016 00:00	INFO REMOVED	INFO REMOVED	INFO REMOVED	ROGERSTONE	NEWPORT	GWENT	INFO REMOVED	INFO REMOVED	Domestic Property (Single)	Active
AC0100401	04/12/2013 00:00		NEWPORT FELN	NEWPORT FELNEX IND ESTATE ARC	NEWPORT FELNEX IND ESTATE ARC	NEWPORT	NEWPORT CBC	WALES	NP19 4PP	ST3261085500	Industrial estates	Active
EPRQB3597TY	02/04/2014 00:00		JUBILEE PARK	TREATMENT SYSTEM @ JUBILEE PARK	TREGWILYM ROAD	ROGERSTONE	NEWPORT	NEWPORT	NP20 9LR	ST2692387937	Civil Engineering	Active

Cyfoeth Naturiol Cymru
Natural Resources Wales

Special Licence – Commercial

Ref: ATI07169B

PARTIES

NATURAL RESOURCES BODY FOR WALES whose principal office is at 29 Newport Road, Cardiff CF24 0TP ("NRW") (1) and

RPS Planning & Development Limited (02947164) whose principal is at 20 Western Avenue, Milton Park, Abingdon, Oxfordshire – OX14 4SH. (the "Licensee") (2)

BACKGROUND

This licence applies if you are seeking permission for re-use of NRW Content by using it commercially for primarily internal business use purposes.

LICENCE

We, Natural Resources Wales ("We" or "us"), and you, the recipient of the Licensed Content ("You") agree that:

1. This agreement (the "agreement") which is dated on the later of the two dates of signing below includes these paragraphs, the Schedules below, the Standard Terms and Conditions for a Natural Resources Wales Intellectual Property Licence in Appendix 1 and Standard Definitions in Appendix 2.
2. We will provide you (if you do not already have a copy) with the Licensed Content.
3. You will pay us the Fees due under this agreement.
4. If it is not possible to interpret consistently the Special Conditions in Schedule 4 below and the Standard Terms and Conditions in Appendix 1 the Special Conditions will prevail.

SCHEDULE 1 – Commencement Date, Term and Contact Details

This agreement commences on 06/05/15 for a period of one year subject to earlier termination.

Next major review dates: 2013 for implementation on or after 1 January 2014, and 2014 for implementation on or after 1 January 2015		
The major licensing reviews aim to review all NRW licences and bring all licensees onto the same terms and conditions. When the review occurs the new terms will replace the terms and conditions of this agreement; this does not affect your right to terminate this agreement.		
Operational contact (day to day)	**NRW**	**LICENSEE**
Name:	Michelle Price	Liz Williams
Position:	External Relations Officer	Senior Environmental Consultant
Tel:	03000 653577	01454 853 000
Email:	michelle.price@naturalresourceswales.gov.uk	williamsl@rpsgroup.com
Address:	Llys Afon, Hawthorn Rise, Haverfordwest, Pembrokeshire – SA61 2BQ	2420 The Quadrant, Aztec West, Almondsbury, Bristol – BS32 4AQ

SUMMARY TABLES

These tables are not definitive or legally part of the agreement but for convenience only. In the event of any discrepancy between them and the agreement the agreement will prevail but We will allow or be allowed a reasonable time for making any correcting payments or refunds.

Licensed Content (all charges are GBP and exclusive of VAT)

No.	Content including any replacement or aka names	Annual charge
1	AFA034 Historic Landfill	
2	AFA111 Authorised Landfill Site Boundaries	
3	AFA138 Environmental Pollution Incidents	
4	AFA021 EPR Industrial Sites	
5	AFA200 EPR Waste Sites	
6	AFA005 WML Current Exemptions	
7	AFA135 Water Abstractions	
8	AFA014 Consented Discharges to Controlled Waters	£60.00
The annual charges shown here is the total payable up front including third party royalties and after terminal discounts based on the standard licence period of one year.		

SCHEDULE 2 – Approved Use

A. INTERNAL USE

The following internal uses are licensed:

- Internal Use

B. EXTERNAL USE AND PERMITTED SUBLICENSING

Standard Permitted External Use and Professional Use is licensed.

SCHEDULE 3 – Licensed Content

This Schedule provides full details of the Licensed Content and also of Licence Fees for internal use of that Content and any special marginal costs of supply charges. These fees are Content related and (together with Third Party Royalties in relation to products or external use identified in Schedule 2) comprise cost recovery charges that aim to recover our costs of reproducing and disseminating Content that we license. Different types of Content have different cost recovery based charges and the annual review will, inter alia, re-assess which charging band to apply and whether any increase is required to reflect the effect of inflation on our costs. Terminal discounts may be available for certain types of Content. Licence Fees for Internal use:

- are annual (apart from any costs of supply e.g. infrastructure set up),
- are reviewed annually on 1st April,
- are subject to VAT but identified below exclusive of VAT,
- identify separately any Third Party Royalties that relate directly to use of Licensed Content. These are the actual charges that We has to pay to third parties.

1 Not applicable to this licence

2. SPECIAL CONTENT

1	**Number**	1
2	**Name & AfA Code (if applicable)**	AFA034 Historic Landfill
3	**Description**	Under the Town and Country Planning (General Development Procedure) Order 1995 Local Planning Authorities have to consult with the Environment Agency about all applications they receive to develop land within 250 metres of landfill sites (including any land that has been used as a landfill site within the past 30 years or is likely to be used as one in the near future). The Historic Landfill dataset was created to help fulfil our statutory responsibility to Local Planning Authorities by supplying information on the risks posed by landfill sites for development within 250m. The data is the most comprehensive and consistent national historic landfill dataset and defines the location of, and provides specific attributes for, known historic (closed) landfill sites, i.e. sites where there is no PPC permit or waste management licence currently in force. This includes sites that existed before the waste licensing regime and sites that have been licensed

		in the past but where this licence has been revoked, ceased to exist or surrendered and a certificate of completion has been issued. Historic Landfill includes all relevant historic information for the sites that both local authorities and the Environment Agency have collected over the years. The data is available in ESRI shape file format, with the boundaries digitised from a base scale of 1:10,000 and an associated attribute table comprising 34 fields. The polygons and attributes describe where the sites were located, when they were used, who used them and what was deposited. This means there are name and address fields, licensee and operator information, licence issue and surrender dates, first and last input dates, and waste types, together with some historical comments.
4	**Content Type**	Dataset
5	**Geographical Coverage**	Natural Resources Wales Owned Data
6 - 8	**These paragraphs are not applicable to this licence**	
9	**Format supplied**	N/A
10 - 14	**These paragraphs are not applicable to this licence**	
15	**Are there any known Third Party Rights?**	None
If yes, state who owns those rights and has licensed us.		N/A
16	**One off cost of supply charges**	Not applicable
17	**Number of Terminals licensed (National Datasets only)**	10
18	**Licence Fees**	**Fees in relation to this Content – reviewed annually on 1 April** NB Charges for Remote Survey Data are one-off. All other Licence Fees are annual. Standard wording below is based on Wales only data.

Internal Use Charges

The National Dataset charge comprises 2p multiplied by the Content Factor (dataset) per sq km or Content Factor (record) per record with a maximum of 10,000 sq km or half the deemed number of records with a terminal discount if applicable.

Content Factor	NRW Internal Use Charges GBP per annum	Third Party Royalties GBP per annum	Dataset Terminal Discount % (if applicable)	Cost of supply charges per annum	Total GBP per annum
10	**£14,000.00**	**None**	**55%**	**£1.80**	**£60.00**

19	**Are there any special conditions added with specific reference to this Content?**	None
20	**Are there any information warnings added with specific reference to this Content?**	None

21	**Full details/attributes**	As contained in Environment Agency Information Asset Register referred to also as the Information for Re-Use Register. HLD_REF Historical Waste Data project Unique Key for each record [String, 10] SITE_NAME Site Name [String, 200] SITE_ADD Site Address [String, 200] EA_WMLR Environment Agency Waste Management Licence Number [String, 5] REGIS_NO REGIS reference number [String, 11] WRC_REF WRC dataset reference [String, 9] BGS_Num BGS dataset Reference Number [String, 4] SITE_REF Waste Regulation Authority Licence Number [String, 100] LIC_HOLD Licence Holder [String, 150] LICHOLDADD Licence Holder's address [String, 250] SITEOPNAME Site Operator [String, 50] SITEOPADD Site Operator's address [String, 250] OS_PREFIX OS Prefix [String, 2] EASTING Easting (automated at nearest 100m grid to the South West of the Site Centroid) [String, 6] NORTHING Northing (automated at nearest 100m grid to the South West of the Site Centroid) [String, 6] EAREGION Code identifying the Environment Agency Region in which the site is located [String, 2] EAAREA Code identifying the Environment Agency Area in which the site is located [String, 30] LIC_ISSUE Date of Issue of Licence [Date, 8] LIC_SURREN Date of surrender of Licence [Date, 8] FIRSTINPUT Date of first input of waste [Date, 8] LASTINPUT Date of last input of waste [Date, 8] INERT Waste deposited at the site included Inert [‘Yes’ or blank, 3] INDUSTRIAL Waste deposited at the site included industrial waste [‘Yes’ or blank, 3] COMMERCIAL Waste deposited at the site included Commercial [‘Yes’ or blank, 3] HOUSEHOLD Waste deposited at the site included Household [‘Yes’ or blank, 3] SPECIAL Waste deposited at the site included Special [‘Yes’ or blank, 3] LIQSLUDGE Waste deposited at the site included Liquid Sludge [‘Yes’ or blank, 3] WASTEUNK Waste deposited at the site included some unknown material [‘Yes’ or blank, 3] GASCONTROL A flag recording if there was any Gas control measures installed at the site [‘Yes’ or blank, 3] LEACHATECNT A flag recording if there was any Leachate control measures installed at the site [‘Yes’ or blank, 3] EXEMPT Was the site known to be exempt from Waste Management Licensing [‘Yes’ or blank, 3] LICENCED Was the site licensed under Waste Disposal or Waste Management Licensing [‘Yes’ or blank, 3] NOLICREQ Was the site known to have not required a licence [‘Yes’ or blank, 3] BUFF_POINT Flag (yes/no) field for Buffered Point polygons [‘Yes’ or blank, 3]

1	**Number**	2
2	**Name & AfA Code (if applicable)**	Permitted Waste Sites – Authorised Landfill Site Boundaries (AfA111)
3	**Description**	The 'Permitted Waste Sites - Authorised Landfill Site Boundaries' is a polygon dataset that contains the boundaries of landfill sites that are currently authorised by the Environment Agency under Environmental Permitting Regulations. Landfill permits are authorised by a Waste Management Licence, a PPC Permit or an EPR Permit, and are recorded within the Regulatory Information System (Regis). . The system is currently being updated to be replaced with the Integrated Regulation (IR) system which will replace both Regis and PAS (Permit Administration System). The current system allows the Environment Agency to extract data on landfill sites. These can be filtered on the following descriptor codes: • A1: Co-Disposal Landfill Site; • A2: Other Landfill Site taking Special Waste; • A4: Household, Commercial & Industrial Waste Landfill; • A5: Landfill taking Non-Biodegradable Wastes; • A6: Landfill taking other wastes; • A7: Industrial Waste Landfill (Factory cartilage); • 5.2 A(1) a): Waste Landfilling; >10T/D with capacity>25,000T excluding inert waste; • 5.2 A(1) b): Waste Landfilling; Any other Landfill to which the 2002 regulations apply; • L04: Non Hazardous Landfill; and • L05: Inert Landfill. It is important to note that because a site is authorised it does not necessarily mean it is accepting waste. Landfill sites are only removed from the dataset on a quarterly basis and added to the Historic Landfill site dataset when the waste licence status changes to either: • Licence Expired – Some licences issued under the Control of Pollution Act 1974 were time limited and expired on the date specified in the licence; or • Licence Revoked – Licence has been entirely revoked and is no longer in force; or • Licence Surrendered – Operator has successfully surrendered the licence which is no longer in force. Please note that details of authorisations are retained on the Public Register for a period of twelve months. Therefore there are some records in the Historic Landfill dataset that are Public Register for a short period of time.
4	**Content Type**	Dataset
5	**Geographical Coverage**	Natural Resources Wales Owned Data
6 - 8	**These paragraphs are not applicable to this licence**	
9	**Format supplied**	Polygon shapefile
10 - 14	**These paragraphs are not applicable to this licence**	
15	**Are there any known Third Party Rights?**	None
If yes, state who owns those rights and has licensed us.		N/A
16	**One off cost of supply charges**	Not applicable
17	**Number of Terminals licensed**	10

	(National Datasets only)	
18	**Licence Fees**	**Fees in relation to this Content – reviewed annually on 1 April** NB Charges for Remote Survey Data are one-off. All other Licence Fees are annual. Standard wording below is based on Wales only data.

Internal Use Charges

The National Dataset charge comprises 2p multiplied by the Content Factor (dataset) per sq km or Content Factor (record) per record with a maximum of 10,000 sq km or half the deemed number of records with a terminal discount if applicable.

Content Factor	NRW Internal Use Charges GBP per annum	Third Party Royalties GBP per annum	Dataset Terminal Discount % (if applicable)	Cost of supply charges per annum	Total GBP per annum
N/A	**N/A**	**N/A**	**55%**	**N/A**	**N/A**

19	**Are there any special conditions added with specific reference to this Content?**	None
20	**Are there any information warnings added with specific reference to this Content?**	None
21	**Full details/attributes**	As contained in Environment Agency Information Asset Register referred to also as the Information for Re-Use Register. SHAPE Geometry type = Polygon Spatial Reference = British National Grid. OBJECTID Object Identifier. LIC_ADMIN Licence administration number. LIC_NMBR Licence reference number. LIC_IPPCR IPPC Reference number if relevant. LIC_WML Unique Waste Management licence number. CUST_NMBR Customer reference number (intended for internal use only) STATUS Landfill status, e.g. Suspended, Closure etc. LIC_LTYPE Licence type code. LIC_NAME Licence holder's name, e.g. private individual's name, company name. LIC_SITE Licensed site's name. SITE_NAME Address field 8: Landfill site Name, e.g. private individual's name, company name. SITE_BUILD Address field 9: Landfill Site Building e.g. Farnham Quarry. SITE_STRT Address field 10: Landfill Site Street. SITE_AREA Address field 11: Landfill Site Area. SITE_TOWN Address field 12: Landfill site Town. SITE_CNTY Address field 13: Landfill site County. SITE_PCODE Address field 14: Landfill site Postcode. TYPE_DESC Landfill type description e.g. A4: Household, Commercial & Industrial Waste Landfill. NGR British National Grid Reference. T_REF Unique polygon reference added by National Data Unit. CTROID_X National Grid Easting for the centroid of the polygon. CTROID_Y National Grid Northing for the centroid of the polygon. REGION Environment Agency Region AREA Environment Agency Area DATE_ISSUE Date of issue of waste licence (dd/mm/yyyy).

1	**Number**	3
2	**Name & AfA Code (if applicable)**	Environmental Pollution Incidents (AfA138)
3	**Description**	Details of all pollution incidents reported to the Environment Agency are held on the National Incident Reporting System. This may include some sensitive information i.e. personal details of individuals reporting the incident etc. and therefore needs to been carefully assessed. There are, however, a number of fields, which have been approved for access and are therefore ok to release. Additional fields would need to be assessed on a case-by-case basis. These should only include substantiated and closed environmental protection incidents, where the environment impact level is either category 1 (major) or category 2 (significant) to at least 1 media (i.e. water, land or air). Where these data indicate an incident occurred on a particular site or property no inference should be drawn that the site or property owner necessarily was responsible.
4	**Content Type**	Dataset
5	**Geographical Coverage**	Natural Resources Wales Owned Data
6 - 8	**These paragraphs are not applicable to this licence**	
9	**Format supplied**	Polygon shape file
10 - 14	**These paragraphs are not applicable to this licence**	
15	**Are there any known Third Party Rights?**	None
If yes, state who owns those rights and has licensed us.		N/A
16	**One off cost of supply charges**	Not applicable
17	**Number of Terminals licensed (National Datasets only)**	10
18	**Licence Fees**	**Fees in relation to this Content – reviewed annually on 1 April** NB Charges for Remote Survey Data are one-off. All other Licence Fees are annual. Standard wording below is based on Wales only data.

Internal Use Charges

The National Dataset charge comprises 2p multiplied by the Content Factor (dataset) per sq km or Content Factor (record) per record with a maximum of 10,000 sq km or half the deemed number of records with a terminal discount if applicable.

Content Factor	NRW Internal Use Charges GBP per annum	Third Party Royalties GBP per annum	Dataset Terminal Discount % (if applicable)	Cost of supply charges per annum	Total GBP per annum
5	**£7,000.00**	**N/A**	**55%**	**£0.90**	**£60.00**

19	**Are there any special conditions added with specific reference to this Content?**	None
20	**Are there any information warnings added with specific reference to this Content?**	Where these data indicate an incident occurred on a particular site or property no inference should be drawn that the site or property owner necessarily was responsible.

21	**Full details/attributes**	As contained in Environment Agency Information Asset Register referred to also as the Information for Re-Use Register. Event identification number Date of notification Region Area Public area face County authority Unitary authority District authority National Grid Reference Easting Northing Y/N – Environmental Protection Environmental Impact Levels – Air, Land and Sea

1	**Number**	4
2	**Name & AfA Code (if applicable)**	Environmental Permitting Regulations – Waste Sites (AfA200)
3	**Description**	A waste management licence is a legal document issued under the Environmental Protection Act 1990. A licence authorises the treatment, keeping or disposal of waste in or on the land. Once we have issued a licence, neither the activities nor the area of land may be changed unless the licence is modified. The Environmental Permitting Regulations, regulating waste sites, came into force on 6 April 2008. The new regime combines a number of earlier permitting / licensing regimes. Other related datasets available are: • Pollution Prevention and Control (IPPC) • Authorised Treatment Facilities (End of Life Vehicles) • Water Quality and Pollution Control (Discharge Consents) • Waste Electrical, Electronic Equipment (WEEE) EPR Waste is the table for granted permits. EPR Waste Applications holds details of applications that did not, or have not yet, resulted in a permit or permit variation.
4	**Content Type**	Dataset
5	**Geographical Coverage**	Natural Resources Wales Owned Data
6 - 8	**These paragraphs are not applicable to this licence**	
9	**Format supplied**	Access database
10 - 14	**These paragraphs are not applicable to this licence**	
15	**Are there any known Third Party Rights?**	None
If yes, state who owns those rights and has licensed us.		N/A
16	**One off cost of supply charges**	Not applicable
17	**Number of Terminals licensed (National Datasets only)**	10
18	**Licence Fees**	**Fees in relation to this Content – reviewed annually on 1 April** NB Charges for Remote Survey Data are one-off. All other Licence Fees are annual. Standard wording below is based on Wales only data.

Internal Use Charges

The National Dataset charge comprises 2p multiplied by the Content Factor (dataset) per sq km or Content Factor (record) per record with a maximum of 10,000 sq km or half the deemed number of records with a terminal discount if applicable.

Content Factor	NRW Internal Use Charges GBP per annum	Third Party Royalties GBP per annum	Dataset Terminal Discount % (if applicable)	Cost of supply charges per annum	Total GBP per annum
5	**£7,000.00**	**N/A**	**55%**	**£0.90**	**£60.00**

19	**Are there any special conditions added with specific reference to this Content?**	None
20	**Are there any information warnings added with specific reference to this Content?**	None

21	**Full details/attributes**	As contained in Environment Agency Information Asset Register referred to also as the Information for Re-Use Register. LIC AREF Area reference used only in Environmental Permitting Regulations – Waste system LIC NMBR Reference code used only in Environmental Permitting Regulations – Waste system LIC OTHID Other licence number LIC WML Waste Management Licence number LIC LTYPE Type of site (links to look-up table 'LIC LTYPE') e.g. A1, A2, S0813 SITE ADD NAME Site location details – Site name SITE ADD BUILD Site location details – Building SITE ADD HOUSE Site location details – House number SITE ADD STRT Site location details – Street SITE ADD AREA Site location details – Area SITE ADD TOWN Site location details – Town SITE ADD CNTY Site location details – County SITE ADD PCODE Site location details – Postcode SITE ADD TEL Site location details – Telephone number SITE ADD FAX Site location details – Fax number SITE ADD EMAIL Site location details – Email address LIC NAME Licence holder's name LIC TRADE Licence holder's trading name, where appropriate LIC SITE Site name NGR Six, eight or ten figure National Grid Reference, typically of site entrance EASTING Six-figure Eastings, padded with zeros from NGR field. NORTHING Six-figure Northings, padded with zeros from NGR field. STAT SDESC Licence status, for example • Modified • Issued • Transferred • Surrendered • Expired • Closure • Revoked • Suspended LIC TARD Target date for processing application LIC DETD Date licence was decided LIC ISSD Date licence was issued LIC SUBD Date from which subsistence is charged LIC MODD Date licence was modified LIC TRAD Date licence was transferred LIC EFFD Date licence transfer came into effect LIC SURD Date licence was surrendered LIC RVKD Date licence was revoked LIC SUSD Date licence was suspended LIC EXPD Date licence expired LIC REND Date licence was renewed LIC CAND Date licence was cancelled LIC AMND Date licence was amended LIC TONS Annual tonnage permitted (where entered on database). A zero indicates that tonnage information was not entered in this field. Region Environment Agency Region Area Environment Agency Area Size Categorisation of permitted waste volume per year. This is derived from the same information as LIC TONS. It links to the charge code look-up table. Size range: • small = 0 – 25000 tonnes per annum • medium = 25000 – 75000 tonnes per annum • large = > 75000 tonnes per annum LIC PPCARD Date IPPC application received LIC IPPCD Date of transfer to IPPC LIC IPPCR IPPC reference LIC EPR EPR permit reference

Full details/attributes	CAT REF Reference for National REGIS compilation (indicates that record refers to linked record in field LIC AREF in 'EPR Waste' table. CAT CCDE Reference for National REGIS compilation (indicates that classification code applies to the record) CAT TREF Reference for National REGIS compilation (indicates that classification category applies to the record) CAT CODE European Waste Catalogue category (links to 'CAT CCDE' in 'Waste Categories' table) CAT DESC UK Waste Classification Scheme description of waste. CAT TREF Special Waste Regulations 1996 category. (links to 'CAT TREF' in 'Waste Categories' table) Type Code Code indicating type of licence (e.g. A07, A08, A09, S0813) Type Description Description of type of licence Industrial Landfills e.g. 'Industrial waste landfills', 'Lagoons', 'Special waste transfer stations' LIC NMBR Reference code used only in the REGIS system LIC OTHID Other reference number LIC WML Waste Management Licence number LIC LTYPE Type of site (links to look-up table 'LIC LTYPE') e.g. A1, A2, S0813 SITE ADD NAME Site location details – Site name SITE ADD BUILD Site location details – Building SITE ADD HOUSE Site location details – House number SITE ADD STRT Site location details – Street SITE ADD AREA Site location details – Area SITE ADD TOWN Site location details – Town SITE ADD CNTY Site location details – County SITE ADD PCODE Site location details – Postcode SITE ADD TEL Site location details – Telephone number SITE ADD FAX Site location details – Fax number SITE ADD EMAIL Site location details – Email address LIC NAME Licence applicant's name LIC TRADE Licence applicant's trading name, where appropriate LIC SITE Site name NGR National Grid Reference, typically of site entrance Corr ADD NAME Correspondence address – Site name Corr ADD BUILD Correspondence address – Building Corr ADD HOUSE Correspondence address – House number Corr ADD STRT Correspondence address – Street Corr ADD AREA Correspondence address – Area Corr ADD TOWN Correspondence address – Town Corr ADD CNTY Correspondence address – County Corr ADD PCODE Correspondence address – Postcode Corr ADD TEL Correspondence address – Telephone number Corr ADD FAX Correspondence address – Fax number Corr ADD EMAIL Correspondence address – Email address STAT SDESC Licence status LIC RECD Date application received LIC CONSD LIC CONCD LIC APPD LIC TARD Target date for applications to be processed by LIC ISSD Date licence issued LIC MODD Date licence was modified LIC TRAD Date licence was transferred LIC EFFD Date licence came into effect LIC SURD Date licence was surrendered LIC EXPD Date licence expired LIC REND Date licence was renewed LIC CAND Date licence was cancelled LIC AMND Date licence was amended LIC TONS Annual tonnage permitted Region Environment Agency Region Area Environment Agency Area

1	**Number**	5
2	**Name & AfA Code (if applicable)**	Environmental Permitting Regulations – Industrial Sites (AfA021)
3	**Description**	The Environmental Permitting Regulations, amongst other things, implement the IPPC (Integrated Pollution Prevention and Control) Directive (EC/61/96) in England & Wales. Facilities covered by this legislation are known as Installations and generally have significant releases to air, land or water or carry out certain, larger scale, waste management activities. Further information on the Environmental Permitting Regulations (EPR) and the IPPC directive, is available on our website or at www.defra.gov.uk This dataset covers all Process Industry sites within the EPR regime and some larger waste activities. Other smaller waste faciltities are known as 'Waste Operations' (formerly known as Waste Management Licences) and are covered in a separate dataset, see below: Other related datasets that are available are: • Environmental Permitting Regulations – Waste Sites • Authorised Treatment Facilities (End of Life Vehicles) • Waste Electrical, Electronic Equipment (WEEE)
4	**Content Type**	Dataset
5	**Geographical Coverage**	Natural Resources Wales Owned Data
6 - 8	**These paragraphs are not applicable to this licence**	
9	**Format supplied**	Access database
10 - 14	**These paragraphs are not applicable to this licence**	
15	**Are there any known Third Party Rights?**	None
If yes, state who owns those rights and has licensed us.		N/A
16	**One off cost of supply charges**	Not applicable
17	**Number of Terminals licensed (National Datasets only)**	10
18	**Licence Fees**	**Fees in relation to this Content – reviewed annually on 1 April** NB Charges for Remote Survey Data are one-off. All other Licence Fees are annual. Standard wording below is based on Wales only data.

Internal Use Charges

The National Dataset charge comprises 2p multiplied by the Content Factor (dataset) per sq km or Content Factor (record) per record with a maximum of 10,000 sq km or half the deemed number of records with a terminal discount if applicable.

Content Factor	NRW Internal Use Charges GBP per annum	Third Party Royalties GBP per annum	Dataset Terminal Discount % (if applicable)	Cost of supply charges per annum	Total GBP per annum
5	**£7,000.00**	**N/A**	**55%**	**£0.90**	**£60.00**

19	**Are there any special conditions added with specific reference to this**	None

	Content?	
20	**Are there any information warnings added with specific reference to this Content?**	None

21	**Full details/attributes**	As contained in Environment Agency Information Asset Register referred to also as the Information for Re-Use Register. Region Environment Agency Region Area Environment Agency Area Original Permit Number Unique PAS (Permitting Administration System) authorisation number for initial application Permit Number Unique PAS authorisation number for current application (primary key, and reference cell for linked table) EPR Ref Environmental Permit Reference Number (will only be present for recent permits). Takes the format: AB1234CD/A001 (application for a new licence) AB1234CD/V001 (variation, also known as modification) AB1234CD/T001 (transfer) AB1234CD/R001 (revocation, also known as surrender) Operator Name Operator Name Status Current (at date of extraction) status of permission: Superceded [sic] Effective Surrender Effective Revoked Transfer Effective Refused Determination Not Yet Effective Local Authority Local Authority Name Installation Name Name of installation where activities occur Secondary Name IS Operator Address – line 1 Primary Name IS Operator Address – line 2 Street Name IS Operator Address – Street Locality IS Operator Address – Locality Town IS Operator Address – Town Post Town IS Operator Address – Post Town County IS Operator Address – Post County Post Code IS Operator Address – Postcode Duly Made Date Date application was accepted as ‘duly made’ Issue Date Date of issue of a variation on an effective permit Permit Effective From Date Date when conditions of Authorisation/Variation apply Application Type Type of entry: Application Variation Surrender Transfer PPCAPP Application Sub-Type Sub-type of entry: New Minor Standard Whole Simple Standard variation Substantial Whole without FAPP Whole with FAPP Whole limited change in management Installation never operated Part Grid Reference IS NGR for site entrance (Eight figure AA11119999) Eastings SIX-FIGURE EASTINGS FOR THE SITE ENTRANCE (TYPICALLY FIVE FIGURE ACCURACY PADDED WITH A ZERO) Northings SIX-FIGURE NORTHINGS FOR THE SITE ENTRANCE (TYPICALLY FIVE FIGURE ACCURACY PADDED WITH A ZERO)

21	**Full details/attributes**	Issue Date Date of issue of a variation on an effective permit Permit Effective From Date Date when conditions of Authorisation/Variation apply Application Type Type of entry: Application Variation Surrender Transfer PPCAPP Application Sub-Type Sub-type of entry: New Minor Standard Whole Simple Standard variation Substantial Whole without FAPP Whole with FAPP Whole limited change in management Installation never operated Part Grid Reference IS NGR for site entrance (Eight figure AA11119999) Eastings SIX-FIGURE EASTINGS FOR THE SITE ENTRANCE (TYPICALLY FIVE FIGURE ACCURACY PADDED WITH A ZERO) Northings SIX-FIGURE NORTHINGS FOR THE SITE ENTRANCE (TYPICALLY FIVE FIGURE ACCURACY PADDED WITH A ZERO) Region Environment Agency Region Area Environment Agency Area Original Permit Number Unique PAS authorisation number for initial application Permit Number Unique PAS authorisation number for current application (links to same field in other table) Part of compound primary key for table EPR Ref Environmental Permit Reference Number Operator Name Operator Name Status Current (at date of extraction) status of permission: • Superceded [sic] • Effective • Surrender Effective • Revoked • Transfer Effective • Refused • Determination • Not Yet Effective Local Authority Local Authority Name Activity Schedule Reference Activity Schedule Reference Number e.g. 5.3 A(1) c) (ii) Part of compound primary key for table Activity Description Description of Activity Schedule Reference Number e.g. OTHER WASTE DISPOSAL; NON-HAZARDOUS WASTE >50T/D BY PHYSICO-CHEMICAL TREATMENT Grid Reference IS NGR for site entrance (Eight-figure e.g. SP12341234) Primary Activity Y/N Whether this is the primary permitted activity under this permit (Boolean operator distinguishing whether this is the primary activity being permitted at a site) e.g. Y/N Part of compound primary key for table

1	**Number**	6
2	**Name & AfA Code (if applicable)**	Waste Management Licence Current Exemptions (AfA005)
3	**Description**	Current Waste Mgt. Licence Exemption data as required by Schedule 3 of the Waste Management Licensing Regulations 1994 (as amended) lists the activities which are normally exempt from WML in England and Wales. Circular 11/94 in England and Circular 26/94 in Wales provides additional information. Typical exemptions include: • Cleaning or coating of waste packaging, containers and textiles • Burning waste as a fuel in an exempt appliance • Burning waste as a fuel in an engine • secure storage of waste treatment of waste for recovery of materials • burning of waste in an exempt incinerator at place of production • depositing of mineral exploration waste storing WEE for recovery elsewhere Some activities may be excluded from WML where the activity is controlled under other regimes.
4	**Content Type**	Dataset
5	**Geographical Coverage**	Natural Resources Wales Owned Data
6 - 8	**These paragraphs are not applicable to this licence**	
9	**Format supplied**	N/A
10 - 14	**These paragraphs are not applicable to this licence**	
15	**Are there any known Third Party Rights?**	None
If yes, state who owns those rights and has licensed us.		N/A
16	**One off cost of supply charges**	Not applicable
17	**Number of Terminals licensed (National Datasets only)**	10
18	**Licence Fees**	**Fees in relation to this Content – reviewed annually on 1 April** NB Charges for Remote Survey Data are one-off. All other Licence Fees are annual. Standard wording below is based on Wales only data.

Internal Use Charges

The National Dataset charge comprises 2p multiplied by the Content Factor (dataset) per sq km or Content Factor (record) per record with a maximum of 10,000 sq km or half the deemed number of records with a terminal discount if applicable.

Content Factor	NRW Internal Use Charges GBP per annum	Third Party Royalties GBP per annum	Dataset Terminal Discount % (if applicable)	Cost of supply charges per annum	Total GBP per annum
N/A	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

19	**Are there any special conditions added with specific reference to this Content?**	None

20	**Are there any information warnings added with specific reference to this Content?**	None
21	**Full details/attributes**	As contained in Environment Agency Information Asset Register referred to also as the Information for Re-Use Register. Exempt E/U Name & Address of the exempt establishment or undertaking Site Address Place where exempt activity occurs Activity Sub para Specific activities registered for exemption Activity Description Description of the Activity that makes it Exempt Date Notified When the Agency is notified about the exempt activity Date Registered The date we register or refuse to register etc (3 different status') District District where exempt site is Catchment Catchment where site is

1	**Number**	7
2	**Name & AfA Code (if applicable)**	Water Abstractions (AfA135)
3	**Description**	The water abstractions dataset details all sites covered under the Water Act 2003 where all abstractions of 20 cubic metres or more require an abstraction licence. The dataset consists of two tables: • The first holds details of all live water abstraction licences in England and Wales. Expired, lapsed and revoked licences are excluded. • The second (supplementary) table holds details of maximum annual and maximum daily abstraction quantities. The quantities are the maximum permitted under the licence; they give an indication of the size of the abstraction. Some licences may include aggregating conditions or other conditions which restrict the abstraction; these are not included in the dataset.
4	**Content Type**	Dataset
5	**Geographical Coverage**	Natural Resources Wales Owned Data
6 - 8	**These paragraphs are not applicable to this licence**	
9	**Format supplied**	N/A
10 - 14	**These paragraphs are not applicable to this licence**	
15	**Are there any known Third Party Rights?**	None
If yes, state who owns those rights and has licensed us.		N/A
16	**One off cost of supply charges**	Not applicable
17	**Number of Terminals licensed (National Datasets only)**	10
18	**Licence Fees**	**Fees in relation to this Content – reviewed annually on 1 April** NB Charges for Remote Survey Data are one-off. All other Licence Fees are annual. Standard wording below is based on Wales only data.

Internal Use Charges

The National Dataset charge comprises 2p multiplied by the Content Factor (dataset) per sq km or Content Factor (record) per record with a maximum of 10,000 sq km or half the deemed number of records with a terminal discount if applicable.

	Content Factor	**NRW Internal Use Charges GBP per annum**	**Third Party Royalties GBP per annum**	**Dataset Terminal Discount % (if applicable)**	**Cost of supply charges per annum**	**Total GBP per annum**
	3	**£4,500.00**	**N/A**	**55%**	**N/A**	**N/A**

19	**Are there any special conditions added with specific reference to this Content?**	Yes, S77
20	**Are there any information warnings added with specific reference to this Content?**	None

21	**Full details/attributes**	As contained in Environment Agency Information Asset Register referred to also as the Information for Re-Use Register. Region EA Region Name Area Agency Area Code Area_Name Full name of the Agency Area Licence_No Unique number Prev_Licence_Number Previous Licence Number Original_Licence_No Original Licence Number Application_no Application number for the current (version of) licence Issue_No Issue number of the licence Increment_No Where any changes applied do not result in a new issue of the licence. Orig_Effective_Date Date first licence document became effective Expiry_Date Date licence has expired (expected to expire) Version_Start_Date Start date of this version of the licence Version_End_Date Date this version expires Salutation Salutation for licence holder Initials Initials of licence holder Forename Forename of licence holder (if individual) Name Surname of licence holder, if an individual; licence holder's full name if a company Line_1 First line of the licence holder's address Line_2 Second line of the licence holder's address Line_3 Third line of the licence holder's address Line_4 Fourth line of the licence holder's address Town Town from the licence holder's address Country Country from the licence holder's address Postcode Licence holder's postcode Primary_Code Code for primary purpose of abstracted water Secondary_Code Code for secondary purpose of abstracted water Use_Code Code for the use for which the water is authorised to be abstracted Primary_Description Text description of primary code Secondary_Description Text description of the use code Use_Description Text description of the use code Period_Start Start of authorised period of abstraction (day/month) Period_End End of authorised period of abstraction (day/month) Source_of_supply Code for source of supply: surface water, groundwater, tidal water Point_Name Name of abstraction point Point_Category Code for abstraction point category Region EA Region name Licence_No Licence_No Max_Annual_QTY Maximum Annual Quantity that can be abstracted under the Licence number Max_Daily_Qty Maximum Daily Quantity that can be abstracted under the Licence number Purpose_Points_Descriptior This field enables basic interpretation of maximum quantity fields in relation to purpose / points. The licence may be for one of the following: • Single Point / Single Purpose • Single Point / Multiple Purposes • Multiple Points / Single Purposes • Multiple Points / Multiple Purposes Aggregated_to_other_Lic Flag indicating whether the quantities are aggregated to another licence

1	**Number**	8
2	**Name & AfA Code (if applicable)**	Consented Discharges to Controlled Waters (AfA014)
3	**Description**	These data provide details of permit details as required under the Environmental Permit Regulations. Information is held for all permit holders and covers all substances that are controlled. These data are taken from the Environment Agency's Public Register and contain only the first of three tiers of data for all active permits. Tier 1 – Site and General Information on the consent holder that has a consent to discharge into controlled waters. Consent holder and the discharge address and type. The date of permit issue, effective and revocation. Information where the effluent enters the environment (such as sewage disposal works) for each holder that has been granted a permit. Data is also held on the effluent type e.g. Sewage effluent, Overflow. The location of the grid reference is supplied for the effluent and the outlet location in OS Nation Grid Reference format. More detailed information is available under AfA184, Consented Discharges to Controlled Waters with Conditions, which includes: Tier 2 – Effluent Further detail is provided on the amount that can be discharged and in which time period in months. This is stored as Dry Weather Flow, Maximum Daily, Mean, Maximum Rate. Further data about the permit type and treatment type from lookup lists are provided. Tier 3 – Determinand Limits Determinands are the substances and numerical limits that make up the effluent. This could include chemical, biological, and physical limits. Textual conditions are not included. The permitted limits are included for each determinand type. Data is provided for each effluent and may contain one or more determinands depending on the complexity of the discharge.
4	**Content Type**	Dataset
5	**Geographical Coverage**	Natural Resources Wales Owned Data
6 - 8	**These paragraphs are not applicable to this licence**	
9	**Format supplied**	N/A
10 - 14	**These paragraphs are not applicable to this licence**	
15	**Are there any known Third Party Rights?**	None
If yes, state who owns those rights and has licensed us.		N/A
16	**One off cost of supply charges**	Not applicable
17	**Number of Terminals licensed (National Datasets only)**	10
18	**Licence Fees**	**Fees in relation to this Content – reviewed annually on 1 April** NB Charges for Remote Survey Data are one-off. All other Licence Fees are annual. Standard wording below is based on Wales only data.

Internal Use Charges

The National Dataset charge comprises 2p multiplied by the Content Factor (dataset) per sq km or Content Factor (record) per record with a maximum of 10,000 sq km or half the deemed number of records with a terminal discount if applicable.

	Content Factor	NRW Internal Use Charges GBP per annum	Third Party Royalties GBP per annum	Dataset Terminal Discount % (if applicable)	Cost of supply charges per annum	Total GBP per annum
	3	**£4,500.00**	**N/A**	**55%**	**£0.54**	**£60.00**
19	**Are there any special conditions added with specific reference to this Content?**	None				
20	**Are there any information warnings added with specific reference to this Content?**	None				
21	**Full details/attributes**	As contained in Environment Agency Information Asset Register referred to also as the Information for Re-Use Register. COMPANY_NAME Consent holders name DISCHARGE_SITE_NAME Discharge site name DISCHARGE_SITE_TYPE_CODE Discharge site type code DSI_TYPE_DESCRIPTION Discharge site type description ADD_OF_DISCHARGE_SITE_LINE_1 Address data ADD_OF_DISCHARGE_SITE_LINE_2 Address data ADD_OF_DISCHARGE_SITE_LINE_3 Address data ADD_OF_DISCHARGE_SITE_LINE_4 Address data ADD_OF_DISCHARGE_SITE_PCODE Address data DISCHARGE_NGR Location of the discharge site DISTRICT_COUNCIL District council CATC_NAME Catchment name CATCHMENT_CODE Catchement code EA_REGION Environment agency region code REGION Environment agency region name PERMIT_REF Consent number VERSION Consent version RECEIVING_WATER Name of the receiving environment RECEIVING_ENVIRON_TYPE_CODE receiving environment type code REC_ENV_CODE_DESCRIPTION receiving environment type description ISSUED_DATE Date the permit was issued EFFECTIVE_DATE Date the permit became effective REVOCATION_DATE Date the permit will be revoked STATUS_OF_PERMIT Code for relevant section/schedule of act of Parliament STATUS_DESCRIPTION Text describing relevant section/schedule of act of Parliament OUTLET_NUMBER ID for the outlet OUTLET_TYPE_CODE Code for outlet type OUTLET_TYPE_DESCRIPTION Description of type of outlet OUTLET_GRID_REF Outlet grid reference EFFLUENT_NUMBER ID for the effluent EFFLUENT_TYPE Code for effluent type EFFLUENT_GRID_REF Effluent Grid ref				

Open Content

Any designated NRW Open Content used by You, however it has come into your possession.

SCHEDULE 4 – Special Conditions

S4 Special Conditions applicable to all Commercial Internal Use Licensees

S4.1 You shall when permitted to supply Licensed Content externally:

- take into account any relevant Information Warning,
- include the most up to date version of Licensed Content available to you, and
- acknowledge NRW as the relevant intellectual property right owner.

S4.2 Maximum liability in Standard Condition 8 shall be replaced by “one hundred thousand pounds”.
S4.3 You will be issued on request an Archival Use licence subject to further payment of annual Licence Fees, with a discount of 80% (other than for Third Party Royalty Fees).
S77 - supplying information that identifies the locations of public water supply abstraction sources

SCHEDULE 5 – Information Warning

None

Signed on behalf of Natural Resources Wales

Name	Michelle Price
Job Title	External Relations Officer
Signature	
Date	12th May 2015

Signed on behalf of the Licensee

Name	Liz Williams
Job Title	Senior Enviromental Consultant
Signature	
Date	12th May 2015

Appendix 1 - Standard terms and conditions for a Natural Resources Body for Wales Intellectual Property Licence

1. Definitions

In this agreement the definitions in Appendix 2 shall apply.

2. Interpretation

2.1 a reference to any statute, statutory provision or statutory instrument includes a reference to all rules and regulations made under it or them as from time to time amended, consolidated or re-enacted;

2.2 reference to any person includes any legal entity, including without limitation a natural person or incorporated entity;

2.3 words importing a singular include the plural and vice versa;

2.4 The headings in this Agreement are for ease of reference only.

3. Term

The period of this agreement shall be as specified in Schedule 1 at the end of which it will expire automatically without notice.

4. Supply of Licensed Content to the Licensee

Where Licensed Content replaces earlier Content supplied the Licensee shall not use that earlier Content otherwise than for Archival Use;

5 Licence

In consideration of the mutual obligations in this agreement and the payment (if applicable) by the Licensee of the Fees the NRW hereby grants to the Licensee personally (and not to any affiliated company or organisation) a non-transferable, non-exclusive revocable worldwide licence subject to the terms of this agreement to make the uses and to sublicense as specified in the Schedule 2 and to take any copies of the Licensed Content reasonably needed in connection with licensed use including backup copies.

6. Obligations of the Parties

6.1 The Licensee shall:

LICENSED CONTENT

6.1.1. Not supply to another person Licensed Content or any other NRW Content or anything Derived therefrom (but this does not prohibit anything not Derived), unless required by law, other than as licensed by the NRW and accompanied by appropriate acknowledgement and attribution of the NRW's contribution and ownership of Intellectual Property Rights and in particular ensure that any web hosting or web mapping services are consistent with this obligation and not given any greater licence to use the Licensed Content than is permitted by way of Contractor Use;

6.1.2. comply with any Terminal Use Restriction;

6.1.3. take all reasonable technical, contractual and other security measures to protect the integrity and security of Licensed Content and to prevent any use of the Licensed Content contrary to this agreement and any breach of this sub-condition which has a demonstrable effect shall be capable of being treated as a material breach of this agreement;

PUBLICITY & MARKETING

6.1.4. other than as required by condition 6.1.1, not refer to the NRW in any marketing or publicity material without prior approval of the NRW in writing and not use any Licensed Content in such material unless licensed herein;

END USER TERMS AND CONDITIONS

6.1.5. ensure that any supply of Licensed Content to a third party in pursuance of this agreement is on the terms of an EULA which prohibits any External Use that is not separately licensed by the NRW and requires As-Is or Copy Derived Licensed Content to be destroyed at the end of the term of the EULA;

COMPLIANCE WITH THE PRINCIPLES

6.1.6. do nothing which might contravene the Principles and any breach of this sub-condition which has a demonstrable effect shall be a material breach of this agreement provided that provision of truthful responses to enquiries put to the Licensee which are purely factual in nature shall only be a breach if contrary to condition 11;

NOTIFICATIONS BY THE LICENSEE

6.1.7. The Licensee will notify the NRW if:

a. it becomes aware that it is in breach of the licence agreement,

b. it suspects or discovers any possible infringement of the NRW''s Intellectual Property Rights in the Licensed Content by a third party,

c. it suspects or discovers that use of the Licensed Content might be an infringement of any third party's Intellectual Property Rights or of any third party's contractual rights derived therefrom or be any other breach of confidentiality or statute,

d. it receives any Third Party Claim or a significant complaint or report in connection with this agreement or the Licensed Content and will, subject to any legally binding confidentiality, supply copies of any relevant documentation to the NRW.

6.2 The NRW shall:

6.2.1 supply to the Licensee such information and assistance as the Licensee may reasonably request, for the purposes of this agreement in connection with the processes and procedures used to create the Licensed Content unless such information is confidential to the NRW or supply would breach any intellectual property rights, contractual restrictions or other third party confidentiality;

6.2.2 treat equitably the Licensee and other comparable licensees.

7. Payment

7.1 Fees are as detailed in Schedules 2 and 3 and are, subject to any Special Conditions, payable in advance of this agreement.

7.2 Where Fees are payable, the Licensee shall keep true, accurate and sufficient accounts and records to enable the amount of all payments required under this agreement to be determined. The Licensee shall keep such accounts and records during the life of this agreement and six years after its termination or expiry.

8. Liability

8.1 QUALITY AND FITNESS FOR PURPOSE

The NRW does not warrant that the Licensed Content will always be accurate, complete or up to date or that the Licensed Content will provide any particular facilities or functions or be suitable for any particular purpose. The Licensee must ensure that the Licensed Content meets its needs and is entirely responsible for the consequences of any use of the Licensed Content.

8.2 ELECTRONIC FORMAT

If an electronic format has been used, the NRW applies reasonable endeavours to ensure that but cannot guarantee that the media on which the Licensed Content is provided will always be free from defects, computer viruses, worms, Trojan horses, software locks or other similar code of a destructive or unwelcome nature. The Licensee should carry out all necessary checks prior to loading the Licensed Content on to its computer system.

8.3 ECONOMIC AND INDIRECT LOSS

Other than in respect of Condition 11, compliance with the Principles and the warranty in condition10, neither party shall be liable to the other or any other person (whether in contract or in negligence or in other tort or otherwise) for:

8.3.1. any economic losses (including without limitation loss of revenues, profits, contracts, business or anticipated savings) other than Fees; or

8.3.2. any loss of goodwill or reputation; or

8.3.3. any special, indirect or consequential losses in any case whether or not such losses were within the contemplation of the parties at the date of this Licence (including loss of business, profit, reputation or goodwill) arising out of or in connection with this agreement or its subject matter.

8.4 MAXIMUM LIABILITY

The Parties' maximum aggregate liability to the other (including legal costs) in connection with this agreement shall not (apart from payment of Fees and the indemnities in condition 17) exceed the total sum of Fees due under this agreement or such other sum as shall be indicated in Special Conditions.

8.5 NOTICE OF CLAIMS

Neither party shall be liable for any claim between the parties (not being in relation to a Third Party Claim) arising under this agreement unless Notice of the claim is given to the other within six months of becoming aware of the circumstances giving rise to such claim, or of such time as the relevant party ought reasonably to have become aware of such circumstances.

8.6 DEFECTS IN OWNERSHIP

The NRW shall not be liable under this agreement for any defect in its Intellectual Property Rights to the Licensed Content if, both:

8.6.1 it has used reasonable endeavours to ensure that relevant numbered section in Schedule 3 is in the generality the property of or licensed to the NRW; and

8.6.2 after the application of the provisions in condition 10 on remedying defects, such defect would not require the withdrawal of that numbered section or a significant part thereof, it being accepted that less than five percent (5%) (measured either as to value, geographically, or by quantity) would not be significant.

8.7 DEATH AND PERSONAL INJURY

Nothing in this condition 8 shall limit or exclude either party's liability for death or personal injury arising from its negligence.

9. Representations

Except as expressly provided in this agreement, all representations, conditions and warranties whether express or implied (by statute or otherwise) are hereby excluded to the fullest extent permitted by law provided that this shall not exclude statutory or common law rights in respect of negligence.

10. Intellectual Property Rights

10.1 No Intellectual Property Rights are transferred or licensed to the Licensee save those which are expressly provided in this agreement .

10.2 The NRW warrants that subject to the provisions on defects in ownership contained in condition 8 it has all other powers and rights necessary to grant to the Licensee the licences set out in condition 5.

10.3 If any use of any part of the Licensed Content in accordance with this agreement infringes any Intellectual Property Rights the NRW shall use all reasonable endeavours to obtain the right (without charge) for the Licensee to continue to use and to distribute the infringing Content If however the NRW is unable to do this, it shall use all reasonable endeavours to modify or replace that Content so as to be as close to the usefulness of the original Licensed Content as reasonably possible and (if this is not possible) it may remove the infringing Content from Schedule 3.

10.4 Neither party shall be entitled to bring an action for specific performance of the other party's obligations under this agreement where the performance of such obligation would be in breach of third party Intellectual Property Rights.

11 Confidentiality

11.1 The Licensee and the NRW agree to keep Confidential Information in strict confidence and secrecy; to restrict the disclosure of any part of Confidential Information to such of their respective employees, agents and contractors who need access to it to enable them to perform their obligations under or in connection with this agreement and to bring to the attention of such persons the duty of confidentiality under this condition before allowing them access to Confidential Information unless they are already bound by alternative equivalent obligations; and not to disclose any Confidential Information to any other third parties without the prior written consent of the other.

11.2 This condition 11 shall survive the expiry or termination of this agreement
11.3 This condition 11 shall not apply to Confidential Information:
11.3.1 which when it was disclosed was in the public domain otherwise than because of a breach of an obligation of confidentiality; or
11.3.2 that a party could be required to disclose by law; or
11.3.3 that has been disclosed in accordance with the Public Interest Disclosure Act 1998, the Freedom of Information Act 2000, the Environmental Information Regulations 2004 or the Re-use of Public Sector Information Regulations 2005; or
11.3.4 received by a party from a third party at liberty to disclose it; or
11.3.5 supplied to a third party whose Intellectual Property Rights have been used in connection with the Licensed Content and who has reasonably asked for such Confidential Information in order to verify payments due to them.

12. Termination

12.1 The Licensee shall be entitled to terminate this agreement by 20 Working Days' Notice for any reason.
12.2 The NRW shall be entitled to terminate this agreement by 20 Working Days Notice identifying the relevant reasons if the Licensee is in material breach of any of the terms of this agreement, or has not fewer than 5 times in any 12 month period committed a non-material breach of any of the terms of this agreement (and, in the case of a breach capable of remedy, the notice period will not commence if the Licensee remedies that breach in such manner as described in the notice within 20 Working Days); or if the Licensee undergoes a change of ownership or control to which the NRW has reasonably objected within 20 Working Days of becoming aware of such change, or if a resolution is passed or an order is made for the winding up of the Licensee (save for the purpose of a bona fide re-construction or amalgamation) or the Licensee becomes subject to an administration order, or a receiver or administrative receiver is appointed over any of the Licensee's property or assets, or the Licensee is dissolved;
12.3 The rights to terminate this agreement given by this condition 12 shall be without prejudice to any other right or remedy of either party in respect of the breach concerned (if any) or any other breach.

13. Consequences of Termination

13.1 On expiry, Cessation or termination of this agreement the Licensee's entitlement to use the Licensed Content shall cease.
13.2 All copies of the Licensed Content in the Licensee's (or its contractors') possession shall be destroyed unless it has been Process Derived.
13.3 Continued use by an End User of Licensed Content supplied under this agreement prior to expiry or termination is licensed by the NRW for the remainder of the period of any EULA that is compliant with this agreement.
13.4 This condition shall survive termination or expiry of this agreement.

14. Force Majeure and NRW's Statutory Obligations

14.1 Neither party shall be liable to the other for any delay in or failure of performance of its obligations under this agreement (other than an obligation to pay money) arising from any cause beyond its reasonable control including, without limitation, any of the following: Act of God, governmental act (including acts of regulatory authorities), statutory obligation, industrial action, war, fire, flood, explosion or civil commotion ("Force Majeure").
14.2 If a party is affected by Force Majeure it shall forthwith give Notice to the other party of the nature and extent of such Force Majeure.
14.3 If Force Majeure prevails for a continuous period in excess of 20 Working Days the parties shall enter into bona fide discussions with a view to alleviating its effects or to agreeing upon such alternative arrangements as may be fair and reasonable.
14.4 The NRW shall not be liable to the Licensee for delay in performing its obligations under this agreement if such delay arises out of the overriding need to comply with its statutory obligations.

15. Assignment

The Licensee may not transfer or in any other way make over to any third party the benefit of this agreement either in whole or in part without the express prior written consent of the NRW such consent not to be unreasonably withheld or delayed.

16. Waiver

Failure by either party to exercise or enforce any rights available to it, or any forbearance, delay or grant of indulgence, will not (subject to condition 17 below) be construed as a waiver of its rights under this agreement or otherwise.

17. Indemnities

17.1 Where Commercial Use is licensed herein each party shall indemnify the other against all costs (including reasonable and proper legal costs), claims, damages, demands and expenses arising directly or indirectly out of any Third Party Claim in accordance with the following principles:
17.1.1 the Licensee shall be responsible for any claims which arise from any breach of the agreement by the Licensee;
17.1.2 the NRW shall, subject to the provisions on defects in ownership in condition 8, be responsible for any claims that use of the Licensed Content infringes any United Kingdom Intellectual Property Rights or has been supplied in breach of a legally binding confidentiality;
17.1.3 nothing in these indemnities shall have the effect of requiring one party to indemnify the other to the extent that the other has been negligent or in wilful default;
17.2 The NRW or the Licensee (as the case may be) shall:
17.2.1 forthwith on receipt of a written request from the Licensee or the NRW(as the case may be) give to the other the sole conduct of the defence and settlement of any such claim and at no time admit liability; and
17.2.2 act in such a way as to mitigate their losses; and
17.2.3 act in accordance with the reasonable instructions of the other and give all such assistance as it may reasonably require to defend or settle such claim.

18. Entire agreement

This agreement constitutes the entire agreement between the parties and supersedes all oral or written agreements, representations, understandings or arrangements relating to its subject matter other than subsequent written alterations to this agreement mutually agreed by the parties in accordance with condition 20 below. The parties irrevocably and unconditionally waive any right to rescind this agreement by virtue of any misrepresentation and to claim damages for any misrepresentation save in each case where such misrepresentation was made fraudulently.

19. Severance

If any part of the agreement is found by a court of competent jurisdiction or other competent authority to be unenforceable, then that part will be severed from the remainder of the agreement which will continue to be valid and enforceable to the fullest extent permitted by law.

20. Variation

Variations must be agreed by both parties in writing signed by or on behalf of the NRW and the Licensee and neither party shall unreasonably refuse or delay 0such requests for a variation.

21. Notices and Consents

21.1 Notices under this agreement shall be written, in English, in advance by at least the period specified in this agreement and shall be sent to the address and contact of the party as set out in this agreement (or such other address in the United Kingdom as either party may notify to the other) in accordance with this condition).
21.2 Notices may be sent by first class mail (or other comparable and reputable postal services) or by email.
21.3 Correctly addressed notices sent by mail shall be deemed to be delivered 2 Working Days after posting.
21.4 Correctly addressed emails shall be deemed to be delivered when sent provided that a confirmation copy is sent by first class mail within 24 (twenty four) hours.
21.5 Any consent, approval or agreement given pursuant to this agreement shall be in writing and in the case of the Licensee shall be signed in accordance with the contacts records in Schedule 1, or any variation thereof.

22. Relationship of Parties

Nothing in this agreement shall create a partnership or joint venture between the parties, nor shall this agreement constitute one party the agent of the other or give either party authority to act or hold itself out as having authority to act on behalf of the other; or confer or purport to confer on any third party any benefit or rights in respect of the terms of this agreement.

23. Dispute Resolution

23.1 All disputes under or in connection with this agreement shall be referred first to the parties' respective managers with responsibility for the day to day management of this agreement.
23.2 Either party may thereafter initiate, at any time, the other party's standard internal complaints process (or if none exists refer the dispute up to the next level of management).
23.3 After the relevant complaints procedure or referral is completed (within the relevant timescales set out therein or in the absence thereof 20 Working Days), the dispute may be referred by either party to the parties' respective Chief Executive Officers or equivalent.
23.4 If the parties' respective Chief Executive Officers are unable to resolve the dispute within 10 Working Days, the dispute shall be referred to the Centre for Dispute Resolution who shall appoint a mediator and the parties shall then submit to the mediator's supervision of the resolution of the dispute.
23.5 Recourse to this dispute resolution procedure shall be binding on the parties as to submission to the mediation but not as to its outcome. Accordingly all negotiations connected with the dispute shall be conducted in strict confidence and without prejudice to the rights of the parties in any future legal proceedings.
23.6 Except for any party's right to seek interlocutory relief in the courts, no party may commence other legal proceedings under the jurisdiction of the courts or any other form of arb0tration until 20 Working Days after the appointment of the mediator.
23.7 If, with the assistance of the mediator, the parties reach a settlement, such settlement shall be put in writing and, once signed by a duly authorised representative of each of the parties, shall remain binding on the parties.
23.8 The parties shall bear their own legal costs of this dispute resolution procedure, but the costs and expenses of mediation shall be borne by the parties equally.
23.9 Nothing in this condition shall restrict the Parties' rights to seek interim relief.

24. Rights of Third Parties

Save where this Agreement expressly provides to the contrary, for the purposes of the Contracts (Rights of Third Parties) Act 1999 this Agreement is not intended to, and does not, give any person who is not a party to it any right to enforce any of its provisions.

25. Governing Law

This agreement shall be governed and construed in accordance with English law and the parties submit to the exclusive jurisdiction of the English courts in the event of a dispute.

APPENDIX 2 - DEFINITIONS

NB core definitions are in standard font.

"2nd Generation Process Derived Product" *means a product that is Process Derived from the Approved Product on which it is immediately based where any preceding Approved Product in the chain of derivation from the Licensed Content is Process Derived and such product is not prohibited by standard condition 6.1.1*

"Approved Chain Derived Product" *mean a Chain Derived Product identified in Schedule 2 and that is fully compliant with the details included in Schedule 2(in particular those of the assessed product category)and any relevant special condition including those created by the Reseller*

"Approved VAR Product" *mean a product created by the Reseller that is Derived directly from the Licensed Content, identified in Schedule 2 a sample of which has been supplied to the Natural Resources Walesprior to approval and that is fully compliant with all the details included in Schedule 2 (in particular those of the assessed product category)and any relevant special condition.*

"Approved Product" *means, unless the context required otherwise an Approved Chain Derived Product and/or an Approved VAR Product.*

"Archival Use" means use after expiry, Cessation or termination that comprises retention Internally by the Licensee or its contractors of copies of the Licensed Content for a period not exceeding six years and only to the extent necessary to answer technical support questions or to comply with any statutory or regulatory requirement.

"Area Search and Print" *means the product category whereby a product is created by means of a full copy of or extract of or Search of Licensed Content and such content is supplied in original or derived form with mapping, interpretation, guidance or other consultancy type work, such as data selection or other customisation, specific to that customer.*

"Area View Only" *means the product category whereby a product meeting the description of any other dataset product category is made available but not supplied to a customer who is given no legal right to any more than viewing the product and all reasonable technical measures are taken to prevent any act in excess of viewing.*

"As-Is" This means a copy of the whole or Part of the original Content that is unaltered and un-adapted and not merged with other Content other than by:

- layout, font, size, colour and other minor display changes,
- digital file compression,
- putting into an encrypted or protected format such as a protected ZIP file or a locked pdf but not un-encrypting original Information that is already in a protected format,
- bundling with other Content or with a cover sheet provided that the original Content remains discrete,
- changing into a different format.

"Cessation" means removal or cessation of use of particular Licensed Content or an Approved External Use from the scope of this agreement.

"Chain Derived Product" *means a product that is:*

a) Derived from an Approved Product, and

b) creates a chain of two or more products requiring approval,

c) where the new product is not Copy Derived from the Licensed Content and not a 2nd Generation Process Derived Product.

"Co-Deliverer" means a person who is supplied by a public or not for profit body with Content for purposes all of which that body considers to be of **significant importance** to the achievement of that body's statutory functions, where that person supplied with Content uses it only for non-commercial purposes.

"Commercial" means

- internal Use within a Commercial Body except to the extent that such use relates to statutory functions of a body subject to the Environmental Information Regulations 2004 or comprises public task functions,
- offering a product or service containing Licensed Content for direct monetary compensation such as the sale of a book or newsletter with a cover charge even if it does not cover all costs but not including supply by a public sector body of products or services to other UK and EU public sector bodies or in pursuance of international treaties or conventions for a charge that does not exceed marginal costs (or costs required to be charged by legislation or binding government rules) where those bodies in receipt of such products or services are permitted to use only for statutory or public task purposes, or
- offering a product or service based on Licensed Content for indirect commercial advantage by a Commercial Body.

"Commercial Body" means an organisation that is primarily engaged in a profession, even if it has public task functions (unless it is a body that is prevented by its set up from distributing any of its income whether as money or in any other form to its Committee, board or members and limits payments to employees to salaries and a bonus scheme that is not designed to distribute all profits or surplus income but has provisions for distribution of surplus income for some public good (usually charitable) purpose) or is engaged in trade or commerce.

"Confidential Information" means any information relating to this agreement (but not the Licensed Content unless we say so expressly) disclosed by one party to the other under this agreement or coming to the Licensee's or NRW's attention directly or indirectly as a result of this agreement whether orally or in writing where such information is expressly stated to be confidential or ought reasonably to be regarded as confidential.

"Consistency Principle" means the principle whereby End Users of Content receive information that is the same from whichever person they obtain it.

"Content" has the same meaning as in the Re-Use of Public Sector Information Regulations 2005, including also computer programs and other intellectual property rights.

"Contractor Use" means passing of Content to a person (Contractor) who is contracted to provide services to the Content provider, when:

- use is limited to the purposes of that contract, and
- all terms of the original licence are applied to the Contractor, and
- the person letting the contract remains responsible for those terms, and
- the Contractor does not pass the Content to any person other than the Licensee or a subcontractor who complies with these conditions and
- the Contractor destroys all copies of the original Licensed Content supplied (and anything Copy Derived from that) at the end of the contract.

"Copy Derived" means the process of creating something from Content that is not the result of As-Is use and either:

- includes a copy of that Content as a whole or as a Part, and/or
- that Content can be reverse engineered from it, by which is meant the Content can be recreated by technical or other means in full or in Part from a derivative or a series of similar derivatives of it, and/or
- is a derivative that is Substitutable.

"Derived" unless the context requires otherwise means Copy Derived or Process Derived.

"e-Learning" means a Process based electronic system of teach yourself training.

"End User" means any person using Content supplied by way of licensed External Use for its own Internal Use, Standard Permitted External Use or for Professional Use.

"End User Licence Agreement" and "EULA" mean the terms under which the Licensee supplies Licensed Content to End Users (see condition 6).

"External As-is Use" means use that is not Internal Use or Standard Permitted External Use that involves the creation of As-Is Licensed Content.

"External Derived Use" means use that is not Internal Use or Standard Permitted External Use that involves the creation of Derived Licensed Content.

"External Use" means External As-Is Use and/or External Derived Use or Standard Permitted External Use.

"Fees" means Licence Fees and Royalty Charges.

"Fixed Format" means Content that is formatted in such a way as to be static and unalterable (or not easily alterable without the loading of special software). It will typically include hard copy, portable document format (pdf), image format (such as jpeg, gif, tiff and bmp) and video format (such as mpeg, avi and wmv).

"Fixed Image Publishing" means general distribution of Licensed Content comprising a still or moving image for viewing by the public where the following conditions apply:

- either:
    - it is a sample or extract that does not exceed 5% of the original specific Licensed Content or anything Copy Derived therefrom displayed in a Non-Commercial. website, social media pages or other electronic or hard copy publication operated by the Licensee (" Non-Commercial Publication"), or
    - it is Process Derived Content used in a Non-Commercial Publication, or
    - it is Licensed Content or anything derived therefrom displayed in any Media Publication to provided that it is not a specific information service or in any other way tailored to the needs of a particular customer or locality,
- there are no use rights granted to end users other than to view and all reasonable technical measures are taken to prevent more than viewing, and
- there is appropriate attribution in respect of Natural Resources Wales contribution, and
- it is supplied with any Information Warning we have identified as applicable to that Content (or such other wording as we may agree).

"Information Warning" means information required by Schedule 5 to be taken into account when using the Information.

"Intellectual Property Rights" means any patent, copyright, database right, registered design, trademark or other industrial or intellectual property together with any applications for any of the foregoing.

"Intermediary Reseller" *means a person other than the Reseller who creates an Approved Chain-Derived Product.*

"Internal Use" means use of Licensed Content by the Licensee or their employees (or in the case of an academic body, their students) that does not involve a supply of Licensed Content to anyone else.

"Licence Fees" means NRW's marginal costs of supply charges and licensing charges as identified in Schedule 3 together with Third Party Royalties.

"Licensed Content" means the Content identified in Schedule 3 and, except where the context requires otherwise anything Derived from it.

"Licensee Update Date" *means the date or period identified in Schedule 3 when an Update is made for the Licensee.*

"Licensee Update Frequency" *means the frequency with which the Licensee is supplied Updates to the Licensed Content.*

"Licensee Update Supply Date" *means the latest date identified in Schedule 3 by which NRW will supply an update to the Licensee.*

"Media Publication" means a publication whether printed or electronic, and whether or not there are any charges, where no use rights are granted to end users other than to read and all reasonable technical measures are taken to prevent more than viewing (generally only applicable to electronic data), that is either

- a newspaper, or
- a current affairs publication issued at least three times a year, or

- an academic, literary, trade or technical journal whose primary purpose is the advancement of or criticism or review of the arts, science or technology and issued at least three times a year, or
- any factual documentary type programmes or materials for the purposes of educating the public generally, on media such as television, distributed disks, films, video on demand or online media.

"No Detriment Principle" means that any intended use of Licensed Content must not represent a risk of being misleading to the End User, detriment to NRW's ability to achieve its objectives, detriment to the environment, including the risk of reduced future enhancement, or being prejudicial to the effective management of Content held by the NRW..

"Non-Commercial" means use that is not Commercial.

"Notice" means a notice given in accordance with condition 21.

"Part" In relation to Content means any discrete part of the original Content that is contained in a larger set of Content.

"Point Search and Print" *means the product category whereby a search is made by reference to information at a point, being a "pin in the map" representing a customer asset or mobile GPS receiver location that does not include information outside that point even if it affects that point. It can be treated as a single product regardless of the number of customers as long as it is only one product or application or publication that typically, but not necessarily, will be website or smart phone view.*

"Principles" means the Transparency Principle, the Consistency Principle and the No Detriment Principle.

"Process" means a rules based procedure that includes some user input such as:
methods, techniques, expert systems, flow charts, etc whether or not electronic, computer programs, apps, macros, artifacts, and other electronic tools and utilities etc.

"Process Derived" describes an output derived from Content that is not the result of As-Is or Copy Derived use that requires the physical input of that Content into a Process that involves some form of copying and/or manipulation (usually this will involve modelling).

"Professional Use" means, in respect of a particular client and particular transaction or matter, supply by a Consultant providing professional services to that client of As-Is Fixed Format Natural Resources Wales Content as a necessary but minor background part of those service, where:

a) the Content is obtained directly from NRW(and any applicable Licence Fees paid) or by way of an Approved Product or a Copy Derived derivative of it, as and when needed for and on behalf of a particular client
b) the Content supplied to a client relates to a site in single ownership and can include any other Content necessary for an environmental assessment of that site; and
c) the client is not granted any licence to copy, adapt or sub-license the Content other than to take one back up copy or to supply As-Is Fixed Format copies necessary for that client matter (or the Consultant can supply such copies on behalf of the client) provided that no charge is made for such supplies; and
d) no charge is made by the Consultant to its client for the Content other than a charge for professional services and disbursements; and
e) Content is attributed as required by Natural Resources Wales.

Note: The marginal costs of a UK trading fund (or any similar government body) can include all charges that are required by legislation or binding government rules in relation to making supplies to other public sector bodies

"Regulatory Use" means inclusion by or on behalf of a person of Fixed Format Content either As-Is or Derived in any documentation where this is reasonably necessary in connection with any process of a court, tribunal or regulatory body (but not including a trade association) affecting that person.

"Reseller Agent *means any person, including a distributor or an agent of the Reseller (or if applicable an Intermediary Reseller), who is supplied with an Approved Product with the intention that such person is permitted to sell it As-Is to an End User.*

"Royalty Charges" *means charges identified in Schedule 2 as Royalty Charges in respect of any Approved Product, including Third Party Royalties in relation to Approved Products.*

*"**Search"** means a query of a dataset by reference to a specified attribute example comprising a) the name of an individual, organisation, substance or site, b) geographical location or postcode or c) a particular date or d) any other similar precise search criterion.*

"Software" has the same meaning as "Process".

"Standard Condition" means one or more of the Standard Terms and Conditions in Appendix 1 also referred individually as a numbered "condition".

"Standard Permitted External Use" means Contractor Use, Regulatory Use or Fixed Image Publishing.

"Sub-setting and Subset" means the act and result respectively of reducing the proportion of a full dataset, without it comprising a Search and without reducing the fields or attributes supplied), by making a geographical extract ("spatial" sub-setting that is charged per square kilometre) or a selection of geographical points, sites, persons or other key attributes or use of one or more filters or selection criteria ("non-spatial" sub-setting", charged on a per record basis).

"Substitutable" in relation to Content means that a derivative of original Content serves substantially the same purpose as the original Content, has not been changed to something different and is effectively imparting the same or substantially the same knowledge.

"Terminal Use Restriction" means the limit specified in Schedule 3 on the number of servers, desktop or portable computers, personal digital assistants, mobile phones or any other electronic means of access, permitted in a particular Year to gain direct access to (this includes viewing) the Licensed Content or anything Copy Derived from it.

"Third Party Claim" means any claim for compensation or other legal remedy (including remedies in respect of negligence) in connection with this agreement or the Licensed Content by any person other than the Licensee or NRW.

“Third Party Royalties” means the charges payable to third parties as identified in and Schedule 2 (External Use) and Schedule 3 (Internal Use).
“Transparency Principle” means the principle that End Users should not be misled in any way about matters relating to the Licensed Content which affect its potential usefulness or as regards its source.
“Updates” means, where indicated in Schedule 3 as included, updated copies of Licensed Content that contain replacements for existing Licensed Content that are made by the NRW to reflect quality improvements or the elimination of errors, or additional within the same description, derived from an extract of the relevant NRWprimary source. An Update collates information from the relevant NRW primary Content source and can comprise either the supply of specific replacement Content or a full replacement set of Content.
“Value Added Reseller” and “**VAR**” means a person who supplies an Approved Product to third parties on a commercial basis with added value through additional information, facilities or services.
“VAR Update Go Live Date” *means the date identified to you at the time of an Update supply before which you must not update an Approved Product with Updates.*
“Wholesale” *means an As-Is supply of a Value Added Reseller dataset product (whether that product has been created As-Is, Copy Derived or Process Derived from Licensed Content), which does NOT include mapping, interpretation, guidance or other consultancy type work, such as data selection or other customisation, specific to that customer but Wholesale can include geographical “cookie cuts”, basic metadata and systems technical advice such as how to load and install.*
“Working Day” means Monday to Friday inclusive from 9:00am to 5:30pm, excluding UK public holidays.
“written” includes fax and email and any other electronic text.
“Year” means each period of twelve months commencing on the date particular Licensed Content is first licensed under this agreement and each anniversary thereof.

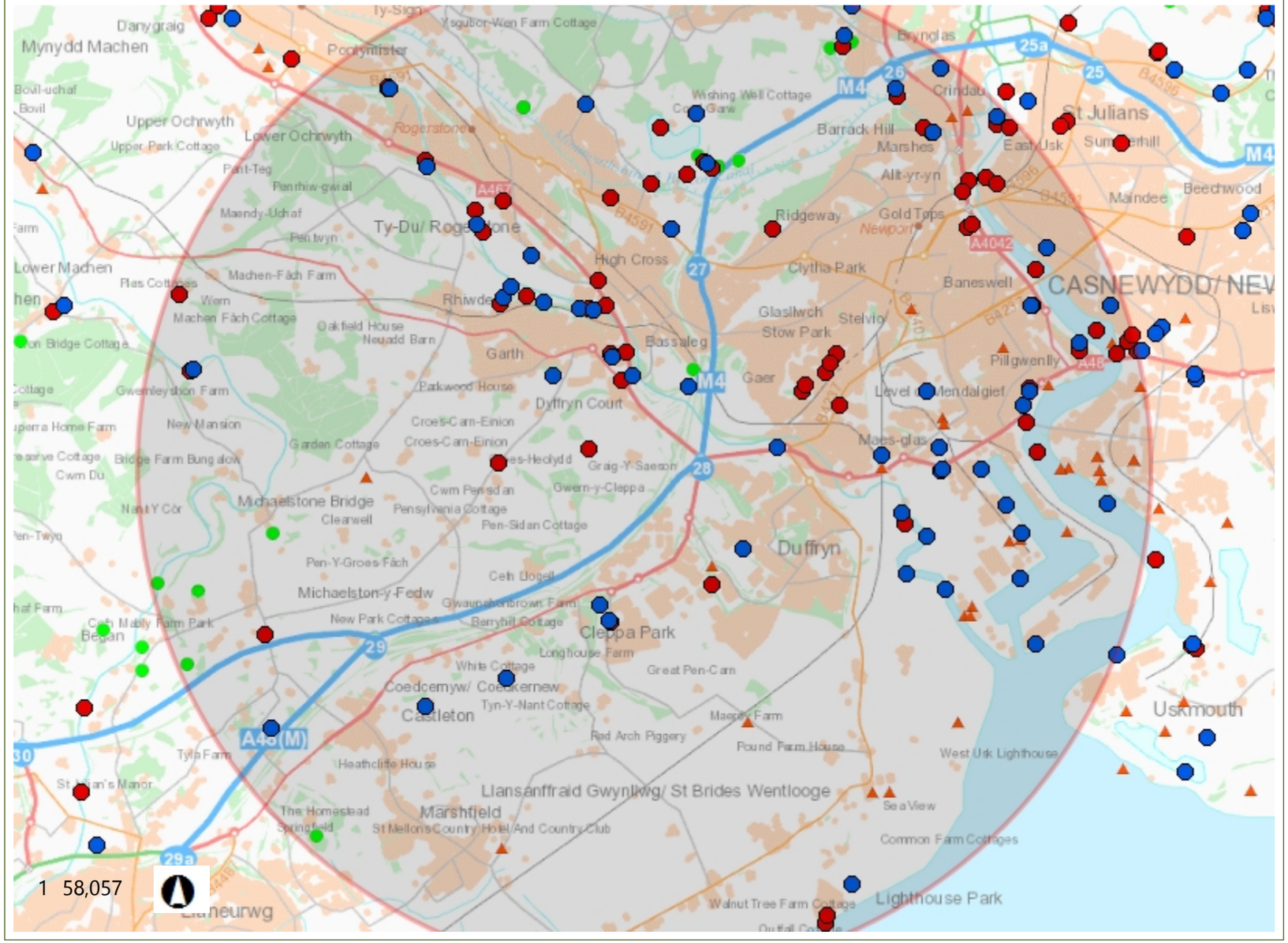
Cyfoeth Naturiol Cymru
Natural Resources Wales



Legend

- WIMS Active Discharge Consents
- WIMS DCWW Discharges
- REGIS Waste Licences
- NALD Licence Abstraction Points

Notes



2.9 0 1.47 2.9 Kilometers

British_National_Grid

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Substantiated Environmental Incidents along M4 corridor - Castleton to Caldicot - since 2010

Event No.	Reported Date and Time	Location	Incident Catchment	Incident Unitary	6 fig NGR	Air Env. Impact Level	Land Env. Impact Level	Water Env. Impact Level	Pollutant_1	Pollutant_2	Cause Type (Tier1)	Cause (Tier2)	Source Identified (Y/N) ?	Premises Type (Tier1)	Premises (Tier2)
743978	05/01/10 10:42	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST440855	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Unidentified Oil	Cause Not Identified	Not Identified	No		
744965	12/01/10 10:21	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST321867	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Oils and Fuel	Diesel	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Other Waste Management Source
745099	12/01/10 16:46	Great Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST383891	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer
745622	15/01/10 13:49	M4 J24	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST362897	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Other Specific Waste Material	Unauthorised Activity	Other Unauthorised Activity	No		
746590	19/01/10 09:37	M4 J24	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST362897	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Batteries	Unauthorised Activity	Unauthorised Discharge or Disposal	No		
746762	19/01/10 15:26	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST243898	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Waste Management	Metal Recycling
747378	21/01/10 16:04	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST339860	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Oils and Fuel	Unidentified Oil	Cause Not Identified	Not Identified	No		
747782	22/01/10 17:02	Bishton	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST390873	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer
748353	25/01/10 13:42	Gwernleyshon	Rhymney	CASNEWYDD - NEWPORT	ST235868	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Combined Sewer Overflow (CSO)	Yes	Water Industry	Combined Sewer Overflow
749242	28/01/10 13:09	Coedkernew	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST274827	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Multiple Pollutants	3 Pollutants Include Soils and Clay	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Agriculture	Other Agricultural Source
749491	29/01/10 13:59	INFO REMOVED	Wye (H&W) d/s Lugg	SIR FYNWY - MONMOUTHSHIRE	ST505905	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Oils and Fuel	Mixed/Waste Oils	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Other Waste Management Source
751496	06/02/10 20:55	Newport	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST328858	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Diesel	Fires	Other Fire	Yes	Transport	Road
752443	10/02/10 17:21	Deepweir	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST480868	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Containment and Control Failure	Accidental Spillage	Yes	Water Industry	Pumping Station
753137	14/02/10 19:28	Somerton	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST330868	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	Yes	Service Sector	Storage and Distribution
753846	17/02/10 03:33	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST310864	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Other Specific Waste Material	Fires	Other Fire	Yes	Retail Sector	Other Retail Sector Premises
753965	17/02/10 11:23	Newport Dock	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST313854	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Electrical Equipment	Unauthorised Activity	Illegal Waste Site	Yes	Waste Management	Metal Recycling
754058	17/02/10 14:05	Lower Llanmellin	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST461912	Category 3 (Minor)	Category 4 (No Impact)	Category 2 (Significant)	Specific Waste Materials	Other Specific Waste Material	Containment and Control Failure	Drainage Failure	Yes	Waste Management	Composting Facility
754521	19/02/10 09:24	Causeway	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST434860	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Transport	Road
754713	19/02/10 15:52	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST243892	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	6 Pollutants Include Soils and Clay	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Agriculture	Stables
755706	23/02/10 13:25	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST302846	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Fly-Tipping	No		
757499	01/03/10 09:50	New Gout	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST319842	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Unauthorised Activity	Other Unauthorised Activity	Yes	Waste Management	Transfer Station
757766	01/03/10 16:41	Caldicot Pill	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST490879	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Storm Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Rising Main
759800	08/03/10 19:22	Causeway	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST434860	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Authorised Activity	Other Authorised Activity	Yes	Agriculture	Stables
760936	12/03/10 10:26	Crick	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST488901	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Final Effluent	Containment and Control Failure	Process Plant Failure (gradual)	Yes	Domestic and Residential	Nursing and Residential Homes
761896	16/03/10 08:40	Caerleon or Caerllion	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST327906	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer
763022	18/03/10 21:12	Bettws	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST296910	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer
767391	06/04/10 12:01	Langstone Court	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST368897	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Domestic and Residential	Private Dwellings
768924	10/04/10 16:51	Castell Coch	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST423885	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer
769129	12/04/10 08:41	INFO REMOVED	Wye (H&W) d/s Lugg	SIR FYNWY - MONMOUTHSHIRE	ST505904	Category 3 (Minor)	Category 2 (Significant)	Category 3 (Minor)	Oils and Fuel	Lubricating Oils	Unauthorised Activity	Illegal Waste Site	Yes	Waste Management	Other Waste Management Source
771660	19/04/10 14:40	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST348863	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Cause Not Identified	Not Identified	No		
773056	22/04/10 20:55	Christchurch	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST345896	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No		
773381	23/04/10 15:22	Llanbeder	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST383899	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Oils and Fuel	Diesel	Containment and Control Failure	Accidental Spillage	No		
773948	26/04/10 11:27	Whitewall Common	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST422868	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Soils and Clay	Unauthorised Activity	Unauthorised Discharge or Disposal	No		
774199	26/04/10 18:25	M4 J24	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST360896	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Inorganic Chemical Wastes	Unauthorised Activity	Fly-Tipping	No		
774452	27/04/10 11:47	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST264868	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Authorised Activity	Other Authorised Activity	Yes	Domestic and Residential	Private Dwellings
774647	27/04/10 16:47	INFO REMOVED	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST249815	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Service Sector	Other Service Sector Premises
775327	29/04/10 11:33	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST243898	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Vehicles and Vehicle Parts	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling
778824	11/05/10 16:44	INFO REMOVED	Llwyd	CASNEWYDD - NEWPORT	ST337916	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Specific Waste Materials	Other Specific Waste Material	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Manufacturing	Building Products
780803	18/05/10 09:10	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST433854	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No		
782098	21/05/10 11:25	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST435850	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Other Atmospheric Pollutant or Effect	Other Cause	Other	Yes	Water Industry	Sewage Treatment Works
783440	25/05/10 11:23	Broad Mead	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST396830	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Soils and Clay	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Dairy
785946	02/06/10 11:36	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST339862	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Oils and Fuel	Other Oil or Fuel	Containment and Control Failure	Control Measure Failure	No		
787439	07/06/10 08:23	Ty-c?ch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST278813	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No		
787636	07/06/10 13:23	Rogerstone	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST272874	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Inert Materials and Wastes	Soils and Clay	Containment and Control Failure	Control Measure Failure	Yes	Other Source	Other
788533	09/06/10 15:56	INFO REMOVED	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST249814	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Commercial Waste	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Other Source	Other
789687	13/06/10 11:58	INFO REMOVED	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST249814	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Metal Wastes	Unauthorised Activity	Other Unauthorised Activity	Yes	Service Sector	Other Service Sector Premises
793007	22/06/10 15:12	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST252814	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No		
793959	24/06/10 16:17	Pillgwenlly	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST314872	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Organic Chemicals/Products	Other Organic Chemical or Product	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Service Sector	Catering and Accommodation
795129	28/06/10 10:41	Causeway	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST430863	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No		
796363	30/06/10 15:52	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST346864	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No		
797172	02/07/10 11:03	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST291810	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Metal Wastes	Unauthorised Activity	Fly-Tipping	No		
800936	12/07/10 09:39	Ty-c?ch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST276812	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Other Pollutant	Other	Unauthorised Activity	Vandalism	Yes	Public Administration	Environment Agency
802537	15/07/10 14:31	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST325859	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Electrical Equipment	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Transport	Road
804270	20/07/10 17:59	Liswerry	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST340868	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Noise	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Power Generation and Supply	Gas-Fired
805746	24/07/10 12:24	Liswerry	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST344874	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Noise	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Power Generation and Supply	Gas-Fired
806862	27/07/10 15:14	Crick	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST489903	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Diesel	Cause Not Identified	Not Identified	No		
807149	28/07/10 10:44	Crick	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST488900	Category 4 (No Impact)	Category 4 (No Impact)	Category 2 (Significant)	Sewage Materials	Grey Water	Containment and Control Failure	Septic Tank or Sewage Treatment Plant Failure	Yes	Domestic and Residential	Nursing and Residential Homes
814677	19/08/10 11:32	Portskewett	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST487883	Category 4 (No Impact)	Category 4 (No Impact)	Category 2 (Significant)	Sewage Materials	Crude Sewage	Cause Not Identified	Not Identified	No		
814950	20/08/10 09:59	Goldcliff	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST367830	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Soils and Clay	Authorised Activity	Consented In-River Works	Yes	Public Administration	Environment Agency
815230	21/08/10 09:05	Samson Court	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST375837	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No		
815511	22/08/10 21:17	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST348840	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Pumping Station
815584	23/08/10 09:19	New Gout	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST324836	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Noise	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Power Generation and Supply	Gas-Fired
817331	27/08/10 17:24	INFO REMOVED	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST246817	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inorganic Chemicals/Products	Other Inorganic Chemical or Product	Containment and Control Failure	Control Measure Failure	Yes	Manufacturing	Other Manufacturing Sector Source
819249	03/09/10 15:43	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST314908	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Sheep
819952	06/09/10 15:43	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST319858	Category 3 (Minor)	Category 2 (Significant)	Category 2 (Significant)	Oils and Fuel	Crude Oil	Containment and Control Failure	Accidental Spillage	Yes	Other Source	Other
821256	09/09/10 18:03	Goldcliff Pill	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST367828	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Soils and Clay	Other Cause	Other	Yes	Natural Source	Other Natural Source
822047	13/09/10 11:42	M4 J25a	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST314906	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Other Inert Material or Waste	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Other Waste Management Source

822336	14/09/10 09:30	Somerton	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST325836	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Noise	Containment and Control Failure	Control Measure Failure	Yes	Power Generation and Supply	Gas-Fired
824115	20/09/10 13:49	INFO REMOVED	Llwyd	CASNEWYDD - NEWPORT	ST337916	Category 4 (No Impact)	Category 4 (No Impact)	Category 2 (Significant)	Multiple Pollutants	2 Pollutants Include Rocks and Gravel	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Manufacturing	Building Products
824351	21/09/10 11:24	Coed y Squire	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST252894	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Noise	Other Cause	Other	Yes	Other Source	Other
824635	22/09/10 09:13	Somerton	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST324836	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Noise	Containment and Control Failure	Control System Failure	Yes	Power Generation and Supply	Gas-Fired
825625	25/09/10 09:05	Pilldu	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST245802	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Cause Not Identified	Not Identified	No		
825822	27/09/10 08:46	Pilldu	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST245802	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Cause Not Identified	Not Identified	No		
828904	07/10/10 10:26	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST473905	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Pipe Failure above ground	Yes	Water Industry	Foul Sewer
828915	07/10/10 11:02	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST257808	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Oils and Fuel	Mixed/Waste Oils	Unauthorised Activity	Fly-Tipping	No		
829993	11/10/10 18:33	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST478892	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Ammonia/Amine Odour	Authorised Activity	Consented Works on Land	Yes	Agriculture	Arable
830131	12/10/10 10:34	M4 J24	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST361897	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Metal Wastes	Unauthorised Activity	Other Unauthorised Activity	Yes	Domestic and Residential	Private Dwellings
830164	12/10/10 11:13	M4 J24	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST361897	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Service Sector	Construction and Demolition
832317	20/10/10 13:52	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST343857	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No		
833111	25/10/10 08:10	Magor	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST425874	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Suspended Solids	Natural Causes	Other Extreme Weather Conditions	Yes	Water Industry	Rising Main
834057	28/10/10 12:20	Ty-c?ch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277817	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Soils and Clay	Authorised Activity	Consented Works on Land	Yes	Agriculture	Other Agricultural Source
834413	29/10/10 14:52	Ballan Moor	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST488893	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Unauthorised Activity	Other Unauthorised Activity	Yes	Service Sector	Recreation and Sports
834810	01/11/10 11:27	Barecroft Common	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST411869	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Agriculture	Other Agricultural Source
837625	11/11/10 12:01	Garth	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST267875	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Combined Sewer Overflow
839067	17/11/10 11:42	Somerton	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST338876	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Vehicles and Vehicle Parts	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Other Waste Management Source
839688	19/11/10 14:30	Caldicot	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST473883	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No		
841352	28/11/10 13:13	New Gout	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST324836	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Containment and Control Failure	Control System Failure	Yes	Power Generation and Supply	Gas-Fired
841377	28/11/10 16:53	Siemens (Severn Power)	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST325836	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Organic Chemicals/Products	Alcohols/Aldehydes	Containment and Control Failure	Pipe Failure above ground	Yes	Power Generation and Supply	Gas-Fired
841786	01/12/10 09:34	Wentlooge Level	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277817	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Suspended Solids	Authorised Activity	Other Authorised Activity	Yes	Agriculture	Arable
844170	14/12/10 09:50	Coed y Squire	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST253895	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	General Biodegradable Materials and Wastes	Food and Drink	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Manufacturing	Food Processing
845291	20/12/10 22:30	New Gout	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST324836	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Other Contaminated Water	Containment and Control Failure	Overfilling of Tank or Container (Bunded)	Yes	Power Generation and Supply	Gas-Fired
847827	06/01/11 17:09	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST445854	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Multiple Pollutants	2 Pollutants Include Soils and Clay	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Sheep
848448	10/01/11 09:30	Sudbrook	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST500876	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Pumping Station
849235	12/01/11 13:31	Malpas	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST301902	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Natural Causes	Other Extreme Weather Conditions	No		
851868	20/01/11 17:12	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST292810	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No		
854181	31/01/11 09:24	Coed Bald	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST276904	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	3 Pollutants Include Other General Biodegradable Material or Waste	Unauthorised Activity	Fly-Tipping	No		
854584	01/02/11 11:04	Clearwell	Rhymney	CASNEWYDD - NEWPORT	ST260852	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Premises Type Not Identified	Not Identified
855713	04/02/11 18:45	Causeway	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST431862	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Rising Main
856496	07/02/11 16:47	Duffryn	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST298852	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Specific Waste Materials	Household Waste	Unauthorised Activity	Other Unauthorised Activity	No		
857644	11/02/11 10:59	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST290814	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Beef
857686	11/02/11 12:01	M4 J26	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST307898	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No		
857938	12/02/11 10:58	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST261826	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Other Agricultural Source
858497	14/02/11 21:15	Lodge Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST325909	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer
858698	15/02/11 14:45	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST291810	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Multiple Pollutants	2 Pollutants Include Other General Biodegradable Material or Waste	Unauthorised Activity	Fly-Tipping	No		
860555	22/02/11 15:37	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST339860	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Transport	Road
861852	28/02/11 12:43	Cold Harbour Pill	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST430842	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Final Effluent	Other Cause	Other	Yes	Premises Type Not Identified	Not Identified
862553	02/03/11 14:25	Duffryn	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST295856	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	3 Pollutants Include Unidentified Oil	Unauthorised Activity	Fly-Tipping	No		
864694	10/03/11 12:23	Maerdy	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST285835	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Specific Waste Materials	Other Specific Waste Material	Unauthorised Activity	Fly-Tipping	No		
866549	17/03/11 08:31	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST337863	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Metal Wastes	Fires	Burning of Waste	No		
867103	18/03/11 14:18	Barnardtown	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST314884	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Other Oil or Fuel	Unauthorised Activity	Unauthorised Waste Management Activity	No		
867955	21/03/11 17:00	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST435850	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Chemical Odour	Containment and Control Failure	Control Measure Failure	Yes	Waste Management	Composting Facility
868160	22/03/11 11:51	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST348916	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Discharge or Disposal	No		
869229	24/03/11 16:34	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST291810	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No		
870792	29/03/11 12:49	Malpas	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST304908	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Unauthorised Activity	Unauthorised Discharge or Disposal	No		
870930	29/03/11 16:05	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST341857	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Other Source	Other
871059	30/03/11 08:43	Pontymister	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST246900	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No		
872481	04/04/11 14:00	Uskmouth	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST336834	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Agricultural Materials and Wastes	Other Agricultural Material or Waste	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Agriculture	Dairy
872484	04/04/11 14:00	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST350835	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Agricultural Materials and Wastes	Other Agricultural Material or Waste	Containment and Control Failure	Control Measure Failure	No	Agriculture	Dairy
872517	04/04/11 14:57	Coed Garw	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST287893	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	Sewage Materials	Final Effluent	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Service Sector	Recreation and Sports
872576	04/04/11 16:55	Blacktown	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST263813	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Contaminated Construction & Demolition Mat & Waste	Unauthorised Activity	Illegal Waste Site	Yes	Agriculture	Beef
873870	08/04/11 12:02	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST299816	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Gas and Fuel Oils	Containment and Control Failure	Storage Tank or Container Failure (Unbunded)	Yes	Domestic and Residential	Private Dwellings
875782	14/04/11 10:45	Fair Orchard	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST302829	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Unauthorised Activity	Unauthorised Discharge or Disposal	No		
876537	16/04/11 10:52	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST244897	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Containment and Control Failure	Wrong Connection	No		
877691	19/04/11 16:06	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST328860	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Sulphide Odour	Other Cause	Other	Yes	Waste Management	Other Waste Management Source
879516	26/04/11 03:18	New Gout	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST319842	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Smoke	Fires	Other Fire	Yes	Waste Management	Metal Recycling
881869	04/05/11 12:44	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST320858	Category 4 (No Impact)	Category 2 (Significant)	Category 2 (Significant)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No		
882379	05/05/11 17:19	Cold Harbour Pill	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST435849	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Other Atmospheric Pollutant or Effect	Unauthorised Activity	Vandalism	Yes	Waste Management	Composting Facility
883190	09/05/11 08:03	Cold Harbour Pill	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST435849	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Other Atmospheric Pollutant or Effect	Unauthorised Activity	Vandalism	Yes	Waste Management	Composting Facility
883433	09/05/11 15:45	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST242899	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Vehicles and Vehicle Parts	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Premises Type Not Identified	Not Identified
884045	11/05/11 12:36	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST345851	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Contaminated Water	Vehicle and Plant Washings	Containment and Control Failure	Control Measure Failure	Yes	Other Source	Other
887538	23/05/11 17:27	Blacktown	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST263813	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Beef
887659	24/05/11 10:14	Coed Bald	Usk d/s Abergavenny	TOR-FAEN - TORFAEN	ST272909	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Unauthorised Activity	Other Unauthorised Activity	No		
888311	25/05/11 20:03	Bettws	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST299905	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Storm Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Combined Sewer Overflow
894369	16/06/11 05:28	Maindee			ST327882	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Fires	Other Fire	No		
894544	16/06/11 14:27	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST243898	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Metal Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling
896993	27/06/11 09:11	Draethen	Rhymney	CAERFFILI - CAERPHILLY	ST229872	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Inert Materials and Wastes	Soils and Clay	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Domestic and Residential	Private Dwellings
902439	13/07/11 11:12	Peterstone Wentlooge	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST269802	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Control Measure Failure	No		
905395	22/07/11 10:25	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST312893	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Tyres	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Transport	Other Transport Source

906409	26/07/11 09:09	M4 J26	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST307897	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Firefighting Run-Off	Fires	Other Fire	No			
910152	04/08/11 10:29	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST473874	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No			
912626	11/08/11 16:53	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST321858	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Organic Chemicals/Products	Hydrocarbons	Containment and Control Failure	Process Plant Failure (sudden)	Yes	Waste Management	Other Waste Management Source	
914733	18/08/11 14:14	Summerleaze	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST427849	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No			
920213	05/09/11 18:10	Penrhiw	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST239912	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Electrical Equipment	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Domestic and Residential	Private Dwellings	
921951	12/09/11 11:50	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST366876	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No			
923211	16/09/11 09:48	Coed y Squire	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST251894	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Other Atmospheric Pollutant or Effect	Containment and Control Failure	Control Measure Failure	Yes	Manufacturing	Food Processing	
929038	03/10/11 16:12	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST325859	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Other Inert Material or Waste	Fires	Burning of Waste	Yes	Transport	Road	
930758	10/10/11 09:27	Garth	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST264872	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
932619	15/10/11 12:14	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST325857	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Waste Management	Transfer Station	
933601	19/10/11 12:08	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST322858	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Other Atmospheric Pollutant or Effect	Containment and Control Failure	Control Measure Failure	Yes	Waste Management	Transfer Station	
933923	20/10/11 13:30	Level of Mendalgief	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST301867	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Illegal Waste Site	No			
936946	31/10/11 14:22	Gwernleyshon	Rhymney	CASNEWYDD - NEWPORT	ST235867	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Storm Sewage	Containment and Control Failure	Combined Sewer Overflow (CSO)	Yes	Water Industry	Combined Sewer Overflow	
937470	02/11/11 09:25	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST344857	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Other Contaminated Water	Other Cause	Other	Yes	Waste Management	Transfer Station	
938267	04/11/11 12:39	Uskmouth	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST329839	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Steam	Natural Causes	Natural Process	Yes	Power Generation and Supply	Coal-Fired	
938300	04/11/11 13:44	The Village	Llwyd	CASNEWYDD - NEWPORT	ST343906	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Agricultural Materials and Wastes	Other Agricultural Material or Waste	Unauthorised Activity	Other Unauthorised Activity	No			
945679	05/12/11 11:15	Caerleon or Caerllion	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST332897	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No			
946951	10/12/11 12:25	Corporation Road, Newport, NP19 4XF	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST333857	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	Atmospheric Pollutants and Effects	Chemical Odour	Containment and Control Failure	Control Measure Failure	Yes	Manufacturing	Chemical Manufacturing	
947089	12/12/11 00:49	Pwll-Pen	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST351868	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Smoke	Fires	Other Fire	Yes	Manufacturing	Iron and Steel	
947655	13/12/11 14:48	Fair Orchard	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST308841	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Agriculture	Dairy	
948812	19/12/11 12:05	Cleppa Park	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST272844	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Service Sector	Construction and Demolition	
949145	20/12/11 15:20	M4 J25a	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST313906	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Treatment Facility	
950665	30/12/11 13:15	Christchurch	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST344894	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Pipe Failure below ground	Yes	Water Industry	Foul Sewer	
951112	03/01/12 11:08	Great Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST383891	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
951587	04/01/12 12:42	Duffryn	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST293859	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Multiple Pollutants	2 Pollutants Include Unidentified Oil	Containment and Control Failure	Road Traffic Accident (RTA)	Yes	Retail Sector	Supermarkets	
952512	07/01/12 09:52	Somerton	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST334872	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No			
954287	13/01/12 17:55	Christchurch	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST338895	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Authorised Activity	Other Authorised Activity	No			
954544	15/01/12 17:03	Great Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST379888	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Pumping Station	
955229	17/01/12 16:57	M4 J25a	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST313908	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Household Waste	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Beef	
955323	18/01/12 10:09	M4 J25a	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST313906	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Agriculture	Dairy	
955439	18/01/12 13:37	Peterstone Wentlooge	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST267807	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Waste Management	Transfer Station	
958882	01/02/12 16:11	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST243839	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Asbestos	Unauthorised Activity	Fly-Tipping	No			
959774	06/02/12 09:15	Ty-c?ch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST278817	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Authorised Activity	Other Authorised Activity	Yes	Agriculture	Other Agricultural Source	
960510	08/02/12 14:14	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST313894	Category 3 (Minor)	Category 2 (Significant)	Category 3 (Minor)	Specific Waste Materials	Tyres	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Premises Type Not Identified	Not Identified	
961021	10/02/12 13:43	Cefn Llogell	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST263851	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Tyres	Authorised Activity	Consented Works on Land	Yes	Agriculture	Stables	
961447	13/02/12 11:44	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST313897	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Tyres	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Transport	Other Transport Source	
962455	16/02/12 16:10	Great Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST384892	Category 3 (Minor)	Category 3 (Minor)	Category 2 (Significant)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
965460	28/02/12 10:21	Ty-c?ch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST276812	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Metal Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Other Agricultural Source	
969546	12/03/12 13:16	INFO REMOVED	Rhymney	CASNEWYDD - NEWPORT	ST237840	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No	Agriculture	Other Agricultural Source	
970072	13/03/12 16:16	Great Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST385892	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Fly-Tipping	No			
971121	16/03/12 12:08	Llanbeder	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST390907	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
972622	21/03/12 12:00	Portskewett	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST498881	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Domestic and Residential	Private Dwellings	
973462	23/03/12 12:43	Coed y Squire	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST258893	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Pipe Failure above ground	Yes	Water Industry	Foul Sewer	
973832	24/03/12 14:25	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST292810	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Multiple Pollutants	2 Pollutants Include Other Specific Waste Material	Unauthorised Activity	Fly-Tipping	No			
974792	27/03/12 12:05	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST471911	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	General Biodegradable Materials and Wastes	Composted Material	Other Cause	Other	Yes	Waste Management	Composting Facility	
975496	28/03/12 14:08	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST311891	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Commercial Waste	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Premises Type Not Identified	Not Identified	
975523	28/03/12 14:47	Cefn	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST278884	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Specific Waste Materials	Vehicles and Vehicle Parts	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Domestic and Residential	Private Dwellings	
977160	02/04/12 09:20	Maindee	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST329884	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Petrol	Other Cause	Other	Yes	Other Source	Other	
977847	03/04/12 14:59	M4 J25	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST331898	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Household Waste	Unauthorised Activity	Fly-Tipping	No			
978124	04/04/12 12:01	Rogerstone	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277871	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Storm Sewage	Containment and Control Failure	Sewer Failure or Overflow	No			
978584	05/04/12 14:09	Danygraig	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST233905	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	4 Pollutants Include Vegetable Cuttings and Deposits	Unauthorised Activity	Fly-Tipping	No			
979324	09/04/12 20:03	Gaer	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST296861	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
981038	14/04/12 16:33	Bettws	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST291906	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	No	Water Industry	Foul Sewer	
981503	16/04/12 15:46	Fair Orchard	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST302829	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Domestic and Residential	Private Dwellings	
983994	25/04/12 11:11	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST266820	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Manufacturing	Timber	
984580	26/04/12 14:54	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST325859	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Fires	Burning of Waste	No			
986333	30/04/12 17:33	INFO REMOVED	Wye H&W downstream of Lugg - Wales		ST506905	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Overfilling of Tank or Container (Bunded)	Yes	Retail Sector	Food	
986745	01/05/12 14:30	Great Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST384893	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
988890	08/05/12 14:30	Whitewall Common	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST422868	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Other Inert Material or Waste	Cause Not Identified	Not Identified	No			
989510	10/05/12 11:44	Gwernleyshon	Rhymney	CASNEWYDD - NEWPORT	ST236867	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Other Sewage Material	Containment and Control Failure	Combined Sewer Overflow (CSO)	Yes	Water Industry	Foul Sewer	
990279	12/05/12 17:42	Glasllwch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST283875	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Oils and Fuel	Diesel	Fires	Other Fire	Yes	Transport	Road	
990729	14/05/12 16:36	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST471911	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Other Odour	Containment and Control Failure	Control System Failure	Yes	Waste Management	Composting Facility	
991708	17/05/12 16:12	Gwernleyshon	Rhymney	CASNEWYDD - NEWPORT	ST236868	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Other Sewage Material	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Water Industry	Combined Sewer Overflow	
993469	23/05/12 12:33	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST341860	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Organic Chemicals/Products	Other Organic Chemical or Product	Containment and Control Failure	Accidental Spillage	Yes	Transport	Road	
994005	24/05/12 15:32	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST315864	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Tyres	Unauthorised Activity	Fly-Tipping	No			
996649	31/05/12 13:46	Alway	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST347888	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Oils and Fuel	Diesel	Containment and Control Failure	Underground Storage Tank Failure	Yes	Other Source	Other	
997554	03/06/12 10:03	Liswerry	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST340876	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Natural Causes	Natural Process	No			
998729	07/06/12 14:27	Gwernleyshon	Rhymney	CASNEWYDD - NEWPORT	ST236868	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Authorised Activity	Other Authorised Activity	Yes	Water Industry	Combined Sewer Overflow	
999511	10/06/12 10:58	Liswerry	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST342868	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Diesel	Containment and Control Failure	Road Traffic Accident (RTA)	Yes	Transport	Road	
1001588	14/06/12 14:31	Barrack Hill	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST305895	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Other Pollutant	Other	Natural Causes	Natural Process	No			
1004451	22/06/12 15:59	Fourteen Locks	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST283886	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Rocks and Gravel	Unauthorised Activity	Unauthorised Waste Management Activity	No			

1009024	05/07/12 10:09	Ty-c?ch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST279813	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Tyres	Unauthorised Activity	Illegal Waste Site	Yes	Waste Management	Transfer Station
1009134	05/07/12 12:21	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST312892	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No		
1011425	09/07/12 13:54	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST471911	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	Multiple Pollutants	2 Pollutants Include Smoke	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Composting Facility
1011466	09/07/12 14:35	Castell Coch	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST422886	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Manufacturing	Timber
1012235	10/07/12 19:11	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST346823	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No		
1012938	12/07/12 10:51	Coed y Squire	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST251894	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Other Cause	Other	Yes	Other Source	Other
1013216	12/07/12 17:03	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST471911	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	General Biodegradable Materials and Wastes	Other General Biodegradable Material or Waste	Fires	Other Fire	Yes	Waste Management	Composting Facility
1015125	18/07/12 09:42	Ringland	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST356888	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Asbestos	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Treatment Facility
1015599	19/07/12 11:31	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST322858	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Other Inert Material or Waste	Unauthorised Activity	Unauthorised Waste Management Activity	No		
1016019	20/07/12 11:11	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST267825	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Specific Waste Materials	Asbestos	Unauthorised Activity	Fly-Tipping	No		
1016121	20/07/12 14:09	Rogerstone	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277875	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	Oils and Fuel	Diesel	Other Cause	Other	Yes	Transport	Road
1016730	23/07/12 08:01	Liswerry	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST343869	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Mixed/Waste Oils	Containment and Control Failure	Road Traffic Accident (RTA)	Yes	Waste Management	Other Waste Management Source
1018927	27/07/12 08:42	Sea Reach	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST323831	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No		
1019052	27/07/12 10:49	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST471895	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Soils and Clay	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Other Source	Other
1019208	27/07/12 15:00	Pillgwenlly	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST311877	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Containment and Control Failure	Pipe Failure below ground	Yes	Water Industry	Water Distribution System
1019328	27/07/12 18:49	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST267825	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Asbestos	Unauthorised Activity	Fly-Tipping	No		
1019657	29/07/12 15:48	New Gout	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST312841	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Oils and Fuel	Unidentified Oil	Containment and Control Failure	Other Inadequate Control or Containment	No		
1019740	29/07/12 22:43	Level of Mendalgief	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST306855	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Waste Management	Transfer Station
1020219	31/07/12 09:14	M4 J26	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST303900	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Other Inert Material or Waste	Unauthorised Activity	Fly-Tipping	No		
1022008	04/08/12 13:56	Fourteen Locks	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST287884	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Tyres	Unauthorised Activity	Fly-Tipping	No		
1025107	12/08/12 18:53	Pilldu	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST243813	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	No		
1025719	14/08/12 09:34	Caerwent	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST469908	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Flies	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Waste Management	Composting Facility
1025742	14/08/12 09:53	Summerleaze	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST422837	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Organic Chemicals/Products	Solvents	Unauthorised Activity	Unauthorised Discharge or Disposal	No		
1027916	18/08/12 17:31	Coed y Squire	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST252894	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	General Biodegradable Materials and Wastes	Other General Biodegradable Material or Waste	Containment and Control Failure	Storage Tank or Container Failure (Bunded)	Yes	Other Source	Other
1028446	20/08/12 11:51	Ringland	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST357886	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Sewage Materials	Grey Water	Cause Not Identified	Not Identified	No		
1028926	21/08/12 09:51	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST263825	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Illegal Waste Site	Yes	Agriculture	Other Agricultural Source
1032643	31/08/12 13:19	A48(M) J29a	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST236818	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	No		
1033656	04/09/12 09:27	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST281813	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Asbestos	Unauthorised Activity	Fly-Tipping	No		
1036327	11/09/12 09:45	New Quay Road, Felnex Industrial Estate, Newport	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST322858	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Other Odour	Containment and Control Failure	Normal Operation	Yes	Waste Management	Other Waste Management Source
1036455	11/09/12 13:18	Coed y Squire	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST259892	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Water Industry	Combined Sewer Overflow
1036784	12/09/12 11:50	Castell Coch	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST422887	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Manufacturing	Timber
1036894	12/09/12 15:22	Wentlooge Level	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST281813	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Commercial Waste	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Other Source	Other
1037406	14/09/12 10:33	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST312892	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Waste Management	Metal Recycling
1039146	20/09/12 12:31	Coed y Squire	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST257894	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Water Industry	Combined Sewer Overflow
1039452	21/09/12 11:00	Coed Garw	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST282891	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Other Water Industry Premises
1041651	26/09/12 02:14	Priory Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST369906	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Diesel	Other Cause	Other	Yes	Transport	Road
1042242	27/09/12 10:31	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST471895	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Rocks and Gravel	Unauthorised Activity	Unauthorised Waste Management Activity	No		
1042599	28/09/12 09:30	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST313894	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Other Pollutant	Other	Unauthorised Activity	Fly-Tipping	No		
1043716	02/10/12 13:15	INFO REMOVED	Rhymney	CAERDYDD - CARDIFF	ST231823	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Commercial Waste	Unauthorised Activity	Unauthorised Waste Management Activity	No		
1044356	04/10/12 13:45	Mariner Way, Newport, NP19 4PQ	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST323859	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Other Odour	Authorised Activity	Other Authorised Activity	No		
1044545	05/10/12 09:32	Rogerstone	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST278876	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No		
1047907	16/10/12 12:02	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST321863	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Cause Not Identified	Not Identified	Yes	Water Industry	Pumping Station
1048011	16/10/12 15:36	Peterstone Wentlooge	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST260803	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No		
1048012	16/10/12 15:39	Peterstone Wentlooge	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST260803	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Inert Materials and Wastes	Other Inert Material or Waste	Unauthorised Activity	Unauthorised Discharge or Disposal	No		
1050450	24/10/12 16:54	Sudbrook	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST508876	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Other Specific Waste Material	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Waste Management	Treatment Facility
1050665	25/10/12 14:06	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST317866	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Vehicles and Vehicle Parts	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling
1051774	30/10/12 16:13	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST323859	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Pumping Station
1054140	07/11/12 11:37	Causeway	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST436864	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	Oils and Fuel	Gas and Fuel Oils	Unauthorised Activity	Vandalism	Yes	Domestic and Residential	Private Dwellings
1054163	07/11/12 12:23	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST243897	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Unidentified Oil	Unauthorised Activity	Unauthorised Discharge or Disposal	No		
1056245	15/11/12 10:58	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST317866	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Other Specific Waste Material	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling
1059271	23/11/12 10:23	Eastern Dry Dock, Newport, NP19 4RE	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST331853	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Metal Wastes	Unauthorised Activity	Other Unauthorised Activity	Yes	Waste Management	Exempt Spreading/Recovery Facility
1064255	30/11/12 11:27	Malpas	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST308909	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Rising Main
1064412	30/11/12 15:13	Deepweir	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST476874	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Rising Main
1065202	03/12/12 16:00	Newport	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST331854	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Transfer Station
1065213	03/12/12 16:24	Caerleon or Caerllion	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST332898	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Soils and Clay	Unauthorised Activity	Unauthorised Waste Management Activity	No		
1066061	06/12/12 14:25	Caerau Park	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST292876	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Pipe Failure below ground	Yes	Water Industry	Foul Sewer
1066996	10/12/12 16:23	Common-y-coed	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST429897	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Other Inert Material or Waste	Unauthorised Activity	Unauthorised Waste Management Activity	No		
1069627	19/12/12 15:08	Bowleaze Common	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST371854	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Insulating and Cable Oils	Containment and Control Failure	Accidental Spillage	Yes	Power Generation and Supply	Electricity Supply and Distribution
1069986	20/12/12 11:29	Llanbeder	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST385903	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Grey Water	Natural Causes	Other Extreme Weather Conditions	Yes	Water Industry	Foul Sewer
1074091	31/12/12 12:11	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST471909	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Adopted Foul Sewer
1078893	17/01/13 11:54	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST474910	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Soils and Clay	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Transfer Station
1080054	23/01/13 11:51	St Mellons	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST235817	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Metal Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	No		
1080485	24/01/13 18:30	Garth	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST266875	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Combined Sewer Overflow (CSO)	Yes	Water Industry	Combined Sewer Overflow
1081511	28/01/13 10:45	Ty-c?ch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST270813	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Asbestos	Unauthorised Activity	Fly-Tipping	No		
1083266	02/02/13 03:23	Barnardtown	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST314884	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No		
1083740	04/02/13 14:51	Leechpool	Wye H&W downstream of Lugg - Wales		ST509897	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Domestic and Residential	Private Dwellings
1086250	13/02/13 15:20	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST340860	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Lubricating Oils	Unauthorised Activity	Unauthorised Discharge or Disposal	No		
1086566	14/02/13 13:42	INFO REMOVED	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST255809	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Inert Materials and Wastes	Other Inert Material or Waste	Other Cause	Other	No		
1086810	15/02/13 11:26	Rogerstone	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277874	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Other Cause	Other	No		
1086848	15/02/13 12:49	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST242899	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Waste Management	Metal Recycling
1087870	19/02/13 10:33	Langstone Court	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST368898	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Domestic and Residential	Private Dwellings

1087925	19/02/13 12:07	Great Porton	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST383832	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Agricultural Materials and Wastes	Slurry and Dilute Slurry	Containment and Control Failure	Storage Tank or Container Failure (Unbunded)	Yes	Agriculture	Beef	
1087979	19/02/13 14:23	Pilldu	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST246808	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Soils and Clay	Unauthorised Activity	Fly-Tipping	No			
1088590	21/02/13 14:20	Eastern Dry Dock, Newport, NP19 4RE	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST332853	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Vehicles and Vehicle Parts	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling	
1090747	01/03/13 17:22	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST247894	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Oils and Fuel	Diesel	Containment and Control Failure	Accidental Spillage	Yes	Transport	Transport Depots/Cargo Handling	
1090787	02/03/13 06:35	Caldicot	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST480881	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No			
1091767	05/03/13 12:22	Rogerstone	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277874	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Cause Not Identified	Not Identified	No			
1092554	07/03/13 14:41	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST348863	Category 3 (Minor)	Category 2 (Significant)	Category 4 (No Impact)	Sewage Materials	Grey Water	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Manufacturing	Food Processing	
1092558	07/03/13 14:42	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST347861	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inorganic Chemicals/Products	Other Inorganic Chemical or Product	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Manufacturing	General Engineering	
1092659	07/03/13 20:57	Gaer	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST294868	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Service Sector	Catering and Accommodation	
1094916	16/03/13 12:07	Pilldu	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST244803	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Grey Water	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Water Industry	Foul Sewer	
1096166	20/03/13 10:48	Ballan Moor	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST484894	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Multiple Pollutants	2 Pollutants Include Soils and Clay	Containment and Control Failure	Control Measure Failure	Yes	Service Sector	Construction and Demolition	
1097428	25/03/13 14:43	Ty-c?ch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST271812	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Asbestos	Unauthorised Activity	Fly-Tipping	No			
1097490	25/03/13 17:39	Lodge Wood	Llwyd	CASNEWYDD - NEWPORT	ST326909	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Cause Not Identified	Not Identified	Yes	Water Industry	Rising Main	
1098520	30/03/13 14:34	Moor Barn	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST360851	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Oils and Fuel	Diesel	Other Cause	Other	Yes	Domestic and Residential	Private Dwellings	
1100799	09/04/13 09:02	Stephenson Industrial Estate, Unit 6-9, Stephenson Street,	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST327863	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Transport	Road	
1100875	09/04/13 11:38	Caerleon or Caerllion	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST338900	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Beef	
1103365	16/04/13 21:11	Langstone Court	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST369897	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
1104347	19/04/13 15:10	Danygraig	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST236905	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Containment and Control Failure	Pipe Failure above ground	Yes	Water Industry	Foul Sewer	
1104784	21/04/13 13:08	Sudbrook	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST508876	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No			
1105011	22/04/13 11:15	Magor	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST426872	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Multiple Pollutants	2 Pollutants Include Vegetable Cuttings and Deposits	Unauthorised Activity	Fly-Tipping	No			
1106293	25/04/13 09:53	Fourteen Locks	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST286882	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Unauthorised Activity	Illegal Waste Site	No			
1106933	26/04/13 15:17	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST272803	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Fly-Tipping	No			
1108505	01/05/13 17:21	Rogerstone	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277874	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
1109651	05/05/13 08:09	Vinegar Hill	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST432870	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Gas and Fuel Oils	Other Cause	Other	Yes	Domestic and Residential	Private Dwellings	
1112109	13/05/13 09:43	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST248823	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Grey Water	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Service Sector	Catering and Accommodation	
1112145	13/05/13 10:37	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST317866	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Metal Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling	
1112662	14/05/13 15:52	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST310860	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Fly-Tipping	No			
1113325	16/05/13 11:50	Pontymister	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST240900	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Vehicles and Vehicle Parts	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling	
1113560	17/05/13 08:49	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST313894	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	General Biodegradable Materials and Wastes	Other General Biodegradable Material or Waste	Unauthorised Activity	Fly-Tipping	Yes	Manufacturing	General Engineering	
1113680	17/05/13 13:05	New Park	Rhymney	CASNEWYDD - NEWPORT	ST256849	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Authorised Activity	Consented Works on Land	Yes	Agriculture	Arable	
1114240	20/05/13 08:50	Portskewett	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST489881	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	General Biodegradable Materials and Wastes	Other General Biodegradable Material or Waste	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Transfer Station	
1115515	23/05/13 13:11	Caldicot Pill	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST490876	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No			
1115945	25/05/13 02:53	Level of Mendalgief	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST306855	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Waste Management	Transfer Station	
1118816	04/06/13 15:54	M4 J24	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST364896	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Unauthorised Activity	Other Unauthorised Activity	Yes	Other Source	Other	
1119207	05/06/13 14:29	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST266823	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Asbestos	Unauthorised Activity	Fly-Tipping	No			
1119235	05/06/13 15:05	INFO REMOVED	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST244817	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
1119937	07/06/13 11:11	INFO REMOVED	Llwyd	CASNEWYDD - NEWPORT	ST338915	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Contaminated Water	Other Contaminated Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Pumping Station	
1120889	10/06/13 16:00	Coed Garw	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST283891	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Other Pollutant	Microbiological	Natural Causes	Algal Activity	No			
1121873	13/06/13 09:33	Newport	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST349865	Category 3 (Minor)	Category 2 (Significant)	Category 4 (No Impact)	Contaminated Water	Other Contaminated Water	Containment and Control Failure	Wrong Connection	Yes	Manufacturing	Food Processing	
1122507	14/06/13 16:14	Uskmouth	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST329838	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Dust	Containment and Control Failure	Process Plant Failure (gradual)	Yes	Power Generation and Supply	Coal-Fired	
1122826	16/06/13 10:17	Coedkernew	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277829	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Asbestos	Unauthorised Activity	Fly-Tipping	No			
1123259	17/06/13 16:21	M4 J28	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST288860	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Treatment Facility	
1124517	20/06/13 16:08	Birdport	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST327853	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Specific Waste Materials	Other Specific Waste Material	Unauthorised Activity	Other Unauthorised Activity	Yes	Other Source	Other	
1126505	27/06/13 13:35	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST266820	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Vehicles and Vehicle Parts	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling	
1128138	02/07/13 17:32	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST291812	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	General Biodegradable Materials and Wastes	Other Animal Matter	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Other Agricultural Source	
1128389	03/07/13 13:40	Garth	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST266873	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Other Cause	Other	Yes	Water Industry	Foul Sewer	
1128878	04/07/13 15:14	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST317891	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Other Unauthorised Activity	Yes	Other Source	Other	
1129195	05/07/13 11:46	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST312892	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Vehicles and Vehicle Parts	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling	
1129772	07/07/13 14:41	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST343857	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Waste Management	Metal Recycling	
1130230	08/07/13 15:38	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST256815	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No			
1130323	08/07/13 18:31	Cleppa Park	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST274847	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No			
1130701	09/07/13 13:50	Fourteen Locks	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST284885	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Containment and Control Failure	Septic Tank or Sewage Treatment Plant Failure	Yes	Waste Management	Inert Landfill	
1133642	15/07/13 20:38	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST245895	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Specific Waste Materials	Other Specific Waste Material	Other Cause	Other	No			
1135125	18/07/13 12:00	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST304912	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Firefighting Run-Off	Fires	Other Fire	Yes	Transport	Road	
1137668	23/07/13 14:27	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST242899	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Urban Run-Off	Unauthorised Activity	Unauthorised Discharge or Disposal	No			
1138878	25/07/13 12:11	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST311859	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Other Specific Waste Material	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Manufacturing	Timber	
1139430	26/07/13 10:54	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST351832	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Household Waste	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Premises Type Not Identified	Not Identified	
1142481	01/08/13 16:31	Liswerry	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST348869	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Other Source	Other	
1142971	02/08/13 14:28	Pilldu	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST246804	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Other Pollutant	Microbiological	Natural Causes	Algal Activity	No			
1144579	06/08/13 17:22	Cold Harbour Pill	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST430843	Category 4 (No Impact)	Category 4 (No Impact)	Category 1 (Major)	Pollutant Not Identified	Not Identified	Natural Causes	Natural Process	No			
1146243	10/08/13 09:10	Great Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST383890	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No			
1146537	11/08/13 21:20	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST318867	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Containment and Control Failure	Accidental Spillage	No			
1146695	12/08/13 11:35	Danygraig	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST239905	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Service Sector	Construction and Demolition	
1147049	13/08/13 08:17	Level of Mendalgief	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST316850	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Containment and Control Failure	Abnormal Process Operation	Yes	Waste Management	Metal Recycling	
1147833	14/08/13 17:05	Uskmouth	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST334832	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Unauthorised Activity	Fly-Tipping	Yes	Other Source	Other	
1149792	20/08/13 14:40	Rogerstone	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277874	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Unauthorised Activity	Unauthorised Discharge or Disposal	No			
1149823	20/08/13 15:32	Bowleaze Common	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST370851	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Agricultural Materials and Wastes	Other Agricultural Material or Waste	Unauthorised Activity	Fly-Tipping	No			
1151257	23/08/13 13:15	Rogerstone	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST277873	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Containment and Control Failure	Pipe Failure below ground	Yes	Water Industry	Foul Sewer	
1151602	24/08/13 12:47	Duffryn	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST300851	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Other Pollutant	Other	Cause Not Identified	Not Identified	No			
1152360	27/08/13 10:57	Trowbridge	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST239802	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Other Contaminated Water	Containment and Control Failure	Wrong Connection	No			
1153455	29/08/13 10:04	Blacktown	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST269813	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No			

1154644	02/09/13 09:10	Castleton	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST252834	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Agricultural Materials and Wastes	Slurry and Dilute Slurry	Containment and Control Failure	Accidental Spillage	No			
1154684	02/09/13 10:20	Caerau Park	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST291875	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
1156029	04/09/13 15:43	Bassaleg	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST275869	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No			
1156681	05/09/13 17:14	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST503901	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Kerosene and Aviation Fuel	Containment and Control Failure	Pipe Failure above ground	Yes	Domestic and Residential	Private Dwellings	
1159913	17/09/13 12:50	Barnardtown	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST308882	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Soils and Clay	Unauthorised Activity	Illegal Waste Site	No			
1161469	23/09/13 14:12	Whitewall Common	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST423868	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Mixed/Waste Oils	Unauthorised Activity	Fly-Tipping	No			
1165071	04/10/13 22:42	Newport	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST317850	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	Yes	Waste Management	Metal Recycling	
1165691	07/10/13 14:30	Allt-yr-yn	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST300883	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Soils and Clay	Containment and Control Failure	Drainage Failure	No			
1167717	15/10/13 09:16	Cefn Llogell	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST264840	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No			
1168106	16/10/13 11:48	INFO REMOVED	Rhymney	CAERFFILI - CAERPHILLY	ST236857	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	Multiple Pollutants	2 Pollutants Include Natural Organic Material	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Service Sector	Recreation and Sports	
1169369	21/10/13 14:08	M4 J25a	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST312906	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Other Sewage Material	Cause Not Identified	Not Identified	No			
1171931	29/10/13 16:53	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST275802	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Agriculture	Stables	
1176230	14/11/13 14:43	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST244898	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Commercial Waste	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Service Sector	Construction and Demolition	
1177625	20/11/13 22:35	INFO REMOVED	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST240820	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No			
1179428	28/11/13 12:29	Pilldu	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST242808	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Agricultural Materials and Wastes	Other Agricultural Material or Waste	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Agriculture	Stables	
1179633	29/11/13 10:37	Portskewett	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST489881	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Household Waste	Other Cause	Other	Yes	Waste Management	Transfer Station	
1180209	02/12/13 11:55	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST317866	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Unauthorised Activity	Other Unauthorised Activity	Yes	Waste Management	Metal Recycling	
1181757	06/12/13 13:09	Killcrow Hill	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST491903	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Exempt Spreading/Recovery Facility	
1183059	12/12/13 08:03	Cleppa Park	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST272846	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Diesel	Containment and Control Failure	Road Traffic Accident (RTA)	Yes	Transport	Road	
1183274	13/12/13 06:27	Coomassie Street, NEWPORT	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST316863	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Fires	Other Fire	No			
1183452	13/12/13 15:48	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST316864	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Tyres	Unauthorised Activity	Fly-Tipping	No			
1184199	17/12/13 14:43	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST484880	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Fires	Burning of Waste	No			
1184845	19/12/13 15:23	St Brides Wentlooge	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST292832	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Other Inert Material or Waste	Unauthorised Activity	Fly-Tipping	No			
1191248	07/01/14 08:31	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST317866	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Metal Recycling	
1195504	17/01/14 15:17	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST314897	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Transport	Transport Depots/Cargo Handling	
1195780	18/01/14 16:40	Barecroft Common	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST419868	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	General Biodegradable Materials and Wastes	Other General Biodegradable Material or Waste	Fires	Burning of Waste	Yes	Other Source	Other	
1196757	21/01/14 14:58	Whitewall Common	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST420867	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Fires	Other Fire	No			
1196976	22/01/14 10:49	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST362858	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Inert Materials and Wastes	Other Inert Material or Waste	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Manufacturing	Building Products	
1197183	22/01/14 16:48	Whitewall Common	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST420867	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No			
1197618	24/01/14 09:03	Tatton Farm	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST353863	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Chemically Contaminated Run-Off	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Waste Management	Transfer Station	
1198903	28/01/14 21:51	Blacktown	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST269813	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Fly-Tipping	No			
1199406	30/01/14 09:34	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST391910	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Household Waste	Unauthorised Activity	Fly-Tipping	No			
1201044	03/02/14 12:24	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST352863	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Illegal Waste Site	Yes	Transport	Transport Depots/Cargo Handling	
1201210	03/02/14 16:25	St Julians	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST332897	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	3 Pollutants Include Household Waste	Unauthorised Activity	Fly-Tipping	No			
1201436	04/02/14 10:55	M4 J25	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST322899	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Diesel	Other Cause	Other	No			
1205304	10/02/14 13:55	Goldcliff	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST373830	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Household Waste	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Other Agricultural Source	
1205350	10/02/14 14:42	Newport Docks	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST323844	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Treatment Facility	
1208987	17/02/14 10:20	Lower Ochrwyth	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST242899	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Unidentified Oil	Other Cause	Other	No			
1210766	21/02/14 11:46	Peterstone Wentlooge	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST260805	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Other Specific Waste Material	Unauthorised Activity	Fly-Tipping	Yes	Transport	Road	
1210768	21/02/14 11:48	Peterstone Wentlooge	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST258807	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	4 Pollutants Include Soils and Clay	Unauthorised Activity	Fly-Tipping	Yes	Transport	Road	
1211021	22/02/14 10:15	Commercial Lane, Risca, NEWPORT	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST242899	Category 4 (No Impact)	Category 2 (Significant)	Category 3 (Minor)	Oils and Fuel	Mixed/Waste Oils	Unauthorised Activity	Unauthorised Discharge or Disposal	No			
1221402	26/03/14 12:26	Broad Mead	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST406839	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Rocks and Gravel	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Agriculture	Dairy	
1221465	26/03/14 14:34	Somerton	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST335874	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Service Sector	Construction and Demolition	
1222307	28/03/14 21:03	Cefn Llogell	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST267842	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No			
1222806	31/03/14 11:51	Pontymister	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST244906	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
1223378	01/04/14 14:25	Uskmouth	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST338835	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Sewage Materials	Other Sewage Material	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Domestic and Residential	Private Dwellings	
1223804	02/04/14 15:18	Dewstow House	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST464881	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Other Source	Other	
1224519	04/04/14 14:11	Peterstone Wentlooge	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST267802	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Service Sector	Catering and Accommodation	
1227483	15/04/14 13:03	Five Lanes	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST448907	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Soils and Clay	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Agriculture	Arable	
1229355	23/04/14 09:46	Level of Mendalgief	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST305857	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No			
1230274	25/04/14 16:28	Caerwent	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST460907	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Natural Causes	Dry Weather	No			
1232399	02/05/14 20:00	Maerdy	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST285835	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	General Biodegradable Materials and Wastes	Other General Biodegradable Material or Waste	Unauthorised Activity	Fly-Tipping	No			
1233409	07/05/14 12:36	Sealand Reen	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST291810	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No			
1238394	23/05/14 14:01	Killcrow Hill	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST491903	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Soils and Clay	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Other Source	Other	
1239251	27/05/14 12:58	Samson Court	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST376830	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Other Oil or Fuel	Unauthorised Activity	Other Unauthorised Activity	No			
1240756	01/06/14 00:55	Brynhedydd	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST258867	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No			
1241912	04/06/14 11:01	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST266824	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Fly-Tipping	No			
1242283	05/06/14 11:06	Somerton	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST332873	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Specific Waste Materials	Household Waste	Cause Not Identified	Not Identified	No			
1242300	05/06/14 11:36	Cefn Llogell	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST265842	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Smoke	Fires	Burning of Waste	Yes	Other Source	Other	
1242675	06/06/14 11:33	Lower Lake	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST348863	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Contaminated Water	Other Contaminated Water	Cause Not Identified	Not Identified	No			
1244566	12/06/14 09:14	Killcrow Hill	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST491903	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Rocks and Gravel	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Waste Management	Exempt Spreading/Recovery Facility	
1244745	12/06/14 14:12	New House	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST275803	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Multiple Pollutants	3 Pollutants Include Household Waste	Unauthorised Activity	Unauthorised Waste Management Activity	No			
1244991	13/06/14 09:20	Pilldu	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST244804	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Other Pollutant	Other	Natural Causes	Algal Activity	No			
1245760	16/06/14 09:27	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST275831	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	General Biodegradable Materials and Wastes	Other General Biodegradable Material or Waste	Unauthorised Activity	Fly-Tipping	No			
1246614	18/06/14 08:56	Olleco	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST322858	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Other Oil or Fuel	Containment and Control Failure	Accidental Spillage	No			
1246669	18/06/14 10:19	Caldicot Level	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST423854	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Agricultural Materials and Wastes	Solid Manure	Other Cause	Other	Yes	Agriculture	Dairy	
1247086	19/06/14 10:04	Coed y Squire	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST251893	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Containment and Control Failure	Process Plant Failure (sudden)	Yes	Manufacturing	Food Processing	
1248219	23/06/14 09:26	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST413840	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Agricultural Materials and Wastes	Slurry and Dilute Slurry	Containment and Control Failure	Control System Failure	Yes	Agriculture	Dairy	
1250222	27/06/14 13:20	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST265821	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Fly-Tipping	No			
1251260	01/07/14 12:25	Samson Court	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST376830	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Oils and Fuel	Unidentified Oil	Containment and Control Failure	Road Traffic Accident (RTA)	Yes	Transport	Road	
1253865	08/07/14 15:34	A48(M) J29a	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST238819	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Multiple Pollutants	2 Pollutants Include Hydraulic Oils	Other Cause	Other	Yes	Other Source	Other	

1259300	22/07/14 13:03	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST314894	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Other Pollutant	Other	Unauthorised Activity	Fly-Tipping	No			
1261843	28/07/14 15:23	Portskewett	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST488883	Category 3 (Minor)	Category 4 (No Impact)	Category 2 (Significant)	Sewage Materials	Grey Water	Containment and Control Failure	Drainage Failure	No			
1262384	29/07/14 15:24	Blacktown	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST260816	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Cause Not Identified	Not Identified	No			
1263052	30/07/14 17:20	Maindee	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST325878	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Dust	Containment and Control Failure	Control System Failure	Yes	Other Source	Other	
1263264	31/07/14 10:34	Malpas	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST308909	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Rising Main	
1264813	04/08/14 17:53	Old Speedway	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST351863	Category 3 (Minor)	Category 4 (No Impact)	Category 3 (Minor)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Transport	Road	
1271183	25/08/14 09:20	Great House	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST413843	Category 3 (Minor)	Category 3 (Minor)	Category 2 (Significant)	Oils and Fuel	Diesel	Other Cause	Other	Yes	Domestic and Residential	Private Dwellings	
1273215	01/09/14 15:47	Great Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST379888	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Storm Sewage	Containment and Control Failure	Pipe Failure below ground	Yes	Water Industry	Rising Main	
1276139	10/09/14 10:48	New Park	Rhymney	CASNEWYDD - NEWPORT	ST254847	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Sludge	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Agriculture	Arable	
1276979	12/09/14 13:10	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST254814	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No			
1277506	15/09/14 01:08	St Mellons	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST238814	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Other Fire	No			
1279820	22/09/14 00:24	Cayo, The	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST432911	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Contaminated Water	Firefighting Run-Off	Fires	Other Fire	No			
1279992	22/09/14 11:50	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST470876	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Multiple Pollutants	2 Pollutants Include Household Waste	Unauthorised Activity	Fly-Tipping	No			
1283898	03/10/14 14:39	Crindau	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST313896	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Transport	Transport Depots/Cargo Handling	
1284392	06/10/14 10:34	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST310863	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Diesel	Other Cause	Other	Yes	Other Source	Other	
1284667	06/10/14 18:28	Manhole at Hendre Lakes	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST245803	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
1287343	16/10/14 12:43	Newport or Casnewydd	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST306880	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Specific Waste Materials	Commercial Waste	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Domestic and Residential	Private Dwellings	
1287565	17/10/14 09:23	INFO REMOVED	Wye (H&W) d/s Lugg	SIR FYNWY - MONMOUTHSHIRE	ST505905	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Manufacturing	Automotive	
1288089	20/10/14 09:44	Clearwell	Rhymney	CASNEWYDD - NEWPORT	ST256858	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Commercial Waste	Fires	Burning of Waste	Yes	Waste Management	Household Waste Recycling Centre	
1288314	20/10/14 17:03	Stow Park	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST306880	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	General Biodegradable Materials and Wastes	Other General Biodegradable Material or Waste	Unauthorised Activity	Unauthorised Waste Management Activity	No			
1288422	21/10/14 10:41	Clearwell	Rhymney	CASNEWYDD - NEWPORT	ST256859	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Waste Management	Transfer Station	
1289326	24/10/14 15:06	Pontymister	Ebbw/Sirhowy	CAERFFILI - CAERPHILLY	ST248904	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
1292198	05/11/14 17:40	M4 J25	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST331898	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Premises Type Not Identified	Not Identified	
1293970	12/11/14 15:36	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST349841	Category 3 (Minor)	Category 4 (No Impact)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Domestic and Residential	Private Dwellings	
1295010	17/11/14 11:23	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST291810	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No			
1295978	20/11/14 16:31	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST360850	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Pollutant Not Identified	Not Identified	Unauthorised Activity	Fly-Tipping	No			
1296723	24/11/14 10:02	INFO REMOVED	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST363853	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Domestic and Residential	Private Dwellings	
1296748	24/11/14 10:39	Hayes Gate	Wye (H&W) d/s Lugg	SIR FYNWY - MONMOUTHSHIRE	ST507911	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Agricultural Materials and Wastes	Slurry and Dilute Slurry	Containment and Control Failure	Control System Failure	Yes	Agriculture	Dairy	
1296900	24/11/14 14:46	CALDICOT, NP26 5RB	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST481876	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Control Measure Failure	Yes	Water Industry	Rising Main	
1299049	03/12/14 13:52	M4 J25	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST330899	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	No			
1299787	08/12/14 08:41	INFO REMOVED	Ebbw/Sirhowy	CAERDYDD - CARDIFF	ST244817	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Diesel	Other Cause	Other	Yes	Transport	Road	
1300049	09/12/14 10:37	Great Wood	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST383890	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Pipe Failure below ground	Yes	Water Industry	Rising Main	
1302622	23/12/14 14:20	Level of Mendalgief	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST309860	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Other Pollutant	Other	Unauthorised Activity	Fly-Tipping	No			
1304912	07/01/15 15:49	INFO REMOVED	Wye (H&W) d/s Lugg	SIR FYNWY - MONMOUTHSHIRE	ST511896	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Agricultural Materials and Wastes	Slurry and Dilute Slurry	Containment and Control Failure	Sewer Failure or Overflow	Yes	Agriculture	Dairy	
1307598	19/01/15 12:48	Sealand Reen	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST292810	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	Yes	Other Source	Other	
1307922	20/01/15 13:46	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST275801	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Specific Waste Materials	Other Specific Waste Material	Other Cause	Other	No			
1309918	29/01/15 13:25	Sealand Reen	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST291823	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	Multiple Pollutants	3 Pollutants Include Smoke	Containment and Control Failure	Other Inadequate Control or Containment	Yes	Agriculture	Dairy	
1311135	04/02/15 11:40	Cold Harbour Pill	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST430843	Category 4 (No Impact)	Category 2 (Significant)	Category 3 (Minor)	Agricultural Materials and Wastes	Slurry and Dilute Slurry	Unauthorised Activity	Unauthorised Discharge or Disposal	Yes	Agriculture	Dairy	
1311463	05/02/15 11:58	Coed Garw	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST285894	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Waste Management Activity	Yes	Other Source	Other	
1312061	07/02/15 15:28	Sealand Reen	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST300817	Category 3 (Minor)	Category 3 (Minor)	Category 3 (Minor)	Oils and Fuel	Gas and Fuel Oils	Containment and Control Failure	Pipe Failure below ground	Yes	Domestic and Residential	Private Dwellings	
1312540	09/02/15 16:06	Barrack Hill	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST305886	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Sewage Materials	Grey Water	Containment and Control Failure	Sewer Failure or Overflow	Yes	Water Industry	Foul Sewer	
1312547	09/02/15 16:23	Newton Green	Wye (H&W) d/s Lugg	SIR FYNWY - MONMOUTHSHIRE	ST511917	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Inert Materials and Wastes	Construction and Demolition Materials and Wastes	Unauthorised Activity	Unauthorised Discharge or Disposal	No			
1312699	10/02/15 09:47	INFO REMOVED	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST432855	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Agricultural Materials and Wastes	Solid Manure	Unauthorised Activity	Other Unauthorised Activity	Yes	Agriculture	Beef	
1313670	13/02/15 14:15	Transporter Bridge	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST314856	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Contaminated Water	Firefighting Run-Off	Fires	Other Fire	Yes	Waste Management	Metal Recycling	
1314675	18/02/15 10:31	Newport or Casnewydd (Newport)	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST321859	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Oils and Fuel	Unidentified Oil	Unauthorised Activity	Unauthorised Discharge or Disposal	No			
1318053	04/03/15 16:33	INFO REMOVED	Rhymney	CASNEWYDD - NEWPORT	ST256859	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Specific Waste Materials	Contaminated Construction & Demolition Mat & Waste	Fires	Burning of Waste	No			
1318471	06/03/15 09:57	Five Lanes	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST443910	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	General Biodegradable Materials and Wastes	Other General Biodegradable Material or Waste	Authorised Activity	Other Authorised Activity	Yes	Waste Management	Household Waste Recycling Centre	
1319496	10/03/15 13:57	Magor	Usk d/s Abergavenny	SIR FYNWY - MONMOUTHSHIRE	ST429870	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Oils and Fuel	Mixed/Waste Oils	Containment and Control Failure	Accidental Spillage	Yes	Domestic and Residential	Nursing and Residential Homes	
1319506	10/03/15 14:14	Coedkernew	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST272835	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Agricultural Materials and Wastes	Solid Manure	Containment and Control Failure	Accidental Spillage	Yes	Agriculture	Stables	
1323776	26/03/15 14:52	Pen-coed Castle	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST401898	Category 3 (Minor)	Category 3 (Minor)	Category 4 (No Impact)	Agricultural Materials and Wastes	Other Agricultural Material or Waste	Fires	Burning of Waste	Yes	Agriculture	Sheep	
1325174	01/04/15 12:23	Ty Coch	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST279811	Category 4 (No Impact)	Category 4 (No Impact)	Category 3 (Minor)	Sewage Materials	Crude Sewage	Containment and Control Failure	Septic Tank or Sewage Treatment Plant Failure	Yes	Premises Type Not Identified	Not Identified	
1327455	10/04/15 10:07	Nash	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST347839	Category 4 (No Impact)	Category 3 (Minor)	Category 3 (Minor)	Sewage Materials	Grey Water	Containment and Control Failure	Wrong Connection	Yes	Domestic and Residential	Private Dwellings	
1327683	10/04/15 15:22	Christchurch	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST346893	Category 4 (No Impact)	Category 3 (Minor)	Category 4 (No Impact)	Sewage Materials	Crude Sewage	Containment and Control Failure	Drainage Failure	Yes	Service Sector	Healthcare	
1331833	24/04/15 10:04	Maerdy	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST281835	Category 4 (No Impact)	Category 2 (Significant)	Category 4 (No Impact)	Specific Waste Materials	Household Waste	Unauthorised Activity	Fly-Tipping	No			
1334523	04/05/15 18:06	Maesglas	Usk d/s Abergavenny	CASNEWYDD - NEWPORT	ST305859	Category 2 (Significant)	Category 4 (No Impact)	Category 3 (Minor)	Atmospheric Pollutants and Effects	Smoke	Fires	Burning of Waste	Yes	Waste Management	Non-Inert Landfill	
1336076	11/05/15 09:19	INFO REMOVED	Ebbw/Sirhowy	CASNEWYDD - NEWPORT	ST279805	Category 4 (No Impact)	Category 4 (No Impact)	Category 4 (No Impact)	Agricultural Materials and Wastes	Solid Manure	Cause Not Identified	Not Identified	No			

AG_APL_NUM	AG_ISSUED	AG_REVOCED	DS_SNAME	DS_LNAME	DS_ADD1	DS_ADD2	DS_ADD3	DS_ADD4	DS_PCODE	DS_NGR	DS_TYPE	REVOKED
AN0239701	23/03/2009		BETTWS LANE	BETTWS LANE SPS NEWPORT ,	BETTWS LANE SPS	BETTWS ,		NEWPORT	NP20 7AZ	ST3000490111	Sewerage Network - Pumping Station - water company	Active
AB0038601	13/09/2007		TREDEGAR PAR	TREDEGAR PARK STW , ,	TREDEGAR PARK STW , ,	, ,	, ,	, ,	,	ST2934086050	Sewage Disposal Works - water company	Active
AN0159601	08/09/2010 00:00		CORPORATION	CORPORATION RD/GASKELL STREET NEW	CORPORATION RD/GASKELL STREET	NEWPORT	NEWPORT CBC	WALES	NP19 0GG	ST3263087450	Sewerage Network - Sewers - water company	Active
AN0159701	08/09/2010 00:00		TRANSPORT DE	TRANSPORT DEPOT CORPORATION ROAD N	TRANSPORT DEPOT	CORPORATION ROAD	NEWPORT	NEWPORT CBC	NP19 0BJ	ST3201088020	Sewerage Network - Sewers - water company	Active
AN0158201	08/09/2010 00:00		BRYNGLAS ROA	BRYNGLAS ROAD NEWPORT NEWPORT CBC	BRYNGLAS ROAD	NEWPORT	NEWPORT CBC	WALES	NP20 5QX	ST3096089780	Sewerage Network - Sewers - water company	Active
AC0130201	03/06/2004 00:00		BRTSH STEEL	BRITISH STEEL LTD WHITEHEAD WORKS	BRITISH STEEL LTD WHITEHEAD WRKS	MENDELGEIF ROAD	NEWPORT	WALES	NP20 2NF	ST3082586597	Iron and Steel Industries	Active
AN0389201	21/10/2005		IAWS	IAWS FERTILISERS SOUTH DOCK NEWPORT	IAWS FERTILISERS (UK) LTD	NORTH SIDE	SOUTH DOCK	ALEXANDRA DOCKS NEWPORT	NP20 2NP	ST3100284649	Fertilisers	Active
AN0385201	07/09/2005 00:00		INFO REMOVED	INFO REMOVED	INFO REMOVED	BEACH ROAD	ST BRIDES	NEWPORT	INFO REMOVED	INFO REMOVED	Domestic Property (Single)	Active
AN0134102	27/03/2007		CROESLLANFRO	CROESLLANFRO PS ROGERSTONE	CROESLLANFRO PS	ROGERSTONE	NEWPORT	GWENT		ST2865988846	Sewerage Network - Pumping Station - water company	Active
AN0325702	07/04/2004 00:00		SIMSMETAL	SIMSMETAL NORTHSIDE SOUTH DOCK	SIMSMETAL UK LTD	NORTHSIDE	SOUTH DOCK	ALEXANDRA DOCK NEWPORT	NP20 2WE	ST3176285206	Metal Recycling Sites (mixed MRSS)	Active
AN028770101	01/08/2002 00:00		700M SE PLAS	A CSO 700M SE OF PLAS MACHEN COTAGE	A CSO 700M SE OF	PLAS MACHEN COTTAGE	LOWER MACHEN	NEWPORT		ST2358986810	Sewerage Network - Sewers - water company	Active
AN0325701	30/07/2002		SIMSMETAL	SIMSMETAL NORTHSIDE SOUTH DOCK	SIMSMETAL UK LTD	NORTHSIDE	SOUTH DOCK	ALEXANDRA DOCK NEWPORT	NP20 2WE	ST3176285206	Metal Recycling Sites (mixed MRSS)	Active
AN0329001	15/11/2002		INFO REMOVED	INFO REMOVED	INFO REMOVED	COEDKERNEW	NEWPORT	WALES	INFO REMOVED	INFO REMOVED	Domestic Property (Single)	Active
AN0394701	30/11/2005		BARRACK HILL	CSO AT BARRACK HILL NEWPORT	COMBINED SEWAGE OVERFLOW	BARRACK HILL	NEWPORT	SOUTH WALES	NP20 5FJ	ST3087989159	Sewerage Network - Sewers - water company	Active
AN0031601	28/11/2005		BLACK CLAWSO	THE FACTORY COMPOUND BLACK CLAWSON	THE FACTORY COMPOUND	BLACK CLAWSON	WESTGATE WORKS	EAST DOCK ROAD	NP20 2BT	ST3232087078	Sewerage Network - Sewers - water company	Active
AN0364401	12/06/2004 00:00		METAL RECYCL	METAL RECYCLING SITE SIMS GROUP UK	METAL RECYCLING SITE	SIMS GROUP UK LTD	NORTH SIDE SOUTH DOCK	ALEXANDRA DOCKS	NP20 2WE	ST3175084760	Metal Recycling Sites (mixed MRSS)	Active
AN0364701	30/06/2004		LAING O ROUR	LAING O ROURKE WALES AND WEST LTD	LAING O ROURKE WALES AND WEST LT	WESTWAY ROAD	NEWPORT DOCK	NEWPORT	NP20 2WD	ST3096685817	Const. and Repair of Buildings	Active
AN0251301	22/11/2002		CSO NO.33193	CSO NO.33193 TREDEGAR PARK GOLF CLU	CSO NO.33193	TREDEGAR PARK GOLF CLUB	TREDEGAR	NEWPORT CBC		ST2846886642	Sewerage Network - Sewers - water company	Active
AN0401301	01/09/2006 00:00		DOCKSWAY	NEWPORT WASTE DISPOSAL SITE NPT	PHASE 2	NEWPORT WASTE DISPOSAL SITE	DOCKSWAY	NEWPORT	NP20 2NS	ST3061884802	Household, commercial and industrial waste landfills	Active
AB0073101	23/10/2001		CSO ROGERSTO	CSO ROGERSTONE ADJ THORNHILL GDNS	CSO ROGERSTONE	ADJ THORNHILL GARDENS		GWENT		ST2589088810	Sewerage Network - Sewers - water company	Active
AN0250501	01/11/2001 00:00		CSO OLDGLOBE	CSO OLD GLOBE PUBLIC HOUSE	CSO OLD GLOBE PUBLIC HOUSE		ROGERSTONE	,		ST2639088240	Sewerage Network - Sewers - water company	Active
AN0397001	15/06/2006		FINNFOREST	FINNFOREST BBH LTD NEWPORT	FINNFOREST BBH LTD	ALEXANDRA DOCK	NEWPORT	SOUTH WALES	NP20 2WA	ST3100284650	Sawmilling of Wood	Active
AN0379701	18/03/2005		WESTFIELD WA	WESTFIELD WAY/HUXLEY GREEN CSO	WESTFIELD WAY/HUXLEY GREEN CSO	OFF RUSSELL DRIVE	MALPAS	NEWPORT		ST3007890396	Sewerage Network - Sewers - water company	Active
AN0394301	18/09/2006		DOCKS WAY	DOCKS WAY LANDFILL SITE NEWPORT	DOCKSWAY LANDFILL SITE	DOCKSWAY	NEWPORT	GWENT	NP20 2NS	ST3081885170	Household, commercial and industrial waste landfills	Active
AN0251401	01/11/2001 00:00		CSO FORGE LN	CSO 5/6 FORGE LANE BASSALEG	CSO 5/6 FORGE LANE		BASSALEG	,		ST2792086760	Sewerage Network - Sewers - water company	Active
AB0054601	23/10/2001		CSO NO 6258	CSO FIELD NO 6258 RHIWDERIN	CSO FIELD NO 6258		RHIWDERIN	,		ST2665087520	Sewerage Network - Sewers - water company	Active
AN0314101	15/11/2001		SPS MAESGLAS	SPS MAESGLAS RETAIL PARK DOCKS WAY	SPS MAESGLAS RETAIL PARK	DOCKS WAY	MAESGLAS	NEWPORT	NP20 2NS	ST3095086050	Sewerage Network - Pumping Station - others	Active
AB0044301	09/12/2003 00:00		TT ELECTRONI	CSO 52 TT ELECTRONICS TREGWILYM IND	CSO 52	TT ELECTRONICS	TREGWILYM INDUSTRIAL ES	ROGERSTONE		ST2739687417	Sewerage Network - Sewers - water company	Active
AN0158101	21/11/2003		CSO 48 TREGW	CSO 48 TREGWILYM CLOSE ROGERSTONE	CSO 48	TREGWILYM CLOSE	ROGERSTONE	NEWPORT CBC		ST2753587403	Sewerage Network - Sewers - water company	Active
AN0351101	21/11/2003		CSO 49 32037	CSO 49 NR VICARAGE GLEBE HOUSE	CSO 49 ASSET NUMBER 32037	NR VICARAGE GLEBE HOUSE	BASSALEG	NEWPORT CBC		ST2771686948	Sewerage Network - Sewers - water company	Active
AN0310101	26/07/2001		ALCAN ALLUMI	ALCAN ALLUMINIUM ROGERSTONE NEWPORT	ALCAN ALUMINIUM	ROGERSTONE	NEWPORT	SOUTH WALES	NP10 9YD	ST2672087630	Metal Treatment, Bolts, Nuts, etc	Active
AN0158401	26/03/2002		MALPAS ROAD	MALPAS ROAD CSO	MALPAS ROAD CSO	IMMEDIATELY SOUTH OF JUNCTION 26	M4 MOTORWAY	NEWPORT		ST3052089580	Sewerage Network - Sewers - water company	Active
AN0389101	09/10/2006 00:00		HIGH CROSS	HIGH CROSS ROAD ROGERSTONE	DEVELOPMENT AT HIGH CROSS ROAD	ROGERSTONE	NEWPORT	GWENT		ST2830888195	Sewerage Network - Pumping Station - others	Active
AB0073102	03/03/2004 00:00		CSO 47 ALCAN	CSO 47 ALCAN WORKS ROGERSTONE	COMBINED SEWER OVERFLOW 47	ALCAN WORKS	ROGERSTONE	ASSET NO 31996		ST2703987476	Sewerage Network - Sewers - water company	Active
AN0376901	17/02/2005		INFO REMOVED	INFO REMOVED	INFO REMOVED	INFO REMOVED	COEDKERNEW	GWENT	INFO REMOVED	INFO REMOVED	Domestic Property (Single)	Active
AN0376701	28/01/2005		A1 SKIPS WES	A1 SKIPS WESTWAY ROAD ALEXANDRA DOC	A1 SKIPS	WESTWAY ROAD	ALEXANDRA DOCK	NEWPORT	NP20 2UW	ST3097285840	Trade (Unknown/Other)	Active
AN0031501	08/02/2000 00:00		PILL SOUTH	PILL SOUTH B PUMPING STATION	PILL SOUTH B PUMPING STATION	OFF USK WAY	PILL SOUTH	NEWPORT		ST3178086460	Sewerage Network - Pumping Station - water company	Active
AN030090101	25/10/2000		INFO REMOVED	INFO REMOVED	INFO REMOVED	INFO REMOVED	NERPORT	,	INFO REMOVED	INFO REMOVED	Domestic Property (Single)	Active
AN030020101	13/10/2000		MAESGLAS	MAESGLAS HIGH LEVEL CSO MAESGLAS	MAESGLAS HIGH LEVEL CSO	OFF MAESGLAS AVENUE	MAESGLAS	NEWPORT	NP9 3BW	ST3037085980	Sewerage Network - Sewers - water company	Active
AD0002801	09/12/2004 00:00		A COMBINED S	A COMBINED SEWER OVERFLOW CSO 119	A CSO	CSO 119 RIVERBAND	ALONGSIDE TANYBRYN HOU	RISCA		ST2552589580	Sewerage Network - Sewers - water company	Active
AN0374301	10/12/2004 00:00		JEWSON LTD T	JEWSON LTD TIMBER SUPPLY DEPOT NORT	JEWSON LTD	TIMBER SUPPLY DEPOT	NORTH DOCK	ALEXANDRA DOCK NEWPORT	NP20 2WB	ST3161185477	Wholesale Dist. of Timber	Active
AN0331901	03/03/2003 00:00		INFO REMOVED	INFO REMOVED	INFO REMOVED	INFO REMOVED	OLD ST MELLONS	CARDIFF	INFO REMOVED	INFO REMOVED	Domestic Property (Single)	Active
AB0041901	10/11/1964 00:00		SCA PACKAGIN	SCA PACKAGING ALEXANDRA DOCKS	SCA PACKAGING NEWPORT	ALEXANDRA DOCKS	NEWPORT	WALES		ST3190084120	Conversion of Paper and Board	Active
AN0031701	10/03/2000 00:00		PILL NTH PS	PILL NORTH PS NORTH OCTOPUS RDBT	PILL NORTH PS	NORTH OF OCTOPUS ROUNDABOUT	NEWPORT	NEWPORT CBC		ST3185087450	Sewerage Network - Pumping Station - water company	Active
AN0394201	02/03/2006 00:00		ST JOSEPHS	ST JOSEPHS R C SCHOOL NEWPORT	FORMER ST JOSEPHS R C SCHOOL	DUFFRYN DRIVE	NEWPORT	WALES	NP10 8YS	ST2901385058	Sewerage Network - Pumping Station - others	Active
AN0336701	22/08/2003		INFO REMOVED	INFO REMOVED	INFO REMOVED	ALECANDRA DOCKS	NEWPORT	GWENT	INFO REMOVED	INFO REMOVED	Domestic Property (Single)	Active
AN0395201	02/03/2006 00:00		BULK CARGO	ABP BULK CARGO NORTH SIDE SOUTH	ABP BULK CARGO	NORTH SIDE SOUTH DOCK	ALEXANDRA DOCK	NEWPORT	NP20 2UW	ST3100284648	Support Serv. Sea Transport	Active
AN030030101	13/10/2000		MAESGLAS PS	MAESGLAS PS OFF MAESGLAS AV	MAESGLAS PS	OFF MAESGLAS AV	MAESGLAS	NEWPORT		ST3057085400	Sewerage Network - Pumping Station - water company	Active
AA0025601	04/11/1999 00:00		SHAFTESBURY	CSO ADJ SHAFTESBURY PS NEWPORT	CSO ADJ SHAFTESBURY PS	(MALPAS & BRYNGLAS)	SHAFTESBURY PARK	NEWPORT		ST3152089310	Sewerage Network - Sewers - water company	Active
AN0034301	11/11/1999 00:00		CSO	PILL SOUTH A	STORM SEWER OVERFLOW	LAND SW OF ROUNDABOUT THAT JOINS	CHURCH STREET TO USK WA	NEWPORT		ST3184086610	Sewerage Network - Sewers - water company	Active
AN029730101	13/06/2000		INFO REMOVED	INFO REMOVED	INFO REMOVED	BLACKSMITHS WAY COED KERNEW	NEWPORT	,	INFO REMOVED	INFO REMOVED	Domestic Property (Single)	Active
AN0038301	29/10/1987		BASSALEG BET	BASSALEG BETHEL CHAPEL HSE DEVLP	BETHEL CHAPEL HSE DEVLP	BASSALEG	NEWPORT	GWENT		ST2713086750	Trade (Unknown/Other)	Active
AN0216401	23/04/1990		COEDKERNEW P	COEDKERNEW PS (EMERGENCY)	COEDKERNEW PS (EMERGENCY)	UNKNOWN	UNKNOWN	UNKNOWN	UNKNOWN	ST2769084340	Sewerage Network - Pumping Station - water company	Active
AN0366301	08/08/2004 00:00	08/08/2016 00:00	INFO REMOVED	INFO REMOVED	INFO REMOVED	ROGERSTONE	NEWPORT	GWENT	INFO REMOVED	INFO REMOVED	Domestic Property (Single)	Active
AC0100401	04/12/2013 00:00		NEWPORT FELN	NEWPORT FELNEX IND ESTATE ARC	NEWPORT FELNEX IND ESTATE ARC	NEWPORT	NEWPORT CBC	WALES	NP19 4PP	ST3261085500	Industrial estates	Active
EPRQB3597TY	02/04/2014 00:00		JUBILEE PARK	TREATMENT SYSTEM @ JUBILEE PARK	TREGWILYM ROAD	ROGERSTONE	NEWPORT	NEWPORT	NP20 9LR	ST2692387937	Civil Engineering	Active

Cyfoeth Naturiol Cymru
Natural Resources Wales

Special Licence – Commercial

Ref: ATI07169B

PARTIES

NATURAL RESOURCES BODY FOR WALES whose principal office is at 29 Newport Road, Cardiff CF24 0TP ("NRW") (1) and

RPS Planning & Development Limited (02947164) whose principal is at 20 Western Avenue, Milton Park, Abingdon, Oxfordshire – OX14 4SH. (the "Licensee") (2)

BACKGROUND

This licence applies if you are seeking permission for re-use of NRW Content by using it commercially for primarily internal business use purposes.

LICENCE

We, Natural Resources Wales ("We" or "us"), and you, the recipient of the Licensed Content ("You") agree that:

1. This agreement (the "agreement") which is dated on the later of the two dates of signing below includes these paragraphs, the Schedules below, the Standard Terms and Conditions for a Natural Resources Wales Intellectual Property Licence in Appendix 1 and Standard Definitions in Appendix 2.
2. We will provide you (if you do not already have a copy) with the Licensed Content.
3. You will pay us the Fees due under this agreement.
4. If it is not possible to interpret consistently the Special Conditions in Schedule 4 below and the Standard Terms and Conditions in Appendix 1 the Special Conditions will prevail.

SCHEDULE 1 – Commencement Date, Term and Contact Details

This agreement commences on 06/05/15 for a period of one year subject to earlier termination.

Next major review dates: 2013 for implementation on or after 1 January 2014, and 2014 for implementation on or after 1 January 2015		
The major licensing reviews aim to review all NRW licences and bring all licensees onto the same terms and conditions. When the review occurs the new terms will replace the terms and conditions of this agreement; this does not affect your right to terminate this agreement.		
Operational contact (day to day)	**NRW**	**LICENSEE**
Name:	Michelle Price	Liz Williams
Position:	External Relations Officer	Senior Environmental Consultant
Tel:	03000 653577	01454 853 000
Email:	michelle.price@naturalresourceswales.gov.uk	williamsl@rpsgroup.com
Address:	Llys Afon, Hawthorn Rise, Haverfordwest, Pembrokeshire – SA61 2BQ	2420 The Quadrant, Aztec West, Almondsbury, Bristol – BS32 4AQ

SUMMARY TABLES

These tables are not definitive or legally part of the agreement but for convenience only. In the event of any discrepancy between them and the agreement the agreement will prevail but We will allow or be allowed a reasonable time for making any correcting payments or refunds.

Licensed Content (all charges are GBP and exclusive of VAT)

No.	Content including any replacement or aka names	Annual charge
1	AFA034 Historic Landfill	
2	AFA111 Authorised Landfill Site Boundaries	
3	AFA138 Environmental Pollution Incidents	
4	AFA021 EPR Industrial Sites	
5	AFA200 EPR Waste Sites	
6	AFA005 WML Current Exemptions	
7	AFA135 Water Abstractions	
8	AFA014 Consented Discharges to Controlled Waters	£60.00
The annual charges shown here is the total payable up front including third party royalties and after terminal discounts based on the standard licence period of one year.		

SCHEDULE 2 – Approved Use

A. INTERNAL USE

The following internal uses are licensed:

- Internal Use

B. EXTERNAL USE AND PERMITTED SUBLICENSING

Standard Permitted External Use and Professional Use is licensed.

SCHEDULE 3 – Licensed Content

This Schedule provides full details of the Licensed Content and also of Licence Fees for internal use of that Content and any special marginal costs of supply charges. These fees are Content related and (together with Third Party Royalties in relation to products or external use identified in Schedule 2) comprise cost recovery charges that aim to recover our costs of reproducing and disseminating Content that we license. Different types of Content have different cost recovery based charges and the annual review will, inter alia, re-assess which charging band to apply and whether any increase is required to reflect the effect of inflation on our costs. Terminal discounts may be available for certain types of Content. Licence Fees for Internal use:

- are annual (apart from any costs of supply e.g. infrastructure set up),
- are reviewed annually on 1st April,
- are subject to VAT but identified below exclusive of VAT,
- identify separately any Third Party Royalties that relate directly to use of Licensed Content. These are the actual charges that We has to pay to third parties.

1 Not applicable to this licence

2. SPECIAL CONTENT

1	**Number**	1
2	**Name & AfA Code (if applicable)**	AFA034 Historic Landfill
3	**Description**	Under the Town and Country Planning (General Development Procedure) Order 1995 Local Planning Authorities have to consult with the Environment Agency about all applications they receive to develop land within 250 metres of landfill sites (including any land that has been used as a landfill site within the past 30 years or is likely to be used as one in the near future). The Historic Landfill dataset was created to help fulfil our statutory responsibility to Local Planning Authorities by supplying information on the risks posed by landfill sites for development within 250m. The data is the most comprehensive and consistent national historic landfill dataset and defines the location of, and provides specific attributes for, known historic (closed) landfill sites, i.e. sites where there is no PPC permit or waste management licence currently in force. This includes sites that existed before the waste licensing regime and sites that have been licensed

		in the past but where this licence has been revoked, ceased to exist or surrendered and a certificate of completion has been issued. Historic Landfill includes all relevant historic information for the sites that both local authorities and the Environment Agency have collected over the years. The data is available in ESRI shape file format, with the boundaries digitised from a base scale of 1:10,000 and an associated attribute table comprising 34 fields. The polygons and attributes describe where the sites were located, when they were used, who used them and what was deposited. This means there are name and address fields, licensee and operator information, licence issue and surrender dates, first and last input dates, and waste types, together with some historical comments.
4	**Content Type**	Dataset
5	**Geographical Coverage**	Natural Resources Wales Owned Data
6 - 8	**These paragraphs are not applicable to this licence**	
9	**Format supplied**	N/A
10 - 14	**These paragraphs are not applicable to this licence**	
15	**Are there any known Third Party Rights?**	None
If yes, state who owns those rights and has licensed us.		N/A
16	**One off cost of supply charges**	Not applicable
17	**Number of Terminals licensed (National Datasets only)**	10
18	**Licence Fees**	**Fees in relation to this Content – reviewed annually on 1 April** NB Charges for Remote Survey Data are one-off. All other Licence Fees are annual. Standard wording below is based on Wales only data.

Internal Use Charges

The National Dataset charge comprises 2p multiplied by the Content Factor (dataset) per sq km or Content Factor (record) per record with a maximum of 10,000 sq km or half the deemed number of records with a terminal discount if applicable.

Content Factor	NRW Internal Use Charges GBP per annum	Third Party Royalties GBP per annum	Dataset Terminal Discount % (if applicable)	Cost of supply charges per annum	Total GBP per annum
10	**£14,000.00**	**None**	**55%**	**£1.80**	**£60.00**

19	**Are there any special conditions added with specific reference to this Content?**	None
20	**Are there any information warnings added with specific reference to this Content?**	None

21	**Full details/attributes**	As contained in Environment Agency Information Asset Register referred to also as the Information for Re-Use Register. HLD_REF Historical Waste Data project Unique Key for each record [String, 10] SITE_NAME Site Name [String, 200] SITE_ADD Site Address [String, 200] EA_WMLR Environment Agency Waste Management Licence Number [String, 5] REGIS_NO REGIS reference number [String, 11] WRC_REF WRC dataset reference [String, 9] BGS_Num BGS dataset Reference Number [String, 4] SITE_REF Waste Regulation Authority Licence Number [String, 100] LIC_HOLD Licence Holder [String, 150] LICHOLDADD Licence Holder's address [String, 250] SITEOPNAME Site Operator [String, 50] SITEOPADD Site Operator's address [String, 250] OS_PREFIX OS Prefix [String, 2] EASTING Easting (automated at nearest 100m grid to the South West of the Site Centroid) [String, 6] NORTHING Northing (automated at nearest 100m grid to the South West of the Site Centroid) [String, 6] EAREGION Code identifying the Environment Agency Region in which the site is located [String, 2] EAAREA Code identifying the Environment Agency Area in which the site is located [String, 30] LIC_ISSUE Date of Issue of Licence [Date, 8] LIC_SURREN Date of surrender of Licence [Date, 8] FIRSTINPUT Date of first input of waste [Date, 8] LASTINPUT Date of last input of waste [Date, 8] INERT Waste deposited at the site included Inert [‘Yes’ or blank, 3] INDUSTRIAL Waste deposited at the site included industrial waste [‘Yes’ or blank, 3] COMMERCIAL Waste deposited at the site included Commercial [‘Yes’ or blank, 3] HOUSEHOLD Waste deposited at the site included Household [‘Yes’ or blank, 3] SPECIAL Waste deposited at the site included Special [‘Yes’ or blank, 3] LIQSLUDGE Waste deposited at the site included Liquid Sludge [‘Yes’ or blank, 3] WASTEUNK Waste deposited at the site included some unknown material [‘Yes’ or blank, 3] GASCONTROL A flag recording if there was any Gas control measures installed at the site [‘Yes’ or blank, 3] LEACHATECNT A flag recording if there was any Leachate control measures installed at the site [‘Yes’ or blank, 3] EXEMPT Was the site known to be exempt from Waste Management Licensing [‘Yes’ or blank, 3] LICENCED Was the site licensed under Waste Disposal or Waste Management Licensing [‘Yes’ or blank, 3] NOLICREQ Was the site known to have not required a licence [‘Yes’ or blank, 3] BUFF_POINT Flag (yes/no) field for Buffered Point polygons [‘Yes’ or blank, 3]

1	**Number**	2
2	**Name & AfA Code (if applicable)**	Permitted Waste Sites – Authorised Landfill Site Boundaries (AfA111)
3	**Description**	The 'Permitted Waste Sites - Authorised Landfill Site Boundaries' is a polygon dataset that contains the boundaries of landfill sites that are currently authorised by the Environment Agency under Environmental Permitting Regulations. Landfill permits are authorised by a Waste Management Licence, a PPC Permit or an EPR Permit, and are recorded within the Regulatory Information System (Regis). . The system is currently being updated to be replaced with the Integrated Regulation (IR) system which will replace both Regis and PAS (Permit Administration System). The current system allows the Environment Agency to extract data on landfill sites. These can be filtered on the following descriptor codes: • A1: Co-Disposal Landfill Site; • A2: Other Landfill Site taking Special Waste; • A4: Household, Commercial & Industrial Waste Landfill; • A5: Landfill taking Non-Biodegradable Wastes; • A6: Landfill taking other wastes; • A7: Industrial Waste Landfill (Factory cartilage); • 5.2 A(1) a): Waste Landfilling; >10T/D with capacity>25,000T excluding inert waste; • 5.2 A(1) b): Waste Landfilling; Any other Landfill to which the 2002 regulations apply; • L04: Non Hazardous Landfill; and • L05: Inert Landfill. It is important to note that because a site is authorised it does not necessarily mean it is accepting waste. Landfill sites are only removed from the dataset on a quarterly basis and added to the Historic Landfill site dataset when the waste licence status changes to either: • Licence Expired – Some licences issued under the Control of Pollution Act 1974 were time limited and expired on the date specified in the licence; or • Licence Revoked – Licence has been entirely revoked and is no longer in force; or • Licence Surrendered – Operator has successfully surrendered the licence which is no longer in force. Please note that details of authorisations are retained on the Public Register for a period of twelve months. Therefore there are some records in the Historic Landfill dataset that are Public Register for a short period of time.
4	**Content Type**	Dataset
5	**Geographical Coverage**	Natural Resources Wales Owned Data
6 - 8	**These paragraphs are not applicable to this licence**	
9	**Format supplied**	Polygon shapefile
10 - 14	**These paragraphs are not applicable to this licence**	
15	**Are there any known Third Party Rights?**	None
If yes, state who owns those rights and has licensed us.		N/A
16	**One off cost of supply charges**	Not applicable
17	**Number of Terminals licensed**	10

	(National Datasets only)	
18	**Licence Fees**	**Fees in relation to this Content – reviewed annually on 1 April** NB Charges for Remote Survey Data are one-off. All other Licence Fees are annual. Standard wording below is based on Wales only data.

Internal Use Charges

The National Dataset charge comprises 2p multiplied by the Content Factor (dataset) per sq km or Content Factor (record) per record with a maximum of 10,000 sq km or half the deemed number of records with a terminal discount if applicable.

Content Factor	NRW Internal Use Charges GBP per annum	Third Party Royalties GBP per annum	Dataset Terminal Discount % (if applicable)	Cost of supply charges per annum	Total GBP per annum
N/A	**N/A**	**N/A**	**55%**	**N/A**	**N/A**

19	**Are there any special conditions added with specific reference to this Content?**	None
20	**Are there any information warnings added with specific reference to this Content?**	None
21	**Full details/attributes**	As contained in Environment Agency Information Asset Register referred to also as the Information for Re-Use Register. SHAPE Geometry type = Polygon Spatial Reference = British National Grid. OBJECTID Object Identifier. LIC_ADMIN Licence administration number. LIC_NMBR Licence reference number. LIC_IPPCR IPPC Reference number if relevant. LIC_WML Unique Waste Management licence number. CUST_NMBR Customer reference number (intended for internal use only) STATUS Landfill status, e.g. Suspended, Closure etc. LIC_LTYPE Licence type code. LIC_NAME Licence holder's name, e.g. private individual's name, company name. LIC_SITE Licensed site's name. SITE_NAME Address field 8: Landfill site Name, e.g. private individual's name, company name. SITE_BUILD Address field 9: Landfill Site Building e.g. Farnham Quarry. SITE_STRT Address field 10: Landfill Site Street. SITE_AREA Address field 11: Landfill Site Area. SITE_TOWN Address field 12: Landfill site Town. SITE_CNTY Address field 13: Landfill site County. SITE_PCODE Address field 14: Landfill site Postcode. TYPE_DESC Landfill type description e.g. A4: Household, Commercial & Industrial Waste Landfill. NGR British National Grid Reference. T_REF Unique polygon reference added by National Data Unit. CTROID_X National Grid Easting for the centroid of the polygon. CTROID_Y National Grid Northing for the centroid of the polygon. REGION Environment Agency Region AREA Environment Agency Area DATE_ISSUE Date of issue of waste licence (dd/mm/yyyy).

1	**Number**	3
2	**Name & AfA Code (if applicable)**	Environmental Pollution Incidents (AfA138)
3	**Description**	Details of all pollution incidents reported to the Environment Agency are held on the National Incident Reporting System. This may include some sensitive information i.e. personal details of individuals reporting the incident etc. and therefore needs to been carefully assessed. There are, however, a number of fields, which have been approved for access and are therefore ok to release. Additional fields would need to be assessed on a case-by-case basis. These should only include substantiated and closed environmental protection incidents, where the environment impact level is either category 1 (major) or category 2 (significant) to at least 1 media (i.e. water, land or air). Where these data indicate an incident occurred on a particular site or property no inference should be drawn that the site or property owner necessarily was responsible.
4	**Content Type**	Dataset
5	**Geographical Coverage**	Natural Resources Wales Owned Data
6 - 8	**These paragraphs are not applicable to this licence**	
9	**Format supplied**	Polygon shape file
10 - 14	**These paragraphs are not applicable to this licence**	
15	**Are there any known Third Party Rights?**	None
If yes, state who owns those rights and has licensed us.		N/A
16	**One off cost of supply charges**	Not applicable
17	**Number of Terminals licensed (National Datasets only)**	10
18	**Licence Fees**	**Fees in relation to this Content – reviewed annually on 1 April** NB Charges for Remote Survey Data are one-off. All other Licence Fees are annual. Standard wording below is based on Wales only data.

Internal Use Charges

The National Dataset charge comprises 2p multiplied by the Content Factor (dataset) per sq km or Content Factor (record) per record with a maximum of 10,000 sq km or half the deemed number of records with a terminal discount if applicable.

Content Factor	NRW Internal Use Charges GBP per annum	Third Party Royalties GBP per annum	Dataset Terminal Discount % (if applicable)	Cost of supply charges per annum	Total GBP per annum
5	**£7,000.00**	**N/A**	**55%**	**£0.90**	**£60.00**

19	**Are there any special conditions added with specific reference to this Content?**	None
20	**Are there any information warnings added with specific reference to this Content?**	Where these data indicate an incident occurred on a particular site or property no inference should be drawn that the site or property owner necessarily was responsible.

21	**Full details/attributes**	As contained in Environment Agency Information Asset Register referred to also as the Information for Re-Use Register. Event identification number Date of notification Region Area Public area face County authority Unitary authority District authority National Grid Reference Easting Northing Y/N – Environmental Protection Environmental Impact Levels – Air, Land and Sea

1	**Number**	4
2	**Name & AfA Code (if applicable)**	Environmental Permitting Regulations – Waste Sites (AfA200)
3	**Description**	A waste management licence is a legal document issued under the Environmental Protection Act 1990. A licence authorises the treatment, keeping or disposal of waste in or on the land. Once we have issued a licence, neither the activities nor the area of land may be changed unless the licence is modified. The Environmental Permitting Regulations, regulating waste sites, came into force on 6 April 2008. The new regime combines a number of earlier permitting / licensing regimes. Other related datasets available are: • Pollution Prevention and Control (IPPC) • Authorised Treatment Facilities (End of Life Vehicles) • Water Quality and Pollution Control (Discharge Consents) • Waste Electrical, Electronic Equipment (WEEE) EPR Waste is the table for granted permits. EPR Waste Applications holds details of applications that did not, or have not yet, resulted in a permit or permit variation.
4	**Content Type**	Dataset
5	**Geographical Coverage**	Natural Resources Wales Owned Data
6 - 8	**These paragraphs are not applicable to this licence**	
9	**Format supplied**	Access database
10 - 14	**These paragraphs are not applicable to this licence**	
15	**Are there any known Third Party Rights?**	None
If yes, state who owns those rights and has licensed us.		N/A
16	**One off cost of supply charges**	Not applicable
17	**Number of Terminals licensed (National Datasets only)**	10
18	**Licence Fees**	**Fees in relation to this Content – reviewed annually on 1 April** NB Charges for Remote Survey Data are one-off. All other Licence Fees are annual. Standard wording below is based on Wales only data.

Internal Use Charges

The National Dataset charge comprises 2p multiplied by the Content Factor (dataset) per sq km or Content Factor (record) per record with a maximum of 10,000 sq km or half the deemed number of records with a terminal discount if applicable.

Content Factor	NRW Internal Use Charges GBP per annum	Third Party Royalties GBP per annum	Dataset Terminal Discount % (if applicable)	Cost of supply charges per annum	Total GBP per annum
5	**£7,000.00**	**N/A**	**55%**	**£0.90**	**£60.00**

19	**Are there any special conditions added with specific reference to this Content?**	None
20	**Are there any information warnings added with specific reference to this Content?**	None

21	**Full details/attributes**	As contained in Environment Agency Information Asset Register referred to also as the Information for Re-Use Register. LIC AREF Area reference used only in Environmental Permitting Regulations – Waste system LIC NMBR Reference code used only in Environmental Permitting Regulations – Waste system LIC OTHID Other licence number LIC WML Waste Management Licence number LIC LTYPE Type of site (links to look-up table 'LIC LTYPE') e.g. A1, A2, S0813 SITE ADD NAME Site location details – Site name SITE ADD BUILD Site location details – Building SITE ADD HOUSE Site location details – House number SITE ADD STRT Site location details – Street SITE ADD AREA Site location details – Area SITE ADD TOWN Site location details – Town SITE ADD CNTY Site location details – County SITE ADD PCODE Site location details – Postcode SITE ADD TEL Site location details – Telephone number SITE ADD FAX Site location details – Fax number SITE ADD EMAIL Site location details – Email address LIC NAME Licence holder's name LIC TRADE Licence holder's trading name, where appropriate LIC SITE Site name NGR Six, eight or ten figure National Grid Reference, typically of site entrance EASTING Six-figure Eastings, padded with zeros from NGR field. NORTHING Six-figure Northings, padded with zeros from NGR field. STAT SDESC Licence status, for example • Modified • Issued • Transferred • Surrendered • Expired • Closure • Revoked • Suspended LIC TARD Target date for processing application LIC DETD Date licence was decided LIC ISSD Date licence was issued LIC SUBD Date from which subsistence is charged LIC MODD Date licence was modified LIC TRAD Date licence was transferred LIC EFFD Date licence transfer came into effect LIC SURD Date licence was surrendered LIC RVKD Date licence was revoked LIC SUSD Date licence was suspended LIC EXPD Date licence expired LIC REND Date licence was renewed LIC CAND Date licence was cancelled LIC AMND Date licence was amended LIC TONS Annual tonnage permitted (where entered on database). A zero indicates that tonnage information was not entered in this field. Region Environment Agency Region Area Environment Agency Area Size Categorisation of permitted waste volume per year. This is derived from the same information as LIC TONS. It links to the charge code look-up table. Size range: • small = 0 – 25000 tonnes per annum • medium = 25000 – 75000 tonnes per annum • large = > 75000 tonnes per annum LIC PPCARD Date IPPC application received LIC IPPCD Date of transfer to IPPC LIC IPPCR IPPC reference LIC EPR EPR permit reference

Full details/attributes	CAT REF Reference for National REGIS compilation (indicates that record refers to linked record in field LIC AREF in 'EPR Waste' table. CAT CCDE Reference for National REGIS compilation (indicates that classification code applies to the record) CAT TREF Reference for National REGIS compilation (indicates that classification category applies to the record) CAT CODE European Waste Catalogue category (links to 'CAT CCDE' in 'Waste Categories' table) CAT DESC UK Waste Classification Scheme description of waste. CAT TREF Special Waste Regulations 1996 category. (links to 'CAT TREF' in 'Waste Categories' table) Type Code Code indicating type of licence (e.g. A07, A08, A09, S0813) Type Description Description of type of licence Industrial Landfills e.g. 'Industrial waste landfills', 'Lagoons', 'Special waste transfer stations' LIC NMBR Reference code used only in the REGIS system LIC OTHID Other reference number LIC WML Waste Management Licence number LIC LTYPE Type of site (links to look-up table 'LIC LTYPE') e.g. A1, A2, S0813 SITE ADD NAME Site location details – Site name SITE ADD BUILD Site location details – Building SITE ADD HOUSE Site location details – House number SITE ADD STRT Site location details – Street SITE ADD AREA Site location details – Area SITE ADD TOWN Site location details – Town SITE ADD CNTY Site location details – County SITE ADD PCODE Site location details – Postcode SITE ADD TEL Site location details – Telephone number SITE ADD FAX Site location details – Fax number SITE ADD EMAIL Site location details – Email address LIC NAME Licence applicant's name LIC TRADE Licence applicant's trading name, where appropriate LIC SITE Site name NGR National Grid Reference, typically of site entrance Corr ADD NAME Correspondence address – Site name Corr ADD BUILD Correspondence address – Building Corr ADD HOUSE Correspondence address – House number Corr ADD STRT Correspondence address – Street Corr ADD AREA Correspondence address – Area Corr ADD TOWN Correspondence address – Town Corr ADD CNTY Correspondence address – County Corr ADD PCODE Correspondence address – Postcode Corr ADD TEL Correspondence address – Telephone number Corr ADD FAX Correspondence address – Fax number Corr ADD EMAIL Correspondence address – Email address STAT SDESC Licence status LIC RECD Date application received LIC CONSD LIC CONCD LIC APPD LIC TARD Target date for applications to be processed by LIC ISSD Date licence issued LIC MODD Date licence was modified LIC TRAD Date licence was transferred LIC EFFD Date licence came into effect LIC SURD Date licence was surrendered LIC EXPD Date licence expired LIC REND Date licence was renewed LIC CAND Date licence was cancelled LIC AMND Date licence was amended LIC TONS Annual tonnage permitted Region Environment Agency Region Area Environment Agency Area

1	**Number**	5
2	**Name & AfA Code (if applicable)**	Environmental Permitting Regulations – Industrial Sites (AfA021)
3	**Description**	The Environmental Permitting Regulations, amongst other things, implement the IPPC (Integrated Pollution Prevention and Control) Directive (EC/61/96) in England & Wales. Facilities covered by this legislation are known as Installations and generally have significant releases to air, land or water or carry out certain, larger scale, waste management activities. Further information on the Environmental Permitting Regulations (EPR) and the IPPC directive, is available on our website or at www.defra.gov.uk This dataset covers all Process Industry sites within the EPR regime and some larger waste activities. Other smaller waste faciltities are known as 'Waste Operations' (formerly known as Waste Management Licences) and are covered in a separate dataset, see below: Other related datasets that are available are: • Environmental Permitting Regulations – Waste Sites • Authorised Treatment Facilities (End of Life Vehicles) • Waste Electrical, Electronic Equipment (WEEE)
4	**Content Type**	Dataset
5	**Geographical Coverage**	Natural Resources Wales Owned Data
6 - 8	**These paragraphs are not applicable to this licence**	
9	**Format supplied**	Access database
10 - 14	**These paragraphs are not applicable to this licence**	
15	**Are there any known Third Party Rights?**	None
If yes, state who owns those rights and has licensed us.		N/A
16	**One off cost of supply charges**	Not applicable
17	**Number of Terminals licensed (National Datasets only)**	10
18	**Licence Fees**	**Fees in relation to this Content – reviewed annually on 1 April** NB Charges for Remote Survey Data are one-off. All other Licence Fees are annual. Standard wording below is based on Wales only data.

Internal Use Charges

The National Dataset charge comprises 2p multiplied by the Content Factor (dataset) per sq km or Content Factor (record) per record with a maximum of 10,000 sq km or half the deemed number of records with a terminal discount if applicable.

Content Factor	NRW Internal Use Charges GBP per annum	Third Party Royalties GBP per annum	Dataset Terminal Discount % (if applicable)	Cost of supply charges per annum	Total GBP per annum
5	**£7,000.00**	**N/A**	**55%**	**£0.90**	**£60.00**

19	**Are there any special conditions added with specific reference to this**	None

	Content?	
20	**Are there any information warnings added with specific reference to this Content?**	None

21	**Full details/attributes**	As contained in Environment Agency Information Asset Register referred to also as the Information for Re-Use Register. Region Environment Agency Region Area Environment Agency Area Original Permit Number Unique PAS (Permitting Administration System) authorisation number for initial application Permit Number Unique PAS authorisation number for current application (primary key, and reference cell for linked table) EPR Ref Environmental Permit Reference Number (will only be present for recent permits). Takes the format: AB1234CD/A001 (application for a new licence) AB1234CD/V001 (variation, also known as modification) AB1234CD/T001 (transfer) AB1234CD/R001 (revocation, also known as surrender) Operator Name Operator Name Status Current (at date of extraction) status of permission: Superceded [sic] Effective Surrender Effective Revoked Transfer Effective Refused Determination Not Yet Effective Local Authority Local Authority Name Installation Name Name of installation where activities occur Secondary Name IS Operator Address – line 1 Primary Name IS Operator Address – line 2 Street Name IS Operator Address – Street Locality IS Operator Address – Locality Town IS Operator Address – Town Post Town IS Operator Address – Post Town County IS Operator Address – Post County Post Code IS Operator Address – Postcode Duly Made Date Date application was accepted as ‘duly made’ Issue Date Date of issue of a variation on an effective permit Permit Effective From Date Date when conditions of Authorisation/Variation apply Application Type Type of entry: Application Variation Surrender Transfer PPCAPP Application Sub-Type Sub-type of entry: New Minor Standard Whole Simple Standard variation Substantial Whole without FAPP Whole with FAPP Whole limited change in management Installation never operated Part Grid Reference IS NGR for site entrance (Eight figure AA11119999) Eastings SIX-FIGURE EASTINGS FOR THE SITE ENTRANCE (TYPICALLY FIVE FIGURE ACCURACY PADDED WITH A ZERO) Northings SIX-FIGURE NORTHINGS FOR THE SITE ENTRANCE (TYPICALLY FIVE FIGURE ACCURACY PADDED WITH A ZERO)

21	**Full details/attributes**	Issue Date Date of issue of a variation on an effective permit Permit Effective From Date Date when conditions of Authorisation/Variation apply Application Type Type of entry: Application Variation Surrender Transfer PPCAPP Application Sub-Type Sub-type of entry: New Minor Standard Whole Simple Standard variation Substantial Whole without FAPP Whole with FAPP Whole limited change in management Installation never operated Part Grid Reference IS NGR for site entrance (Eight figure AA11119999) Eastings SIX-FIGURE EASTINGS FOR THE SITE ENTRANCE (TYPICALLY FIVE FIGURE ACCURACY PADDED WITH A ZERO) Northings SIX-FIGURE NORTHINGS FOR THE SITE ENTRANCE (TYPICALLY FIVE FIGURE ACCURACY PADDED WITH A ZERO) Region Environment Agency Region Area Environment Agency Area Original Permit Number Unique PAS authorisation number for initial application Permit Number Unique PAS authorisation number for current application (links to same field in other table) Part of compound primary key for table EPR Ref Environmental Permit Reference Number Operator Name Operator Name Status Current (at date of extraction) status of permission: • Superceded [sic] • Effective • Surrender Effective • Revoked • Transfer Effective • Refused • Determination • Not Yet Effective Local Authority Local Authority Name Activity Schedule Reference Activity Schedule Reference Number e.g. 5.3 A(1) c) (ii) Part of compound primary key for table Activity Description Description of Activity Schedule Reference Number e.g. OTHER WASTE DISPOSAL; NON-HAZARDOUS WASTE >50T/D BY PHYSICO-CHEMICAL TREATMENT Grid Reference IS NGR for site entrance (Eight-figure e.g. SP12341234) Primary Activity Y/N Whether this is the primary permitted activity under this permit (Boolean operator distinguishing whether this is the primary activity being permitted at a site) e.g. Y/N Part of compound primary key for table

1	**Number**	6
2	**Name & AfA Code (if applicable)**	Waste Management Licence Current Exemptions (AfA005)
3	**Description**	Current Waste Mgt. Licence Exemption data as required by Schedule 3 of the Waste Management Licensing Regulations 1994 (as amended) lists the activities which are normally exempt from WML in England and Wales. Circular 11/94 in England and Circular 26/94 in Wales provides additional information. Typical exemptions include: • Cleaning or coating of waste packaging, containers and textiles • Burning waste as a fuel in an exempt appliance • Burning waste as a fuel in an engine • secure storage of waste treatment of waste for recovery of materials • burning of waste in an exempt incinerator at place of production • depositing of mineral exploration waste storing WEE for recovery elsewhere Some activities may be excluded from WML where the activity is controlled under other regimes.
4	**Content Type**	Dataset
5	**Geographical Coverage**	Natural Resources Wales Owned Data
6 - 8	**These paragraphs are not applicable to this licence**	
9	**Format supplied**	N/A
10 - 14	**These paragraphs are not applicable to this licence**	
15	**Are there any known Third Party Rights?**	None
If yes, state who owns those rights and has licensed us.		N/A
16	**One off cost of supply charges**	Not applicable
17	**Number of Terminals licensed (National Datasets only)**	10
18	**Licence Fees**	**Fees in relation to this Content – reviewed annually on 1 April** NB Charges for Remote Survey Data are one-off. All other Licence Fees are annual. Standard wording below is based on Wales only data.

Internal Use Charges

The National Dataset charge comprises 2p multiplied by the Content Factor (dataset) per sq km or Content Factor (record) per record with a maximum of 10,000 sq km or half the deemed number of records with a terminal discount if applicable.

Content Factor	NRW Internal Use Charges GBP per annum	Third Party Royalties GBP per annum	Dataset Terminal Discount % (if applicable)	Cost of supply charges per annum	Total GBP per annum
N/A	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

19	**Are there any special conditions added with specific reference to this Content?**	None

20	**Are there any information warnings added with specific reference to this Content?**	None
21	**Full details/attributes**	As contained in Environment Agency Information Asset Register referred to also as the Information for Re-Use Register. Exempt E/U Name & Address of the exempt establishment or undertaking Site Address Place where exempt activity occurs Activity Sub para Specific activities registered for exemption Activity Description Description of the Activity that makes it Exempt Date Notified When the Agency is notified about the exempt activity Date Registered The date we register or refuse to register etc (3 different status') District District where exempt site is Catchment Catchment where site is

1	**Number**	7
2	**Name & AfA Code (if applicable)**	Water Abstractions (AfA135)
3	**Description**	The water abstractions dataset details all sites covered under the Water Act 2003 where all abstractions of 20 cubic metres or more require an abstraction licence. The dataset consists of two tables: • The first holds details of all live water abstraction licences in England and Wales. Expired, lapsed and revoked licences are excluded. • The second (supplementary) table holds details of maximum annual and maximum daily abstraction quantities. The quantities are the maximum permitted under the licence; they give an indication of the size of the abstraction. Some licences may include aggregating conditions or other conditions which restrict the abstraction; these are not included in the dataset.
4	**Content Type**	Dataset
5	**Geographical Coverage**	Natural Resources Wales Owned Data
6 - 8	**These paragraphs are not applicable to this licence**	
9	**Format supplied**	N/A
10 - 14	**These paragraphs are not applicable to this licence**	
15	**Are there any known Third Party Rights?**	None
If yes, state who owns those rights and has licensed us.		N/A
16	**One off cost of supply charges**	Not applicable
17	**Number of Terminals licensed (National Datasets only)**	10
18	**Licence Fees**	**Fees in relation to this Content – reviewed annually on 1 April** NB Charges for Remote Survey Data are one-off. All other Licence Fees are annual. Standard wording below is based on Wales only data.

Internal Use Charges

The National Dataset charge comprises 2p multiplied by the Content Factor (dataset) per sq km or Content Factor (record) per record with a maximum of 10,000 sq km or half the deemed number of records with a terminal discount if applicable.

	Content Factor	**NRW Internal Use Charges GBP per annum**	**Third Party Royalties GBP per annum**	**Dataset Terminal Discount % (if applicable)**	**Cost of supply charges per annum**	**Total GBP per annum**
	3	**£4,500.00**	**N/A**	**55%**	**N/A**	**N/A**

19	**Are there any special conditions added with specific reference to this Content?**	Yes, S77
20	**Are there any information warnings added with specific reference to this Content?**	None

21	**Full details/attributes**	As contained in Environment Agency Information Asset Register referred to also as the Information for Re-Use Register. Region EA Region Name Area Agency Area Code Area_Name Full name of the Agency Area Licence_No Unique number Prev_Licence_Number Previous Licence Number Original_Licence_No Original Licence Number Application_no Application number for the current (version of) licence Issue_No Issue number of the licence Increment_No Where any changes applied do not result in a new issue of the licence. Orig_Effective_Date Date first licence document became effective Expiry_Date Date licence has expired (expected to expire) Version_Start_Date Start date of this version of the licence Version_End_Date Date this version expires Salutation Salutation for licence holder Initials Initials of licence holder Forename Forename of licence holder (if individual) Name Surname of licence holder, if an individual; licence holder's full name if a company Line_1 First line of the licence holder's address Line_2 Second line of the licence holder's address Line_3 Third line of the licence holder's address Line_4 Fourth line of the licence holder's address Town Town from the licence holder's address Country Country from the licence holder's address Postcode Licence holder's postcode Primary_Code Code for primary purpose of abstracted water Secondary_Code Code for secondary purpose of abstracted water Use_Code Code for the use for which the water is authorised to be abstracted Primary_Description Text description of primary code Secondary_Description Text description of the use code Use_Description Text description of the use code Period_Start Start of authorised period of abstraction (day/month) Period_End End of authorised period of abstraction (day/month) Source_of_supply Code for source of supply: surface water, groundwater, tidal water Point_Name Name of abstraction point Point_Category Code for abstraction point category Region EA Region name Licence_No Licence_No Max_Annual_QTY Maximum Annual Quantity that can be abstracted under the Licence number Max_Daily_Qty Maximum Daily Quantity that can be abstracted under the Licence number Purpose_Points_Descriptior This field enables basic interpretation of maximum quantity fields in relation to purpose / points. The licence may be for one of the following: • Single Point / Single Purpose • Single Point / Multiple Purposes • Multiple Points / Single Purposes • Multiple Points / Multiple Purposes Aggregated_to_other_Lic Flag indicating whether the quantities are aggregated to another licence

1	**Number**	8
2	**Name & AfA Code (if applicable)**	Consented Discharges to Controlled Waters (AfA014)
3	**Description**	These data provide details of permit details as required under the Environmental Permit Regulations. Information is held for all permit holders and covers all substances that are controlled. These data are taken from the Environment Agency's Public Register and contain only the first of three tiers of data for all active permits. Tier 1 – Site and General Information on the consent holder that has a consent to discharge into controlled waters. Consent holder and the discharge address and type. The date of permit issue, effective and revocation. Information where the effluent enters the environment (such as sewage disposal works) for each holder that has been granted a permit. Data is also held on the effluent type e.g. Sewage effluent, Overflow. The location of the grid reference is supplied for the effluent and the outlet location in OS Nation Grid Reference format. More detailed information is available under AfA184, Consented Discharges to Controlled Waters with Conditions, which includes: Tier 2 – Effluent Further detail is provided on the amount that can be discharged and in which time period in months. This is stored as Dry Weather Flow, Maximum Daily, Mean, Maximum Rate. Further data about the permit type and treatment type from lookup lists are provided. Tier 3 – Determinand Limits Determinands are the substances and numerical limits that make up the effluent. This could include chemical, biological, and physical limits. Textual conditions are not included. The permitted limits are included for each determinand type. Data is provided for each effluent and may contain one or more determinands depending on the complexity of the discharge.
4	**Content Type**	Dataset
5	**Geographical Coverage**	Natural Resources Wales Owned Data
6 - 8	**These paragraphs are not applicable to this licence**	
9	**Format supplied**	N/A
10 - 14	**These paragraphs are not applicable to this licence**	
15	**Are there any known Third Party Rights?**	None
If yes, state who owns those rights and has licensed us.		N/A
16	**One off cost of supply charges**	Not applicable
17	**Number of Terminals licensed (National Datasets only)**	10
18	**Licence Fees**	**Fees in relation to this Content – reviewed annually on 1 April** NB Charges for Remote Survey Data are one-off. All other Licence Fees are annual. Standard wording below is based on Wales only data.

Internal Use Charges

The National Dataset charge comprises 2p multiplied by the Content Factor (dataset) per sq km or Content Factor (record) per record with a maximum of 10,000 sq km or half the deemed number of records with a terminal discount if applicable.

	Content Factor	NRW Internal Use Charges GBP per annum	Third Party Royalties GBP per annum	Dataset Terminal Discount % (if applicable)	Cost of supply charges per annum	Total GBP per annum
	3	**£4,500.00**	**N/A**	**55%**	**£0.54**	**£60.00**
19	**Are there any special conditions added with specific reference to this Content?**	None				
20	**Are there any information warnings added with specific reference to this Content?**	None				
21	**Full details/attributes**	As contained in Environment Agency Information Asset Register referred to also as the Information for Re-Use Register. COMPANY_NAME Consent holders name DISCHARGE_SITE_NAME Discharge site name DISCHARGE_SITE_TYPE_CODE Discharge site type code DSI_TYPE_DESCRIPTION Discharge site type description ADD_OF_DISCHARGE_SITE_LINE_1 Address data ADD_OF_DISCHARGE_SITE_LINE_2 Address data ADD_OF_DISCHARGE_SITE_LINE_3 Address data ADD_OF_DISCHARGE_SITE_LINE_4 Address data ADD_OF_DISCHARGE_SITE_PCODE Address data DISCHARGE_NGR Location of the discharge site DISTRICT_COUNCIL District council CATC_NAME Catchment name CATCHMENT_CODE Catchement code EA_REGION Environment agency region code REGION Environment agency region name PERMIT_REF Consent number VERSION Consent version RECEIVING_WATER Name of the receiving environment RECEIVING_ENVIRON_TYPE_CODE receiving environment type code REC_ENV_CODE_DESCRIPTION receiving environment type description ISSUED_DATE Date the permit was issued EFFECTIVE_DATE Date the permit became effective REVOCATION_DATE Date the permit will be revoked STATUS_OF_PERMIT Code for relevant section/schedule of act of Parliament STATUS_DESCRIPTION Text describing relevant section/schedule of act of Parliament OUTLET_NUMBER ID for the outlet OUTLET_TYPE_CODE Code for outlet type OUTLET_TYPE_DESCRIPTION Description of type of outlet OUTLET_GRID_REF Outlet grid reference EFFLUENT_NUMBER ID for the effluent EFFLUENT_TYPE Code for effluent type EFFLUENT_GRID_REF Effluent Grid ref				

Open Content

Any designated NRW Open Content used by You, however it has come into your possession.

SCHEDULE 4 – Special Conditions

S4 Special Conditions applicable to all Commercial Internal Use Licensees

S4.1 You shall when permitted to supply Licensed Content externally:

- take into account any relevant Information Warning,
- include the most up to date version of Licensed Content available to you, and
- acknowledge NRW as the relevant intellectual property right owner.

S4.2 Maximum liability in Standard Condition 8 shall be replaced by “one hundred thousand pounds”.
S4.3 You will be issued on request an Archival Use licence subject to further payment of annual Licence Fees, with a discount of 80% (other than for Third Party Royalty Fees).
S77 - supplying information that identifies the locations of public water supply abstraction sources

SCHEDULE 5 – Information Warning

None

Signed on behalf of Natural Resources Wales

Name	Michelle Price
Job Title	External Relations Officer
Signature	
Date	12th May 2015

Signed on behalf of the Licensee

Name	Liz Williams
Job Title	Senior Enviromental Consultant
Signature	
Date	12th May 2015

Appendix 1 - Standard terms and conditions for a Natural Resources Body for Wales Intellectual Property Licence

1. Definitions

In this agreement the definitions in Appendix 2 shall apply.

2. Interpretation

2.1 a reference to any statute, statutory provision or statutory instrument includes a reference to all rules and regulations made under it or them as from time to time amended, consolidated or re-enacted;

2.2 reference to any person includes any legal entity, including without limitation a natural person or incorporated entity;

2.3 words importing a singular include the plural and vice versa;

2.4 The headings in this Agreement are for ease of reference only.

3. Term

The period of this agreement shall be as specified in Schedule 1 at the end of which it will expire automatically without notice.

4. Supply of Licensed Content to the Licensee

Where Licensed Content replaces earlier Content supplied the Licensee shall not use that earlier Content otherwise than for Archival Use;

5 Licence

In consideration of the mutual obligations in this agreement and the payment (if applicable) by the Licensee of the Fees the NRW hereby grants to the Licensee personally (and not to any affiliated company or organisation) a non-transferable, non-exclusive revocable worldwide licence subject to the terms of this agreement to make the uses and to sublicense as specified in the Schedule 2 and to take any copies of the Licensed Content reasonably needed in connection with licensed use including backup copies.

6. Obligations of the Parties

6.1 The Licensee shall:

LICENSED CONTENT

6.1.1. Not supply to another person Licensed Content or any other NRW Content or anything Derived therefrom (but this does not prohibit anything not Derived), unless required by law, other than as licensed by the NRW and accompanied by appropriate acknowledgement and attribution of the NRW's contribution and ownership of Intellectual Property Rights and in particular ensure that any web hosting or web mapping services are consistent with this obligation and not given any greater licence to use the Licensed Content than is permitted by way of Contractor Use;

6.1.2. comply with any Terminal Use Restriction;

6.1.3. take all reasonable technical, contractual and other security measures to protect the integrity and security of Licensed Content and to prevent any use of the Licensed Content contrary to this agreement and any breach of this sub-condition which has a demonstrable effect shall be capable of being treated as a material breach of this agreement;

PUBLICITY & MARKETING

6.1.4. other than as required by condition 6.1.1, not refer to the NRW in any marketing or publicity material without prior approval of the NRW in writing and not use any Licensed Content in such material unless licensed herein;

END USER TERMS AND CONDITIONS

6.1.5. ensure that any supply of Licensed Content to a third party in pursuance of this agreement is on the terms of an EULA which prohibits any External Use that is not separately licensed by the NRW and requires As-Is or Copy Derived Licensed Content to be destroyed at the end of the term of the EULA;

COMPLIANCE WITH THE PRINCIPLES

6.1.6. do nothing which might contravene the Principles and any breach of this sub-condition which has a demonstrable effect shall be a material breach of this agreement provided that provision of truthful responses to enquiries put to the Licensee which are purely factual in nature shall only be a breach if contrary to condition 11;

NOTIFICATIONS BY THE LICENSEE

6.1.7. The Licensee will notify the NRW if:

a. it becomes aware that it is in breach of the licence agreement,

b. it suspects or discovers any possible infringement of the NRW''s Intellectual Property Rights in the Licensed Content by a third party,

c. it suspects or discovers that use of the Licensed Content might be an infringement of any third party's Intellectual Property Rights or of any third party's contractual rights derived therefrom or be any other breach of confidentiality or statute,

d. it receives any Third Party Claim or a significant complaint or report in connection with this agreement or the Licensed Content and will, subject to any legally binding confidentiality, supply copies of any relevant documentation to the NRW.

6.2 The NRW shall:

6.2.1 supply to the Licensee such information and assistance as the Licensee may reasonably request, for the purposes of this agreement in connection with the processes and procedures used to create the Licensed Content unless such information is confidential to the NRW or supply would breach any intellectual property rights, contractual restrictions or other third party confidentiality;

6.2.2 treat equitably the Licensee and other comparable licensees.

7. Payment

7.1 Fees are as detailed in Schedules 2 and 3 and are, subject to any Special Conditions, payable in advance of this agreement.

7.2 Where Fees are payable, the Licensee shall keep true, accurate and sufficient accounts and records to enable the amount of all payments required under this agreement to be determined. The Licensee shall keep such accounts and records during the life of this agreement and six years after its termination or expiry.

8. Liability

8.1 QUALITY AND FITNESS FOR PURPOSE

The NRW does not warrant that the Licensed Content will always be accurate, complete or up to date or that the Licensed Content will provide any particular facilities or functions or be suitable for any particular purpose. The Licensee must ensure that the Licensed Content meets its needs and is entirely responsible for the consequences of any use of the Licensed Content.

8.2 ELECTRONIC FORMAT

If an electronic format has been used, the NRW applies reasonable endeavours to ensure that but cannot guarantee that the media on which the Licensed Content is provided will always be free from defects, computer viruses, worms, Trojan horses, software locks or other similar code of a destructive or unwelcome nature. The Licensee should carry out all necessary checks prior to loading the Licensed Content on to its computer system.

8.3 ECONOMIC AND INDIRECT LOSS

Other than in respect of Condition 11, compliance with the Principles and the warranty in condition10, neither party shall be liable to the other or any other person (whether in contract or in negligence or in other tort or otherwise) for:

8.3.1. any economic losses (including without limitation loss of revenues, profits, contracts, business or anticipated savings) other than Fees; or

8.3.2. any loss of goodwill or reputation; or

8.3.3. any special, indirect or consequential losses in any case whether or not such losses were within the contemplation of the parties at the date of this Licence (including loss of business, profit, reputation or goodwill) arising out of or in connection with this agreement or its subject matter.

8.4 MAXIMUM LIABILITY

The Parties' maximum aggregate liability to the other (including legal costs) in connection with this agreement shall not (apart from payment of Fees and the indemnities in condition 17) exceed the total sum of Fees due under this agreement or such other sum as shall be indicated in Special Conditions.

8.5 NOTICE OF CLAIMS

Neither party shall be liable for any claim between the parties (not being in relation to a Third Party Claim) arising under this agreement unless Notice of the claim is given to the other within six months of becoming aware of the circumstances giving rise to such claim, or of such time as the relevant party ought reasonably to have become aware of such circumstances.

8.6 DEFECTS IN OWNERSHIP

The NRW shall not be liable under this agreement for any defect in its Intellectual Property Rights to the Licensed Content if, both:

8.6.1 it has used reasonable endeavours to ensure that relevant numbered section in Schedule 3 is in the generality the property of or licensed to the NRW; and

8.6.2 after the application of the provisions in condition 10 on remedying defects, such defect would not require the withdrawal of that numbered section or a significant part thereof, it being accepted that less than five percent (5%) (measured either as to value, geographically, or by quantity) would not be significant.

8.7 DEATH AND PERSONAL INJURY

Nothing in this condition 8 shall limit or exclude either party's liability for death or personal injury arising from its negligence.

9. Representations

Except as expressly provided in this agreement, all representations, conditions and warranties whether express or implied (by statute or otherwise) are hereby excluded to the fullest extent permitted by law provided that this shall not exclude statutory or common law rights in respect of negligence.

10. Intellectual Property Rights

10.1 No Intellectual Property Rights are transferred or licensed to the Licensee save those which are expressly provided in this agreement .

10.2 The NRW warrants that subject to the provisions on defects in ownership contained in condition 8 it has all other powers and rights necessary to grant to the Licensee the licences set out in condition 5.

10.3 If any use of any part of the Licensed Content in accordance with this agreement infringes any Intellectual Property Rights the NRW shall use all reasonable endeavours to obtain the right (without charge) for the Licensee to continue to use and to distribute the infringing Content If however the NRW is unable to do this, it shall use all reasonable endeavours to modify or replace that Content so as to be as close to the usefulness of the original Licensed Content as reasonably possible and (if this is not possible) it may remove the infringing Content from Schedule 3.

10.4 Neither party shall be entitled to bring an action for specific performance of the other party's obligations under this agreement where the performance of such obligation would be in breach of third party Intellectual Property Rights.

11 Confidentiality

11.1 The Licensee and the NRW agree to keep Confidential Information in strict confidence and secrecy; to restrict the disclosure of any part of Confidential Information to such of their respective employees, agents and contractors who need access to it to enable them to perform their obligations under or in connection with this agreement and to bring to the attention of such persons the duty of confidentiality under this condition before allowing them access to Confidential Information unless they are already bound by alternative equivalent obligations; and not to disclose any Confidential Information to any other third parties without the prior written consent of the other.

11.2 This condition 11 shall survive the expiry or termination of this agreement
11.3 This condition 11 shall not apply to Confidential Information:
11.3.1 which when it was disclosed was in the public domain otherwise than because of a breach of an obligation of confidentiality; or
11.3.2 that a party could be required to disclose by law; or
11.3.3 that has been disclosed in accordance with the Public Interest Disclosure Act 1998, the Freedom of Information Act 2000, the Environmental Information Regulations 2004 or the Re-use of Public Sector Information Regulations 2005; or
11.3.4 received by a party from a third party at liberty to disclose it; or
11.3.5 supplied to a third party whose Intellectual Property Rights have been used in connection with the Licensed Content and who has reasonably asked for such Confidential Information in order to verify payments due to them.

12. Termination

12.1 The Licensee shall be entitled to terminate this agreement by 20 Working Days' Notice for any reason.
12.2 The NRW shall be entitled to terminate this agreement by 20 Working Days Notice identifying the relevant reasons if the Licensee is in material breach of any of the terms of this agreement, or has not fewer than 5 times in any 12 month period committed a non-material breach of any of the terms of this agreement (and, in the case of a breach capable of remedy, the notice period will not commence if the Licensee remedies that breach in such manner as described in the notice within 20 Working Days); or if the Licensee undergoes a change of ownership or control to which the NRW has reasonably objected within 20 Working Days of becoming aware of such change, or if a resolution is passed or an order is made for the winding up of the Licensee (save for the purpose of a bona fide re-construction or amalgamation) or the Licensee becomes subject to an administration order, or a receiver or administrative receiver is appointed over any of the Licensee's property or assets, or the Licensee is dissolved;
12.3 The rights to terminate this agreement given by this condition 12 shall be without prejudice to any other right or remedy of either party in respect of the breach concerned (if any) or any other breach.

13. Consequences of Termination

13.1 On expiry, Cessation or termination of this agreement the Licensee's entitlement to use the Licensed Content shall cease.
13.2 All copies of the Licensed Content in the Licensee's (or its contractors') possession shall be destroyed unless it has been Process Derived.
13.3 Continued use by an End User of Licensed Content supplied under this agreement prior to expiry or termination is licensed by the NRW for the remainder of the period of any EULA that is compliant with this agreement.
13.4 This condition shall survive termination or expiry of this agreement.

14. Force Majeure and NRW's Statutory Obligations

14.1 Neither party shall be liable to the other for any delay in or failure of performance of its obligations under this agreement (other than an obligation to pay money) arising from any cause beyond its reasonable control including, without limitation, any of the following: Act of God, governmental act (including acts of regulatory authorities), statutory obligation, industrial action, war, fire, flood, explosion or civil commotion ("Force Majeure").
14.2 If a party is affected by Force Majeure it shall forthwith give Notice to the other party of the nature and extent of such Force Majeure.
14.3 If Force Majeure prevails for a continuous period in excess of 20 Working Days the parties shall enter into bona fide discussions with a view to alleviating its effects or to agreeing upon such alternative arrangements as may be fair and reasonable.
14.4 The NRW shall not be liable to the Licensee for delay in performing its obligations under this agreement if such delay arises out of the overriding need to comply with its statutory obligations.

15. Assignment

The Licensee may not transfer or in any other way make over to any third party the benefit of this agreement either in whole or in part without the express prior written consent of the NRW such consent not to be unreasonably withheld or delayed.

16. Waiver

Failure by either party to exercise or enforce any rights available to it, or any forbearance, delay or grant of indulgence, will not (subject to condition 17 below) be construed as a waiver of its rights under this agreement or otherwise.

17. Indemnities

17.1 Where Commercial Use is licensed herein each party shall indemnify the other against all costs (including reasonable and proper legal costs), claims, damages, demands and expenses arising directly or indirectly out of any Third Party Claim in accordance with the following principles:
17.1.1 the Licensee shall be responsible for any claims which arise from any breach of the agreement by the Licensee;
17.1.2 the NRW shall, subject to the provisions on defects in ownership in condition 8, be responsible for any claims that use of the Licensed Content infringes any United Kingdom Intellectual Property Rights or has been supplied in breach of a legally binding confidentiality;
17.1.3 nothing in these indemnities shall have the effect of requiring one party to indemnify the other to the extent that the other has been negligent or in wilful default;
17.2 The NRW or the Licensee (as the case may be) shall:
17.2.1 forthwith on receipt of a written request from the Licensee or the NRW(as the case may be) give to the other the sole conduct of the defence and settlement of any such claim and at no time admit liability; and
17.2.2 act in such a way as to mitigate their losses; and
17.2.3 act in accordance with the reasonable instructions of the other and give all such assistance as it may reasonably require to defend or settle such claim.

18. Entire agreement

This agreement constitutes the entire agreement between the parties and supersedes all oral or written agreements, representations, understandings or arrangements relating to its subject matter other than subsequent written alterations to this agreement mutually agreed by the parties in accordance with condition 20 below. The parties irrevocably and unconditionally waive any right to rescind this agreement by virtue of any misrepresentation and to claim damages for any misrepresentation save in each case where such misrepresentation was made fraudulently.

19. Severance

If any part of the agreement is found by a court of competent jurisdiction or other competent authority to be unenforceable, then that part will be severed from the remainder of the agreement which will continue to be valid and enforceable to the fullest extent permitted by law.

20. Variation

Variations must be agreed by both parties in writing signed by or on behalf of the NRW and the Licensee and neither party shall unreasonably refuse or delay 0such requests for a variation.

21. Notices and Consents

21.1 Notices under this agreement shall be written, in English, in advance by at least the period specified in this agreement and shall be sent to the address and contact of the party as set out in this agreement (or such other address in the United Kingdom as either party may notify to the other) in accordance with this condition).
21.2 Notices may be sent by first class mail (or other comparable and reputable postal services) or by email.
21.3 Correctly addressed notices sent by mail shall be deemed to be delivered 2 Working Days after posting.
21.4 Correctly addressed emails shall be deemed to be delivered when sent provided that a confirmation copy is sent by first class mail within 24 (twenty four) hours.
21.5 Any consent, approval or agreement given pursuant to this agreement shall be in writing and in the case of the Licensee shall be signed in accordance with the contacts records in Schedule 1, or any variation thereof.

22. Relationship of Parties

Nothing in this agreement shall create a partnership or joint venture between the parties, nor shall this agreement constitute one party the agent of the other or give either party authority to act or hold itself out as having authority to act on behalf of the other; or confer or purport to confer on any third party any benefit or rights in respect of the terms of this agreement.

23. Dispute Resolution

23.1 All disputes under or in connection with this agreement shall be referred first to the parties' respective managers with responsibility for the day to day management of this agreement.
23.2 Either party may thereafter initiate, at any time, the other party's standard internal complaints process (or if none exists refer the dispute up to the next level of management).
23.3 After the relevant complaints procedure or referral is completed (within the relevant timescales set out therein or in the absence thereof 20 Working Days), the dispute may be referred by either party to the parties' respective Chief Executive Officers or equivalent.
23.4 If the parties' respective Chief Executive Officers are unable to resolve the dispute within 10 Working Days, the dispute shall be referred to the Centre for Dispute Resolution who shall appoint a mediator and the parties shall then submit to the mediator's supervision of the resolution of the dispute.
23.5 Recourse to this dispute resolution procedure shall be binding on the parties as to submission to the mediation but not as to its outcome. Accordingly all negotiations connected with the dispute shall be conducted in strict confidence and without prejudice to the rights of the parties in any future legal proceedings.
23.6 Except for any party's right to seek interlocutory relief in the courts, no party may commence other legal proceedings under the jurisdiction of the courts or any other form of arb0tration until 20 Working Days after the appointment of the mediator.
23.7 If, with the assistance of the mediator, the parties reach a settlement, such settlement shall be put in writing and, once signed by a duly authorised representative of each of the parties, shall remain binding on the parties.
23.8 The parties shall bear their own legal costs of this dispute resolution procedure, but the costs and expenses of mediation shall be borne by the parties equally.
23.9 Nothing in this condition shall restrict the Parties' rights to seek interim relief.

24. Rights of Third Parties

Save where this Agreement expressly provides to the contrary, for the purposes of the Contracts (Rights of Third Parties) Act 1999 this Agreement is not intended to, and does not, give any person who is not a party to it any right to enforce any of its provisions.

25. Governing Law

This agreement shall be governed and construed in accordance with English law and the parties submit to the exclusive jurisdiction of the English courts in the event of a dispute.

APPENDIX 2 - DEFINITIONS

NB core definitions are in standard font.

"2nd Generation Process Derived Product" *means a product that is Process Derived from the Approved Product on which it is immediately based where any preceding Approved Product in the chain of derivation from the Licensed Content is Process Derived and such product is not prohibited by standard condition 6.1.1*

"Approved Chain Derived Product" *mean a Chain Derived Product identified in Schedule 2 and that is fully compliant with the details included in Schedule 2(in particular those of the assessed product category)and any relevant special condition including those created by the Reseller*

"Approved VAR Product" *mean a product created by the Reseller that is Derived directly from the Licensed Content, identified in Schedule 2 a sample of which has been supplied to the Natural Resources Walesprior to approval and that is fully compliant with all the details included in Schedule 2 (in particular those of the assessed product category)and any relevant special condition.*

"Approved Product" *means, unless the context required otherwise an Approved Chain Derived Product and/or an Approved VAR Product.*

"Archival Use" means use after expiry, Cessation or termination that comprises retention Internally by the Licensee or its contractors of copies of the Licensed Content for a period not exceeding six years and only to the extent necessary to answer technical support questions or to comply with any statutory or regulatory requirement.

"Area Search and Print" *means the product category whereby a product is created by means of a full copy of or extract of or Search of Licensed Content and such content is supplied in original or derived form with mapping, interpretation, guidance or other consultancy type work, such as data selection or other customisation, specific to that customer.*

"Area View Only" *means the product category whereby a product meeting the description of any other dataset product category is made available but not supplied to a customer who is given no legal right to any more than viewing the product and all reasonable technical measures are taken to prevent any act in excess of viewing.*

"As-Is" This means a copy of the whole or Part of the original Content that is unaltered and un-adapted and not merged with other Content other than by:

- layout, font, size, colour and other minor display changes,
- digital file compression,
- putting into an encrypted or protected format such as a protected ZIP file or a locked pdf but not un-encrypting original Information that is already in a protected format,
- bundling with other Content or with a cover sheet provided that the original Content remains discrete,
- changing into a different format.

"Cessation" means removal or cessation of use of particular Licensed Content or an Approved External Use from the scope of this agreement.

"Chain Derived Product" *means a product that is:*

a) Derived from an Approved Product, and

b) creates a chain of two or more products requiring approval,

c) where the new product is not Copy Derived from the Licensed Content and not a 2nd Generation Process Derived Product.

"Co-Deliverer" means a person who is supplied by a public or not for profit body with Content for purposes all of which that body considers to be of **significant importance** to the achievement of that body's statutory functions, where that person supplied with Content uses it only for non-commercial purposes.

"Commercial" means

- internal Use within a Commercial Body except to the extent that such use relates to statutory functions of a body subject to the Environmental Information Regulations 2004 or comprises public task functions,
- offering a product or service containing Licensed Content for direct monetary compensation such as the sale of a book or newsletter with a cover charge even if it does not cover all costs but not including supply by a public sector body of products or services to other UK and EU public sector bodies or in pursuance of international treaties or conventions for a charge that does not exceed marginal costs (or costs required to be charged by legislation or binding government rules) where those bodies in receipt of such products or services are permitted to use only for statutory or public task purposes, or
- offering a product or service based on Licensed Content for indirect commercial advantage by a Commercial Body.

"Commercial Body" means an organisation that is primarily engaged in a profession, even if it has public task functions (unless it is a body that is prevented by its set up from distributing any of its income whether as money or in any other form to its Committee, board or members and limits payments to employees to salaries and a bonus scheme that is not designed to distribute all profits or surplus income but has provisions for distribution of surplus income for some public good (usually charitable) purpose) or is engaged in trade or commerce.

"Confidential Information" means any information relating to this agreement (but not the Licensed Content unless we say so expressly) disclosed by one party to the other under this agreement or coming to the Licensee's or NRW's attention directly or indirectly as a result of this agreement whether orally or in writing where such information is expressly stated to be confidential or ought reasonably to be regarded as confidential.

"Consistency Principle" means the principle whereby End Users of Content receive information that is the same from whichever person they obtain it.

"Content" has the same meaning as in the Re-Use of Public Sector Information Regulations 2005, including also computer programs and other intellectual property rights.

"Contractor Use" means passing of Content to a person (Contractor) who is contracted to provide services to the Content provider, when:

- use is limited to the purposes of that contract, and
- all terms of the original licence are applied to the Contractor, and
- the person letting the contract remains responsible for those terms, and
- the Contractor does not pass the Content to any person other than the Licensee or a subcontractor who complies with these conditions and
- the Contractor destroys all copies of the original Licensed Content supplied (and anything Copy Derived from that) at the end of the contract.

"Copy Derived" means the process of creating something from Content that is not the result of As-Is use and either:

- includes a copy of that Content as a whole or as a Part, and/or
- that Content can be reverse engineered from it, by which is meant the Content can be recreated by technical or other means in full or in Part from a derivative or a series of similar derivatives of it, and/or
- is a derivative that is Substitutable.

"Derived" unless the context requires otherwise means Copy Derived or Process Derived.

"e-Learning" means a Process based electronic system of teach yourself training.

"End User" means any person using Content supplied by way of licensed External Use for its own Internal Use, Standard Permitted External Use or for Professional Use.

"End User Licence Agreement" and "EULA" mean the terms under which the Licensee supplies Licensed Content to End Users (see condition 6).

"External As-is Use" means use that is not Internal Use or Standard Permitted External Use that involves the creation of As-Is Licensed Content.

"External Derived Use" means use that is not Internal Use or Standard Permitted External Use that involves the creation of Derived Licensed Content.

"External Use" means External As-Is Use and/or External Derived Use or Standard Permitted External Use.

"Fees" means Licence Fees and Royalty Charges.

"Fixed Format" means Content that is formatted in such a way as to be static and unalterable (or not easily alterable without the loading of special software). It will typically include hard copy, portable document format (pdf), image format (such as jpeg, gif, tiff and bmp) and video format (such as mpeg, avi and wmv).

"Fixed Image Publishing" means general distribution of Licensed Content comprising a still or moving image for viewing by the public where the following conditions apply:

- either:
    - it is a sample or extract that does not exceed 5% of the original specific Licensed Content or anything Copy Derived therefrom displayed in a Non-Commercial. website, social media pages or other electronic or hard copy publication operated by the Licensee (" Non-Commercial Publication"), or
    - it is Process Derived Content used in a Non-Commercial Publication, or
    - it is Licensed Content or anything derived therefrom displayed in any Media Publication to provided that it is not a specific information service or in any other way tailored to the needs of a particular customer or locality,
- there are no use rights granted to end users other than to view and all reasonable technical measures are taken to prevent more than viewing, and
- there is appropriate attribution in respect of Natural Resources Wales contribution, and
- it is supplied with any Information Warning we have identified as applicable to that Content (or such other wording as we may agree).

"Information Warning" means information required by Schedule 5 to be taken into account when using the Information.

"Intellectual Property Rights" means any patent, copyright, database right, registered design, trademark or other industrial or intellectual property together with any applications for any of the foregoing.

"Intermediary Reseller" *means a person other than the Reseller who creates an Approved Chain-Derived Product.*

"Internal Use" means use of Licensed Content by the Licensee or their employees (or in the case of an academic body, their students) that does not involve a supply of Licensed Content to anyone else.

"Licence Fees" means NRW's marginal costs of supply charges and licensing charges as identified in Schedule 3 together with Third Party Royalties.

"Licensed Content" means the Content identified in Schedule 3 and, except where the context requires otherwise anything Derived from it.

"Licensee Update Date" *means the date or period identified in Schedule 3 when an Update is made for the Licensee.*

"Licensee Update Frequency" *means the frequency with which the Licensee is supplied Updates to the Licensed Content.*

"Licensee Update Supply Date" *means the latest date identified in Schedule 3 by which NRW will supply an update to the Licensee.*

"Media Publication" means a publication whether printed or electronic, and whether or not there are any charges, where no use rights are granted to end users other than to read and all reasonable technical measures are taken to prevent more than viewing (generally only applicable to electronic data), that is either

- a newspaper, or
- a current affairs publication issued at least three times a year, or

- an academic, literary, trade or technical journal whose primary purpose is the advancement of or criticism or review of the arts, science or technology and issued at least three times a year, or
- any factual documentary type programmes or materials for the purposes of educating the public generally, on media such as television, distributed disks, films, video on demand or online media.

"No Detriment Principle" means that any intended use of Licensed Content must not represent a risk of being misleading to the End User, detriment to NRW's ability to achieve its objectives, detriment to the environment, including the risk of reduced future enhancement, or being prejudicial to the effective management of Content held by the NRW..

"Non-Commercial" means use that is not Commercial.

"Notice" means a notice given in accordance with condition 21.

"Part" In relation to Content means any discrete part of the original Content that is contained in a larger set of Content.

"Point Search and Print" *means the product category whereby a search is made by reference to information at a point, being a "pin in the map" representing a customer asset or mobile GPS receiver location that does not include information outside that point even if it affects that point. It can be treated as a single product regardless of the number of customers as long as it is only one product or application or publication that typically, but not necessarily, will be website or smart phone view.*

"Principles" means the Transparency Principle, the Consistency Principle and the No Detriment Principle.

"Process" means a rules based procedure that includes some user input such as:
methods, techniques, expert systems, flow charts, etc whether or not electronic, computer programs, apps, macros, artifacts, and other electronic tools and utilities etc.

"Process Derived" describes an output derived from Content that is not the result of As-Is or Copy Derived use that requires the physical input of that Content into a Process that involves some form of copying and/or manipulation (usually this will involve modelling).

"Professional Use" means, in respect of a particular client and particular transaction or matter, supply by a Consultant providing professional services to that client of As-Is Fixed Format Natural Resources Wales Content as a necessary but minor background part of those service, where:

a) the Content is obtained directly from NRW(and any applicable Licence Fees paid) or by way of an Approved Product or a Copy Derived derivative of it, as and when needed for and on behalf of a particular client
b) the Content supplied to a client relates to a site in single ownership and can include any other Content necessary for an environmental assessment of that site; and
c) the client is not granted any licence to copy, adapt or sub-license the Content other than to take one back up copy or to supply As-Is Fixed Format copies necessary for that client matter (or the Consultant can supply such copies on behalf of the client) provided that no charge is made for such supplies; and
d) no charge is made by the Consultant to its client for the Content other than a charge for professional services and disbursements; and
e) Content is attributed as required by Natural Resources Wales.

Note: The marginal costs of a UK trading fund (or any similar government body) can include all charges that are required by legislation or binding government rules in relation to making supplies to other public sector bodies

"Regulatory Use" means inclusion by or on behalf of a person of Fixed Format Content either As-Is or Derived in any documentation where this is reasonably necessary in connection with any process of a court, tribunal or regulatory body (but not including a trade association) affecting that person.

"Reseller Agent *means any person, including a distributor or an agent of the Reseller (or if applicable an Intermediary Reseller), who is supplied with an Approved Product with the intention that such person is permitted to sell it As-Is to an End User.*

"Royalty Charges" *means charges identified in Schedule 2 as Royalty Charges in respect of any Approved Product, including Third Party Royalties in relation to Approved Products.*

*"**Search"** means a query of a dataset by reference to a specified attribute example comprising a) the name of an individual, organisation, substance or site, b) geographical location or postcode or c) a particular date or d) any other similar precise search criterion.*

"Software" has the same meaning as "Process".

"Standard Condition" means one or more of the Standard Terms and Conditions in Appendix 1 also referred individually as a numbered "condition".

"Standard Permitted External Use" means Contractor Use, Regulatory Use or Fixed Image Publishing.

"Sub-setting and Subset" means the act and result respectively of reducing the proportion of a full dataset, without it comprising a Search and without reducing the fields or attributes supplied), by making a geographical extract ("spatial" sub-setting that is charged per square kilometre) or a selection of geographical points, sites, persons or other key attributes or use of one or more filters or selection criteria ("non-spatial" sub-setting", charged on a per record basis).

"Substitutable" in relation to Content means that a derivative of original Content serves substantially the same purpose as the original Content, has not been changed to something different and is effectively imparting the same or substantially the same knowledge.

"Terminal Use Restriction" means the limit specified in Schedule 3 on the number of servers, desktop or portable computers, personal digital assistants, mobile phones or any other electronic means of access, permitted in a particular Year to gain direct access to (this includes viewing) the Licensed Content or anything Copy Derived from it.

"Third Party Claim" means any claim for compensation or other legal remedy (including remedies in respect of negligence) in connection with this agreement or the Licensed Content by any person other than the Licensee or NRW.

“Third Party Royalties” means the charges payable to third parties as identified in and Schedule 2 (External Use) and Schedule 3 (Internal Use).
“Transparency Principle” means the principle that End Users should not be misled in any way about matters relating to the Licensed Content which affect its potential usefulness or as regards its source.
“Updates” means, where indicated in Schedule 3 as included, updated copies of Licensed Content that contain replacements for existing Licensed Content that are made by the NRW to reflect quality improvements or the elimination of errors, or additional within the same description, derived from an extract of the relevant NRWprimary source. An Update collates information from the relevant NRW primary Content source and can comprise either the supply of specific replacement Content or a full replacement set of Content.
“Value Added Reseller” and “**VAR**” means a person who supplies an Approved Product to third parties on a commercial basis with added value through additional information, facilities or services.
“VAR Update Go Live Date” *means the date identified to you at the time of an Update supply before which you must not update an Approved Product with Updates.*
“Wholesale” *means an As-Is supply of a Value Added Reseller dataset product (whether that product has been created As-Is, Copy Derived or Process Derived from Licensed Content), which does NOT include mapping, interpretation, guidance or other consultancy type work, such as data selection or other customisation, specific to that customer but Wholesale can include geographical “cookie cuts”, basic metadata and systems technical advice such as how to load and install.*
“Working Day” means Monday to Friday inclusive from 9:00am to 5:30pm, excluding UK public holidays.
“written” includes fax and email and any other electronic text.
“Year” means each period of twelve months commencing on the date particular Licensed Content is first licensed under this agreement and each anniversary thereof.

Annex B

Newport Council Data

Application for Ordinary Watercourse Consent
With Guidance Notes

Please read through these guidance notes and the application form carefully before you fill in the form.

- If you fill in the application form correctly first time, we can process it quicker.
- The guidance notes give you information to help you fill in your application for Ordinary Watercourse Consent.
- Before completing the application form you are recommended to contact us for advice your proposal.
- Under the Land Drainage Act 1991, you need consent if you want to build a culvert or structure (such as a weir) to control the flow of water on any ordinary watercourse.
- There is a charge of £50 per structure for Ordinary Watercourse Consent applications made under the Land Drainage Act 1991

If you are not sure about anything in the guidance notes or application form, please contact us.

When you have completed the application form please return it by recorded delivery, or electronically together with all relevant supporting documents and applicable fee, to:

Newport City Council
Streetscene
Civic Centre
Newport
South Wales
NP20 4UR

Email: Streetscene@newport .gov.uk

LLFA Office Use Only: Application Ref No: _____
Date App received: _____ Date Fee received: _____
No. of structures: _____ Fee Applicable: Yes / No
Delegated officer: _____ Date App complete

1. Location of the Proposed Works

We need to be able to easily identify where the proposed works will be carried out. Please give details of:

- The location of the site;
- The name of the watercourse; and
- The National Grid Reference (12 figures)

Location: _____

Name of Watercourse (if known): _____

National Grid reference of the site (12 figures): _____

2. Contact – Name of person we can contact in respect of this application

In order for us to process your application as promptly as possible we need to have a named person who can
be contacted to clarify any aspects of your application (it may be yourself or a representative acting on your behalf e.g. solicitor, contractor, etc).

Title: _____

First Name: _____ Last Name: _____

Address: _____

_____

_____

_____

Postcode: _____ Email: _____

Contact telephone: _____ Mobile: _____

3. Applicant

We need to understand who is making the application, If you are applying as:

- a company go straight to 3.1
- an individual go straight to 3.2
- a group go straight to 3.3
- a public body go straight to 3.4

3.1. Applying as a company

You should fill in this section if you would like to apply for Consent as a Company. You must be a registered company formally registered with Companies House. Any Consent you get will be in the company name registered with Companies House.
Please ensure that the details you provide are those which are registered with Companies House.

Company name: _____

Company registration number: _____

Company registered address: _____

_____

_____

Postcode: _____

Country: _____

Email: _____

Telephone: _____

Mobile: _____

Fax: _____

Company Director (Full Name): _____

Official Position: _____

3.2. Applying as an Individual

You should fill in this section if you are applying for Consent as an individual.
If you are the named person in Section 2 (the main contact for the application) you do not need to fill in this section or 3.5. If you are not the named individual you need to complete this section.
The name you give will be the name on any Consent we grant.

Title _____

First Name: _____

Last Name: _____

3.3. Applying as a Group

Fill in this section if you would like to apply as a charity, group of individuals, club or partnership.
If the group's main representative is named in Section 2. You will still need to complete the name of the group and its status (i.e. is the group a charity, a club etc).
Please ensure that the name of the group is provided as this is the name which will appear on the Consent we grant.

Title _____

First name: _____

Last Name: _____

Position: _____

Name of group: _____

Status of group: _____

3.4. Applying as a Public Body

Fill in this section if you would like to apply for consent as a public body such as an NHS Trust.
Please indicate the type of public body.

Name of Public body: _____

What type of public body are you? _____

3.5. Address

If the applicant's main UK business address is the same as the address given in Section 2, there is no need to complete this section. This address you give will be the address your Consent will be registered to and will be shown on any Consent we grant.

Address: _____

_____

_____

_____

Postcode: _____

Country: _____

Telephone: _____

Mobile: _____

Email: _____

Fax: _____

4. Interest in the Land

We need to know what interest you have in the land where the works will be carried out (for example whether you are the landowner or a tenant). If any work will be carried out on land that you do not own, you will need permission from whoever owns the land.

What is your interest in the land? _____

_____

_____

_____

_____

_____

5. Description and purpose of the proposed works

It is important that you accurately describe the proposals for the application being made. Please tell us the purpose of the works and the number of structures you need consent for. If consent is required for more than one structure please provide a unique reference number for each structure (if necessary continue on a separate sheet), including this reference on any drawings.

Please provide a description of the proposed Works:

_____

_____

_____

_____

_____

Total number of structures: _____

Structure 1 ref _____

Structure 2 ref _____

Structure 3 ref _____

Structure 4 ref _____

Structure 5 ref _____

6. Detailed Proposals

To consider your proposals we need to receive plans and drawings, drawn by a competent engineer or surveyor and showing Ordnance Datum Newlyn (height above sea level). It should be noted that we are not designing the work for you. You have to ensure that you comply with all current requirements of Construction Design & Management Regulations. You will need to provide three copies of all relevant drawings. The drawings must be no larger than A0 size and they need to include the following:

- **Location Plans**

This must be at an appropriate scale and be based on an Ordnance Survey map. It must clearly show the general location of the site where the proposed work will be carried out and include general features and street names. It must also identify the watercourse or other bodies of water in the surrounding area.

- **Site Plan (general arrangement)**

You must provide a plan of the site showing:
The existing site, including any watercourses; your proposals; the position of any structures which may influence local river hydraulics, including bridges, pipes and ducts, ways of crossing the watercourse, culverts and screens, embankments, walls, outfalls and so on, including existing fish passes or structures intended to allow fish to pass upstream and downstream. The plan should be drawn to an appropriate scale which must be clearly stated.

- **Cross Sections**

Where works encroach into any watercourse, you should provide cross sections both upstream and downstream of the proposed works. Cross sections should be drawn as if looking downstream on the watercourse and should include details of existing and proposed features and water levels.

- **Longitudinal Sections**

Longitudinal sections taken along the centre line of the watercourse are needed. These must show the existing and proposed features including the water levels, bed levels and structures. They should extend both upstream and downstream of the proposed work.

- **Detailed Drawings**

These are to show details of the existing and proposed features such as the following:
The materials to be used for any structures; the location of any proposed service pipes or cables which may affect the future maintenance of the watercourse;
Details of any tree, shrub, hedgerow, pond or wetland area that may be affected by the proposed works;
Details of any planting or seeding;
Dams and weirs (we need a plan showing the extent of the water impounded (held back) under normal and flood conditions so that we can assess the possible effect on the land next to the river. The plans must also show any land drains to be affected.

- **Calculations**

Where appropriate drainage and structural design calculations shall be submitted for each structure.

6.1. Please provide a description and reference number of all plans and sections you have provided (see guidance notes above) – If required please continue on a separate sheet.

Location Plan
Reference number (s): _____

Site Plan
Reference number (s): _____

Cross sections
Reference number (s): _____

Longitudinal Drawings
Reference number (s): _____

Detailed Drawings
Reference number (s): _____

Calculations
Reference number (s): _____

Detailed method statement
Reference number (s): _____

7. Construction details

You need separate consents for the permanent works and any temporary works that do not form part of the permanent works. Temporary works could include, for example, cofferdams (watertight enclosures) across a watercourse, or temporary diversions of water while work is carried out.
For any temporary work we need to know how you are proposing to carry out the work. So you need to send us a 'method statement' that includes details of the specific measures you plan to take to keep disruption to a minimum and reduce any unwanted effects while the work is being carried out.
We need to know when you are proposing to carry out the work and how long you think it will take. When you are planning the work you need to make sure that you have allowed enough time for us to consider your application.

7.1. Are the works permanent or temporary?

Permanent: Yes ☐ No ☐

Temporary: Yes ☐ No ☐

How long is the temporary period? _____

7.2. Date Construction work will start

Date (dd/mm/yyyy): _____

8. Additional licenses or consents

You need to consider if your plan will involve or could affect any of the listed.
If you answer 'yes' to any of the questions, you will probably need extra licenses or consents from the relevant authority before you start. You should make sure that you have enough time to get all the approvals you need before you start work. If you don't this could delay the work.

8.1. Do the proposed works involve or affect the following?

	Yes	No	Relevant authority to obtain consent:
Impounding (holding back a watercourse):	☐	☐	Environment Agency
Abstracting (removing) water:	☐	☐	Environment Agency
Fish or fisheries:	☐	☐	Environment Agency / CCW
Disposing of waste material:	☐	☐	Environment Agency
Third Party Land:	☐	☐	Land Owner
Public Highway / Verge	☐	☐	NCC
Public Right of Way	☐	☐	NCC

Please note: If yes to any or all of above, you will probably need extra licenses or consents from the relevant authority before you start (see guidance notes).

9. Effects on the Environment

We have a legal duty to protect and improve the environment, so we must consider the environmental effects of your proposal.
You may need to carry out an environmental appraisal to assess the effects of your work. You should contact us before you send us your application so that we can give you advice on this. If you don't your application could be delayed.
The environmental appraisal should identify and consider all likely effects on the environment. You should consider the direct and indirect effects the work has on sites and features of interest and species of particular value.
Include any specific measures you plan to keep disruption to a minimum and reduce any unwanted effects while the work is being carried out.
Set out any opportunities for you to improve the environmental value of the site. This may include creating water features, planting trees and shrubs that would normally grow at the site, providing bird nesting boxes or creating sustainable places for wildlife to live. If, as part of the planning permission we have asked for an environmental appraisal, you must send it to us with all the other supporting documents we need.
If your site falls within, is next to or is linked to a nature conservation site, contact us as soon as possible to discuss your proposals before you send us your application.
Under the European Habitats Regulations, we must make sure that Ordinary Watercourse Consent does not have a direct or indirect negative effect on any site specified in the regulations, including:

- Sites of Specific Scientific Interest (SSSIs);
- Designated Special Areas of Conservation (SACs);
- Special Protection Areas (SPAs);
- Listed RAMSAR sites; and
- Scheduled Ancient Monuments

Under the Habitat Regulations, we must consult the Countryside Council for Wales (or CADW in the case of ancient monuments).
You may wish to contact these organisations yourself to get their views on your proposal.

9.1. Please provide brief details of the effect the work will have on the environment together with any proposals for improvements you will make or action you will take to compensate for the effects

10. Other Authority Permissions

Please provide details of any planning permissions you may have or are applying for that relates to this proposal.

Fill in this Section if you have submitted a planning application for the proposed works. Otherwise go to 11.

Planning Authority: _____

_____

Application Number: _____

Date submitted (dd/mm/yyyy): _____

Planning permission approved: ☐ Yes If yes, approval date _____

☐ No: awaiting decision

☐ No: rejected

11. Maintaining the structure

We need to know who will be responsible for the maintenance of the structure both during construction work and after the work has finished. The details must include addresses and suitable contact details e.g. telephone/email addresses etc.

During construction:

Name: _____

Address: _____

_____

Postcode: _____

Country: _____

Email: _____

Telephone: _____

Mobile: _____

Fax: _____

Upon completion:

Name: _____

Address: _____

_____

Postcode: _____

Country: _____

Email: _____

Telephone: _____

Mobile: _____

Fax: _____

12. Fees

The fee for Ordinary Watercourse Consent is £50 per structure. **An acceptable form of payment is via cheque made payable to 'Newport City Council'. Please do not send cash.**

Ordinary Watercourse Consent fees are applicable to this application:

Number of structures: (Section 5) ☐ x (multiplied by) £50.00

Total Fee enclosed: **£** ☐

Fee Enclosed: Yes: ☐ No: ☐

13. Checklist

We have provided a list of items for you to check which items are relevant to your application and should be included.
It should be noted that if the application is being submitted electronically it is only necessary to provide one set of supporting drawings and documents.

Please read through this list and confirm the items you are sending with this application:

- Completed Form: ☐
- Location Plan (section 6.1): ☐
- Site Plan (section 6.1): ☐
- Cross Sections (section 6.1): ☐
- Long Sections (section 6.1): ☐
- Detailed Drawings (section 6.1): ☐
- Calculations (section 6.1): ☐
- Method Statements (section 6.1): ☐
- Environmental/Ecological Reports (section 9): ☐
- Applicable Fee (section 12): ☐

14. Declaration

We need you to confirm that the information you have provided in the application, as far as you know, is true. ***Note: Newport City Council, by granting Consent under the Land Drainage Act 1991 accepts no liability for any loss or damage which may arise out of design, construction, maintenance or use.***

Signature: _____

Title: _____

First name: _____

Last name: _____

Position: _____

Today's date (dd/mm/yyyy): _____

15. Data Protection Act 1998

We will process the information you provide so that we can deal with your enquiry.
We may also process or release the information to:

Offer you documents or services relating to environmental matters;
Consult the public, public organizations and other organizations (for example, the Health & Safety Executive);
Carry out research into the environmental issues and develop solutions to problems;
Provide information from the public register to anyone who asks;
Prevent anyone from breaking environmental law, investigate cases where environmental law may have been broken, and take any action that is needed;
Assess whether customers are satisfied with our service and improve it where necessary; and
Respond to requests for information under the Freedom of Information Act 2000 and the Environmental Information Regulations 2004 (if the Data Protection Act allows)

16. Next steps

Please return the application form together with any supporting documents to our offices (details on the front cover)

If you are happy with our service, please tell us. It helps us identify good practice and encourages our staff. If you are not happy with our service, please tell us how we can improve.

THIS PAGE IS INTENTIONALLY LEFT BLANK

Environmental Protection Act 1990: Part IIA
Newport City Council
Contaminated Land Register

The statutory requirement for the identification and remediation of contaminated land is laid out in Part 2A of the Environmental Protection Act 1990.

As the primary enforcing authority Newport City Council is required to inspect its area and determine whether any land is "Contaminated Land" as defined in the legislation. Local authorities have been given powers to ensure the remediation of any sites determined to be contaminated land.

The Council has a duty (under section 78R(1)) to maintain a Register which includes details of remediation notices served and other documents in relation to each area of contaminated land for which the authority is responsible.

The particular details to be included in the register are prescribed in Regulation 15 of, and Schedule 3 to, the Contaminated Land (England) Regulation 2000. This will detail the location and extent of contaminated land in the Borough and can include:

- remediation notices and appeals against such notices;
- remediation statements and declarations;
- appeals against charging notices;
- notices relating to the designation of land as a special site;
- guidance issued by the Environment Agency;
- information where a site is formally identified as contaminated land but is dealt with under other legislation;
- site details, and
- details from the Environment Agency regarding the regulation of Special Sites.

The Council is under a duty to keep its Register available for free inspection by the public at all reasonable times (Section 78R(8)(a)). In addition, it is under a duty to provide facilities for members of the public to obtain copies of register entries, for which it can make a reasonable charge (section 78R(8)(b)).

Before including any information on its register the enforcing authority needs to consider whether the information should be excluded on the basis that:

- it's inclusion would be against the interest of national security; or
- the information is commercially confidential.

For full details of the information required to be kept in the register, and the grounds for exclusion, the relevant legislation and guidance should be consulted.

This Register contains the required details of action taken under Part IIA of the Environmental Protection Act 1990 in relation to contaminated land.

1. Index of sites that are included in the Register

Site Ref. No.	Address	Grid Reference	Date of first entry
North Glebelands (Zone 2, Pitch 1)	**St Julians Recreation Ground, Newport**	**331551 190266**	**28th July 2011**
Shaftesbury Park Allotments	**Shaftesbury park Allotments, Crindau, Newport**	**331453 189568**	**14th September 2011**

Information contained in the Register

Remediation Notices

Site Ref. No.	Date	Address

Appeals against remediation notices

Site Ref. No.	Date	Address

Remediation declarations

Site Ref. No.	Date	Address

Remediation statements

Site Ref. No.	Date	Address
North Glebelands	28.7.11	North Glebelands (Zone 2, Pitch 1), St Julians Recreation Ground, Newport.
Shaftesbury Allotments	14.9.11	Shaftesbury Park Allotments, Crindau, Newport

Appeals against charging notices

Site Ref. No.	Date	Address

Designation of special sites

Site Ref. No.	Date	Address

Notification of claimed remediation

Site Ref. No.	Date	Address

Convictions for offences under section 78M

Site Ref. No.	Date	Address

Guidance issued under section 78V(1)

Date	Issued by	Title

Other environmental controls

Site Ref. No.	Date	Address

This Register is updated to include the latest available information and therefore it is essential to check for the current issue:

- by checking on the Newport City Council web site
- by phoning the Environmental Protection Team on (01633 851474)
- by e-mail: mailto: environmental.health@newport.gov.uk
- in person (by appointment): Environmental Protection Team, Information Station, Old Station Building, Queensway, Newport, South Wales, NP20 4AX.

A2 & PART B PERMITS

Permit Number	Installation	Status
LA-IPPC/001/05/v2	**Civil & Marine Ltd** - Llanwern Works, Newport, NP19 4QX *(Slag/Cement Production)*	Mothball Status
LA-IPPC 002/06	**Newport Galvanizers Ltd** - Llanwern Works, Newport, NP19 4QX *(Galvanizers)*	
LAPPC/005/05/v1	**Cemex Seament Ltd** - Eastway Raod, South Dock, Alexandra Dock, Newport, NP20 2NQ *(Cement)*	Mothball Status
LAPPC/006/05/v1	**Marshals Mono Ltd** - Eastern Dry Dock, Corporation Road, Newport, NP19 4RE *(Cement)*	
LAPPC/007/04/v1	**Hanson Aggregates South Wales Ltd** - Felnex Sand Wharf, Stephenson Street, Newport, NP19 4PP *(Cement)*	
LAPPC/008/04/v1	**Caerleon Readymix** - Western Industrial Estate, Ponthir Road, Caerleon, NP6 1NN *(Cement)*	
LAPPC/009/05/v1	**Cemex UK Materials Ltd** - Star Ind Estate, Caerleon, Newport, NP18 1PQ *(Cement)*	
	Newport Ford - Ford House, Leeway, Newport, NP19 4QU *(Respraying of Road Vehicles)*	
LAPPC/011/05/v1	**Bisley Office Equipment** - Caswell Way, Reevesland Ind Estate, Newport, NP19 4PW *(Powder Coating and Coating of Metal)*	
LAPPC/012/05/v1	**St Woolos Auto Repair Service Ltd** - Unit 27 – 28 Leeway Ind Estate, Newport, NP19 4SL *(Respraying of Road Vehicles)*	
LAPPC/015/05/v1	**Nationwide Crash Repair** - Curlew Close, Queensway Meadow Ind Estate, Newport, NP19 4SY *(Respraying of Road Vehicles)*	
LAPPC/018/05/v1	**Burt Boulton & Haywood Ltd (Finn Forest)** - Westway Road, Alexandra Dock, Newport, NP20 2WA *(Timber – Creosote)*	
LAPPC/019/05/v1	**Jewson Ltd** - Internal Timber Supply, North Dock, Alexandra Dock, Newport, NP20 2WB *(Timber)*	
LAPPC/022/05/v1	**ABP** - Atlantic Site, Alexandra Dock, Newport, NP20 2UW *(Coal)*	
LAPPC/023/05/v1	**ABP** - Alexandra Dock, Newport, NP20 2UW *(Coal)*	
LAPPC/024/06/v1	**New Dairy Farm** - St Brides, Newport, NP10 8SF *(Maggot Breeding)*	
LAPPC/026/06/v1	**Coilcolor Ltd** - Whitehead Estate, Docks Way, Newport, NP20 2NW *(Coil Coating)*	
LAPPC/030/06/v1	**B.P Rolls** - Unit 3 Nash Mead, Queensway Meadow Ind Estate, Newport, NP19 4SU *(Respraying of Road Vehicles)*	
LAPPC/031/05/v1	**Tarmac Topmix** - Llanwern Works, Queensway, Newport, NP19 OQX *(Cement)*	
LAPPC/037/06/v1	**Quinn Radiators Ltd** - Imperial Park, Newport, NP10 8ZY *(Powder Coating and Coating of Metal)*	
LAPPC/038/06/v1	**Cemex UK Materials Ltd** - Eastern Dry Dock Concrete Plant, Eastern Wharf, Corporation Road, Newport, NP9 0RE *(Cement)*	
LAPPC/039/07/v1	**Tarmac Limited** - Llanwern Works, Queensway, Newport *(Roadstone Coating)*	
LAPPC/041/07	**Premier Mortars** - Stevenson Ind Estate, Corporation Road, Newport, NP19 4RE *(Cement)*	
LAPPC/036/06	**Admiral Cleaners** -362 Chepstow Road, Newport, NP19 8JH *(Dry Cleaning)*	
LAPPC/044/10	**Johnsons Cleaners UK Ltd** -156 – 160 Cardiff Road, Newport, NP20 1GF *(Dry Cleaning)*	
LAPPC/028/05	**L C Motors Ltd (Fiat)** -121 Corporation Road, Newport, NP19 0BG *(Waste Oil Burner)*	
LAPPC/043/09	**Cardiff Steve Doring & Cargo Handling CO Ltd, T/A Birdport -** Corporation Road, Newport (Coke)	
LAPPC/046/10	**Hargreaves (UK) Services Limited –** McPhail's Yard Area, Atlantic Site, Alexandra Dock (Coal)	
LAPPC/47/13	**Severn Sands -** Lockhead Docks, Newport *(Cement)*	
LAPPC/048/14	**Trew & Reece** – 26 Coomassie Street *(Waste Oil Burner)*	
LAPPC/049/14	**A&K Autokare** – 1 Capel Crescent *(Waste Oil Burner)*	
LAPPC/050/14	**Thomas & Beard Ltd -** Redlands Street *(Waste Oil Burner)*	
LAPPC/051/14	**Manic Mechanics Ltd** – 3 Fredrick Street *(Waste Oil Burner)*	

Permit Number	Installation	Status
LAPPC/052/14	**Mechanica Ltd** – Nash Mead *(Waste Oil Burner)*	
P001/05	**Sainsburys Supermarkets Ltd** - Wyndham Street, Newport *(Vapour Recovery)*	
P002/05	**Asda Supermarkets Plc** - Pencarn Way, Coedkernew, Newport *(Vapour Recovery)*	
P003/05	**Newport BP Malpas Service Station** - Malpas Road, Newport *(Vapour Recovery)*	
P004/05	**Tesco Stores Ltd** - Harlech Retail Park, Cardiff Road, Newport *(Vapour Recovery)*	
P005/05	**Tesco Stores Ltd** - Newport Retail Park, Spytty Road, Newport *(Vapour Recovery)*	
P007/05	**Shell Newport** - Malpas Road, Newport *(Vapour Recovery)*	
P008/05	**Star High Cross** - High Cross Road, Rogerstone, Newport *(Vapour Recovery)*	
P009/05	**Sinclair Station** - Corporation Road, Newport *(Vapour Recovery)*	
P011/05	**Tesco Stores Ltd Newport Chespstow Road Express** - Chepstow Road, *(Vapour Recovery)*	
P012/05	**Stow Hill Service Station** - Stow Hill, Newport *(Vapour Recovery)*	
P013/05	**Shell Casnewydd** - 17-25 Chepstow Road, Newport *(Vapour Recovery)*	
P017/05	**Bettws Service Station** - Monnow Way, Newport *(Vapour Recovery)*	
P018/05	**Hillcroft Garage** - Chepstow Road, Langstone *(Vapour Recovery)*	
P019/05	**Newport Service Station** - 57-59 Chepstow Road, Newport *(Vapour Recovery)*	
P21/05	**WM Morrison Supermarkets Plc** - Azalea Road, Newport *(Vapour Recovery)*	
P22/05	**Boxer Service Station** - Ponthir Road, Caerleon, Newport *(Vapour Recovery)*	
P24/05	**Castleton Service Station** - Newport Road, Castleton *(Vapour Recovery)*	
	Asda - Lower Dock Street *(Vapour Recovery)*	

A2 & PART B NOTICES

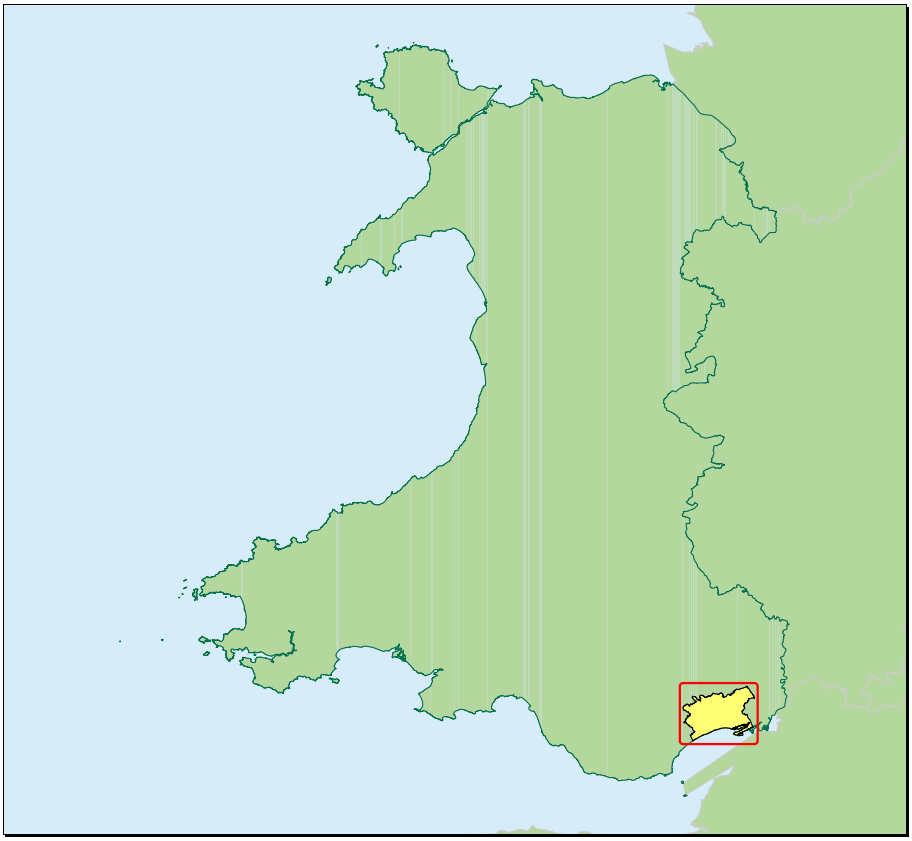
Permit Number	Installation	Notice Information

Cyfoeth Naturiol Cymru
Natural Resources Wales

Local Evidence Package

Newport

14/05/2014



Local Evidence Package

As of 1st April 2013, the Countryside Council for Wales, Environment Agency Wales and Forestry Commission Wales became Natural Resources Wales/Cyfoeth Naturiol Cymru.

Natural Resources Wales has inherited the statutory consultee role that both Environment Agency Wales and the Countryside Council for Wales had in the Strategic Environmental Assessment (SEA) process, under the Environmental Assessment of Plans and Programmes (Wales) Regulations (2004 No. 1656 (W170)) that implement the SEA Directive.

We will work with relevant responsible authorities at various stages of the SEA process. This includes provision of data and information to describe baseline environmental conditions at the scoping stage of the SEA process. This evidence pack is intended to help with that. It is intended primarily for use by plan-making authorities such as Local Planning Authorities and Regional Transport Planning Consortia in their discussions with Natural Resources Wales Planning Liaison teams. It summarises environmental information available from Natural Resources Wales. Information is presented in the form of maps cut to Local Authority areas, accompanied by a brief description of the data. Further interpretation is therefore required to assess the meaning of the data in terms of decision making.

Plan-makers will be able to use this information in preparing both plans and accompanying Strategic Environmental Assessment/ Sustainability Appraisals (SEA/SA).

The pack will show plan-making bodies what information we will be able to provide for measuring change as a result of their plan. Some historical trend data is included in this pack as well as forecasts. Plan-making bodies may need to augment this with further trend data so that they can forecast likely changes in the state of the environment without a plan and meet one of the SEA Directive's requirements.

In addition, these packs can be useful for providing evidence for other decision making processes, such as Community Strategies, and Local Service Boards.

Some of the data presented in this package is not owned solely by Natural Resources Wales. Where the intellectual property rights in the data are not owned by Natural Resources Wales their use is licensed by third party data providers. If you wish to have permission to do anything other than that permitted above you should contact us or the identified third party data owner for such permission. This package should not be reproduced or shared without permission from us. The information has not been prepared to meet your or anyone else's individual requirements. It is your responsibility to ensure that the information meets your needs.

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These packs will be updated periodically, normally twice a year. Packs for Local Authorities are made available on the Local Government Data Unit Wales InfoBaseCymru website http://www.infobasecymru.net/. Packs for National Parks may be requested from the Environmental Assessment & Reporting Team (contact details below) or via your Natural Resources Wales Planning contacts.

Comments or enquiries regarding this package may be sent to:

The Environmental Assessment & Reporting Team,
Natural Resources Wales
Tŷ Cambria, 29 Newport Road, Cardiff CF24 0TP
email: local.evidence@cyfoethnaturiolcymru.gov.uk

How to Access our Data

This document shows data and information that is available from Natural Resources Wales for Strategic Environmental Assessment and planning purposes.

The Local Evidence Packs were originally produced by Environment Agency Wales so most of the datasets currently included came from Environment Agency Wales. The packs are gradually being developed to include relevant datasets from Countryside Council for Wales and Forestry Commission Wales as well.

There will be a transition period of up to two years during which Natural Resources Wales will still be using the IT systems of its parent bodies, i.e. Environment Agency , Countryside Council for Wales and Forestry Commission Wales, to provide data and information to the public and our professional partners.

Many of the datasets illustrated in this document are available through the **What's In Your Backyard?** pages of the Environment Agency web site: https://www.gov.uk/check-local-environmental-data.

DataShare http://www.geostore.com/environment-agency/ is the Environment Agency's data download and live feed portal, through which spatial datasets can be provided directly to the public and professional partners (such as other government organisations). Natural Resources Wales is currently continuing to use DataShare to provide data.

GIS data downloads
http://naturalresourceswales.gov.uk/our-work/freedom-of-information-act-2000/how-to-access-or-request-information/data-and-information-we-hold

Landmap
http://naturalresourceswales.gov.uk/out-and-about/nrw-web-maps/LANDMAP

Open Access Maps
http://naturalresourceswales.gov.uk/out-and-about/nrw-web-maps/open-access-map

Forestry Commission Wales Map Viewer

http://naturalresourceswales.gov.uk/out-and-about/nrw-web-maps/wales-viewer

Strategic Environmental Assessment Guidance

The Strategic Environmental Assessment Topic Guidance documents previously provided by the Countryside Council for Wales are still available from the CCW website: http://www.ccw.gov.uk (search for Strategic Environmental Assessment Guidance)

Note that some of the links in these documents may be broken. We apologise for this. The guidance documents are currently being updated and the updated versions will be made available as soon as possible.

The guidance document *Strategic Environmental Assessment and Climate Change: Guidance for Practitioners* is available here: https://www.gov.uk/government/publications/strategic-environmental-assessment-sea-and-climate-change

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The Water Framework Directive, River Basin Management Plans and Classification

As of 1 April 2013, the Countryside Council for Wales, Environment Agency Wales and Forestry Commission Wales became Natural Resources Wales/Cyfoeth Naturiol Cymru.

Natural Resources Wales is now the Competent Authority in Wales for implementing the Water Framework Directive.

Water Framework Directive

The Water Framework Directive (WFD) establishes a framework for the protection of surface waters (rivers, lakes, estuaries and coastal waters) and groundwaters. Its purpose is to prevent deterioration and improve the status of aquatic ecosystems, promote sustainable water use, reduce pollution of groundwater and contribute to mitigating the effects of floods and droughts. The WFD requires us to achieve good status in all of our water bodies by 2027. This means that we must protect and improve the quality of our water bodies so that they can support natural biological communities and are free from pollution.

River Basin Management Plans

River Basin Management Plans (RBMPs) are statutory plans for delivering the requirements of the WFD. Public authorities are required to have regard to them when exercising their functions.

RBMPs outline the main issues for the water environment and the actions we all need to take to deal with them. RBMPs follow a 6 year cycle. The first plans were approved by the Minister in December 2009. Future plans will be published in 2015 and 2021.

There are 3 RBMPs which cover Wales: Dee, Severn and Western Wales.

Natural Resources Wales has responsibility for drawing up the RBMPs for Western Wales and the Dee - working in partnership with a wide range of public, private and voluntary organisations (including water companies and local government). The Environment Agency retains responsibility for the RBMP for the Severn.

The RBMPs are available via:
http://naturalresourceswales.gov.uk/our-work/policy-advice-guidance/water-policy/water-framework-directive

Integrated catchment management and working with co-deliverers

Our ambition for Wales' first River Basin Management Plans (RBMPs) is to achieve 50% of all water bodies at Good or better status (or potential) by 2015 and work towards the delivery of objectives for Protected Areas such as Natura 2000 sites and Bathing Waters. To achieve these objectives, many different co-deliverers need to take action, including land managers, farms and businesses, water companies, the third sector (voluntary and charitable groups), local communities, planners and public bodies.

We are delivering a programme of investigations to identify the reasons why water bodies are failing Good Status, and working with co-deliverers to ensure the evidence base for targeting actions is robust. Where there are gaps or no clear mechanisms

The Water Framework Directive: River Basin Management Plans and Classification

to deliver improvements we will work with co-deliverers to gather evidence and develop cost-effective solutions.

We also want to work with others to develop our approach to integrated catchment management, which we believe can deliver greater and multiple benefits for people and wildlife.

WFD Classification

The way we classify our waters has changed. Previously, we used the General Quality Assessment (GQA) scheme to assess river water quality in terms of chemistry, biology and nutrients. Now the WFD classification looks at over 30 measures, grouped into ecological status (this includes biology as well as 'elements' like phosphorus and pH) and chemical status ('priority substances' e.g. mercury). The WFD covers estuaries, coastal waters, groundwater and lakes as well as rivers. We have updated our existing assessment techniques and have developed new ones for indicators we have not assessed before.

For further information on WFD classification see:

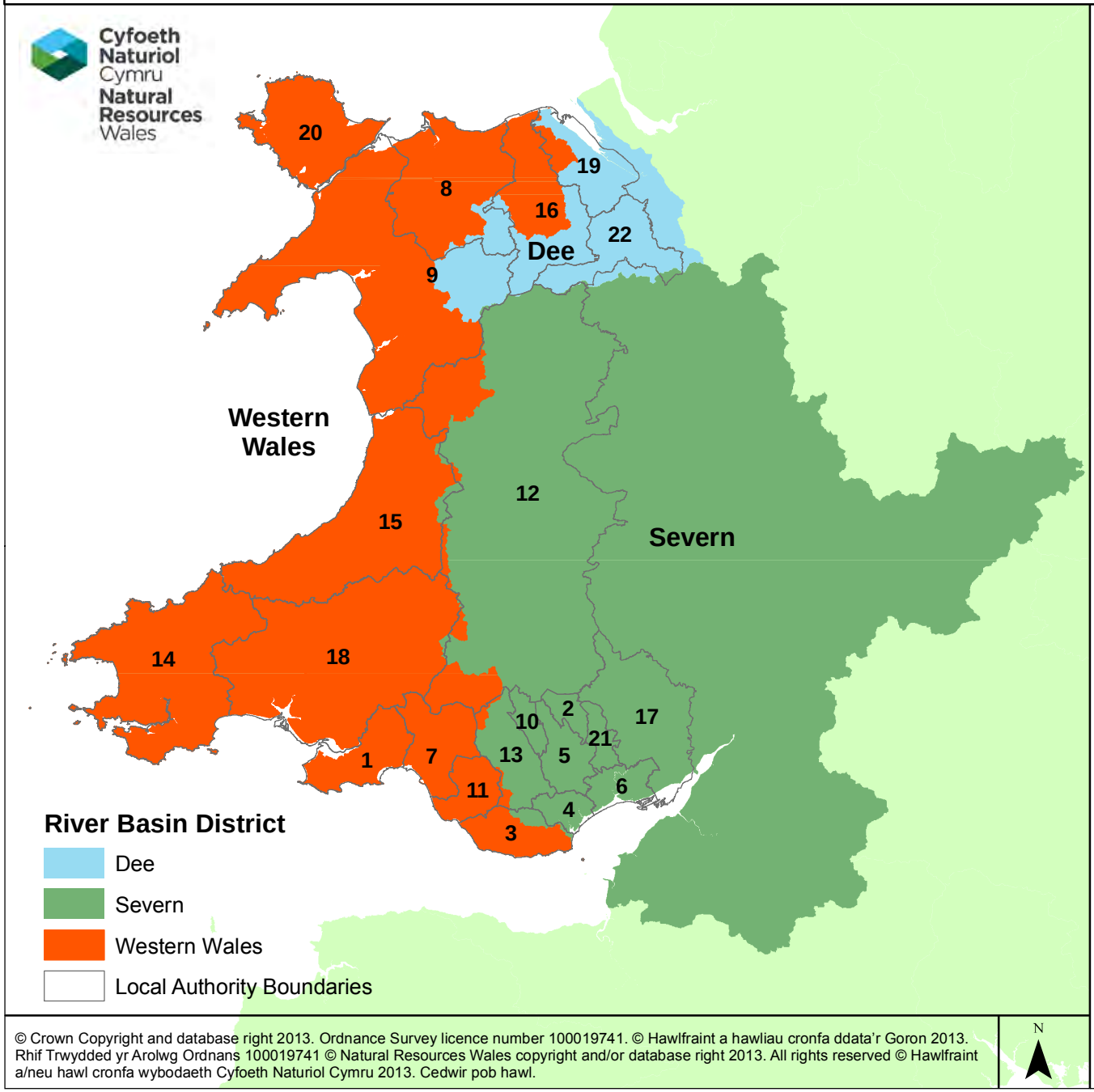
https://www.gov.uk/government/policies/improving-water-quality/supporting-pages/planning-for-better-water

River Basin Districts

A river basin is the area of land from which all surface run-off and spring water flows through a sequence of streams, lakes and rivers into the sea at a single river mouth, estuary or delta. It comprises one or more individual catchments. A river basin district is a river basin or several river basins, together with the associated coastal waters.

The map on the next page shows the river basin districts that cover Wales.

River Basin Districts



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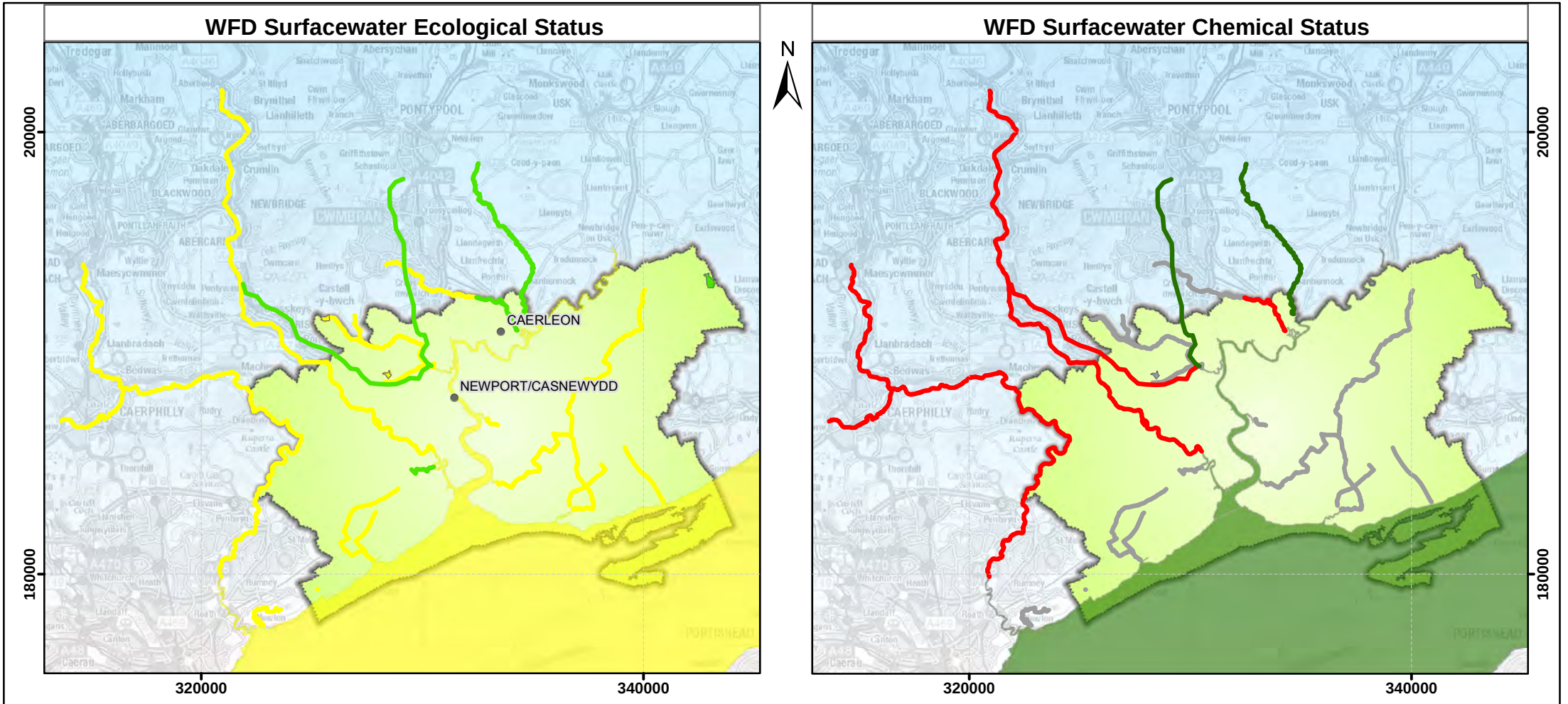
River Basin Districts

A river basin is the area of land from which all surface run-off and spring water flows through a sequence of streams, lakes and rivers into the sea at a single river mouth, estuary or delta. It comprises one or more individual catchments. A river basin district is a river basin or several river basins, together with associated coastal waters.

The map on this page shows the river basin districts that cover Wales.

Local Authority	Label No.
Abertawe - Swansea	1
Blaenau Gwent - Blaenau Gwent	2
Bro Morgannwg - the Vale of Glamorgan	3
Caerdydd - Cardiff	4
Caerffili - Caerphilly	5
Casnewydd - Newport	6
Castell-nedd Port Talbot - Neath Port Talbot	7
Conwy - Conwy	8
Gwynedd - Gwynedd	9
Merthyr Tudful - Merthyr Tydfil	10
Pen-y-bont ar Ogwr - Bridgend	11
Powys - Powys	12
Rhondda Cynon Taf - Rhondda Cynon Taf	13
Sir Benfro - Pembrokeshire	14
Sir Ceredigion - Ceredigion	15
Sir Ddinbych - Denbighshire	16
Sir Fynwy - Monmouthshire	17
Sir Gaerfyrddin - Carmarthenshire	18
Sir y Fflint - Flintshire	19
Sir Ynys Mon - Isle of Anglesey	20
Tor-faen - Torfaen	21
Wrecsam - Wrexham	22

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Water Framework Directive Surfacewater Water Body Classification

(Baseline 2009)

Legend

Ecological Status

- High
- Good
- Moderate
- Poor
- Bad

Chemical Status

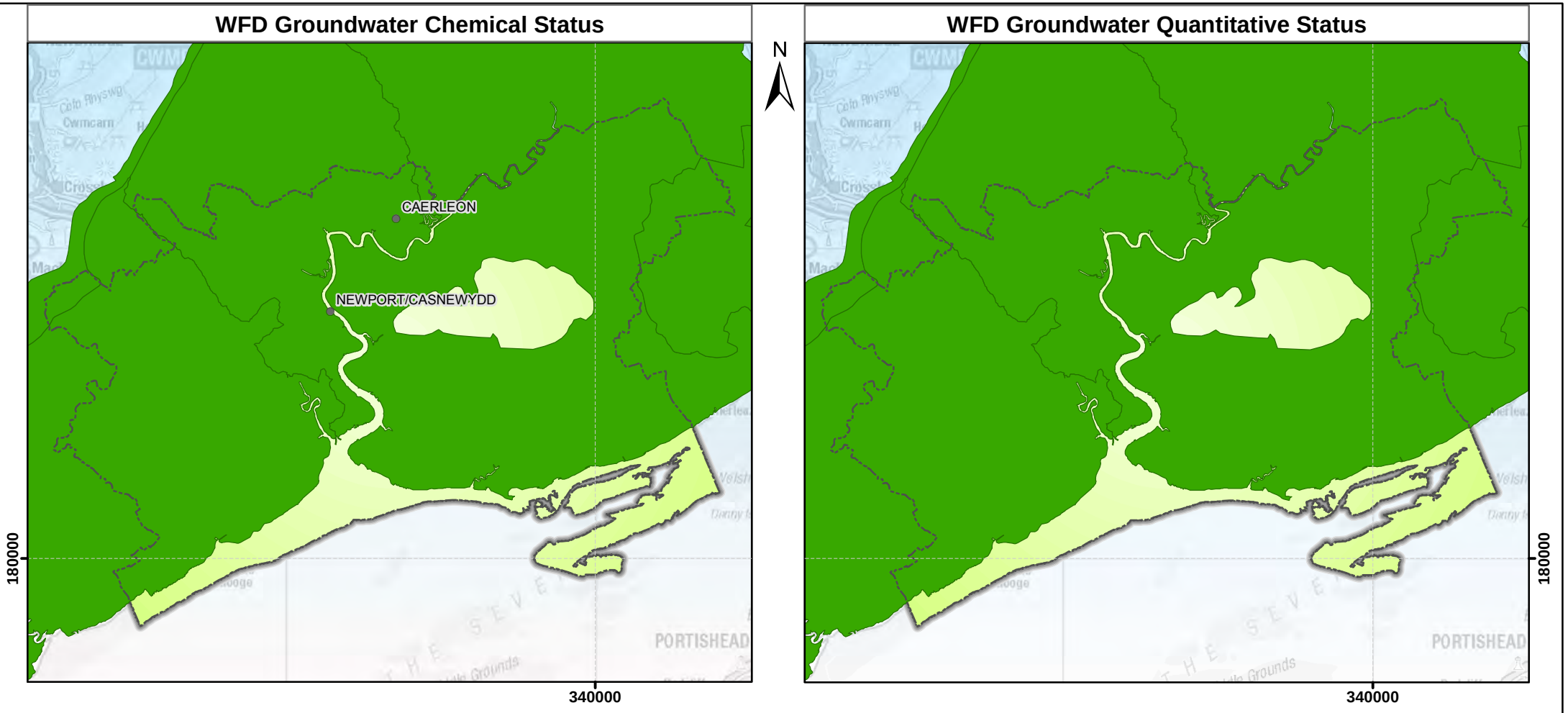
- Good
- Failing to achieve Good
- Does Not Require Assessment

- Towns & Cities
- Planning Authority Boundary

Cyfoeth Naturiol Cymru Natural Resources Wales

2.5 1.25 0 2.5 km

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Water Framework Directive Groundwater Water Body Classification

(Baseline 2009)

Legend

Chemical/Quantitative Status

- Good
- Poor

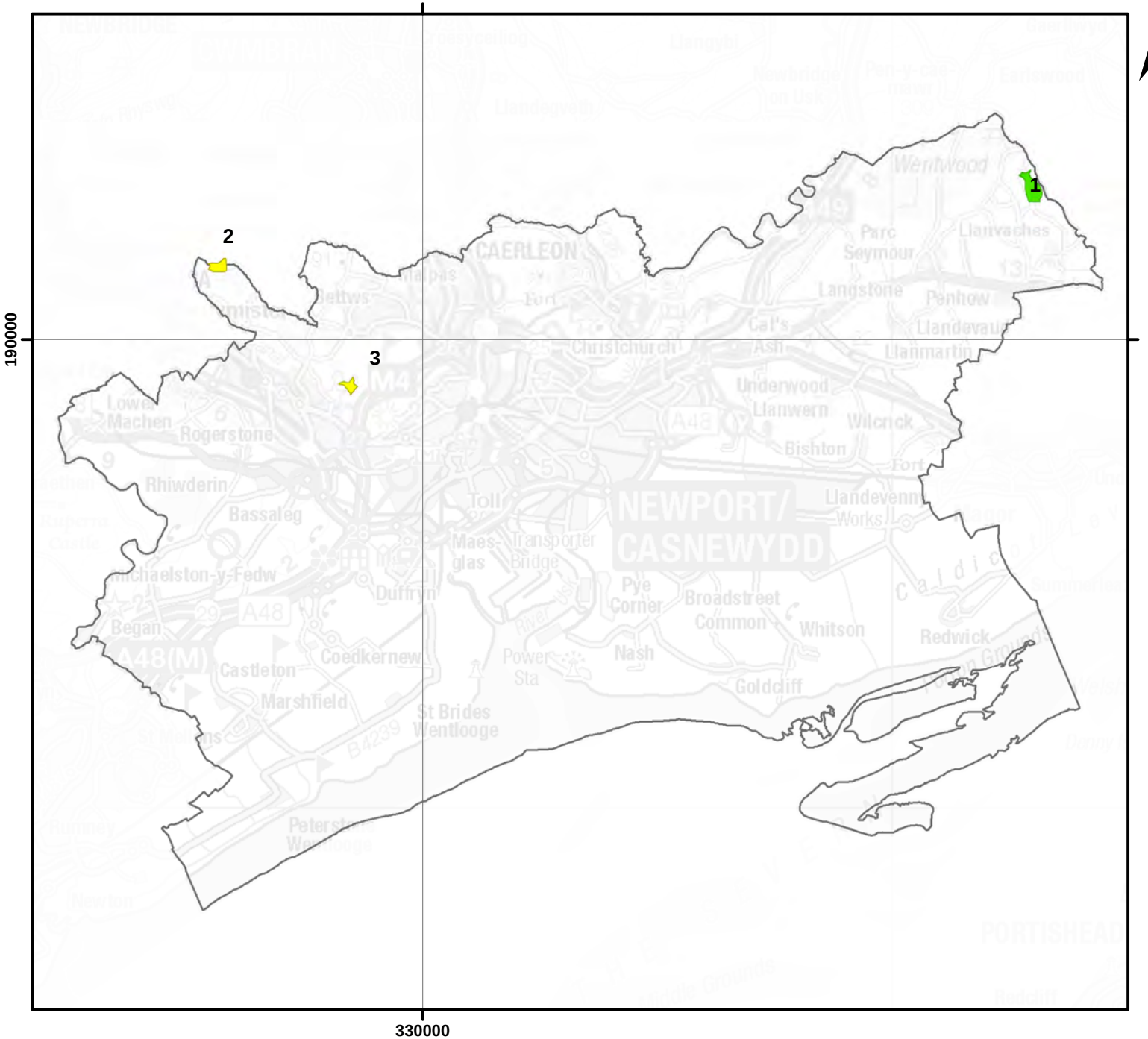
Towns & Cities

Planning Authority Boundary

Cyfoeth Naturiol Cymru Natural Resources Wales

2.5 1.25 0 2.5 km

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Water Framework Directive Lakes Ecological Status

(Baseline 2009)

Legend

Ecological Status

- High
- Good
- Moderate
- Poor
- Bad

Planning Authority Boundary

The numbers on the map refer to the table on the following page

Cyfoeth Naturiol Cymru
Natural Resources Wales

2 1 0 2 km

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Water Framework Directive: Lakes - Ecological Status (Baseline 2009)

Label No.	Lake	Ecological Status	Chemical Status
1	Wentwood Reservoir	Good	Does Not Require Assessment
2	Pant-yr-eos Reservoir	Moderate	Does Not Require Assessment
3	Ynysyfro Reservoir	Moderate	Does Not Require Assessment

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Water Framework Directive: Water Bodies Status Summary (Baseline 2009) for Newport

		Ecological status					Chemical status			Quantitative status	
Water Body Category	**Total No. Water Bodies**	**High**	**Good**	**Moderate**	**Poor**	**Bad**	**Good**	**Failing to achieve Good**	**Does not require assessment**	**Good**	**Poor**
River	14		5	9			2	4	8		
Lake	3		1	2					3		
Transitional	2			2			2				
Coastal	0										
Groundwater	5						5			5	

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The Water Framework Directive: Water Bodies Status

Water Framework Directive Status Maps

The five maps shown in the previous pages show the baseline, 2009, classification of WFD water bodies. The Water Framework Directive requires there to be no deterioration from this baseline. The aim is to achieve at least Good status by 2015. Where this is not possible and subject to the criteria set out in the Directive, we aim to achieve Good status by 2021 or 2027.

Ecological status is shown for all surfacewater water bodies. Ecological status includes biological elements such as invertebrates and fish as well as supporting physico-chemical elements such as phosphates and nitrates.

Chemical assessment of water bodies is risk-based. Not all water bodies require assessment. Chemical monitoring looks for priority substances such as mercury that have been identified as presenting a significant risk to or via the aquatic environment under the Water Framework Directive. We only monitor for priority substances in water bodies where there are known discharges of these pollutants. A list of priority substances can be found here: http://ec.europa.eu/environment/water/water-framework/priority_substances.htm.

Groundwaters are classified in terms of chemical and quantitative status.

Quantitative status is about the impacts of groundwater abstraction. Over-abstraction of groundwater may reduce river flows and water levels in lakes and wetlands. It may also cause degradation of groundwaters due to saline intrusion from the sea.

Transitional waters are intermediate between fresh and marine water. They include estuaries and saline lagoons.

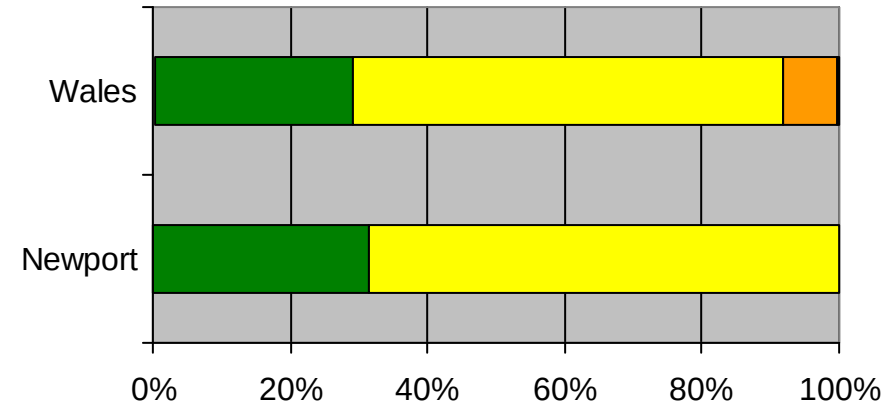
Lake water bodies and status are shown separately because many of them are too small to identify on the map. The numbered labels shown on the map refer to the table on the page following the map which gives the ecological and chemical status for each lake.

Water Bodies Status Summary

The Water Bodies Status summary table on the previous page shows the numbers of each type of water body in each ecological, chemical and quantitative (groundwater only) class according to the baseline, 2009, classification of WFD water bodies.

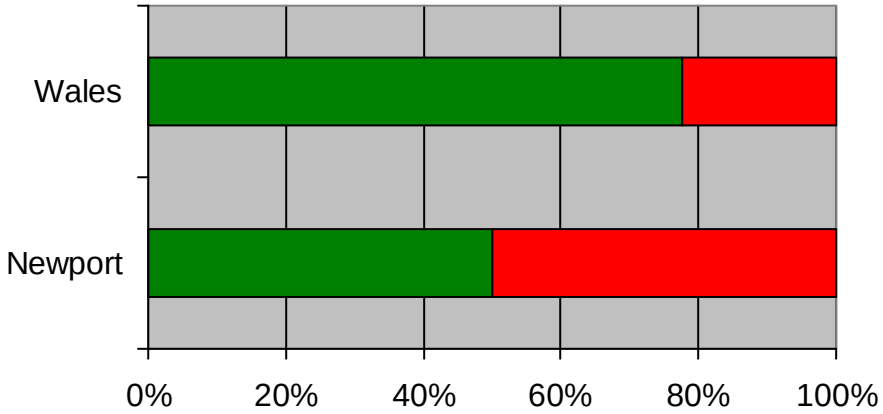
Baseline 2009 data is shown here because this is the standard that WFD progress will be measured against. Annual updates to the classification and further information on the reasons for failure and the actions that need to be taken are available from your Planning Liaison contact or the Environmental Assessment & Reporting team local.evidence@naturalresourceswales.gov.uk.

Water Framework Directive: Surfacewater Water Bodies Ecological and Chemical Status (Baseline 2009) for Newport



	Newport	Wales
Bad	0	4
Poor	0	92
Moderate	13	738
Good	6	339
High	0	5

Number of water bodies in each class



	Newport	Wales
Fail	4	21
Good	4	73

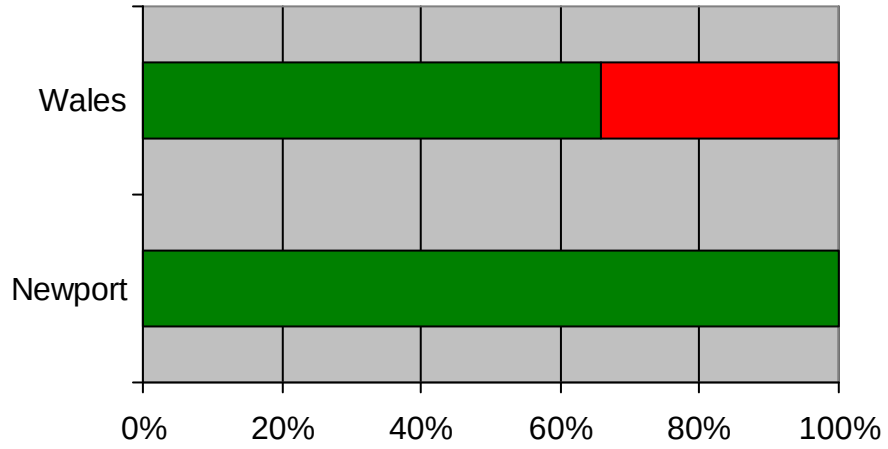
Number of water bodies in each class

The charts above show the percentage of surfacewater water bodies in each class for the whole of Wales and for the Planning Authority.

The tables show the numbers of surfacewater water bodies in each class for the whole of Wales and for the Planning Authority.

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Water Framework Directive: Groundwater Overall Status (Baseline 2009) for Newport



	Newport	Wales
Poor	0	13
Good	5	25

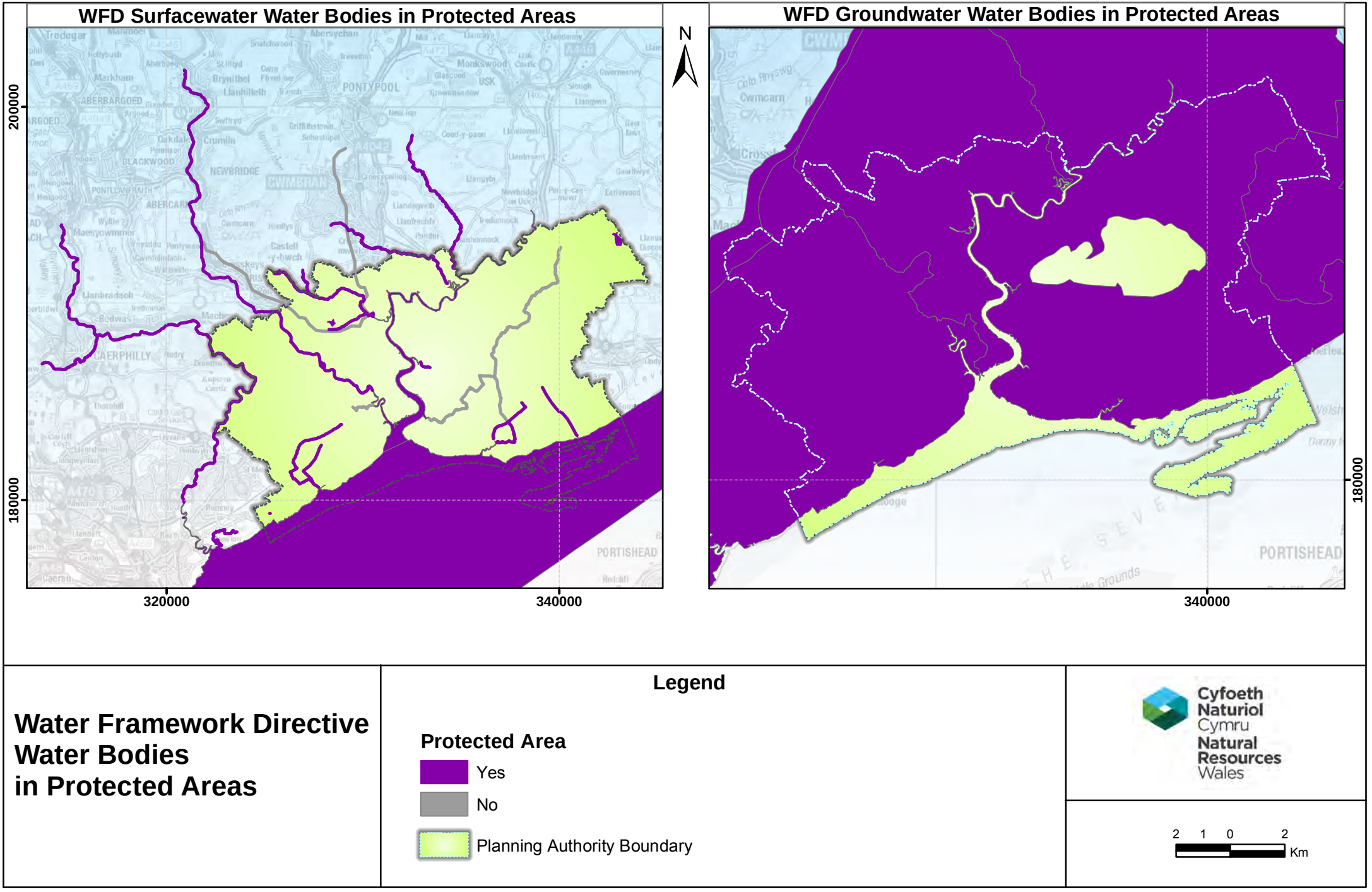
Number of water bodies in each class

The overall classification status for groundwaters is assessed by combining the chemical status with the quantitative status. If either or both of these is Poor, then the overall status is Poor.

The chart on the left shows the percentage of groundwater water bodies in each class for the whole of Wales and for the Planning Authority.

The table shows the number of groundwater water bodies in each class for the whole of Wales and for the Planning Authority.

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Water Framework Directive Water Bodies in Protected Areas

Legend

Protected Area

- Yes
- No
- Planning Authority Boundary

Cyfoeth Naturiol Cymru
Natural Resources Wales

2 1 0 2 Km

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Water Framework Directive - Water Bodies Protected Areas Summary (Baseline 2009) for Newport

Water Body Category	Total Number of Water Bodies Affecting a Protected area	Number of Water Bodies Affecting: Type of Protected Area							
		Bathing Waters	Drinking Water	Fresh Water Fish	Shellfish Waters	Nitrates	Urban Waste Water	Habitats & Species	Wild Birds
River	10		1	5				4	3
Lake	3		3						
Transitional	2	1					1	1	2
Coastal	0								
Groundwater	5		5			2			

The table above shows the number of WFD water bodies that are associated with a designated Protected Area.

Protected Areas

The Water Framework Directive specifies that areas requiring special protection under other EC Directives and waters used for the abstraction of drinking water are identified as protected areas. The different types of protected areas have their own objectives and standards.

Bathing Waters - bodies of water designated as recreational waters, including areas designated as Bathing Waters

Drinking Water - areas designated for the abstraction of water for human consumption

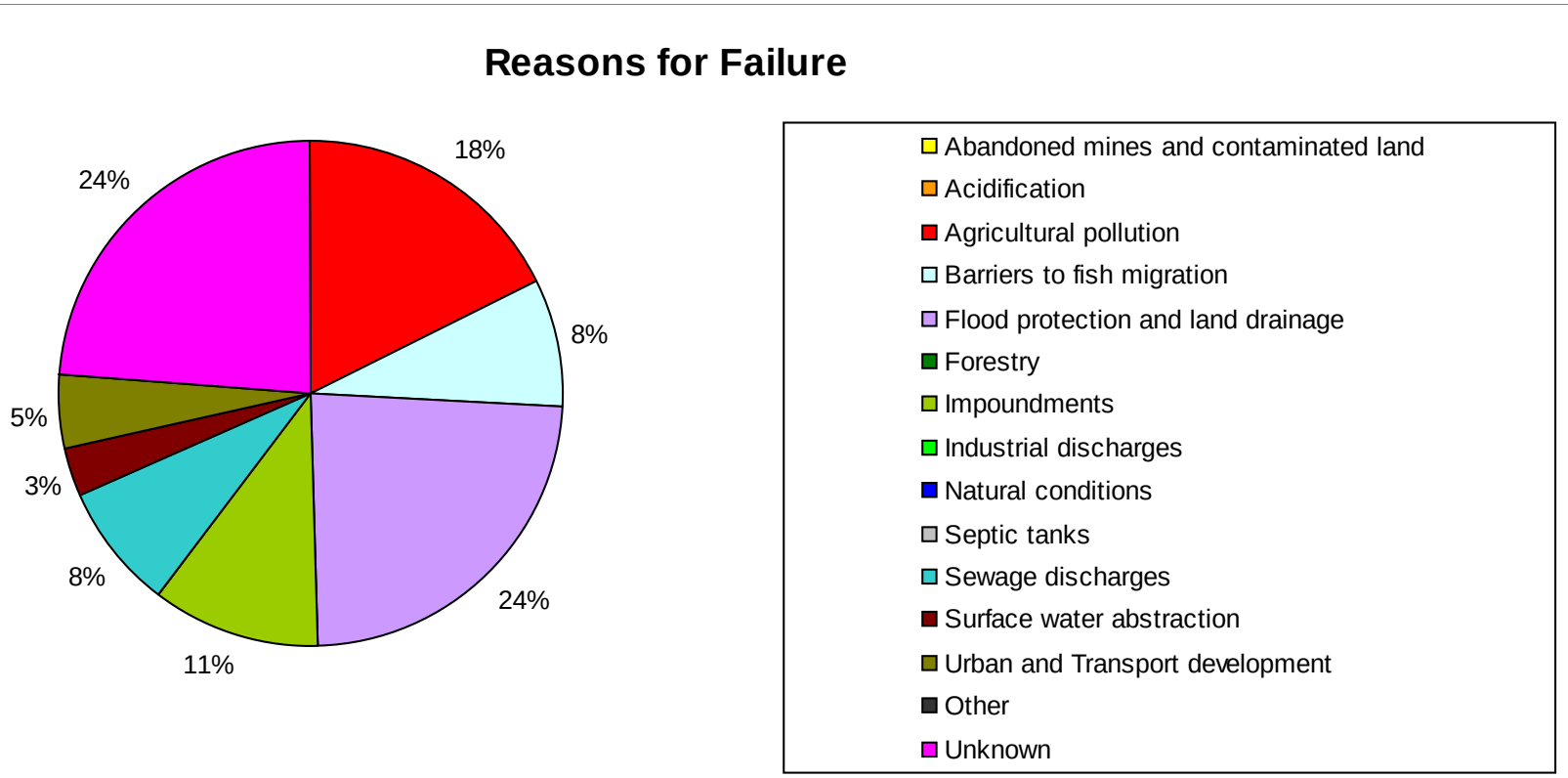
Freshwater Fish and **Shellfish Waters** - areas designated for the protection of economically significant aquatic species

Nitrates and **Urban Waste Water** - nutrient-sensitive areas, including areas identified as Nitrate Vulnerable Zones under the Nitrates Directive or areas designated as sensitive under the Urban Waste Water Treatment Directive (UWWTD)

Habitats & Species and Wild Birds - areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection, including relevant Natura 2000 sites

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Water Framework Directive: Reasons for Failure for Water Bodies in Newport



Reasons for failure chart and table

This pie chart shows confirmed or suspected reasons for water bodies in the Planning Authority that are failing to meet WFD objectives. It includes all water body types.

This data represents a snapshot of the current understanding of the reasons for failure data at the time of collation (early 2013). We are continuing to collect and record reasons for failure as part of our ongoing programme of investigations. Further collations of reasons for failure will be made annually.

Natural conditions – this category includes water bodies failing due to ecological recovery time, natural low flows and natural mineralisation.

Notes:

- The chart does not show the number of water bodies failing for particular reasons. It shows the number of times each reason for failure has been identified.
- There can be more than one reason for failure for each water body.
- This data is to be viewed as indicative only as it is based on variable amounts and quality of evidence.
- Not all water bodies have been assessed.

This graph was produced using the 2013 RFF data.

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Water Framework Directive: Reasons for Failure for Water Bodies in Newport

We have used all our reasons for failure information to identify the main issues impacting our water environment.

Some failures may be caused by issues upstream (e.g. over-abstraction or regulation of flow) or downstream (e.g. a weir or dam will prevent migration of fish). These issues occur across catchments and water bodies. In many cases water bodies fail for more than one reason.

Many different co-deliverers need to take action, including land managers, farms and businesses, water companies, the third sector, local communities, planners and public bodies. Where possible, existing mechanisms and measures will be used to engage and deliver sustainable improvements.

Public Authorities are required to deliver their WFD duties and embed the objectives of RBMPs within their strategies and programmes.

The main reasons for failure that Planning Authorities in general can and should address have been identified:

- Artificial barriers to fish migration
- Abandoned mines & contaminated land
- Sewage discharges
- Flood protection & land drainage
- Urban & transport development

The river catchments where these issues are present in this Planning Authority are shown in the following 6 maps.

All reasons for failure identified in this Planning Authority

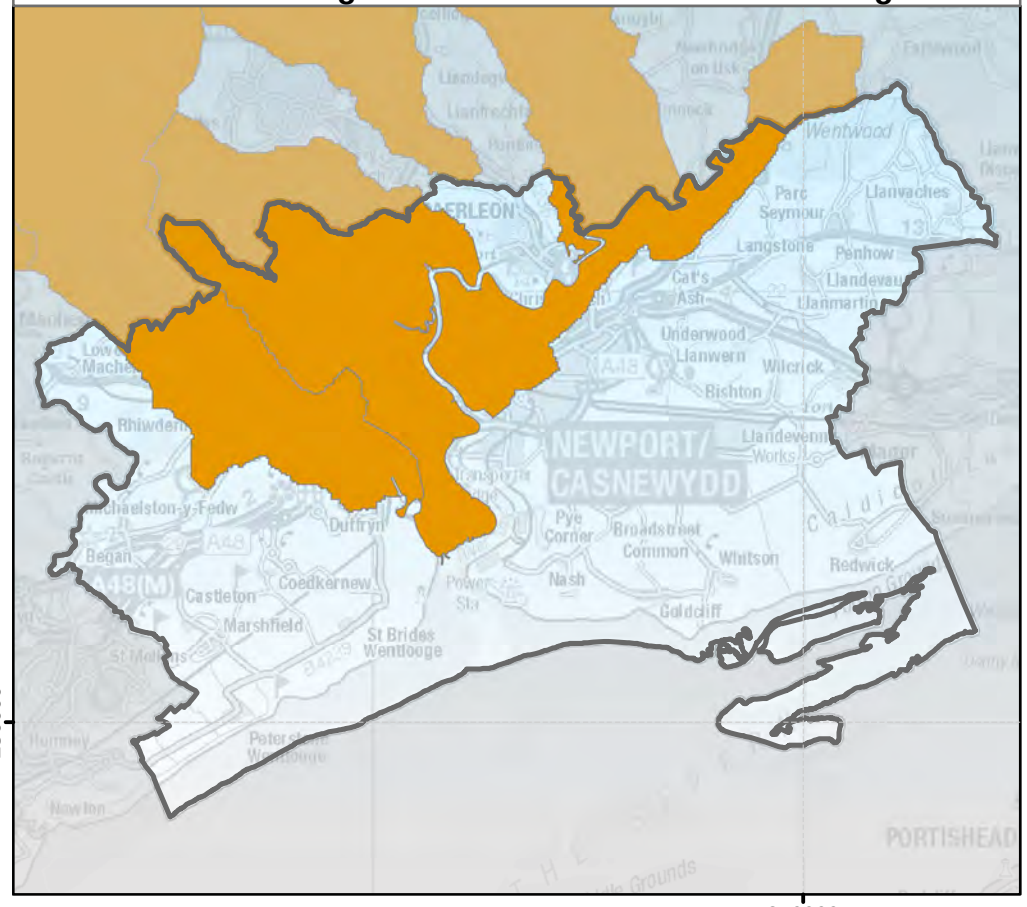
The table below shows all of the reasons for failure that have been identified for water bodies in the Planning Authority. (This is the same data as the pie chart on the previous page.)

More information on the reasons for failure is available from your Natural Resources Wales Planning contacts.

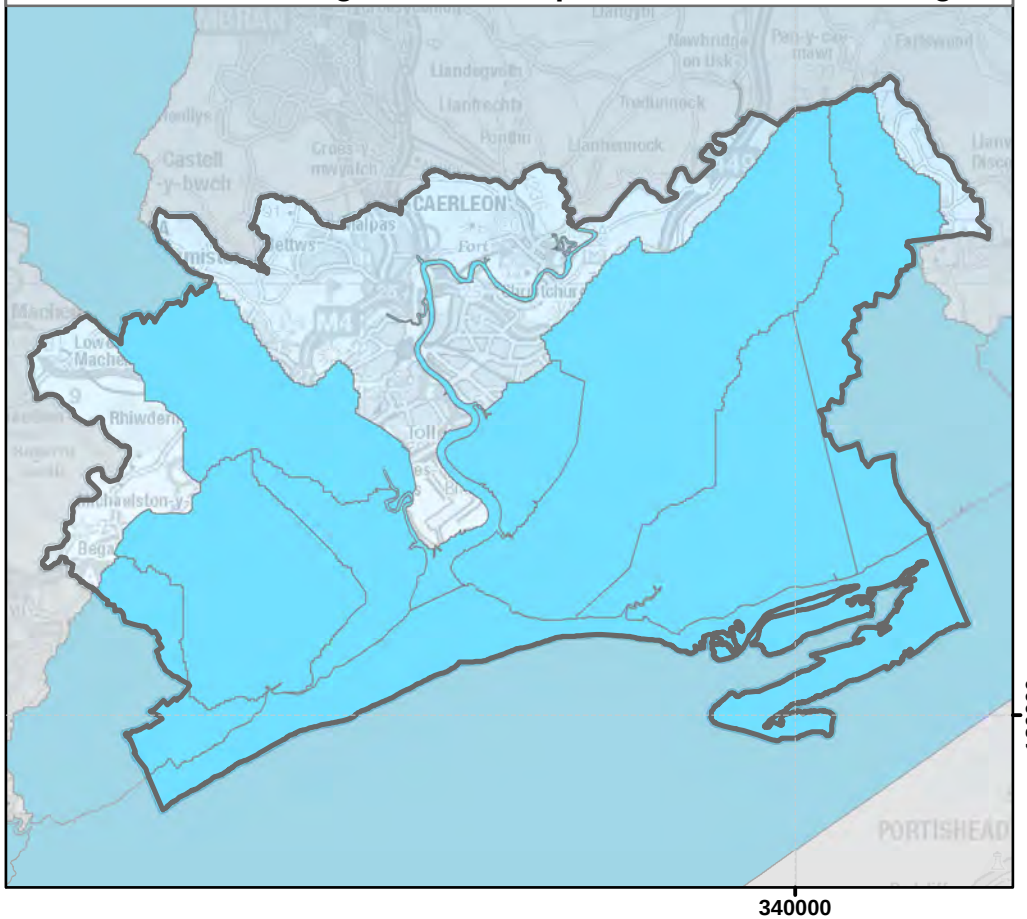
Reason for Failure	Number of times reason for failure identified
Abandoned mines and contaminated land	
Acidification	
Agricultural pollution	7
Barriers to fish migration	3
Flood protection and land drainage	9
Forestry	
Impoundments	4
Industrial discharges	
Natural conditions	
Septic tanks	
Sewage discharges	3
Surface water abstraction	1
Urban and Transport development	2
Other	
Unknown	9

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Surfacewaters failing due to artificial barriers to fish migration



Surfacewaters failing due to flood protection or land drainage



Water Framework Directive Reasons for Failure

Barriers to Fish Migration and Flood Protection or Land Drainage

Legend

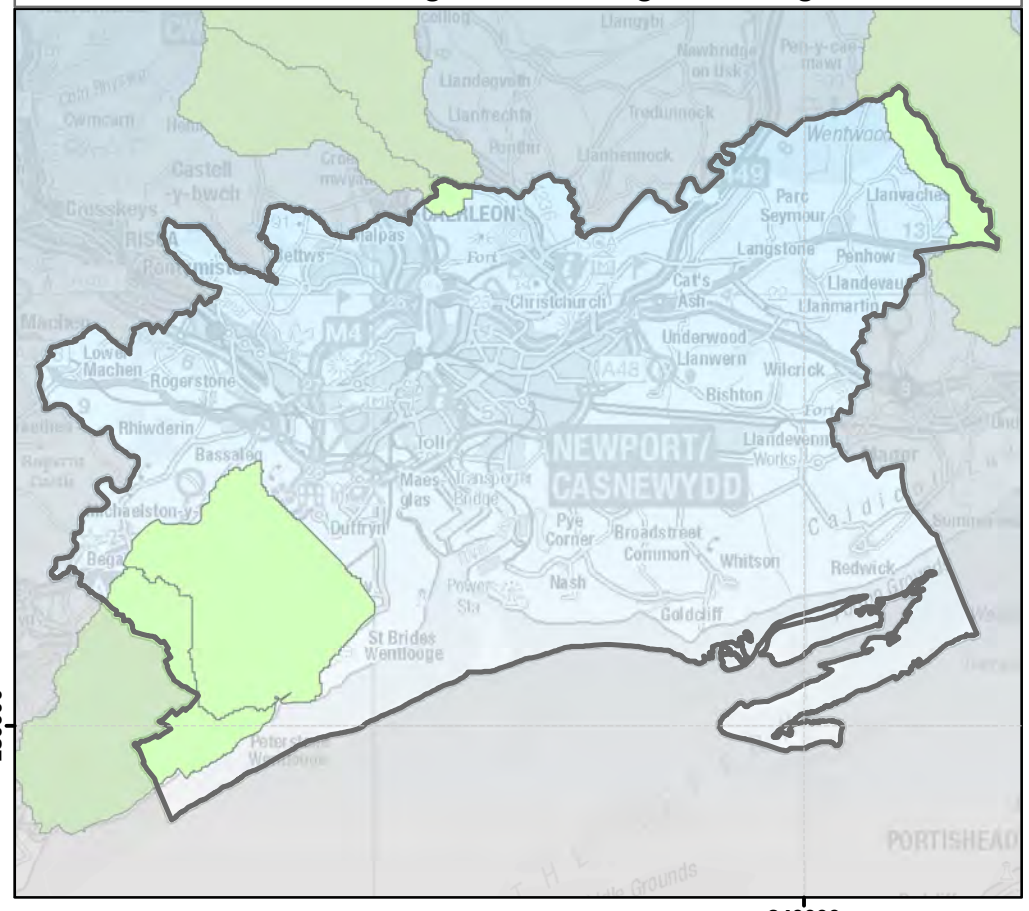
- Flood Protection or Land Drainage
- Barriers to Fish Migration
- Planning Authority Boundary

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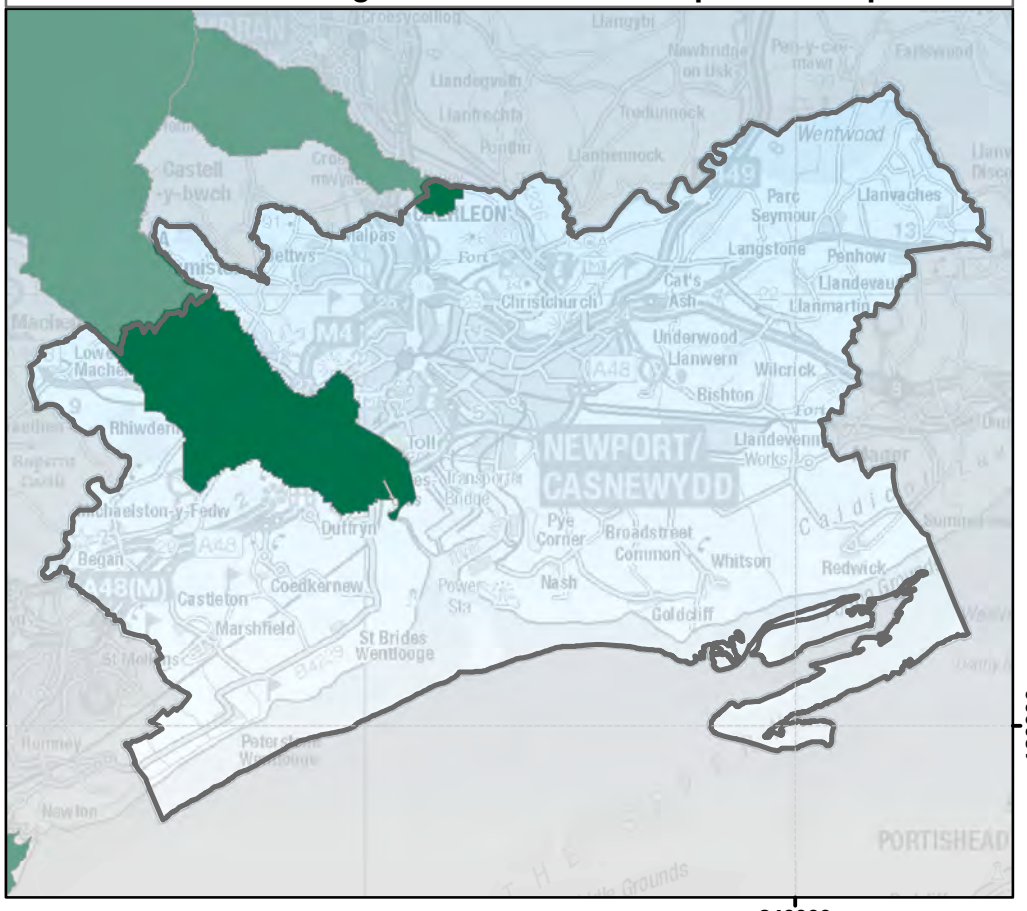
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Surfacewaters failing due to sewage discharges



Surfacewaters failing due to urban & transport development



Water Framework Directive Reasons for Failure

Sewage Discharges and Urban & Transport Development

Legend

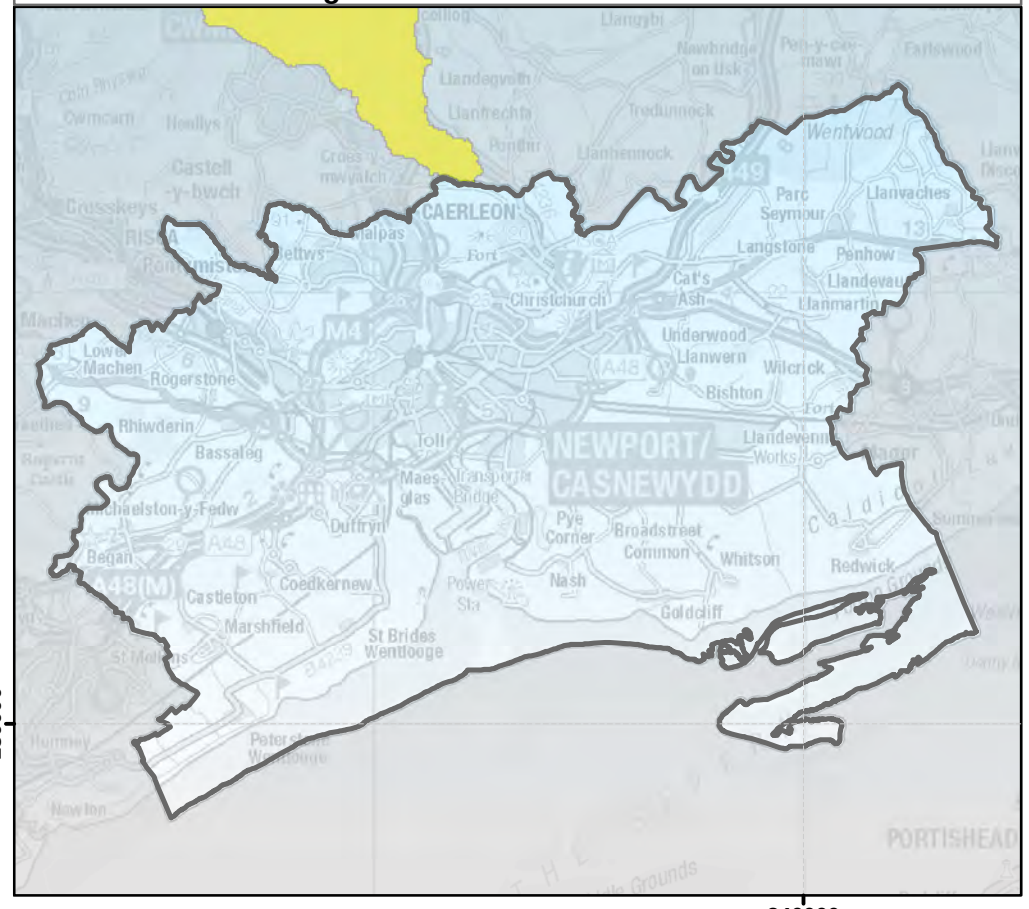
- Urban & Transport Development
- Sewage Discharge
- Planning Authority Boundary

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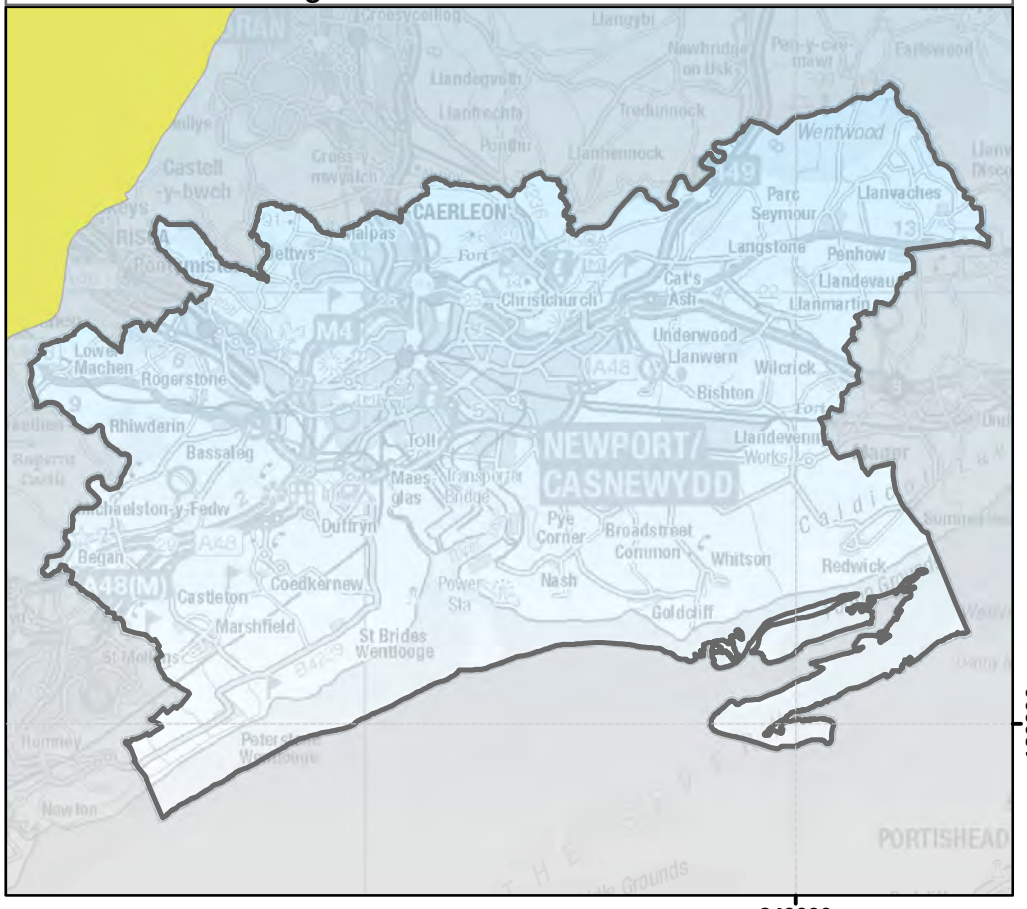
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Surfacewaters failing due to abandoned mines & contaminated land



Groundwaters failing due to abandoned mines & contaminated land



Water Framework Directive Reasons for Failure

Abandoned Mines and Contaminated Land

Legend

- Abandoned mines & contaminated land
- Planning Authority Boundary

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km

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The Water Framework Directive: Actions to Take

What can Local Authorities do?

Barriers to fish migration

- ensure that planning applications that include impoundment, such as Hydroelectric Power Schemes, do not adversely affect water bodies' WFD status

Abandoned mines & contaminated land

- ensure that risks posed to groundwaters from land contamination are mitigated and remediation is put in place where necessary

Sewage Discharges

- work with householders and businesses, along with Natural Resources Wales and water companies, to address misconnections
- work with developers, sewerage undertakers and Natural Resources Wales when developing their Local Development Plans (LDPs) to ensure sufficient sewage capacity exists both for current and future needs
- work with Natural Resources Wales to ensure any planning permissions granted help to deliver the required water quality
- work with water companies and Natural Resources Wales to implement long term planning that accounts for sewerage and development pressures

Flood protection & land drainage

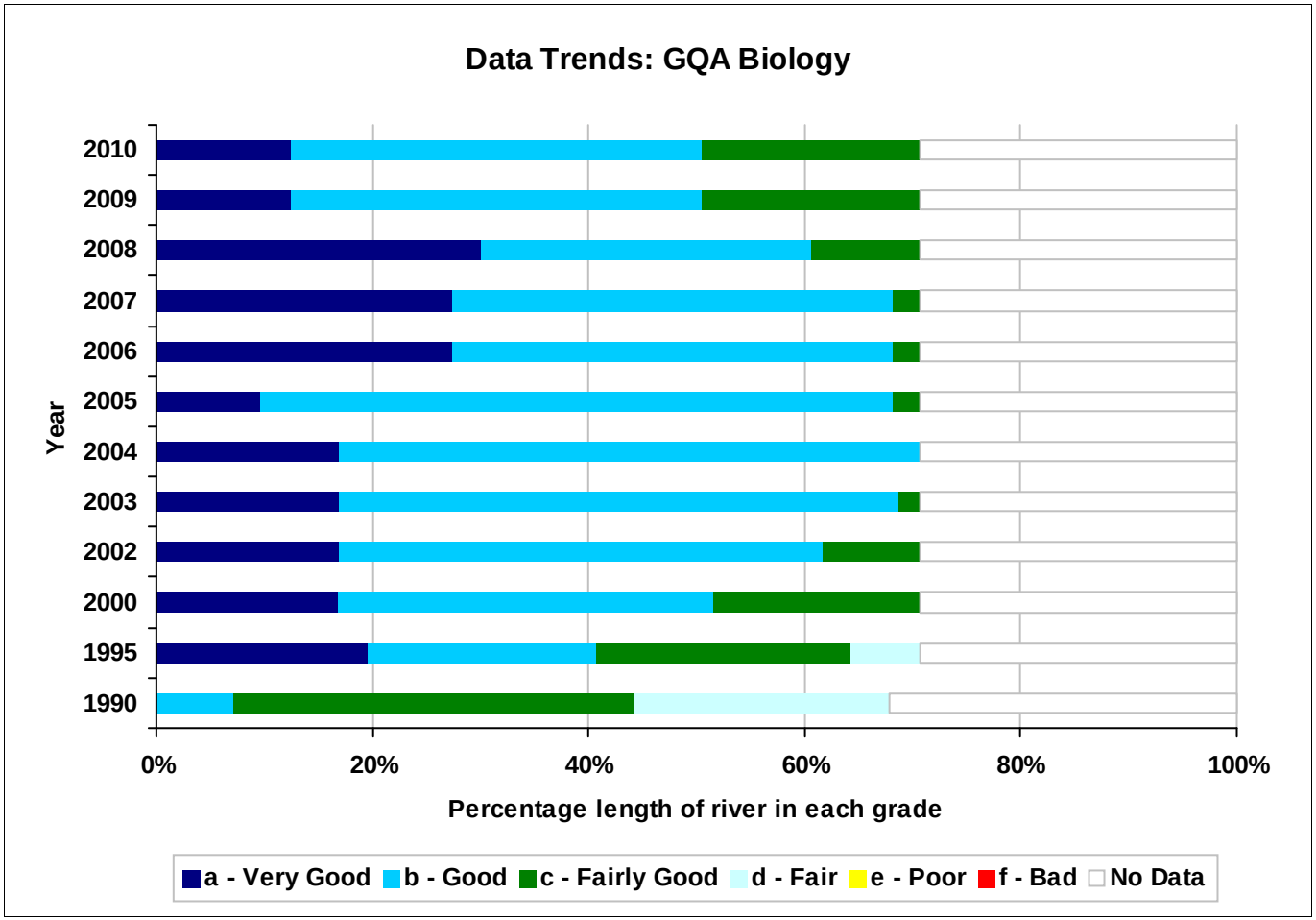
- ensure, along with developers and Natural Resources Wales, that existing and proposed flood protection structures and operations incorporate the required mitigation
- work with Natural Resources Wales to ensure new development is located outside of flood plains
- ensure, along with Natural Resources Wales and land owners, that managed realignment of flood defences delivers environmental improvements where appropriate (e.g. saltmarsh and wetland creation)
- Future SuDS (Sustainable Drainage Systems) Approval Bodies ensure new SuDS deliver solutions for the management of surface water quality and quantity

Urban & transport development

- work with Natural Resources Wales, local communities and the third sector to identify opportunities to restore urban rivers, such as removal of redundant weirs and reinstating riparian habitat and trees
- work with Natural Resources Wales, local communities and water companies to address diffuse pollution and misconnection issues
- ensure that planning decisions take regard of the River Basin Management Plans and support the delivery of environmental improvements.

We have recently published an advice note on the Water Framework for Local Authorities in Wales. This will help Local Authorities to have a better understanding of their roles and responsibilities and the actions they can take to contribute to WFD objectives.
http://naturalresourceswales.gov.uk/our-work/policy-advice-guidance/water-policy/water-framework-directive

GQA Biology Trends in Newport



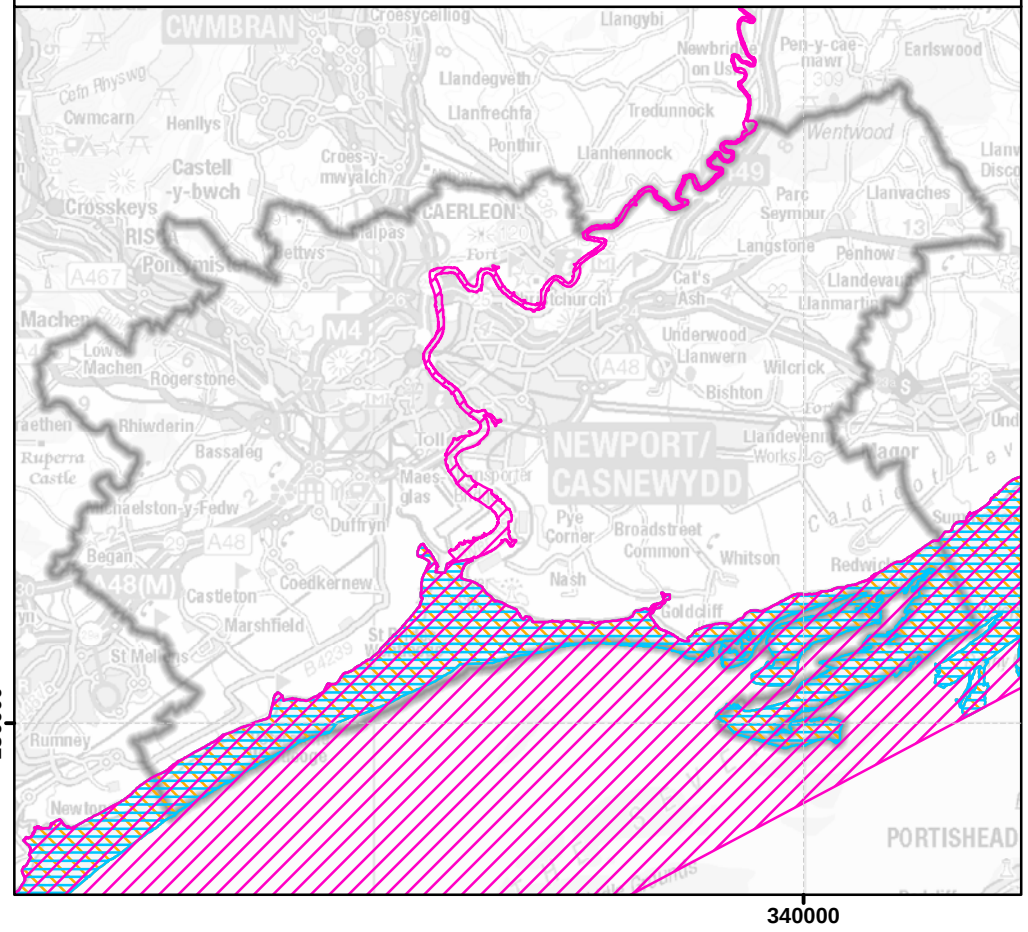
The General Quality Assessment (GQA) scheme was our previous scheme for assessing water quality. GQA has now been superceded by the Water Framework Directive. 2010 was the last year that GQA was reported.

GQA biology historical trends are shown here for reference. This graph shows the percentage length of the classified river network achieving each GQA grade for biology.

Each bar represents 100% of the classified river and canal network for a year. This bar is divided into bands according to the proportion of the length of the network achieving each grade. The bands are stacked from left to right from Grade a (very good) to f (bad) and then No Data (un-graded). A length of river will be un-graded for biology if the channel is unsuitable for the sampling techniques. The un-graded sections will include canals and drainage ditches as well as the deeper, lower sections of some rivers.

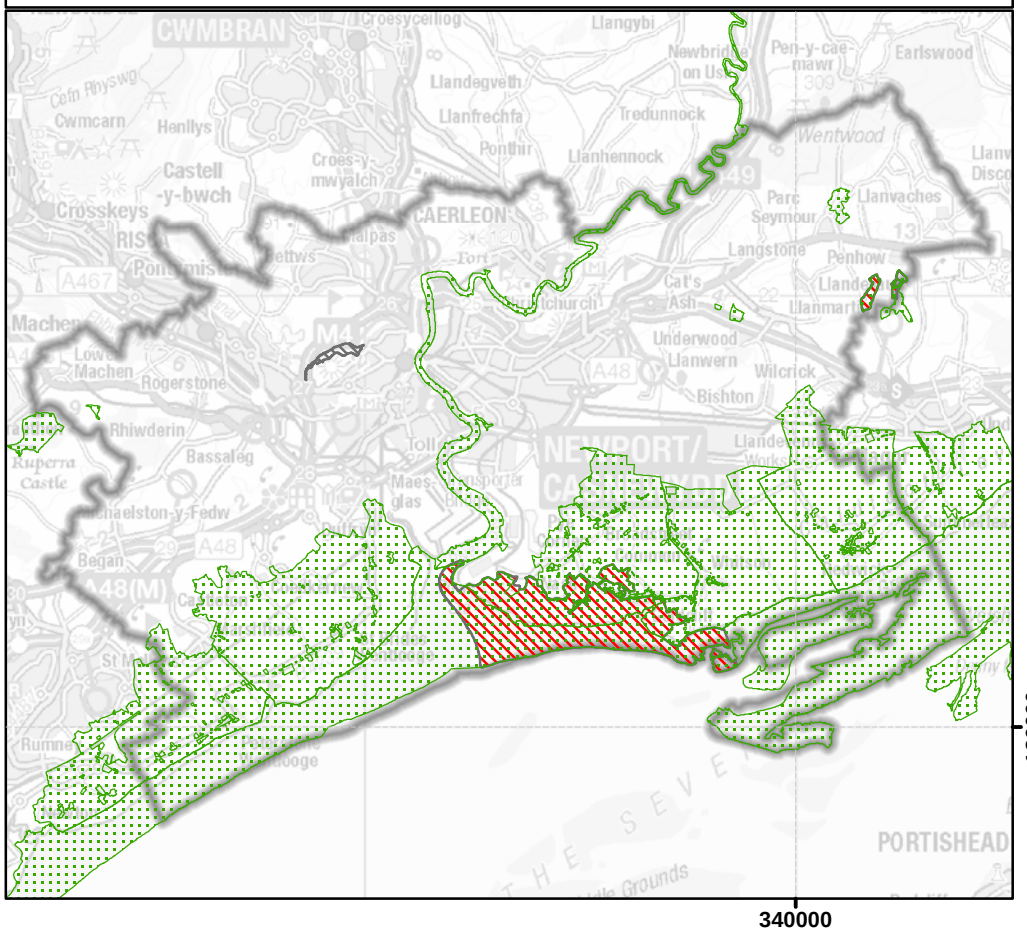
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SACs, SPAs and Ramsar sites



N

Other designated sites



Protected Sites

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Natural Resources Wales

2 1 0 2 km

Legend

SACs, SPAs and Ramsar sites

- Special Protection Area (SPA)
- Special Areas of Conservation (SAC)
- Ramsar sites
- Planning Authority Boundary

Other Designated Sites

- Heritage Coast
- Sites of Special Scientific Interest (SSSI)
- Areas of Outstanding Natural Beauty
- National Nature Reserves (NNR)
- Marine Nature Reserves (MNR)
- Local Nature Reserves (LNR)
- Biosphere Reserves
- Biogenetic Reserves

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Designated Protected Sites and Protected Species

Special Protection Areas (SPAs)

The EC Birds Directive of 1979 requires member states to establish Special Protection Areas to conserve the habitats of two categories of birds: species which are rare or vulnerable, of which there are forty-eight in the UK; and some migratory species which visit our shores regularly.

Special Areas of Conservation (SACs)

SACs are designated under the EC Habitats Directive. They help to maintain the variety of wildlife by protecting vulnerable habitats and the plants and animals that they support.

Ramsar Sites

These are sites identified under the Ramsar Convention on Wetlands of International Importance. These wetlands are of key importance to the survival of many wetland plants and animals. They are vital for many types of birds particularly waterfowl. Wetland sites can be areas of marsh, fen, peatland or open water; natural or artificial; permanent or temporary; with water that is fresh, brackish or salty. They can also include shallow areas of sea.

Heritage Coast

Heritage Coasts are stretches of outstanding, unspoilt coastline. They occupy about 500 km of the Welsh coastline. They were set up to protect our coastlines from insensitive developments. Their status carries no legal protection, but planning authorities must take the designation into account when making decisions on development. Management of Heritage Coasts is the remit of the local authority.

Sites of Special Scientific Interest (SSSIs)

SSSIs are the cornerstone of wildlife and habitat protection in Wales and are backed by law. There are more than 1,000 of them. An SSSI may be made on any area of land which is considered to be of special interest by virtue of its fauna, flora, geological or physiographical / geomorphological features. SSSIs in Wales cover a wide range of habitats from small fens, bogs and riverside meadows to sand dunes, woodlands and vast tracts of uplands. Local planning authorities are required to consult with Natural Resources Wales before allowing any development to proceed that may affect an SSSI.

Areas of Outstanding Natural Beauty (AONBs)

Areas of Outstanding Natural Beauty (AONB's) are designated under national legislation in recognition of the outstanding qualities of their 'natural beauty'. The primary purpose of designation is to secure the conservation and enhancement of their 'natural beauty' which includes protecting flora, fauna, and geological as well as landscape features. The Countryside and Rights of Way Act 2000 requires all relevant authorities to have regard to the purpose of conserving and enhancing the natural beauty of AONBs when performing their functions.

National Nature Reserves (NNRs)

National Nature Reserves represent the very best examples of our wildlife, habitats and geological features. Most NNRs are also SSSI.

Designated Protected Sites and Protected Species

Marine Nature Reserves (MNRs)

Marine Nature Reserves are a way of conserving important marine habitats and wildlife, and other features along the shore or on the seabed. Skomer is currently the only MNR in Wales.

Local Nature Reserves (LNRs)

Local Nature Reserves are established and managed by local authorities. LNRs have natural features of special interest to the local area. LNR are useful not only to protect habitats and wildlife but increase people's awareness of their environment. They are often situated in or near urban areas.

Biosphere Reserves

Biosphere Reserves are designated by UNESCO. Each reserve is part of a world-wide chain of permanently protected areas dedicated to studying the way human activity affects the local environment. Wales has one biosphere reserve.

Biogenetic Reserves

Biogenetic reserves are part of a European network of reserves that aims to conserve plants, animals and natural areas that may be common in one country, but scarce in another by protecting the store of genetic material for the future. Sites have to be SSSIs or similar. Wales has one biogenetic reserve

Further data and information about protected sites is available on our website http://naturalresourceswales.gov.uk/our-work/policy-advice-guidance/designated-sites

Protected species data

Data and information about protected species is available from your Natural Resources Wales planning contact and from the following links:

Our website
http://naturalresourceswales.gov.uk/our-work/policy-advice-guidance/protected-species-wales

The National Biodiversity Network Gateway
http://nbn.org.uk/

The Local Records Centres Wales website www.lrcwales.org.uk

South East Wales Biodiversity Records Centre (SEWBReC) http://www.sewbrec.org.uk/

West Wales Biodiversity Information Centre (WWBIC) http://www.wwbic.org.uk/

Biodiversity Information Service for Powys and Brecon Beacons National Park (BIS) http://www.b-i-s.org/index.php

Cofnod, North Wales Environmental Information Service http://www.cofnod.org.uk/About

Landscape and Open Access Land

LANDMAP

LANDMAP is an interactive map showing landscape characteristics and qualities and influences on the landscape in Wales. It includes five datasets: Geological Landscape; Landscape Habitats; Visual & Sensory; Historic Landscape and Cultural Landscape. Using the five datasets of information together promotes sustainable landscape decision-making.

LANDMAP is the formally adopted methodology for landscape assessment in Wales and informs planning related uses and landscape baseline conditions at both local and landscape scale. It provides a useful starting point for the assessment of cultural services. It is regularly updated and therefore forms a useful baseline against which to monitor long-term change.

The LANDMAP website
http://naturalresourceswales.gov.uk/out-and-about/nrw-web-maps/LANDMAP

GIS downloads
http://naturalresourceswales.gov.uk/our-work/freedom-of-information-act-2000/how-to-access-or-request-information/data-and-information-we-hold

Register of Landscapes of Historic Interest in Wales

This is a non-statutory register that has been compiled by the Countryside Council for Wales, Cadw and the International Council for Monuments and Sites (ICOMOS). It is a good source of information about landscape history, and it can be used to help assess the impact of development proposals on the historic landscape. Planning Policy Wales states that local planning authorities should take the Register into account in preparing their development plans.

Further information and an interactive map:
http://naturalresourceswales.gov.uk/out-and-about/nrw-web-maps/historic-landscapes

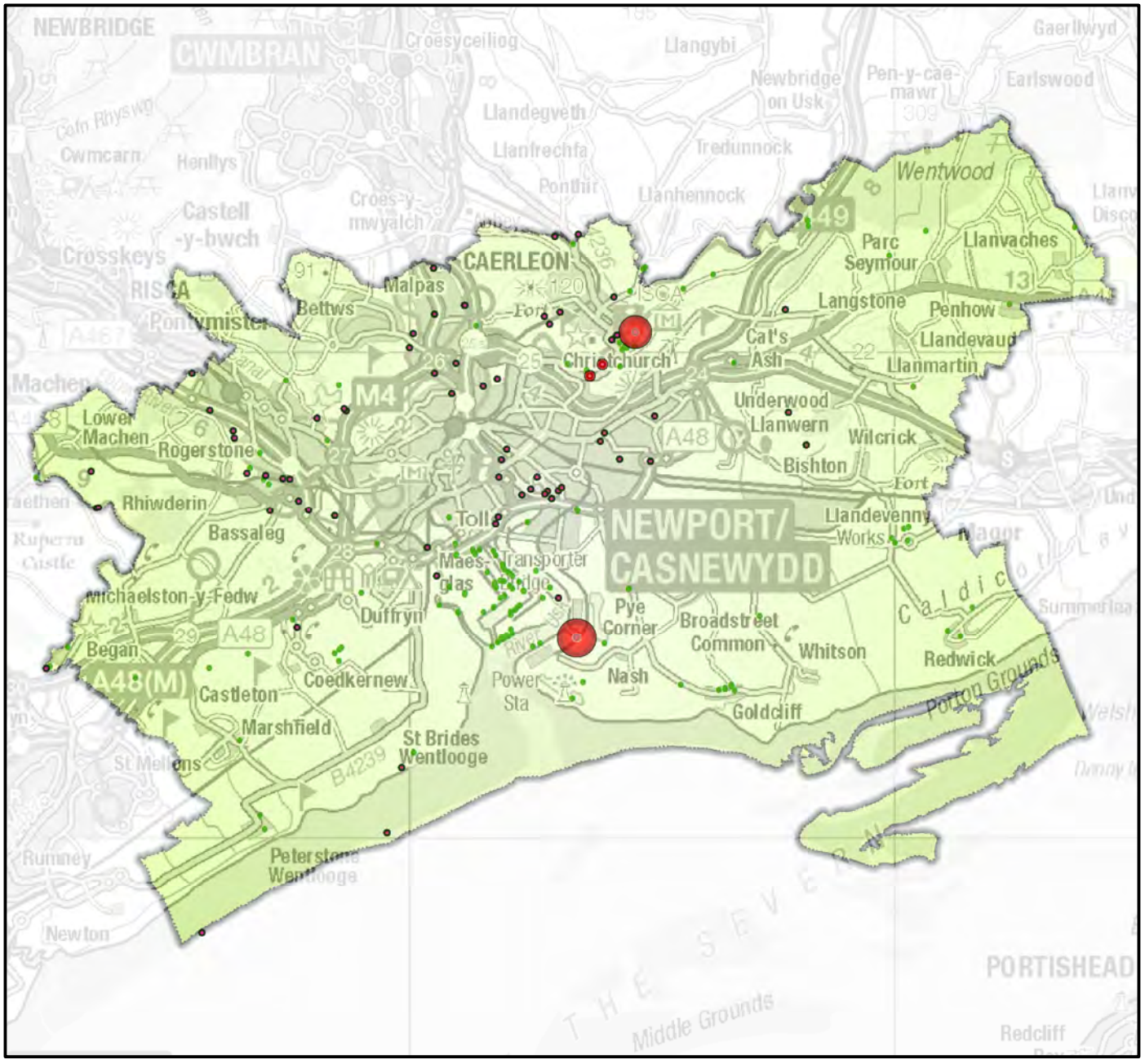
Open Access Land

Open access land in Wales is identified under the Countryside and Rights of Way Act (CRoW). About 20% of Wales is mapped as ‘access land’ where the public have a right of access on foot.

Access land is mostly open country; mountain, moor, heath and downland. It also includes 'registered common land' (land that is recorded on the official registers held by the commons registration authorities) and areas of 'dedicated public forests' where owners such as Natural Resources Wales allow free access.

To implement the CRoW Act, the Countryside Council for Wales produced accurate maps of all open access land. These maps are currently under review. Provisional maps are available at http://naturalresourceswales.gov.uk/out-and-about/nrw-web-maps/open-access-map

Final maps will be published in September 2014.



Permitted Discharges to Controlled Waters

Legend

Welsh Water Discharges

Dry Weather Flow (m3/day)

- 0 - 1000
- 1000 - 4000
- 4000 - 8000
- 8000 - 18000
- 18000 - 44000
- 44000 - 310000
- Welsh Water no DWF

Other Discharges

- Active
- Not yet effective
- Local Authority Boundary

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0 1.5 3 6
Km

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Permitted Discharges to Controlled Waters and Permitted Industrial Sites

Environmental Permits

The Environmental Permitting (England and Wales) Regulations 2010, introduced in April 2010, have produced a single regulatory framework by streamlining and integrating:

- Waste Management Licensing
- Pollution Prevention and Control
- Water Discharge Consenting
- Groundwater Authorisations
- Radioactive Substances Regulation

These activities will now all have Environmental Permits (EPR permits)

Permitted Discharges to Controlled waters

Natural Resources Wales has a wide range of responsibilities under legislation to protect and improve the water environment. As part of these responsibilities we actively monitor the quality of watercourses and groundwaters.

Controlled waters include inland freshwaters, groundwaters, tidal waters and coastal waters up to 3 nautical miles out to sea.

Natural Resources Wales now regulates discharges to controlled waters using Environmental Permits. The permit allows the holder to discharge into controlled waters. The permit details the conditions under which the discharge can be made, including the amounts and concentrations of specific pollutants the operator can release into controlled waters.

The Permitted Discharges to Controlled Waters map on the previous page shows locations of all current discharge consents.

Dŵr Cymru Welsh Water (DCWW) consents to discharge are symbolised according to the consented dry weather flow (DWF).This can be taken as an indication of the size of the discharge.

Permitted Industrial Sites

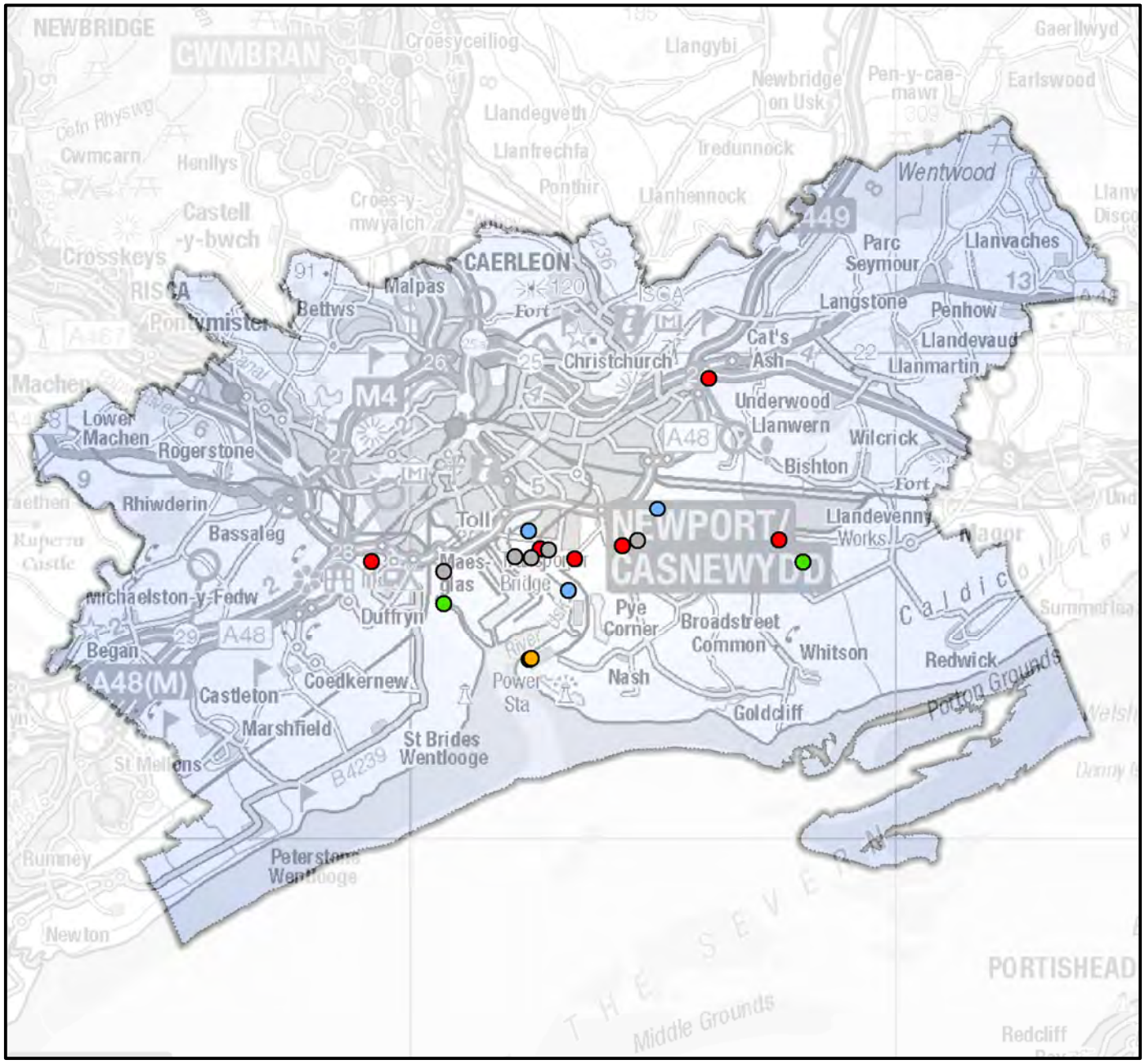
The following map and table show the location of permitted industrial sites in the planning authority.

Natural Resources Wales uses environmental permits to control emissions from industrial processes that have the potential to pollute. These permits set limits to control the level of pollutants that can be released to air, land or water from a particular site, and may require the site operator to carry out processes in accordance with stated conditions.

Permitted processes can include; complex process industries (chemical or cement works and power stations), sewage treatment works, waste management facilities (landfill sites and incinerators) and industries that use radioactive material.

Part 2 of Schedule 1 of the Environmental Permitting Regulations separates the permitted sectors into Part A(1), Part A(2) or Part B activities. Part A(1) activities are regulated by Natural Resources Wales. Part A(2) and Part B activities are regulated by local authorities.

Further information on the Natural Resources Wales website:
http://naturalresourceswales.gov.uk/apply-buy-report/apply-buy-grid/installations/



N

Permitted Industrial Sites

Legend

Industrial sites

- Other activity

Activity

- Agriculture
- Cement & Minerals
- Chemicals
- Combustion
- Energy from Waste
- Food & Drink
- Landfill
- Metals
- Paper, Pulp & Textiles
- Refineries
- Waste Storage
- Local Authority Boundary

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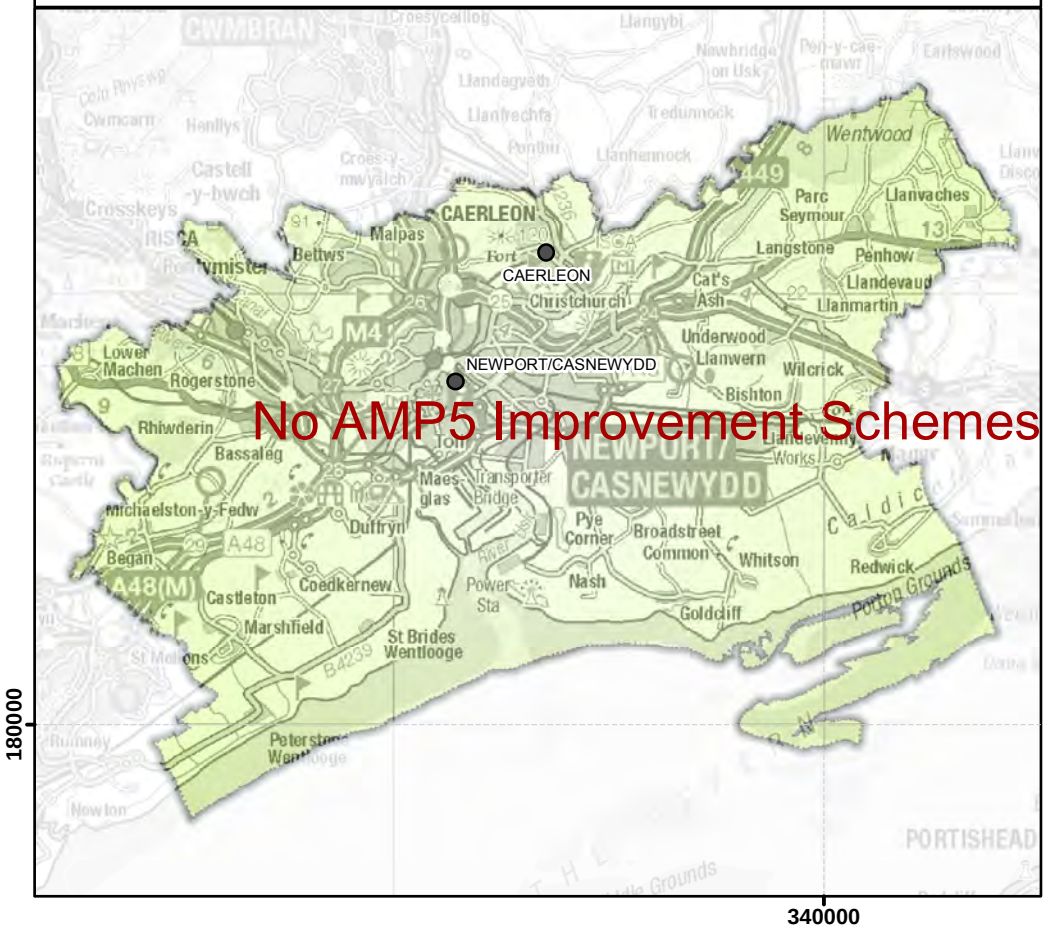
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Permitted Industrial Sites

Original Permit No.	Site Name	Operator	Address	National Grid Reference	Activity
BL2459IC	Llanwern Hydrogen Plant	Air Products (BR) Limited	Queensway,Spencer Works,Newport,NP19 4QX	ST37608615	Chemicals
BP3532HX	Newport Ceramic Works	Kennametal UK Ltd	Leeway Industrial Estate,Lake Road,Newport,NP19 4SR	ST34388603	Chemicals
BR9715IB	Newport Chemical Complex	Solutia UK Ltd	Corporation Road,Newport,NP19 4XF	ST33398576	Chemicals
BS3905IP	Llanwern Steelworks NRW/EPR/BS3905IP/V004	Tata Steel UK Limited	Tata Steel Strip Products UK,Llanwern Works,Newport,NP19 4QZ	ST35108680	Metals
BV7460ID	Newport Semiconductor Plant	International Rectifier Newport Limited	Newport Semiconductor Plant,Cardiff Road,Newport,NP10 8YJ	ST29218571	Chemicals
CP3333BQ	Orb Electrical Steels	Tata Steel UK Limited	PO Box 30,Stephenson Street,Newport,NP19 0RB	ST32448633	Metals
CP3538MP	East Bank Waste Oil Facility	OSS Group Ltd	Units 18a & 19,East Bank Road,Felnex Industrial Estate,Newport,NP19 4PP	ST32508578	Other
DP3733BK	Docksway Landfill - Area 2	Newport City Council	Docksway Disposal Site - Phase 2,Docks Way,Maesglas,Newport,NP20 2NS	ST30708485	Landfill
EP3830GH	Newport Steelworks	Mir Steel UK Ltd	Mir Steel UK Ltd,Corporation Road,Newport,NP19 4XE	ST33278512	Metals
GP3331SV	South Side Of Queensway Llanwern Landfill	Tata Steel UK Limited	South Side Queensway Non-Hazardous Landfill Site,Llanwern Works,Newport,NP19 4QZ	ST38108570	Landfill
HP3131KU	SPTS Technologies	SPTS Technologies Limited	SPP Process Technology Systems UK Ltd,Ringland Way,Newport,NP18 2TA	ST36168948	Chemicals
HP3737UE	Severn Power Station	Siemens plc	Western Power,West Nash Road,Nash,Newport,NP18 2BZ	ST32468368	Combustion

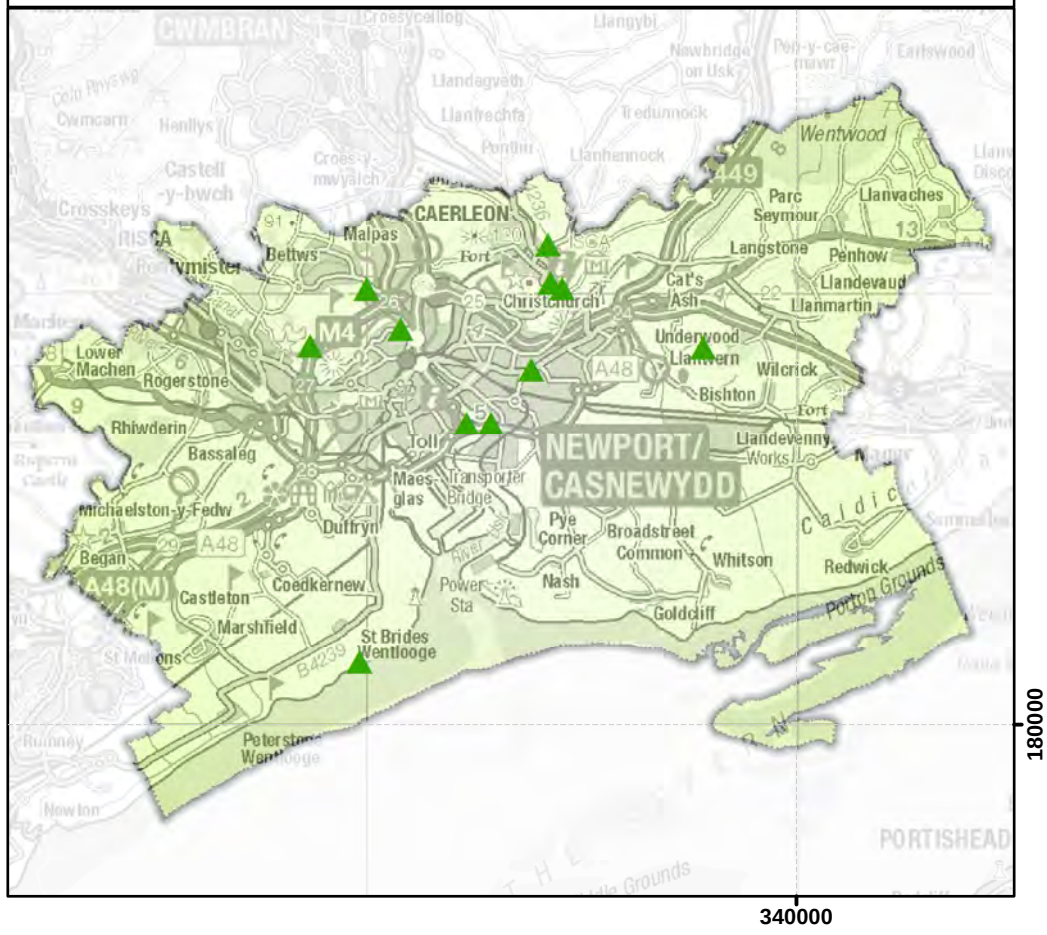
Original Permit No.	Site Name	Operator	Address	National Grid Reference	Activity
LP3131SW	Uskmouth Power Plant	Uskmouth Power Co Ltd	Uskmouth Power Station,West Nash Road,Newport,NP18 2BZ	ST32508370	Combustion
LP3135SB	Docksway Generation Plant EPR/LP3135SB/V003	Novera Energy Generation No 2 Limited	Generation Plant,Docks Way,Maesglas,Newport,NP20 2NS	ST30708550	Other
NP3030BJ	Enersys Newport	Enersys Ltd	Enersys Ltd,Stephenson Street,Newport,NP19 4XJ	ST32688597	Chemicals
SP3531SK	Gwent Waste Management Centre	Tradebe Gwent Limited	Park House,Corporation Road,Newport,NP19 4RD	ST32868595	Other
UP3336LT	Newport Oil Treatment Plant	Eco-Oil Limited	7 New Quay Road,Felnex Industrial Estate,Newport,NP19 4PL	ST32168581	Other
XP3833UB	East Bank Road Treatment Facility	G D Environmental Services Ltd	Unit 18a & 19,East Bank Road,Felnex Industrial Estate,Newport,NP19 4PP	ST32508578	Other
YP3135TE	Newport Recycling Facility	Celtic Recycling Ltd	Celtic Recycling Ltd,Clearwater Road,Queensway Meadows Industrial Estate,Newport,NP19 4ST	ST34698614	Other

Asset Management Plan (AMP5) Improvement Schemes



N

Asset Management Plan (AMP4) Improvement Schemes



Dwr Cymru Welsh Water Asset Management Plans

AMP4 (2005-2010) and
AMP5 (2010-2015)

(completion status as at end March 2013)

Legend

AMP5 Schemes
Completed
- Y
- N
- Towns

AMP4 Schemes
Completed
- Y
- N
- Local Authority

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Asset Management Plan Improvement Schemes

AMP4 Programme for 2005-10 and AMP5 Programme for 2010-2015

Ofwat are the economic regulator for the water industry. Their main role is to seek value for money for water industry customers. Natural Resources Wales, along with the Drinking Water Inspectorate, are responsible for the environmental regulation of the water industry in Wales.

Ofwat sets the price limits that water companies can charge their customers for the supply of water and the treatment of waste water for the following five years. This happens every 5 years and is known as a Periodic Review. In November 2009, following price review PR09, Ofwat set the prices that water companies will charge their customers between 2010 and 2015.

The Periodic Review also determines how much investment water companies can spend on maintaining and improving their services. As part of the price review the water companies, working with Natural Resources Wales, the Drinking Water Inspectorate and other interested stakeholders, develop a programme of environmental and water quality improvements to be delivered in the next 5 years. The resulting investment programme is known as an Asset Management Plan or AMP and includes the National Environment Programme that has been drawn up by Natural Resources Wales.

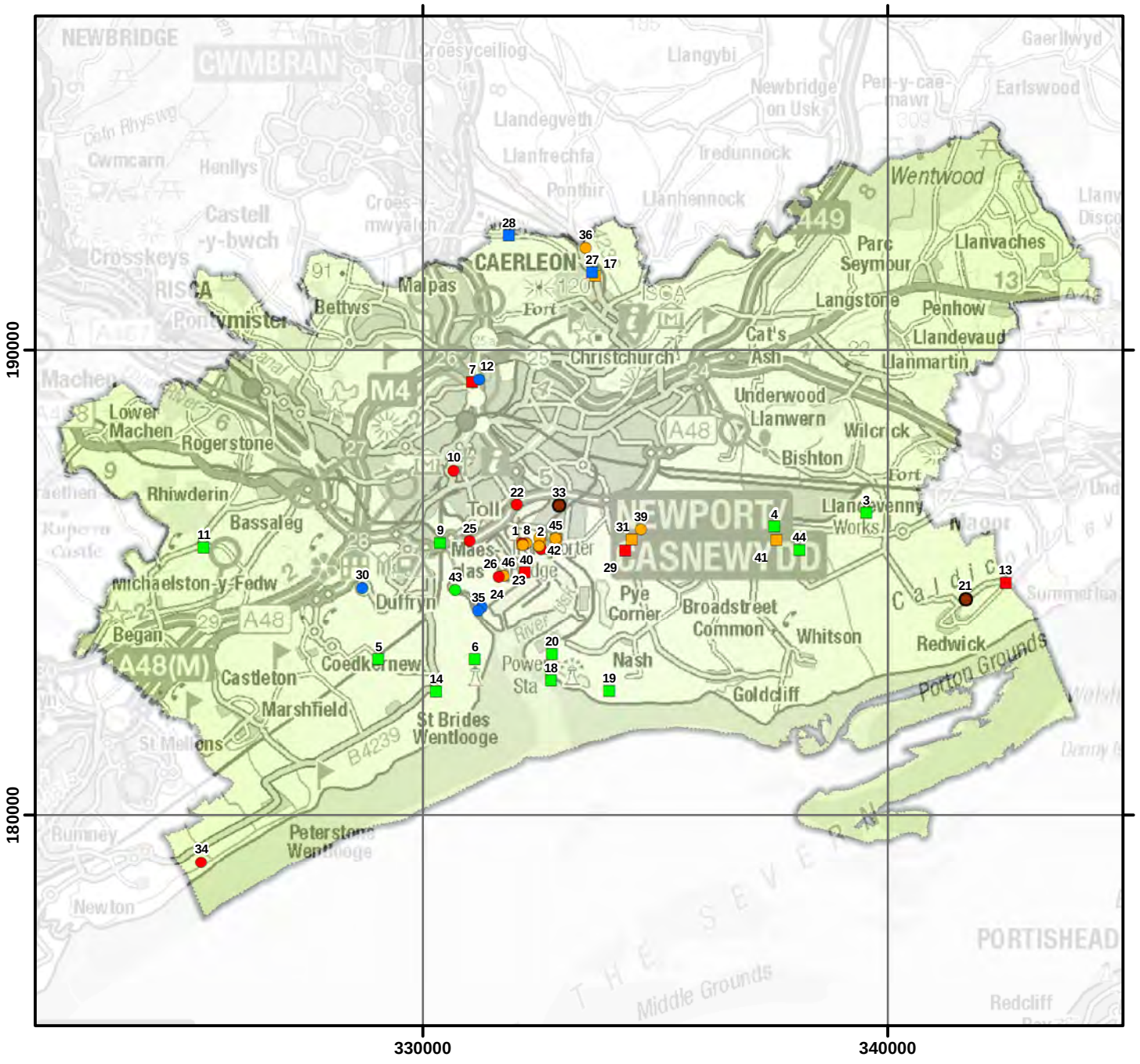
The current AMP, AMP5, runs from 2010 to 2015. The previous programme, AMP4, ran from 2005 to 2010.

The Asset Management Plan (AMP4) Improvement Schemes map on the previous page shows assets owned by Dŵr Cymru which were identified for improvement during AMP4 (2005-2010). It also shows which schemes have been completed. The Asset Management Plan (AMP5) Improvement Scheme map shows assets owned by Dŵr Cymru which were identified for improvement during AMP5 (2010-2015). It also shows which schemes have been completed.

Links to further information:

Dwr Cymru/Welsh Water website www.dwrcymru.co.uk

Ofwat website www.ofwat.gov.uk



Permitted Waste Management Sites

Legend

Permitted Waste Management Sites

- Other

Category, Active2012

- Landfill,
- Landfill, Y
- MRS,
- MRS, Y
- Transfer,
- Transfer, Y
- Treatment,
- Treatment, Y
- Use of Waste,
- Use of Waste, Y
- Local Authority Boundary

Numeric labels reference features shown in the table following.

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Permitted Waste Management Sites

Label No.	Permit No.	Site Name	Category	Active in 2012?
1	300010	Eco Oil Ltd (P P C Permit)	Treatment	
2	300011	O S S (P P C Permit)	Treatment	
3	30003	Llanwern Works East	Landfill	
4	30009	Llanwern Landfill : South Side Of Queensway	Landfill	
5	30027	Wentloog Landfill	Landfill	
6	30028	The Saltings (West Usk) Landfill	Landfill	
7	30030	Leighton Carter	Transfer	
8	30045	Olleco Cymru Wales	Treatment	Y
9	30058	Docks Way Landfill	Landfill	
10	30062	St Woolos Hospital	Transfer	Y
11	30077	Croescarneinon Farm Landfill	Landfill	
12	30113	S J Bull Scrapyard	MRS	Y
13	30131	Summerleaze Farm 1	Transfer	
14	30161	Ty Mawr Farm Landfill	Landfill	
15	30164	Eco Oil Ltd	Transfer	Y
16	30178	Gwent Waste Management Centre	Treatment	
17	30198	Leigh Environmental Ltd	Treatment	
18	30199	Uskmouth Power Station East Nash	Landfill	
19	30202	Uskmouth Power Station West Nash (ash Lagoon No.5 10-13	Landfill	
20	30214	Uskmouth Power Station Landfill	Landfill	
21	30226	Summerleaze Pet Crematorium	Incineration	Y
22	30258	Volehurst Ltd	Transfer	Y
23	30264	Sims Group U K Ltd (fridge Plant)	Treatment	Y
24	30273	North Quay	MRS	Y
25	30298	A1 Skips	Transfer	Y
26	30312	Sims Group U K Ltd	Transfer	Y

Label No.	Permit No.	Site Name	Category	Active in 2012?
27	30313	Vauxplus	MRS	
28	30333	C A R	MRS	
29	30340	Able Skip Hire Limited	Transfer	
30	30343	Panasonic System Networks Company U K Ltd	MRS	Y
31	30384	Fingal Recycling Waste Trasfer Station	Treatment	
32	30387	G D Environmental Services Ltd	Transfer	Y
33	102924	Lysaght Village Newport	On/In Land	Y
34	100124	Unit 2, Sea View Bungalow	Transfer	Y
35	100605	Newport Weee Facility (weee)	MRS	Y
36	101015	Colin Richardson Recycling Centre	Treatment	Y
37	103449	Footprintmatters2u Ltd	Treatment	Y
38	XP3833UB	East Bank Road Treatment Facility EA/EPR/XP3833UB/V005	Treatment	Y
39	YP3135TE	Newport Recycling Facility EA/EPR/YP3135TE/V003	Treatment	Y
40	400181	Alexandra Docks	Transfer	
41	900015	Llanwern Works Inert Waste Recycling Facility	Treatment	
42	CP3538MP	East Bank Waste Oil Facility EA/EPR/CP3538MP/V002	Treatment	Y
43	DP3733BK	Docksway Landfill - Area 2 EA/EPR/DP3733BK/V003	Landfill	Y
44	GP3331SV	South Side Of Queensway Llanwern Landfill	Landfill	
45	SP3531SK	Gwent Waste Management Centre EA/EPR/SP3531SK/V006	Treatment	Y
46	UP3336LT	Newport Oil Treatment Plant EA/EPR/UP3336LT/V003	Treatment	Y

Waste Management Sites

Waste Management Sites

Waste Management Licensing was one of the regulatory systems used to regulate the waste management industry. We now regulate waste and other industries under one system, Environmental Permitting Regulations. Operations that previously had a Waste Management Licence (WML) will now have an Environmental Permit.

The Permitted Waste Management Sites map shows the locations of permitted waste management sites as in November 2013. These sites have a current permit for waste management activities, but may not be currently accepting waste. Those waste management sites that received waste during 2012 have been shown as active.

Sources of Waste Management Data and Information

Waste Data Interrogator and Reporting Tool

The Waste Data Interrogator contains details of all waste deposited and removed from permitted waste facilities in England and Wales for a given year, including hazardous waste, but not waste from exempted facilities such as land spreading or exempt scrap yards. This tool is primarily designed to provide data for waste planners and waste management professionals for undertaking strategic waste management assessments and general waste flow analysis.

Hazardous Waste Interrogator

The Hazardous Waste Interrogator lets you view and analyse detailed information from our hazardous waste database. You can find data on the different types and quantities of waste produced, where it is produced and deposited, and how it is disposed of and recovered in England and Wales.

The Waste Data Interrogator and the Hazardous Waste Interrogator may be downloaded from the Environment Agency DataShare website.

There is an annual summary of the types and quantities of waste handled by permitted waste management facilities in Wales on the Natural Resources Wales website.

Other waste data and information

Wales waste data information 2012
http://naturalresourceswales.gov.uk/our-work/policy-advice-guidance/waste-Policy/wales-waste-data-information-2012

Waste data interrogators may be downloaded from the Environment Agency DataShare website
http://www.geostore.com/environment-agency/

Data and information about fly-tipping is available on the Welsh Government website
http://wales.gov.uk/topics/statistics/headlines/environment2012/120816/

Waste Management: Landfill Allowances Scheme and Landfill Inputs

The **Landfill Allowances Scheme** (Wales) Regulations 2004 (The LAS regulations) came into force in Wales on 1 October 2004, to reduce the amount of biodegradable municipal waste going to landfill sites. Landfilling biodegradable municipal waste, for example food, paper, and garden waste, can contribute to environmental problems such as leachate production - liquid that drains or 'leaches' from a landfill. It also releases methane, a potent greenhouse gas, which can contribute to climate change.

Further information about the Landfill Allowances scheme
http://naturalresourceswales.gov.uk/our-work/policy-advice-guidance/waste-Policy/landfill-allowance-scheme/

Report on the Landfill Allowances Scheme (LAS) Wales 2012-13
http://naturalresourceswales.gov.uk/content/docs/pdfs/our-work/Policy-advice-and-guidance/87161/landfill-allowances-2012-13

Landfill Directive site classification

The implementation of the Landfill Directive introduced many new requirements. Under the Directive, landfills were classified into three main types according to the type of waste they accept: hazardous waste; non-hazardous waste and inert waste.

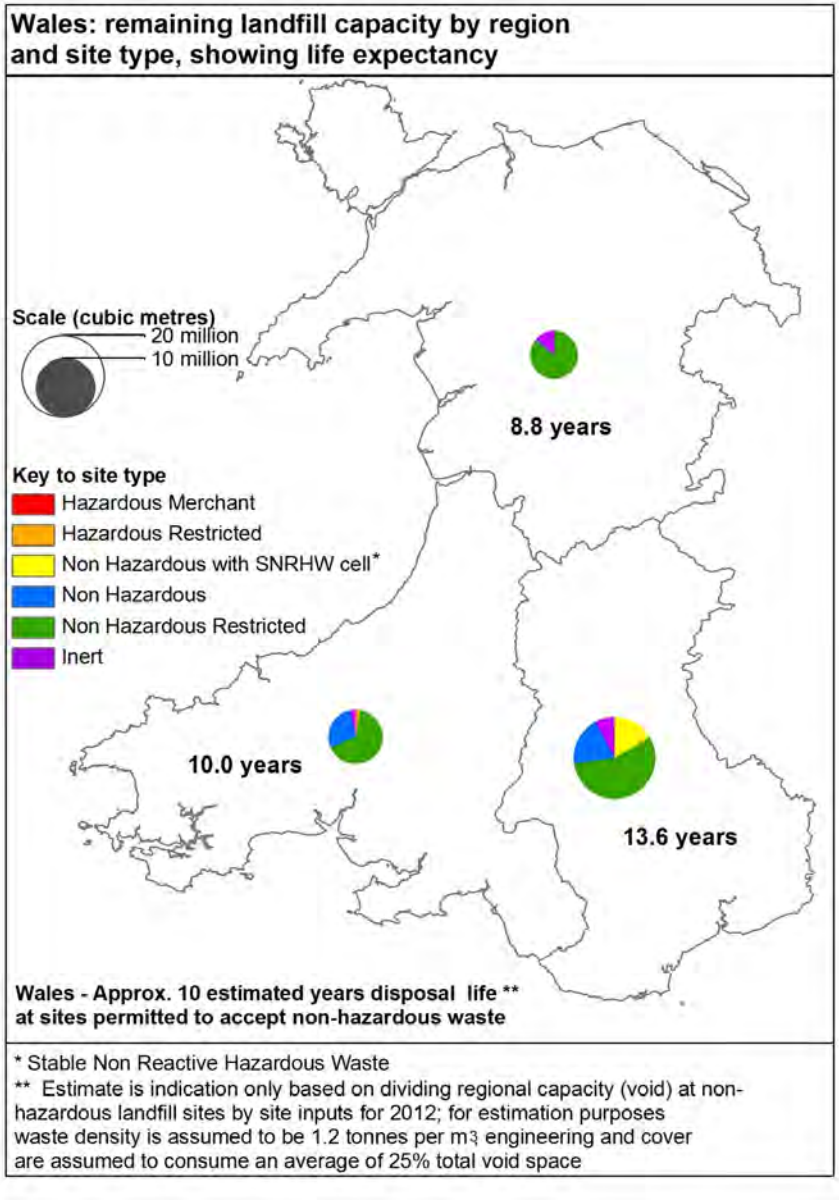
Some non-hazardous landfills can also have a separate hazardous waste cell for Stable Non Reactive Hazardous Wastes (SNRHW), e.g. asbestos and gypsum. This cell is usually a very small part of the overall site. There are some of these in Wales but they are not currently actively accepting this type of waste.
There are also detailed restrictions on the waste (i.e. Waste Acceptance Criteria) that each class of landfill can take.

Landfill Inputs

A total of 2.16 million tonnes of waste was landfilled in Wales in 2012. This has reduced by 2% (37,000 tonnes) between 2011 and 2012. The total tonnage of waste landfilled in Wales has fallen by 51% since 2001.

51% of the waste that was landfilled in 2012 was HIC (Household, Industrial & Commercial) waste, 29% was inert/C&D (Construction & Demolition) waste and approximately 66 tonnes (<0.001%) was hazardous waste (consisting of mainly insulation material).

Waste Management Sites: Landfill Capacity and Historic and Permitted Landfills



Landfill Capacity

There was 34.5 million cubic metres of remaining capacity at permitted landfill sites in Wales at the end of 2012. Approximately 10 years of landfill life is left at sites for non-hazardous wastes in Wales, at 2012 input rates.

Overall capacity decreased by 1.5 per cent compared to 2011. No additional landfill capacity was created this year, but more accurate surveying of sites by operators has indicated more space available at some sites**.** At the end of 2012: 8 per cent of capacity was at inert sites; 73 per cent of capacity was at non-hazardous sites; 19 per cent of capacity was at restricted user sites (non hazardous and hazardous).

Historic Landfill sites

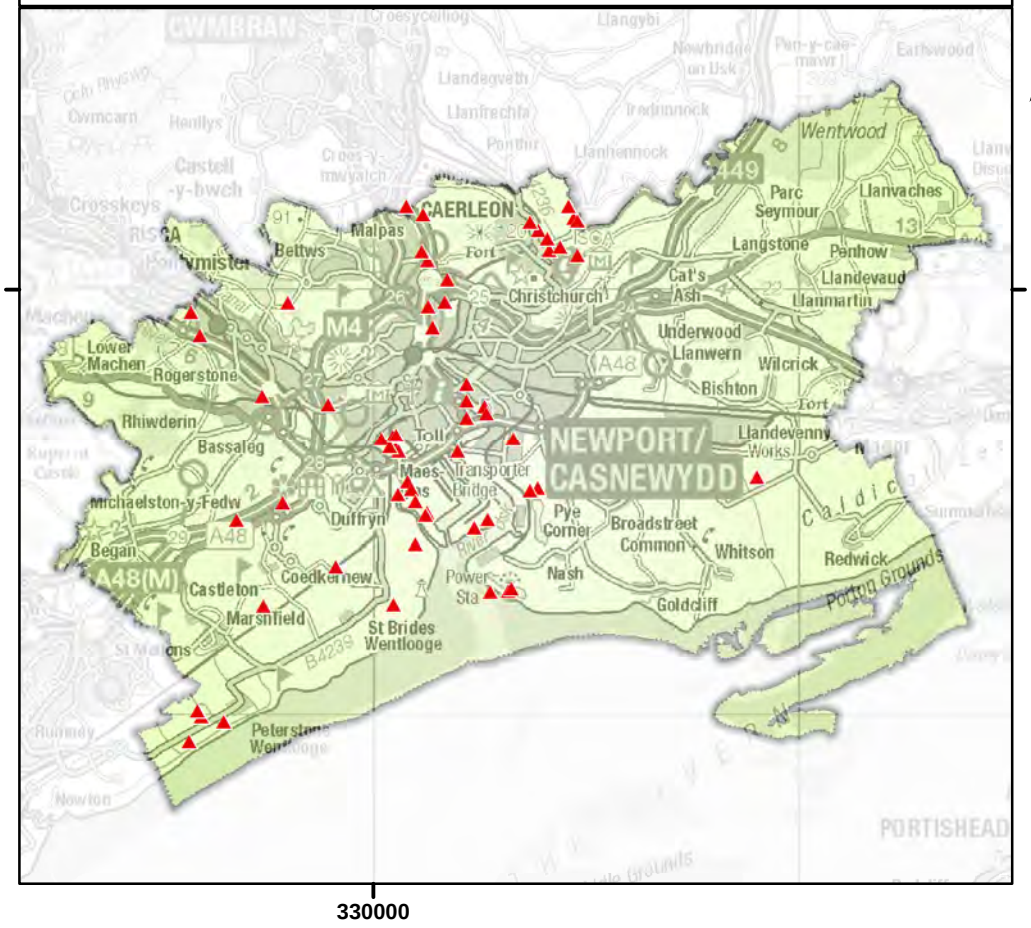
The left hand map on the next page shows the location of historic landfills known to Natural Resources Wales. Historic landfill sites are locations where there are records of waste being received to be buried but the site is now closed or covered. They do not have a current permit.

The information held has been collated from data held by Local Authorities, the former Department of the Environment, British Geological Survey and Environment Agency suspended authorised landfill licences. When landfills regulated by Natural Resources Wales are no longer permitted, they are added to the historic landfill database.

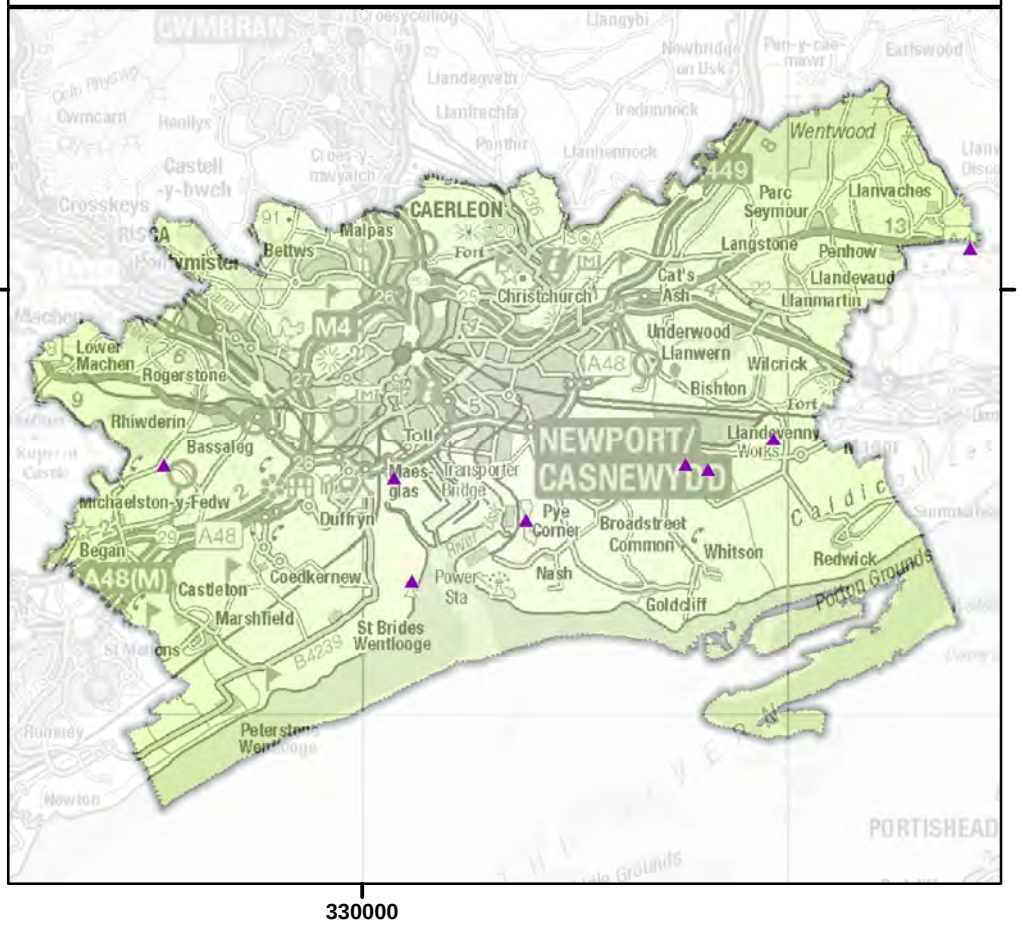
Permitted Landfill Sites

The right hand map on the next page shows the location of all operational landfills. Operational landfills are sites with a current permit that are still accepting waste, or are no longer accepting waste but still being actively managed.

Historic Landfill Sites



Permitted Landfill Sites



Historic and Currently Permitted Landfill Sites

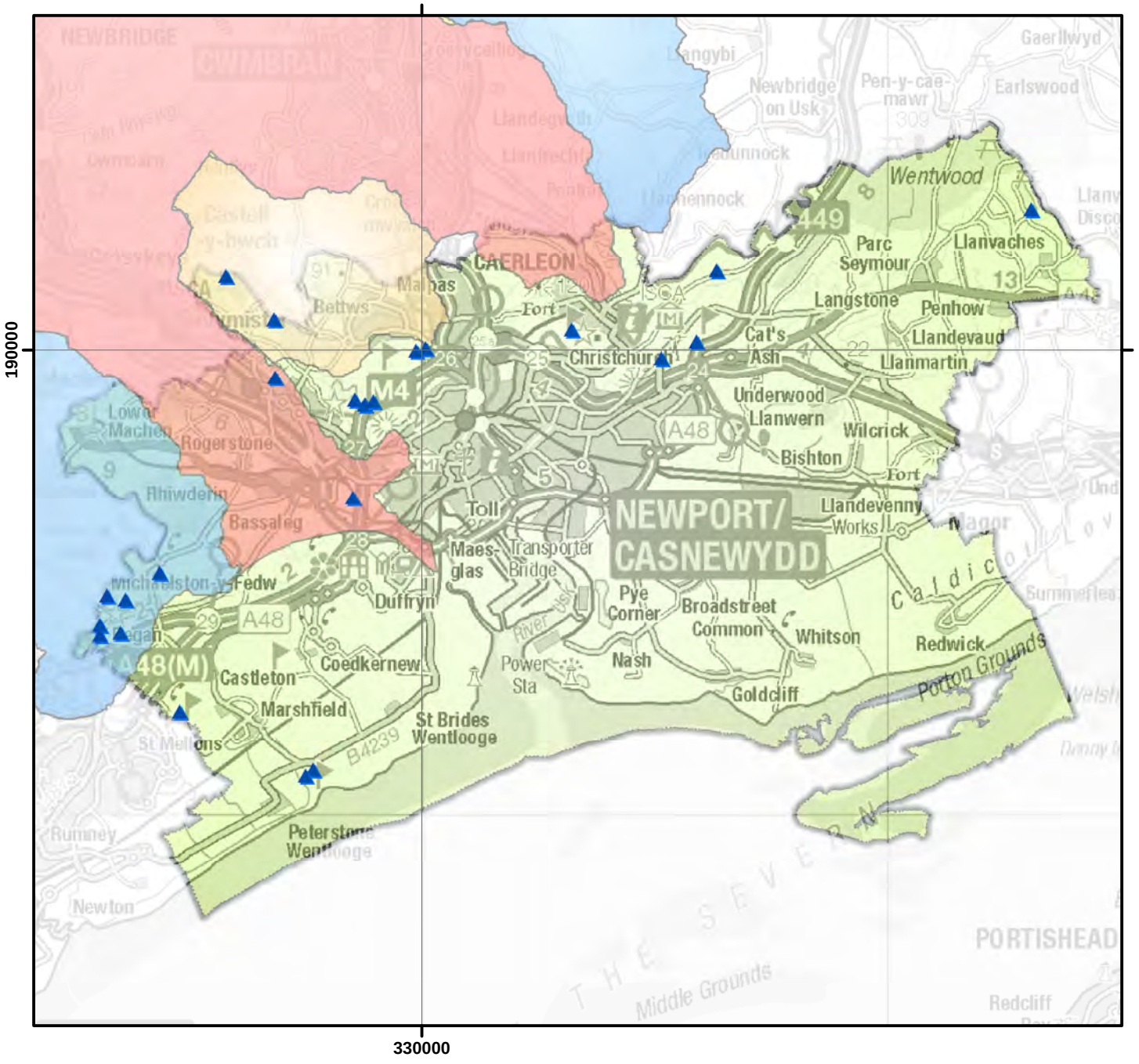
Legend

- Historic Landfill Sites
- Local Authority Boundary
- Permitted Landfill Sites
- Local Authority Boundary

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CAMS Resource Availability Status

December 2008

Legend

- Active Abstraction Licenses

Resource Availability Status

- No Water Available
- Over Abstracted
- Over Licensed
- Water Available
- Assessment not complete
- Not Assessed
- Not included in LA

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Water Resources: Catchment Abstraction Management Strategies

Water Resources

Natural Resources Wales is responsible for managing water resources in Wales. One of the ways that this is done is through licensing water abstraction. We developed **Catchment Abstraction Management Strategies** (CAMS):

- to inform the public on water resources and licensing practice
- to provide a consistent approach to local water resources management
- to help to balance the needs of water users and the environment

CAMS are 6 year plans detailing how water resources in an area will be managed.

Catchment Abstraction Management Strategies (CAMS) have been produced 'to provide a framework for resource availability assessment and produce a licensing strategy which aids the sustainable management of water resources on a catchment scale.

The current CAMS documents for Wales can be found here:
Catchment Abstraction Management Plans - Wales
http://naturalresourceswales.gov.uk/our-work/policy-advice-guidance/water-policy/water-resources

A new approach to CAMS has been developed to align with the Water Framework Directive (WFD) process. The implementation of the WFD requires further assessments of the water environment that were previously not part of CAMS. Also, the role of CAMS in licensing abstraction and managing time-limiting licences needs to be strengthened. By moving CAMS away from a cyclic review and into the day to day business, in particular its role in managing time-limited licences, we have made the process more flexible. This is important in the light of uncertainties such as climate change.

The Environment Agency document *Managing Water Abstraction*, sets out the national approach and regulatory framework within which we will manage water resources.
https://www.gov.uk/government/publications/managing-water-abstraction

Resource Availability Status

The following text explains the resource availability status shown on the *CAMS Resource Availability Status* map on the last but one page.

For all CAMS Areas classified as 'water available'. (blue)

- Additional water is likely to be available for abstraction even at low flows.
- Larger volumes of water may be available at higher flows or for non-consumptive purposes.
- All new licences will be subject to restrictions that protect the environment and existing water users.
- All licence applications will be assessed on a case by case basis
- Existing Abstraction Licences – There will be no impact on existing abstractors unless their abstraction is causing an adverse impact on a designated site. Action may be needed under the Habitats Directive Review of Consents.

Water Resources: Catchment Abstraction Management Strategies

For all CAMS Areas classified as '**no water available'**. (yellow)

- No additional water is available for abstraction at low flows.
- Water may be available at high flows or for non-consumptive purposes.
- All new licences will be subject to restrictions that protect the environment and existing water users.
- All licence applications will be assessed on a case by case basis
- Existing Abstraction Licences – There will be no impact on existing abstractors unless their abstraction is causing an adverse impact on a designated site. Action may be needed under the Habitats Directive Review of Consents.

For all CAMS Areas classified as '**over licensed**'. (orange)

- Most abstractors do not abstract their full licence quantity. If existing licences used their full allocation, they would have the potential to cause unacceptable environmental impact at low flows.
- New licences will only be granted if water is available at higher flows.
- All licence applications will be assessed on a case by case basis.
- Existing Abstraction licences - there will be no impact on existing abstractors unless their abstraction is causing an adverse impact on a designated site. Action may be needed under the Habitats Directive Review of Consents

For all CAMS Areas classified as '**over abstracted'.** (Red)

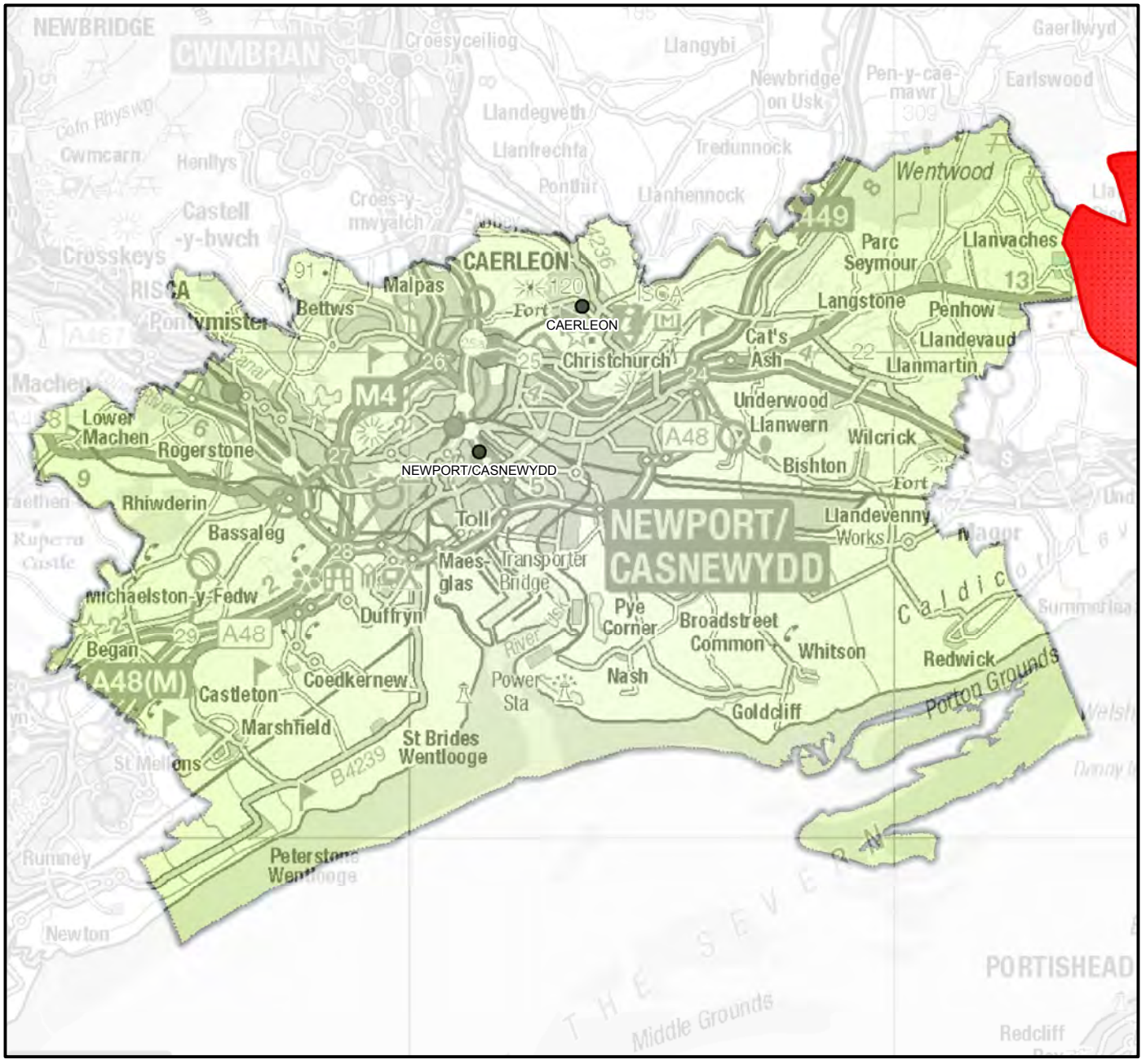
- Existing licences already have the potential to cause unacceptable environmental impact at low flows.
- In some cases new licences will be granted if water is available at higher flows.
- All licence applications will be assessed on a case by case basis.
- Existing Abstraction licences - there will be no impact on existing abstractors unless their abstraction is causing an adverse impact on a designated site. Action may be needed under the Habitats Directive Review of Consents

Not yet assessed (purple) – these areas have not yet been assessed under the CAMS process. This work is on-going.

Not assessed (green)
Not all watercourses are assessed under the CAMS process. Those very small coastal watercourses where abstraction is limited are not included within the classification.

All licences applied for in these locations will be subject to the same licensing processes as all other applications.

All licence applications will be assessed on a case by case basis.



Groundwater Source Protection Zones (SPZ)

Legend

Source Protection Zones

- Zone 1 - Inner Protection Zone
- Zone 2 - Outer Protection Zone
- Zone 3 - Total Catchment
- Zone of Special Interest
- Local Authority

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Groundwater Source Protection Zones (SPZ)

Groundwater

Groundwater supplies about one third of drinking water in England and around 3 per cent in Wales. Groundwater also helps to maintain the flow in many of our rivers and wetland ecosystems. Pollution and increasing demand for water are putting groundwater resources under pressure.

Definitions

Groundwater	water that is below the surface of the ground in the saturation zone (below the water table) and in direct contact with the ground or subsoil
Aquifer	a subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater
Recharge	water which percolates downward from the surface into groundwater

Links to Further information:

A comprehensive guide on groundwater protection is available in: "*Groundwater Protection: Principles and Practice*" (GP3)
https://www.gov.uk/government/publications/groundwater-protection-principles-and-practice-gp3
This policy sets out how we manage and protect groundwater resources, and our plans for the future.

Source Protection Zones (SPZs)

We have defined Source Protection Zones (SPZs) for groundwater sources such as wells, boreholes and springs used for public drinking water supply. These zones show the risk of contamination from any activities that might cause pollution in the area. The closer the activity, the greater the risk. The maps show three main zones (inner, outer and total catchment) and a fourth zone of special interest, which we occasionally apply, to a groundwater source.

Zone 1 (Inner protection zone)

Defined as the 50 day travel time from any point below the water table to the source. This zone has a minimum radius of 50 metres.

Zone 2 (Outer protection zone)

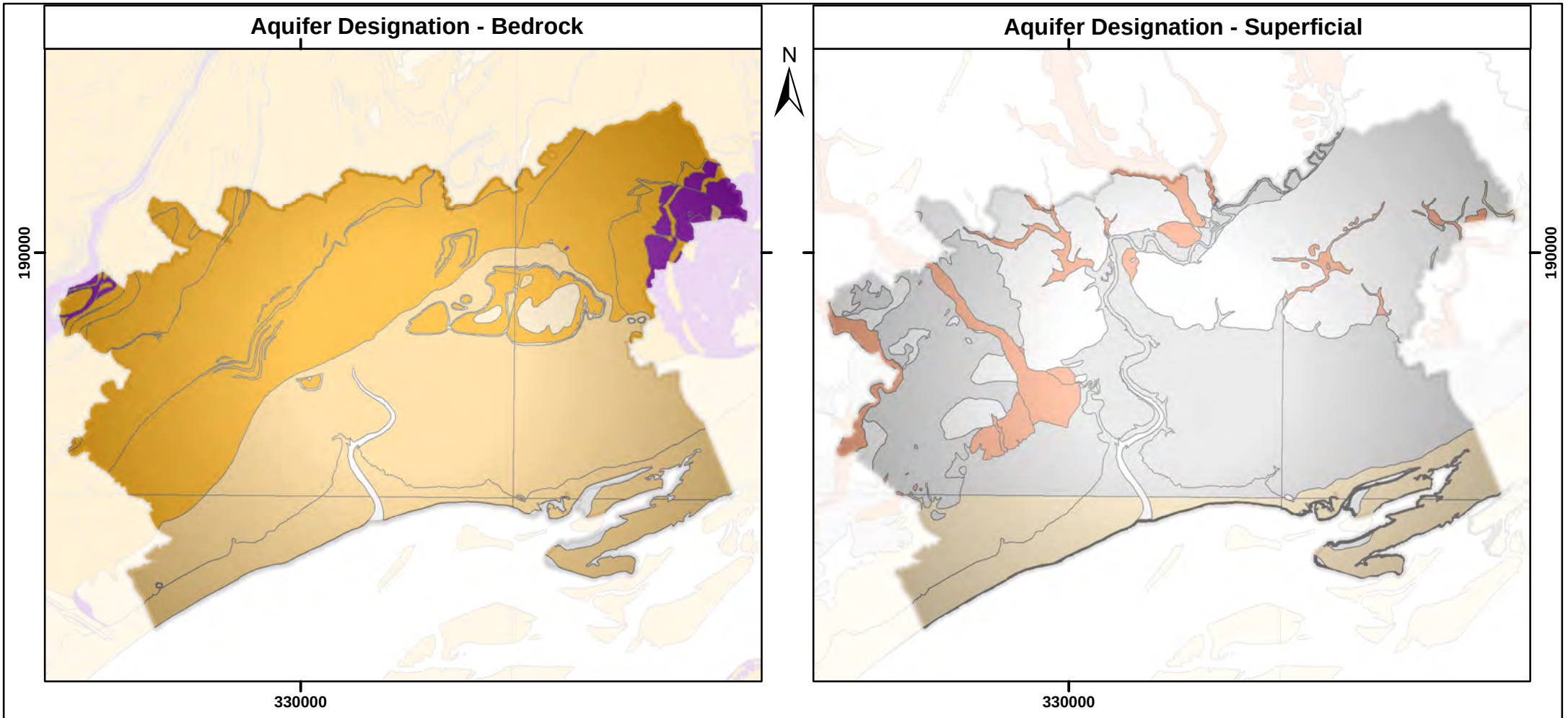
Defined by the 400-day travel time from a point below the water table. Additionally this zone has a minimum radius of 250 or 500 metres, depending on the size of the abstraction.

Zone 3 (Total catchment)

This zone is defined as the total area needed to support the abstraction or discharge from the protected groundwater source.

Zone of special interest

A fourth zone SPZ4 or 'Zone of Special Interest' was previously defined for some groundwater sources. These zones highlighted areas (mainly on non-aquifers) where known local conditions meant that potentially polluting activities could impact on a groundwater source even though the area is outside the normal catchment of that source. In future this zone will be incorporated into one of the other zones (1, 2 or 3), whichever is appropriate in the particular case.



Aquifer Designation

Legend

Aquifer Typology - Bedrock

- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unproductive

Aquifer Typology - Superficial

- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unknown (lakes+landslip)
- Unproductive

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Aquifer Designation Maps

We help to protect groundwater by identifying different types of aquifer - underground layers of water-bearing permeable rock or drift deposits from which groundwater can be extracted.

Our Groundwater Protection Policy now uses aquifer designations that are consistent with the Water Framework Directive. These designations reflect the importance of aquifers in terms of groundwater as a resource (drinking water supply) but also their role in supporting surface water flows and wetland ecosystems.

The aquifer designation data is based on geological mapping provided by the British Geological Survey. It will be updated regularly to reflect their ongoing programme of improvements to these maps. We gratefully acknowledge this assistance.

The maps show two different types of aquifer designation:

Bedrock – solid permeable formations e.g. sandstone, chalk and limestone

Superficial – permeable unconsolidated (loose) deposits e.g. sands and gravels

Note: Some map tiles on the Aquifer Designation – Superficial maps may appear to be missing. These areas were not surveyed because they do not contain significant aquifers and the whole area has been classified as unproductive.

The aquifer designation maps shown on the previous page display the following designations:

Principal Aquifers

These are layers of rock or drift deposits that have high intergranular and/or fracture permeability- meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

Secondary Aquifers

These include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage. Secondary aquifers are subdivided into two types:

Secondary A - permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

Secondary B - predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.

Secondary Undifferentiated - has been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

Unproductive Strata

These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

Note: We are only able to display the principal and secondary aquifers as coloured areas on the maps. All uncoloured areas on the bedrock designation map will be unproductive strata.

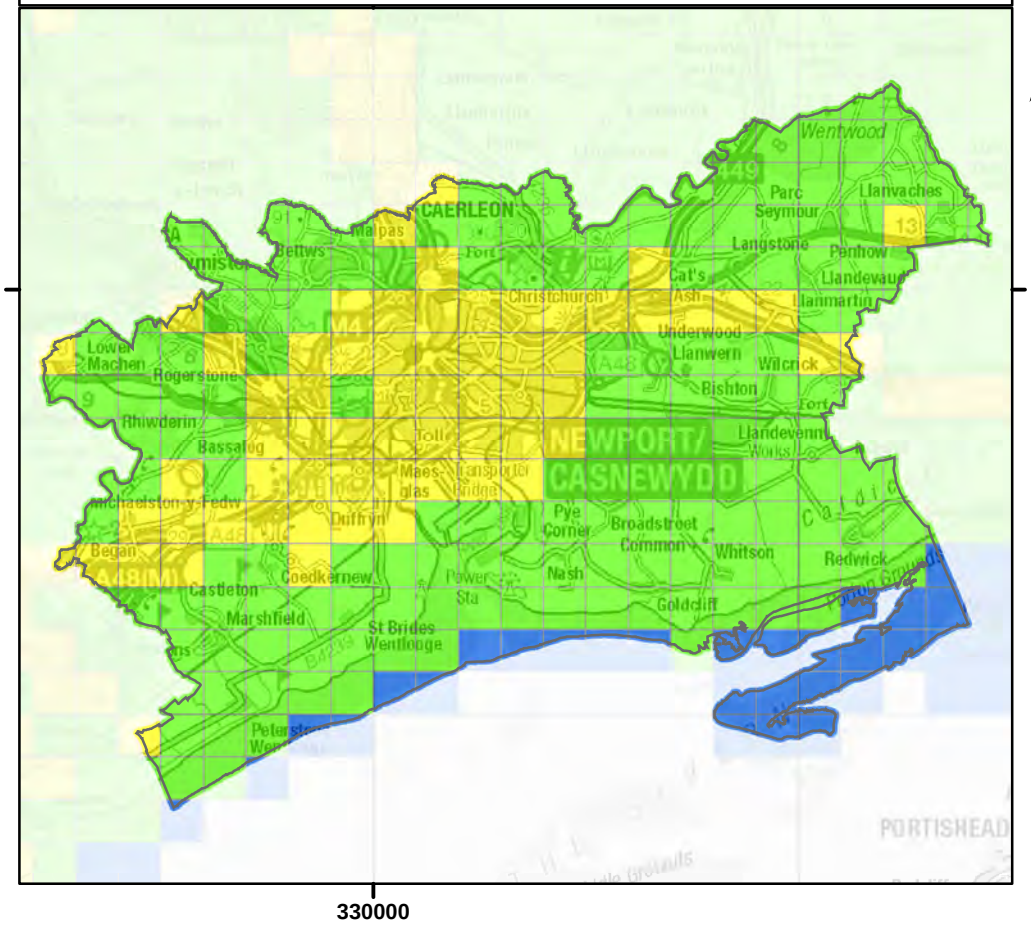
Aquifer Designation Maps

However, for uncoloured areas on the superficial (drift) designation map you will not be able to distinguish between areas of unproductive strata and areas where no drift is present. To do this you will need to consult the published geological survey maps.

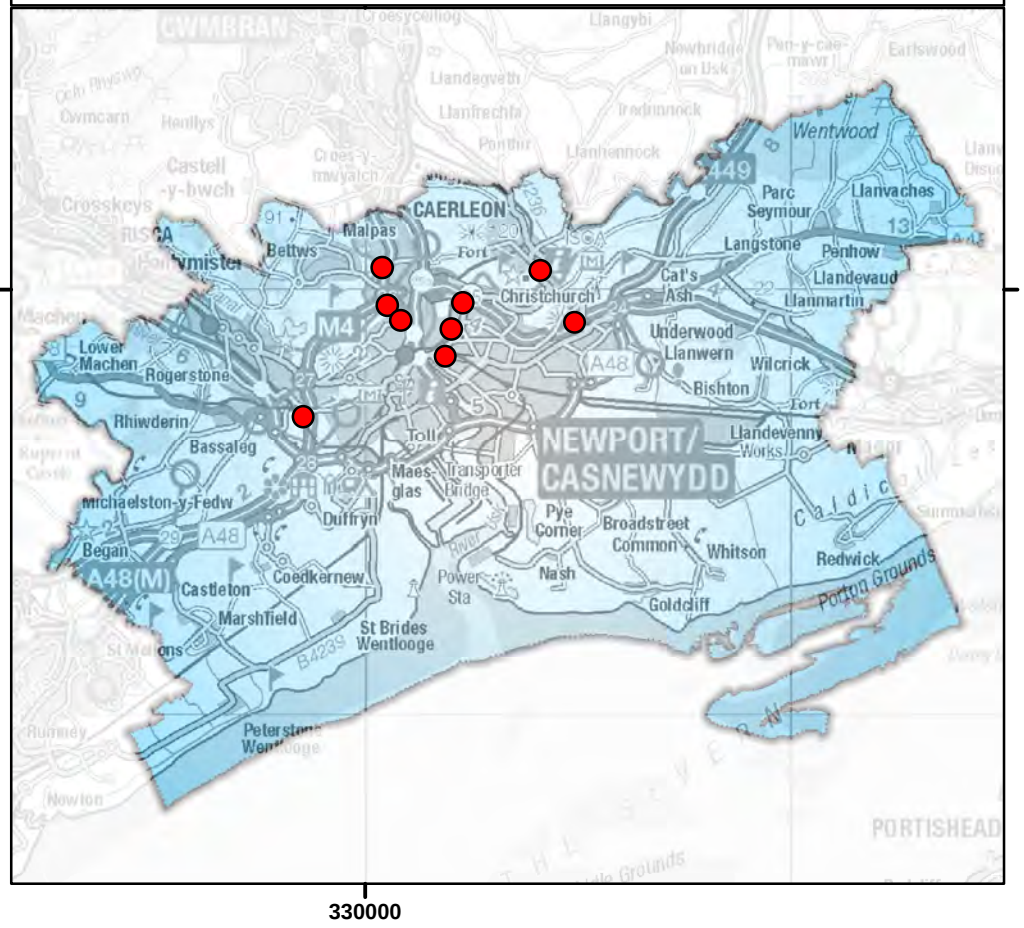
Links to further information

Environment Agency website - Aquifer designations
http://www.environment-agency.gov.uk/homeandleisure/117020.aspx

Particulate Concentrations: PM10 ug/m3



Air Quality Management Areas



Air Quality: Modelled Annual Mean Concentrations for PM10 (2010)

and

Air Quality Management Area Locations

Air Quality

PM10

- <=5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 30
- Local Authority Boundary

Legend

Air Quality Management Areas

- Air Quality Management Area
- Local Authority Boundary

Air Quality Management Areas are as known at February 2014

Cyfoeth Naturiol Cymru Natural Resources Wales

3 1.5 0 3 Km

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Air Quality: Modelled Concentrations of PM_{10}

Particulate Matter (PM_{10})

The PM_{10} concentration map shows modelled annual mean concentrations for PM_{10} mapped to a 1km grid. The data is produced by Ricardo-AEA for Defra and is based on modelled emissions to the atmosphere from UK sources from the National Atmospheric Emissions Inventory (NAEI) together with measured concentrations. The data is available from http://uk-air.defra.gov.uk/ under the Open Government Licence http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2/.

This map should only be used as an indication of the level of the substance in the local environment. This map is meant to be used at an aggregated scale towards the local authority level and errors may be found when looking at single 1km x 1km cells themselves. The aggregation of this data over a 10km radius is thought to be valid and the map does provide an indication of the spatial distribution of each substance. However, care should be taken to not 'over interpret' the data shown.

Particulate matter is generally categorised on the basis of the size of the particles, PM_{10} being particles with a diameter of less than 10µm. Particulate matter is made up of a wide range of materials and is produced by a variety of processes such as combustion (eg in vehicle engines), mechanical breakdown of hard materials (e.g. quarrying) and natural sources (e.g. sea salt). As well as primary particles emitted directly into the atmosphere there can be secondary particles formed by chemical reactions in the air.

Both short-term and long-term exposure to ambient levels of PM are consistently associated with respiratory and cardiovascular illness and mortality as well as other ill-health effects.

The current UK National Air Quality Strategy objectives and Air Quality Standards (Wales) 2010 Regulations limit values for PM10 are a concentration of less than 40 µg m^{-3} measured as an annual mean and 50 µg m^{-3} measured as a 24 hour mean (not to be exceeded more than 35 times per year). We have mapped the available data for the annual mean concentrations, but do not have access to modelled estimates of the daily averages.

Links to further information:

Air Quality on the GOV.UK website

https://www.gov.uk/government/policies/protecting-and-enhancing-our-urban-and-natural-environment-to-improve-public-health-and-wellbeing

Air Quality on the Welsh Government website

http://wales.gov.uk/topics/environmentcountryside/epq/airqualitypollution/airquality/

UK-AIR: Defra's air information resource

http://uk-air.defra.gov.uk/

Air Quality: Air Quality Management Areas (AQMA)

Air Quality Management Areas (AQMA)

Local Authorities are required to ensure that local air quality meets national standards. If not, they must take action to improve air quality.

Since December 1997, local authorities have been carrying out a review and assessment of air quality in their area. This involves measuring air pollution and trying to predict how it will change in the next few years. The aim of the review is to make sure that the national air quality objectives will be achieved throughout the UK by the relevant deadlines. These objectives have been put in place to protect people's health and the environment.

If a local authority finds any places where the objectives are not likely to be achieved, it must declare an Air Quality Management Area there. This area could be just one or two streets, or it could be much bigger. Then the local authority will put together a plan to improve the air quality - a Local Air Quality Action Plan.

AQMAs have been declared in Wales for PM_{10} and NO_2.

Some links to further information:

Welsh Government – Air Quality
http://new.wales.gov.uk/topics/environmentcountryside/epq/airqualitypollution/

StatsWales – State of the Environment indicator: number of people living in Air Quality Management Areas
http://statswales.wales.gov.uk/

(StatsWales Home>Environment and Countryside> State of the Environment> Environmental Hazards)

Defra – Air Quality Management Areas http://aqma.defra.gov.uk/

Nitrogen Oxides (NO and NO_2)

Nitric oxide (NO) is mainly derived from road transport emissions and other combustion processes such as the electricity supply industry. NO is not considered to be harmful to health. However, once released to the atmosphere, NO is usually very rapidly oxidised to nitrogen dioxide (NO_2), which is harmful to health. NO_2 and NO are both oxides of nitrogen and together are referred to as nitrogen oxides (NOx).

Nitrogen dioxide can irritate the lungs and lower resistance to respiratory infections such as influenza. Continued or frequent exposure to concentrations that are typically much higher than those normally found in the ambient air may cause increased incidence of acute respiratory illness in children.

High levels of NOx can have an adverse effect on vegetation, including leaf or needle damage and reduced growth. Deposition of pollutants derived from NOx emissions contribute to acidification and/or eutrophication of sensitive habitats leading to loss of biodiversity, often at locations far removed from the original emissions. NOX also contributes to the formation of secondary particles and ground level ozone, both of which are associated with ill-health effects. Ozone also damages vegetation.

The current UK National Air Quality Strategy objectives for nitrogen dioxide are a concentration of 200 µg m^{-3} measured as a 1 hour mean not to be exceeded more than 18 times a year and an annual mean of 40 µg m^{-3} not to be exceeded.

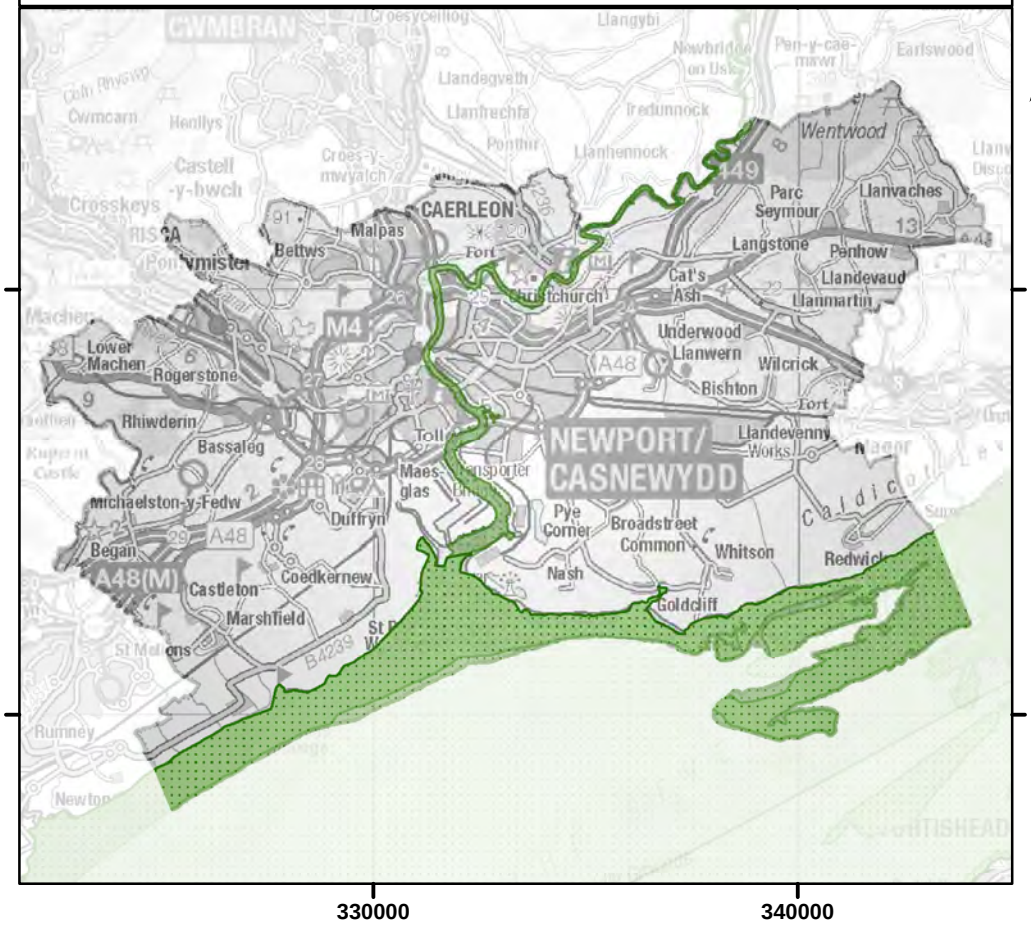
The table on the following page shows Air Quality Management Areas in the planning authority area (as at February 2014).

Air Quality: Air Quality Management Areas (AQMA) in Newport

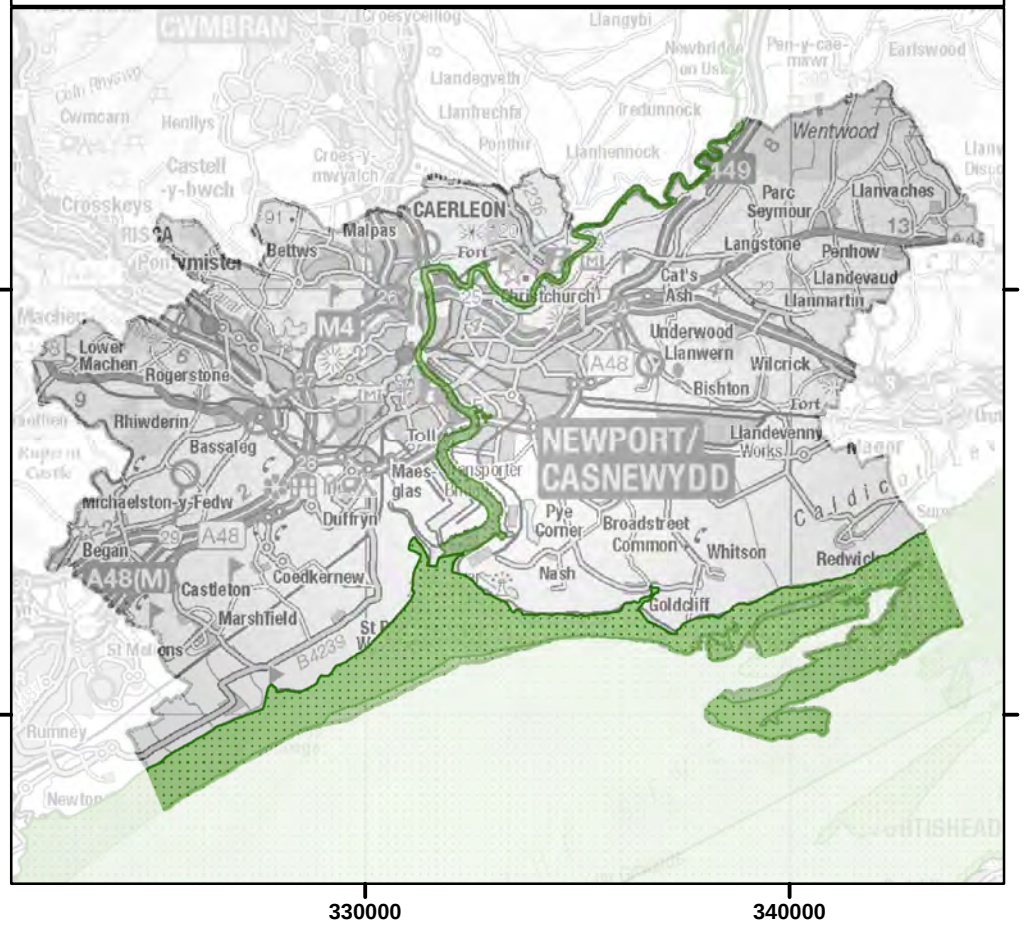
AQMA name	Local Authority	pollutant	standards	original year of designation	alias
Newport City Council Malpas Road AQMA 2011	Newport City Council	NO2	Annual mean > 40	2011	Malpas Road (Graig Park Road and Graig Park Avenue)
Newport City Council Chepstow Road Air Quality Management Area Order 2011	Newport City Council	NO2	Annual mean > 40	2011	
Caerleon High Street AQMA	Newport City Council	NO2	Annual mean > 40	2005	
Royal Oak Hill AQMA	Newport City Council	NO2	Annual mean > 40	2005	Buckland College
Caerleon Road AQMA	Newport City Council	NO2	Annual mean > 40	2005	
Malpas Road AQMA	Newport City Council	NO2	Annual mean > 40	2005	
St Julians AQMA	Newport City Council	NO2	Annual mean > 40	2002	Denbigh Road
Shaftesbury/Crindau AQMA	Newport City Council	NO2	Annual mean > 40	2002	Crindau
Glasllwch AQMA	Newport City Council	NO2	Annual mean > 40	2002	Bassleg Road

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Acid Deposition



Nitrate Deposition



Natura 2000 Sites
Air Quality Impacts

Modelled Predictions for 2010

Legend

- Acid Critical Load - Exceeded
- Acid Critical Load - Not Exceeded
- Local Authority
- Nitrate Critical Load - Exceeded
- Nitrate Critical Load - Not Exceeded
- Local Authority

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Natural Resources Wales

0 1.25 2.5 5
Km

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Critical Loads - Acid Deposition and Nitrate Deposition

Acid deposition includes both wet and dry deposition of pollutants from the atmosphere that have the potential to acidify soils and freshwaters. The pollutants include sulphur dioxide (SO_2), nitrogen oxides (NOx) and ammonia (NH_3).

Nitrogen deposition is the deposition of mainly nitrogen oxides (NOx) and ammonia (NH_3) from the atmosphere to land. Total deposition is the combination of both wet and dry deposition. Nitrogen deposition refers to the pollutant dose that may lead to eutrophication.

In order to decipher whether acid or nitrogen deposition is having a negative effect on an ecosystem, or an aspect of an ecosystem, critical loads are set for individual habitats, for example a woodland or a bog, and species, for example a moss or a freshwater plant. Critical load relates to the quantity of a pollutant deposited from air to ground. Where deposition is less than a critical load it can be concluded that deposition is not having a negative effect on specified sensitive elements of the environment. The critical load is the threshold level for the deposition of a pollutant above which harmful indirect effects can be shown on a habitat or species. If deposition is greater than the critical load then it is deemed as an exceedance of critical load.

The effects of acid deposition vary according to habitat or species. In general where acid deposition is high there is a decrease in overall biodiversity. Woodland habitats see a decline in general tree health and trees can become more susceptible to stresses such as drought and frost. Mosses, lichens and bryophytes are most at risk of damage from acidification and are often used as bio-indicators in order to establish whether acid deposition is having a negative effect. Acidification of freshwaters leads to a reduction in biodiversity - as pH falls the number of species of invertebrates and fish falls. Loss of invertebrates and fish leads to a reduction in available food supply affecting fauna further up the food chain.

Nitrogen deposition can lead to the eutrophication of an ecosystem where plant species that are more tolerant of higher nitrogen levels dominate, reducing plant diversity, both on terrestrial sites and in the freshwater environment. A reduction in plant diversity will have knock on effects where fauna diversity will also decrease.

The main sources of sulphur deposition in the UK are large point sources such as power stations and refineries. Deposition from large, national and international sources is known as long range deposition. However there are local sources of sulphur, such as local point sources and transport.

The largest source of nitrogen deposition in the UK is from livestock emissions. Other large sources are emissions from transport - sites that are in close proximity to major roads can be subject to high levels of NOx.

Critical Loads are modelled using the National Critical Loads database. We talk about status as at 2010 because this is the date set in the Habitats directive for the end of Habitats review of consents.

Natura 2000 is the European Union-wide network of protected areas, recognised as ‘sites of Community importance’ under the EC Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora). The Natura 2000 network includes two types of designated areas: Special Areas of Conservation (SAC) and Special Protection Areas (SPA). SACs are designated under the EC Habitats Directive and SPAs are classified under the EC Wild Birds

Directive (Council Directive 79/409/EEC on the conservation of wild birds).

Some links to further information:

APIS provides a comprehensive source of information on air pollution and the effects on habitats and species. APIS has been developed in partnership by the UK conservation agencies and regulatory agencies and the Centre for Ecology and Hydrology

http://www.apis.ac.uk

http://www.apis.ac.uk/starters-guide-air-pollution

Critical Loads & Dynamic Modelling http://cldm.defra.gov.uk/

Natura 2000 sites on our website

http://naturalresourceswales.gov.uk/our-work/policy-advice-guidance/designated-sites

Joint Nature Conservation Committee information about protected sites, Special Areas of Conservation (SAC) and Special Protection Areas (SPA)

http://www.jncc.gov.uk/page-4

Welsh Index of Multiple Deprivation: Air Quality

The Welsh Index of Multiple Deprivation

The Welsh Index of Multiple Deprivation 2011 (WIMD) is the official measure of deprivation at the small area level in Wales. WIMD was developed for the Welsh Government by the Welsh Government Statistical Directorate and the Local Government Data Unit (Wales).

More information can be found in the Welsh Government's Welsh Index of Multiple Deprivation 2011: Summary Report
http://wales.gov.uk/statistics-and-research/welsh-index-multiple-deprivation

There are eight domains, or kinds, of deprivation included in the overall index of deprivation: Income; Employment; Education; Health; Access to services; Housing; Physical environment and Community safety.

Natural Resources Wales provides the data for the physical environment domain.

The physical environment domain of the WIMD index incorporates four indicators: air quality (concentrations of air pollutants), emissions of air pollutants, flood risk and proximity to regulated sites i.e. waste disposal and industrial sites.

Air Quality

Air quality is believed to be a good proxy measure of the quality of the surrounding environment. Poor air quality suggests proximity to certain activities such as traffic, domestic combustion and industrial sites – activities that could have a negative impact on quality of life, the local environment and health.

The Air Quality indicator uses data on concentrations of pollutants (benzene, nitrogen dioxide, sulphur dioxide, particulates, carbon monoxide and ozone) and Air Quality Management Area data.

More information on how the index was produced can be found in *Welsh Index of Multiple Deprivation 2008: Technical Report* and the *Welsh Index of Multiple Deprivation 2011: Summary of Methodological Changes*.
http://wales.gov.uk/statistics-and-research/welsh-index-multiple-deprivation

Air Emissions

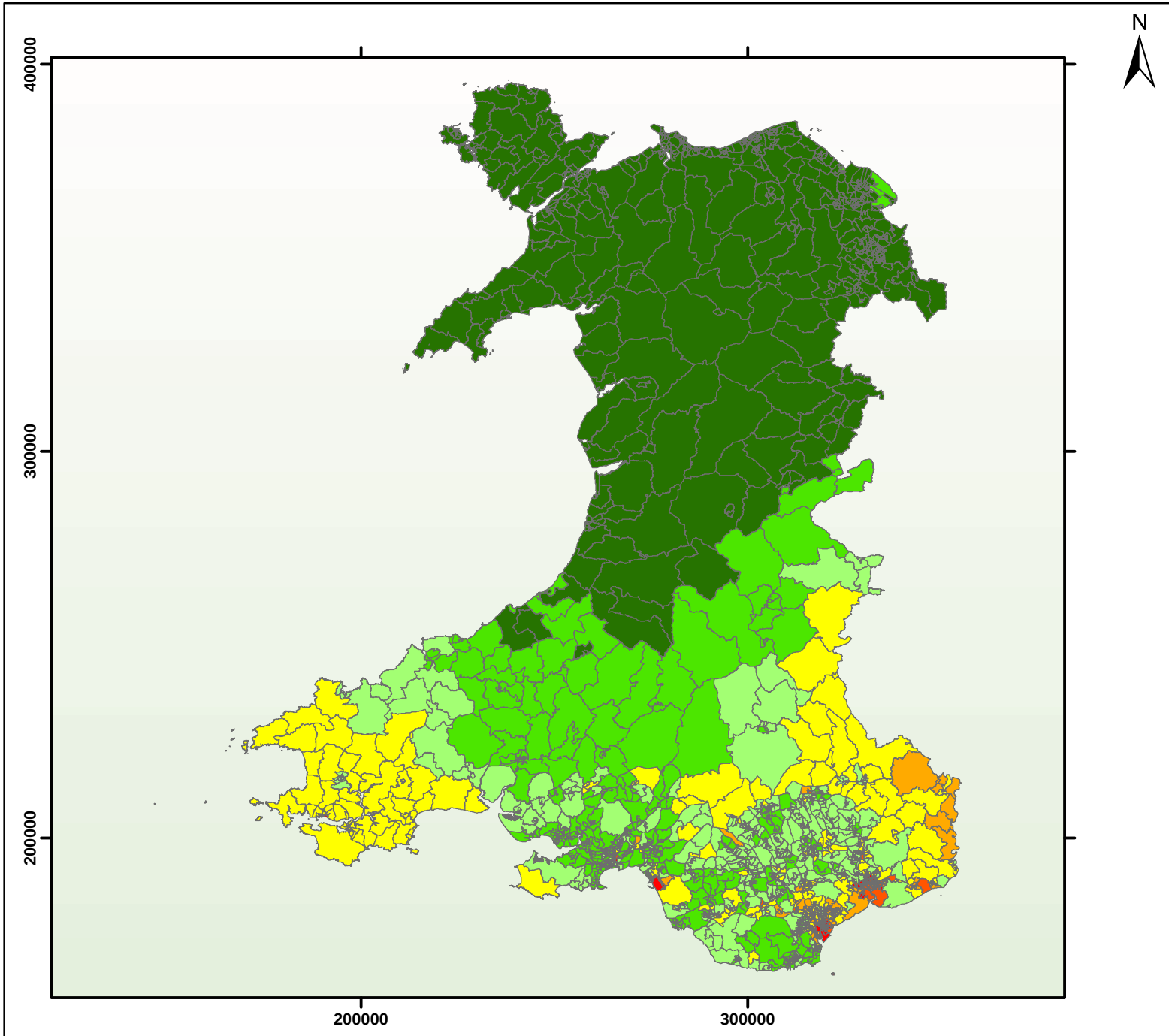
Air quality is the preferred measure of risks from air pollution but air emissions data provides a good set of complementary data covering pollutants that are not included in the Air Quality indicator. Emissions data are good indicators of proximity to polluting activities. More information on how the index was produced can be found in Welsh Index of Multiple Deprivation 2008: Technical Report.
http://wales.gov.uk/docs/statistics/2009/090319wimdtechreport09en.pdf

The four maps in the following pages show:

- Lower Layer Super Output Areas (LSOA) in Wales and the position of the LSOA within the index for Air Quality
- Lower Layer Super Output Areas (LSOA) in the Local Authority and the position of the LSOA within the index for Air Quality
- Lower Layer Super Output Areas (LSOA) in Wales and the position of the LSOA within the index for Air Emissions
- Lower Layer Super Output Areas (LSOA) in the Local Authority and the position of the LSOA within the index for Air Emissions

The areas shown in red have the most significant air quality issues.

Note: For more information on LSOAs and what they are, see http://www.neighbourhood.statistics.gov.uk NeSS Geography.



Welsh Index of Multiple Deprivation (WIMD): Population Averaged Air Quality Concentration Index

WIMD 2011

Legend

Position of LSOA within Index

Percentile

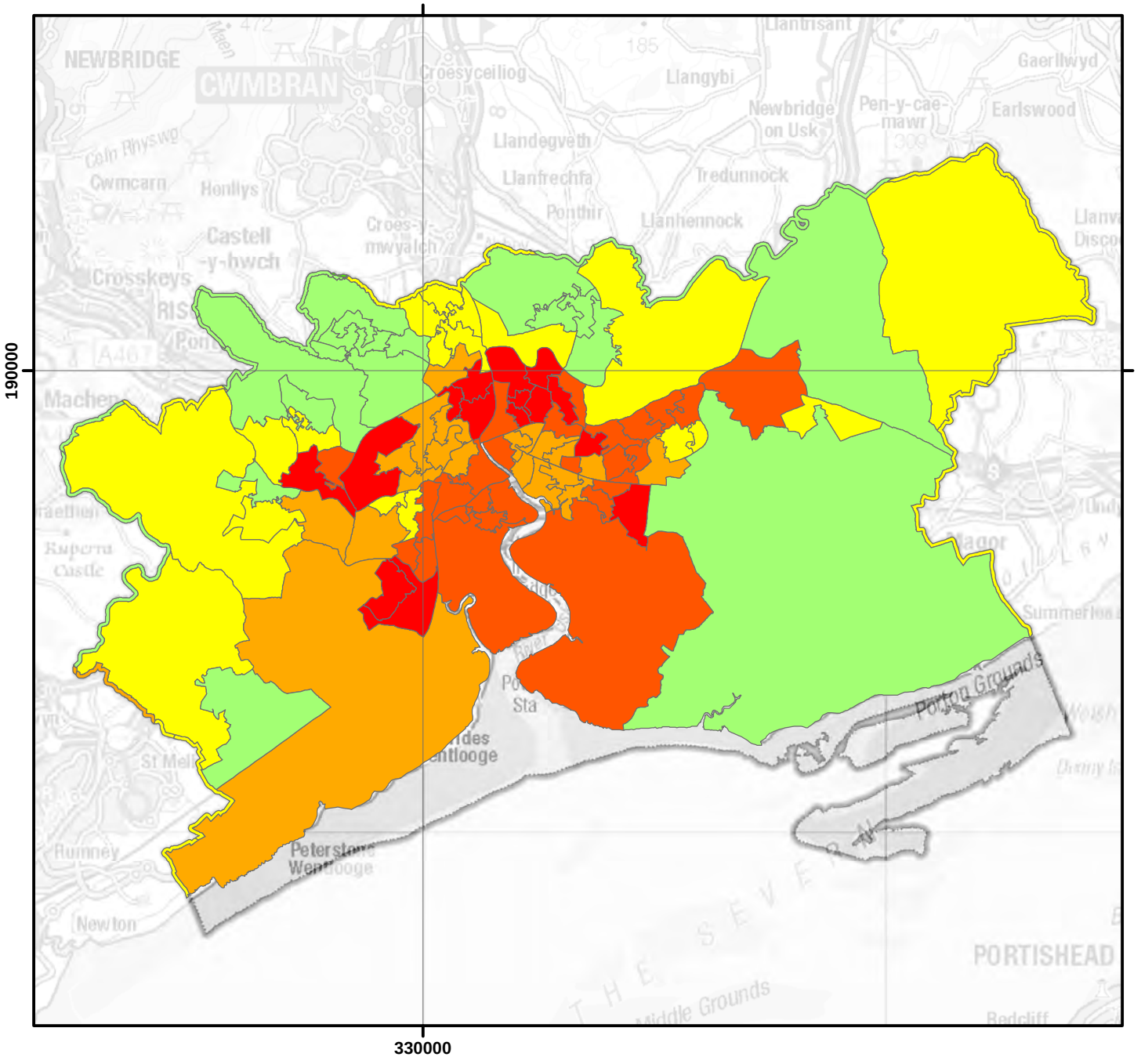
- 2.5 % (most deprived)
- 5 %
- 10 %
- 25 %
- 50 %
- 75 %
- 100 % (least deprived)

Communities with the most significant air quality issues in relation to population are shown in red

Cyfoeth Naturiol Cymru
Natural Resources Wales

0 15 30 60
Km

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Welsh Index of Multiple Deprivation (WIMD): Population Averaged Air Quality Concentration Index

WIMD 2011

Legend

Position of LSOA within Index

Percentile

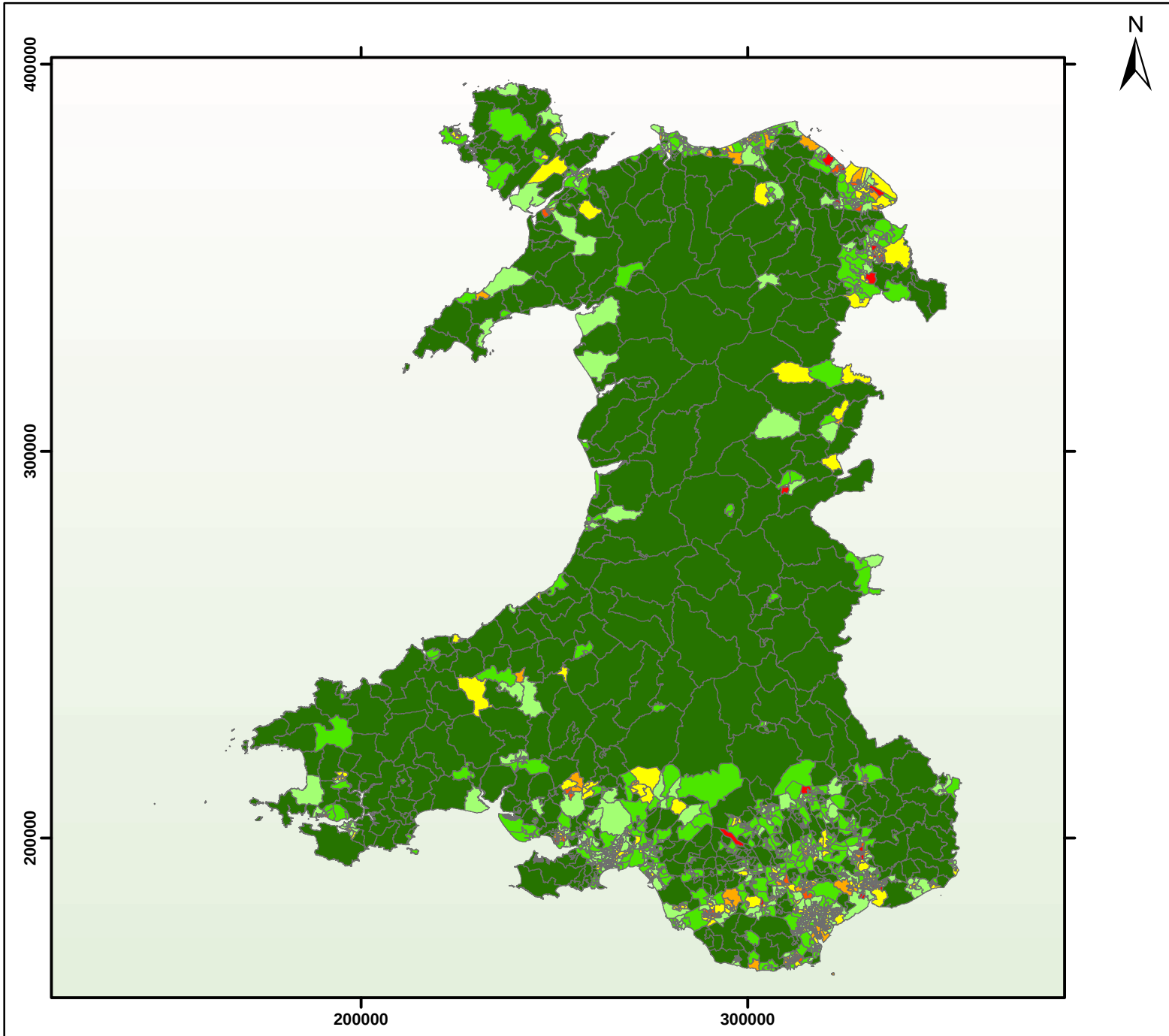
- 2.5 % (most deprived)
- 5 %
- 10 %
- 25 %
- 50 %
- 75 %
- 100 % (least deprived)
- Local Authority

Communities with the most significant air quality issues in relation to population are shown in red.

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0 1.25 2.5 5
Km

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Welsh Index of Multiple Deprivation (WIMD): Population Averaged Air Emissions Index

WIMD 2011

Legend

Position of LSOA within Index

Percentile

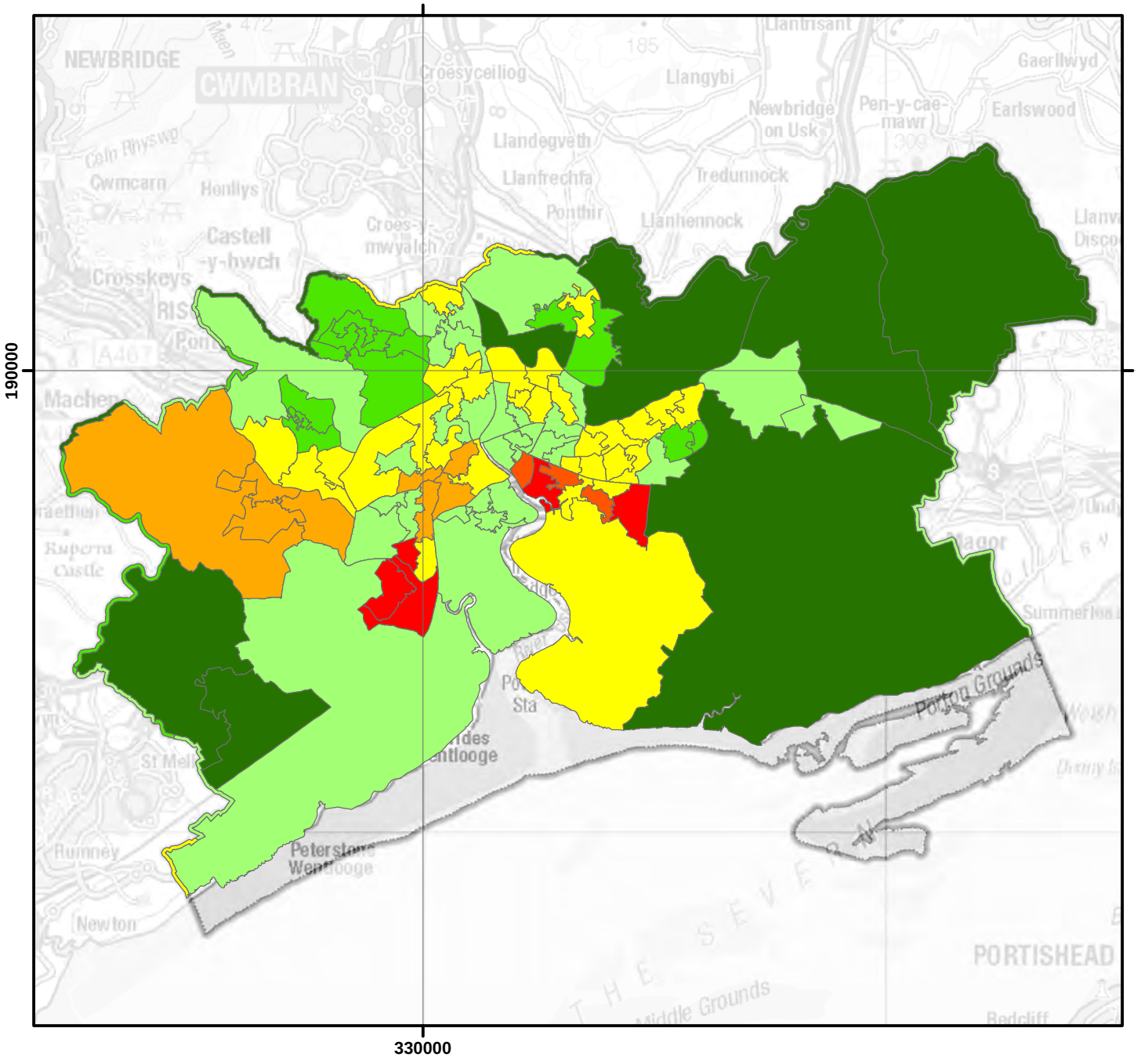
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- 5 %
- 10 %
- 25 %
- 50 %
- 75 %
- 100 % (least deprived)

Communities with the most significant air quality issues in relation to population are shown in red

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Natural Resources Wales

0 15 30 60
Km

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Welsh Index of Multiple Deprivation (WIMD): Population Averaged Air Emissions Index

WIMD 2011

Legend

Position of LSOA within Index

Percentile

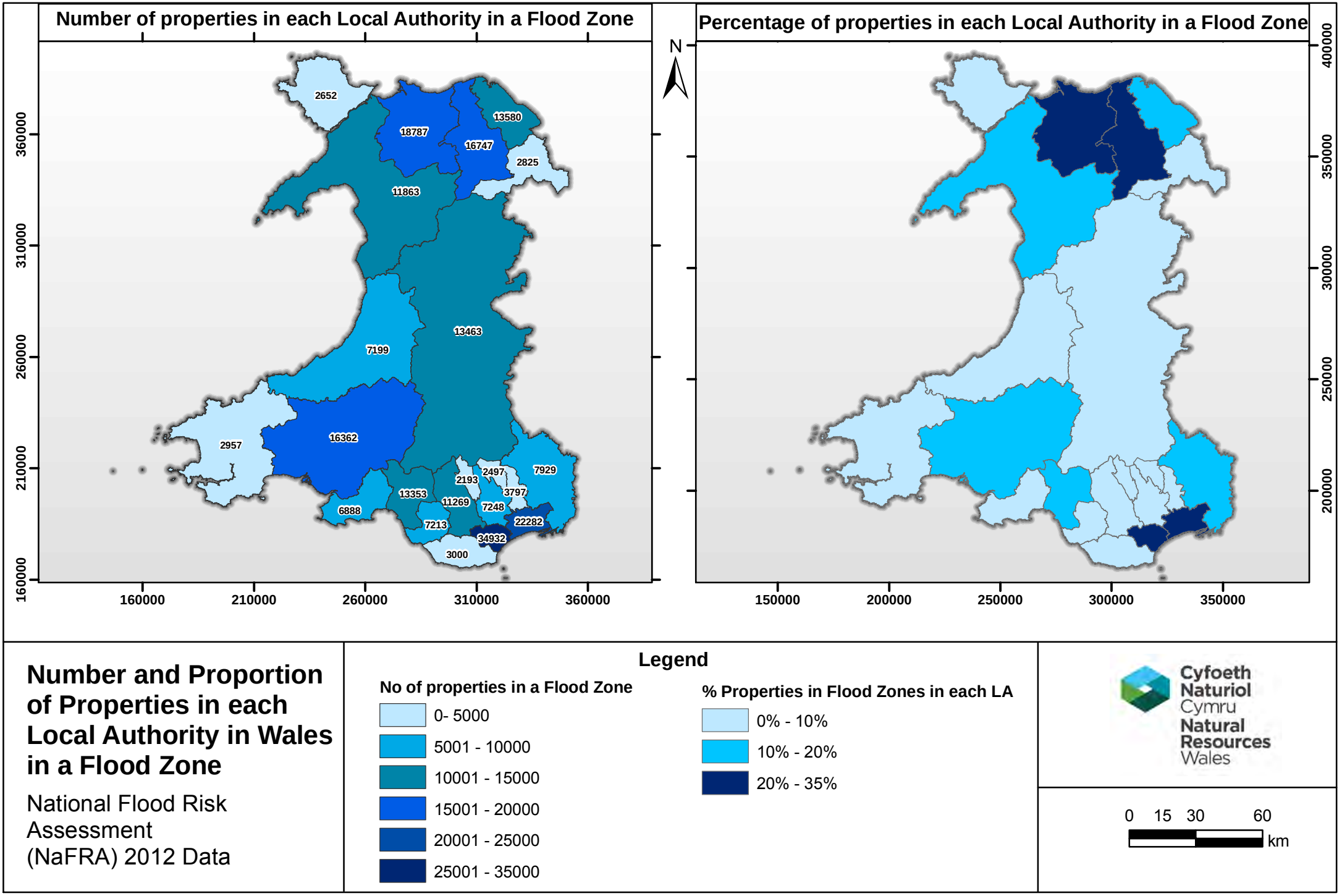
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- 5 %
- 10 %
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- 50 %
- 75 %
- 100 % (least deprived)
- Local Authority

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Cyfoeth Naturiol Cymru
Natural Resources Wales

2.5 1.25 0 2.5
Km

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Number and Proportion of Properties in each Local Authority in Wales in a Flood Zone

National Flood Risk Assessment (NaFRA) 2012 Data

Legend

No of properties in a Flood Zone

- 0- 5000
- 5001 - 10000
- 10001 - 15000
- 15001 - 20000
- 20001 - 25000
- 25001 - 35000

% Properties in Flood Zones in each LA

- 0% - 10%
- 10% - 20%
- 20% - 35%

Cyfoeth Naturiol Cymru
Natural Resources Wales

0 15 30 60
km

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Flooding: Impact on Wales

The impact of flooding on Wales

Floods and coastal erosion are the greatest natural threats to the people, economy and environment of Wales.

Across Wales around 220,000 properties are currently at risk of flooding from rivers and the sea. Around half a million, out of a population of 3 million, live and work on the flood plains in Wales. The potential annual economic risk to residential and business properties and their contents was estimated at £200 million in April 2008. Commercial, industrial and key infrastructure, like power supplies, communication systems, transport links, emergency services and schools are situated on land at risk of flooding and estimated to be worth over £8 billion.

Climate change is expected to increase river flooding, cause sea level rise and increase the flood and coastal erosion risk. The 2004 Foresight Future Flooding report suggested that the annual economic damages in Wales will rise from £70 million in 2004 to £1,235 million in the 2080s under the most likely scenario. However, as the Stern Report found, taking action now can reduce the longer term total economic damage.

Risk of flooding from rivers and the sea

The maps on the previous page show the number of properties in each local authority and the proportion of properties in each local authority at risk of flooding.

The information shown on these maps comes from our National Flood Risk Assessment (NAFRA) data. NAFRA takes into account the effect of existing flood defences.

Flood Hazard and Risk Maps

Our Flood Risk Maps show what is at risk of flooding in across Wales as of December 2013: number of people, properties, economic activity; and natural and historic areas of environmental importance. Our Flood Hazard Maps show how deep and fast the flood water may be.

Risk of Flooding from Rivers and the Sea Hazard and Risk Maps

These maps were produced using NAFRA and our National Receptor Database. They show the risk of flooding from each river catchment and from the sea, taking into account existing flood defences.

Risk of Flooding from Surface Water Hazard and Risk Maps

These maps were produced using the Updated Flood Map for Surface Water and our National Receptor Database. They show the risk from surface water flooding – where water from heavy rainfall cannot drain or flow away quickly enough.

Risk of Flooding from Reservoirs Map

These maps show the modelled risk of flooding in the unlikely event that a reservoir fails.

Flood risk information on our website:
http://naturalresourceswales.gov.uk/alerts/whats-my-flood-risk

Welsh Index of Multiple Deprivation: Flood Risk

The Welsh Index of Multiple Deprivation

The Welsh Index of Multiple Deprivation 2011 (WIMD) is the official measure of deprivation at the small area level in Wales. WIMD was developed for the Welsh Government by the Welsh Government Statistical Directorate and the Local Government Data Unit (Wales).

More information can be found in the Welsh Government's Welsh Index of Multiple Deprivation 2011: Summary Report
http://wales.gov.uk/statistics-and-research/welsh-index-multiple-deprivation

There are eight domains, or kinds, of deprivation included in the overall index of deprivation: Income; Employment; Education; Health; Access to services; Housing; Physical environment and Community safety.

Natural Resources Wales is involved in the production of the physical environment domain index.

The physical environment domain of the WIMD index incorporates four indicators: air quality (concentrations of air pollutants), emissions of air pollutants, flood risk and proximity to regulated sites i.e. waste disposal and industrial sites.

Flood Risk

Those who suffer flooding have a significant lowering of quality of life that can last for a number of years. Homes in areas that suffer increased flood risk will often have significantly higher insurance premiums, potentially leading to higher financial hardship in these areas. It is likely that economically and socially deprived areas will take longer to recover from flood events.

Flood risk calculations and maps were based on the 2009 NAFRA database which includes flood risk, taking into account flood defences where these are known. Different levels of risk were taken into account, as is done with insurance companies, with 3 levels of risk; significant, moderate and low risk. The risk is based on frequency rather than level of damage caused by any flooding.

More information on how the index was produced can be found in *Welsh Index of Multiple Deprivation 2011: Technical Report* and the *Welsh Index of Multiple Deprivation 2011: Summary of Methodological Changes*.
http://wales.gov.uk/statistics-and-research/welsh-index-multiple-deprivation

More information on flood risk assessment and the NAFRA database can be found in *Flooding in Wales – National Assessment of Flood Risk*

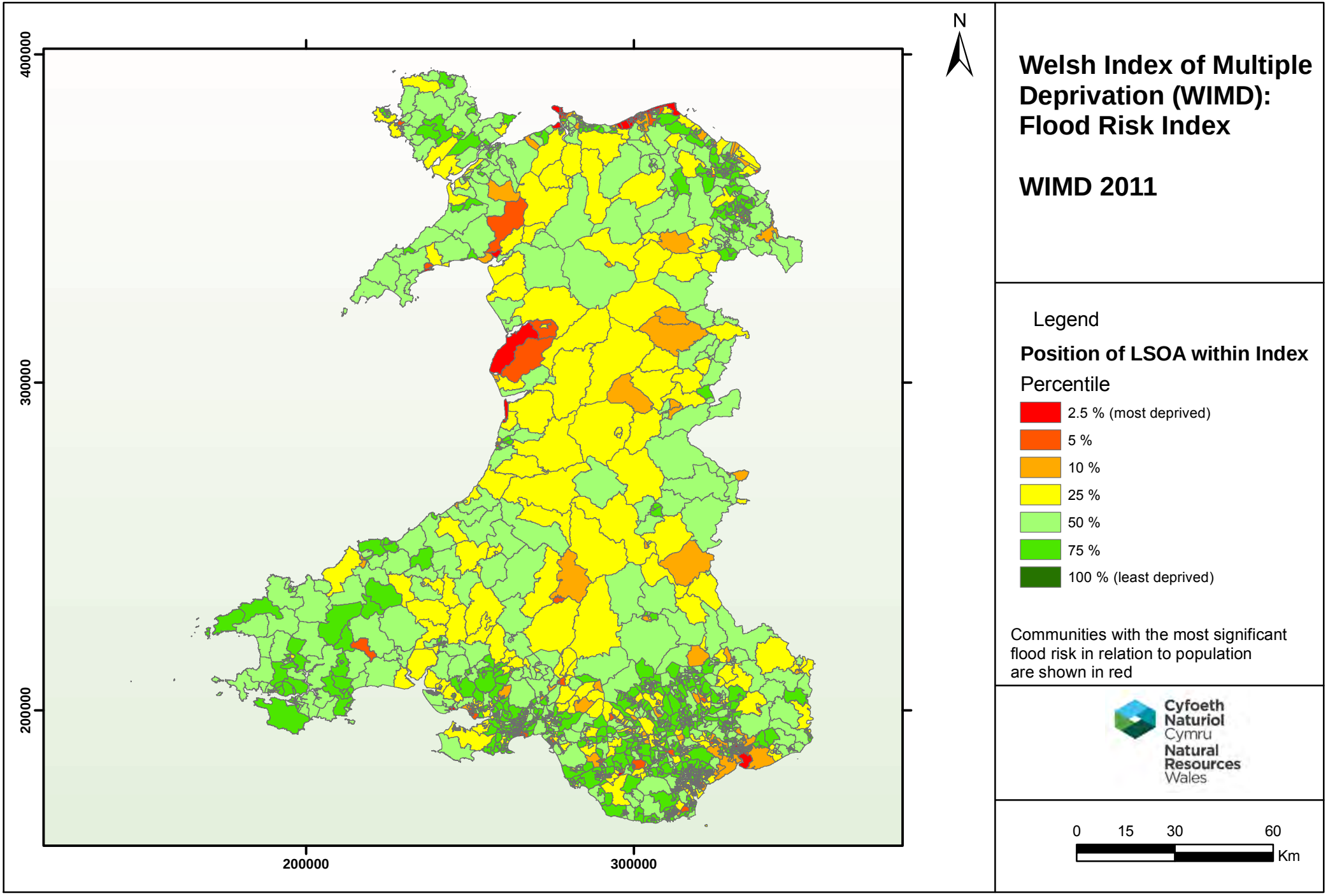
http://wales.gov.uk/topics/environmentcountryside/epq/flooding/studies/nationalassessment.

The two maps in the following pages show:

- Lower Layer Super Output Areas (LSOA) in Wales and the position of the LSOA within the index for Flood Risk
- Lower Layer Super Output Areas (LSOA) in the Local Authority and the position of the LSOA within the index for Flood Risk

The areas shown in red have the most significant flood risk in relation to population.

The WIMD: Flood Risk Index by LSOA table after the maps shows how each LSOA in the planning authority is ranked within Wales for flood risk. Low rank corresponds to relatively high flood risk.



Welsh Index of Multiple Deprivation (WIMD): Flood Risk Index

WIMD 2011

Legend

Position of LSOA within Index

Percentile

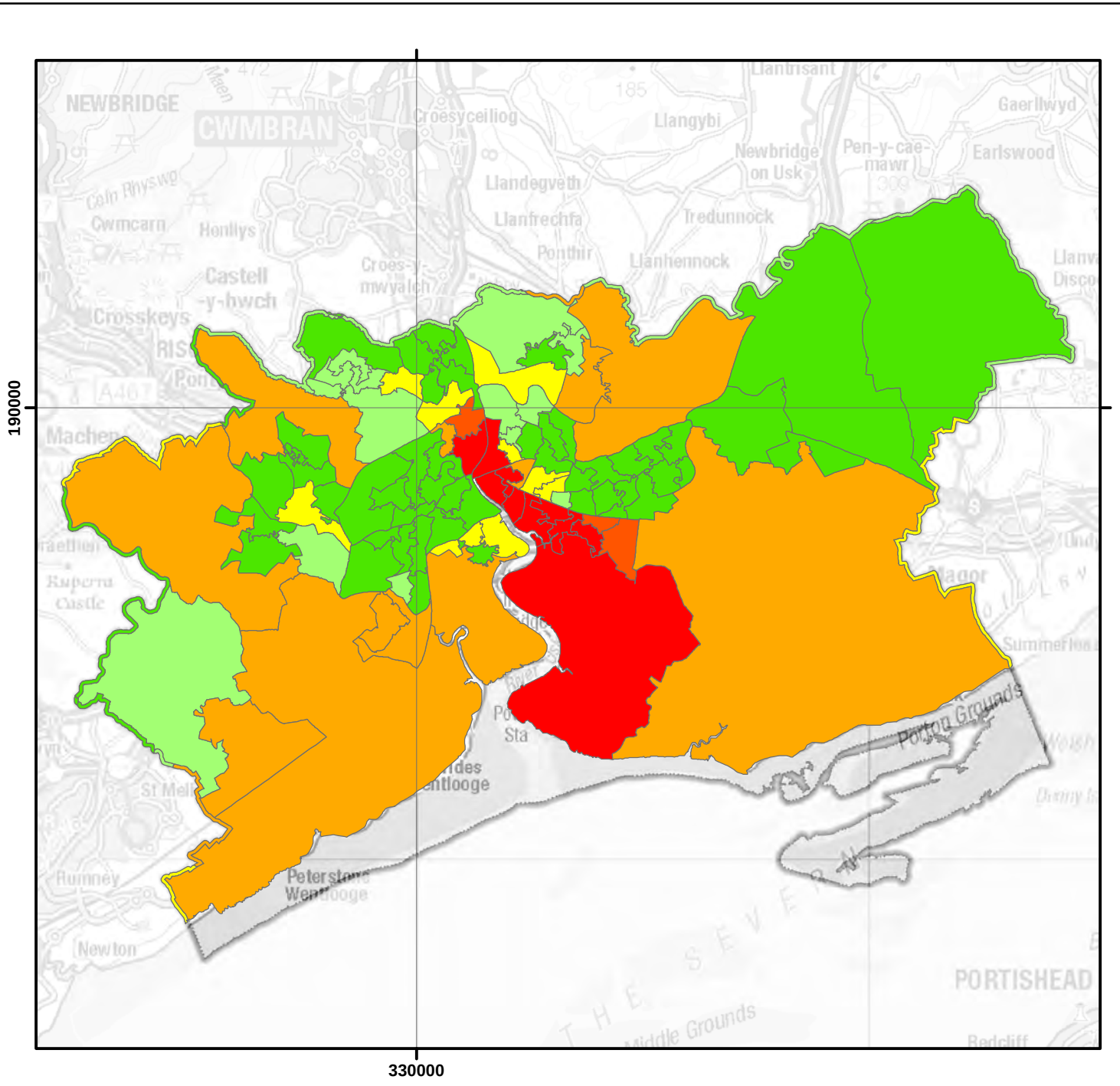
- 2.5 % (most deprived)
- 5 %
- 10 %
- 25 %
- 50 %
- 75 %
- 100 % (least deprived)

Communities with the most significant flood risk in relation to population are shown in red

Cyfoeth Naturiol Cymru
Natural Resources Wales

0 15 30 60
Km

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Welsh Index of Multiple Deprivation (WIMD): Flood Risk Index

WIMD 2011

Legend

Position of LSOA within Index

Percentile

- 2.5 % (most deprived)
- 5 %
- 10 %
- 25 %
- 50 %
- 75 %
- 100 % (least deprived)
- Local Authority

Communities with the most significant flood risk in relation to population are shown in red.

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Natural Resources Wales

2 1 0 2
Km

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WIMD: Flood Risk Rank by Lower Super Output Area (LSOA)

This table shows how each LSOA in the planning authority is ranked within Wales for flood risk. Low rank corresponds to relatively high risk.

ONS = Office of National Statistics

LSOA Code	LSOA Name	ONS LSOA Name	Flood Risk - National Rank
W01001643	Liswerry 2	Newport 013B	10
W01001676	St. Julians 2	Newport 007B	11
W01001692	Victoria 3	Newport 011E	16
W01001642	Liswerry 1	Newport 013A	19
W01001644	Liswerry 3	Newport 013C	20
W01001690	Victoria 1	Newport 013D	21
W01001648	Liswerry 7	Newport 015G	23
W01001693	Victoria 4	Newport 013E	28
W01001681	Shaftesbury 1	Newport 006B	29
W01001647	Liswerry 6	Newport 015F	37
W01001646	Liswerry 5	Newport 015E	51
W01001683	Shaftesbury 3	Newport 006D	78
W01001645	Liswerry 4	Newport 015D	90
W01001689	Tredegar Park 2	Newport 019D	101
W01001688	Tredegar Park 1	Newport 019C	102
W01001656	Marshfield 1	Newport 020B	117
W01001660	Pillgwenlly 2	Newport 018B	125
W01001625	Caerleon 3	Newport 001C	135
W01001691	Victoria 2	Newport 011D	137
W01001636	Graig (Newport) 2	Newport 020A	145
W01001509	Llanyrafon South 2	Torfaen 013D	152
W01001684	Shaftesbury 4	Newport 006E	155
W01001658	Marshfield 3	Newport 020D	157
W01001670	Rogerstone 2	Newport 009B	166
W01001649	Llanwern 1	Newport 004D	178
W01001623	Caerleon 1	Newport 001A	183
W01001882	Trowbridge 6	Cardiff 011C	188
W01001661	Pillgwenlly 3	Newport 018C	208
W01001675	St. Julians 1	Newport 007A	209
W01001612	Beechwood 1	Newport 011B	211
W01001662	Pillgwenlly 4	Newport 018D	222
W01001413	Risca West 3	Caerphilly 017C	244
W01001885	Trowbridge 9	Cardiff 011D	264
W01001343	Bedwas, Trethomas and Machen 4	Caerphilly 021B	282

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LSOA Code	LSOA Name	ONS LSOA Name	Flood Risk - National Rank	ONS = Office of National Statistics
W01001573	Mill 2	Monmouthshire 011B	375	
W01001613	Beechwood 2	Newport 011C	384	
W01001682	Shaftesbury 2	Newport 006C	391	
W01001624	Caerleon 2	Newport 001B	423	
W01001618	Bettws (Newport) 2	Newport 003B	457	
W01001671	Rogerstone 3	Newport 016D	458	
W01001637	Graig (Newport) 3	Newport 016B	495	
W01001634	Gaer 6	Newport 019B	501	
W01001590	Shirenewton	Monmouthshire 009D	575	
W01001620	Bettws (Newport) 4	Newport 003D	587	
W01001657	Marshfield 2	Newport 020C	610	
W01001565	Llangybi Fawr	Monmouthshire 006D	622	
W01001877	Trowbridge 1	Cardiff 011A	639	
W01001611	Alway 6	Newport 011A	641	
W01001505	Llantarnam 2	Torfaen 013B	651	
W01001534	Two Locks 3	Torfaen 012C	737	
W01001680	St. Julians 6	Newport 007E	748	
W01001627	Caerleon 5	Newport 001E	763	
W01001678	St. Julians 4	Newport 005D	796	
W01001628	Caerleon 6	Newport 001F	801	
W01001677	St. Julians 3	Newport 007C	814	
W01001617	Bettws (Newport) 1	Newport 003A	823	
W01001542	Caerwent	Monmouthshire 009A	830	
W01001619	Bettws (Newport) 3	Newport 003C	852	
W01001621	Bettws (Newport) 5	Newport 003E	896	
W01001533	Two Locks 2	Torfaen 012B	914	
W01001687	Stow Hill 3	Newport 014D	953	
W01001659	Pillgwenlly 1	Newport 018A	977	
W01001419	St. James 1	Caerphilly 021D	986	
W01001843	Pontprennau/Old St. Mellons 4	Cardiff 003C	1007	
W01001641	Langstone 3	Newport 004C	1032	
W01001672	Rogerstone 4	Newport 009C	1038	
W01001609	Alway 4	Newport 015B	1060	
W01001622	Bettws (Newport) 6	Newport 003F	1092	
W01001655	Malpas 5	Newport 002E	1106	
W01001606	Alway 1	Newport 008A	1159	
W01001605	Allt-yr-yn 6	Newport 014A	1159	

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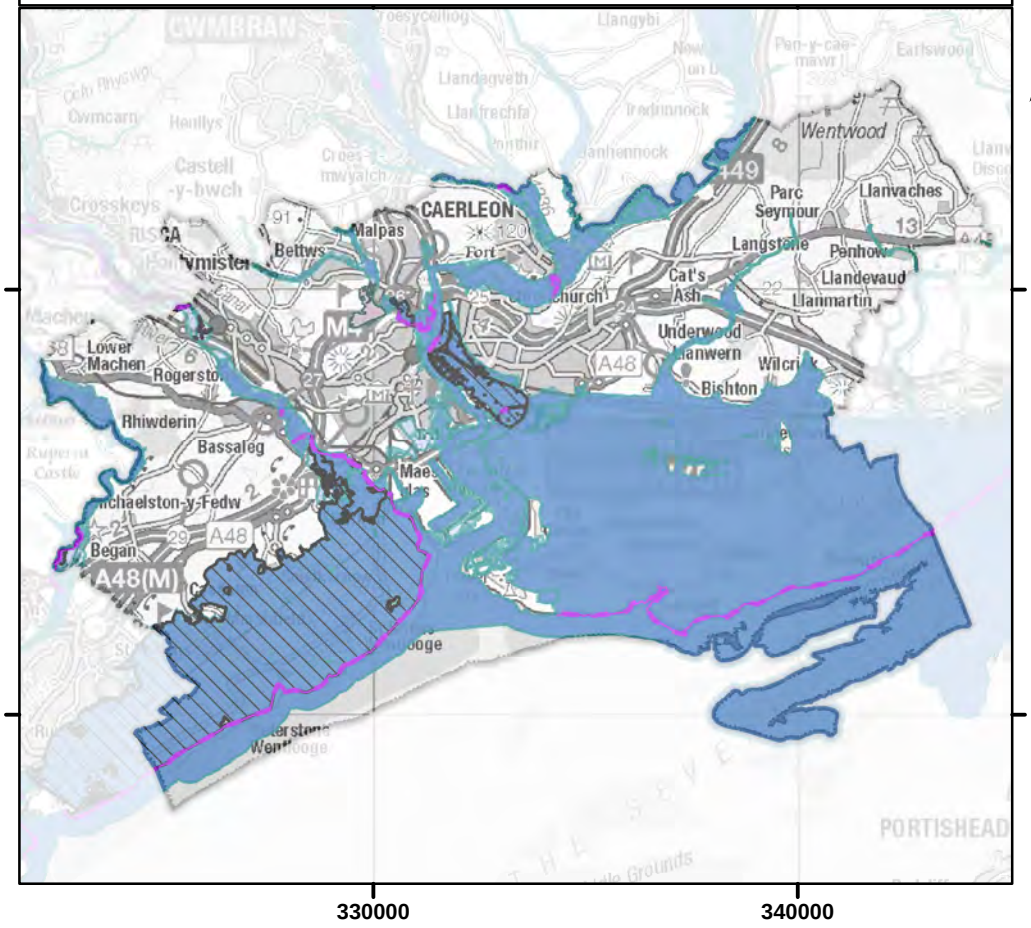
LSOA Code	LSOA Name	ONS LSOA Name	Flood Risk - National Rank	ONS = Office of National Statistics
W01001604	Allt-yr-yn 5	Newport 012D	1159	
W01001603	Allt-yr-yn 4	Newport 012C	1159	
W01001602	Allt-yr-yn 3	Newport 012B	1159	
W01001601	Allt-yr-yn 2	Newport 006A	1159	
W01001600	Allt-yr-yn 1	Newport 012A	1159	
W01001667	Ringland 5	Newport 010C	1159	
W01001669	Rogerstone 1	Newport 009A	1159	
W01001607	Alway 2	Newport 015A	1159	
W01001842	Pontprennau/Old St. Mellons 3	Cardiff 003B	1159	
W01001407	Risca East 1	Caerphilly 016A	1159	
W01001409	Risca East 3	Caerphilly 016C	1159	
W01001535	Two Locks 4	Torfaen 012D	1159	
W01001673	Rogerstone 5	Newport 009D	1159	
W01001410	Risca East 4	Caerphilly 016D	1159	
W01001674	Rogerstone 6	Newport 009E	1159	
W01001679	St. Julians 5	Newport 007D	1159	
W01001685	Stow Hill 1	Newport 014B	1159	
W01001686	Stow Hill 2	Newport 014C	1159	
W01001668	Ringland 6	Newport 010D	1159	
W01001653	Malpas 3	Newport 002C	1159	
W01001633	Gaer 5	Newport 019A	1159	
W01001632	Gaer 4	Newport 017D	1159	
W01001631	Gaer 3	Newport 017C	1159	
W01001630	Gaer 2	Newport 017B	1159	
W01001629	Gaer 1	Newport 017A	1159	
W01001638	Graig (Newport) 4	Newport 016C	1159	
W01001639	Langstone 1	Newport 004A	1159	
W01001626	Caerleon 4	Newport 001D	1159	
W01001650	Llanwern 2	Newport 004E	1159	
W01001608	Alway 3	Newport 008B	1159	
W01001652	Malpas 2	Newport 002B	1159	
W01001640	Langstone 2	Newport 004B	1159	
W01001654	Malpas 4	Newport 002D	1159	
W01001663	Ringland 1	Newport 008C	1159	
W01001616	Beechwood 5	Newport 005C	1159	
W01001615	Beechwood 4	Newport 005B	1159	
W01001614	Beechwood 3	Newport 005A	1159	

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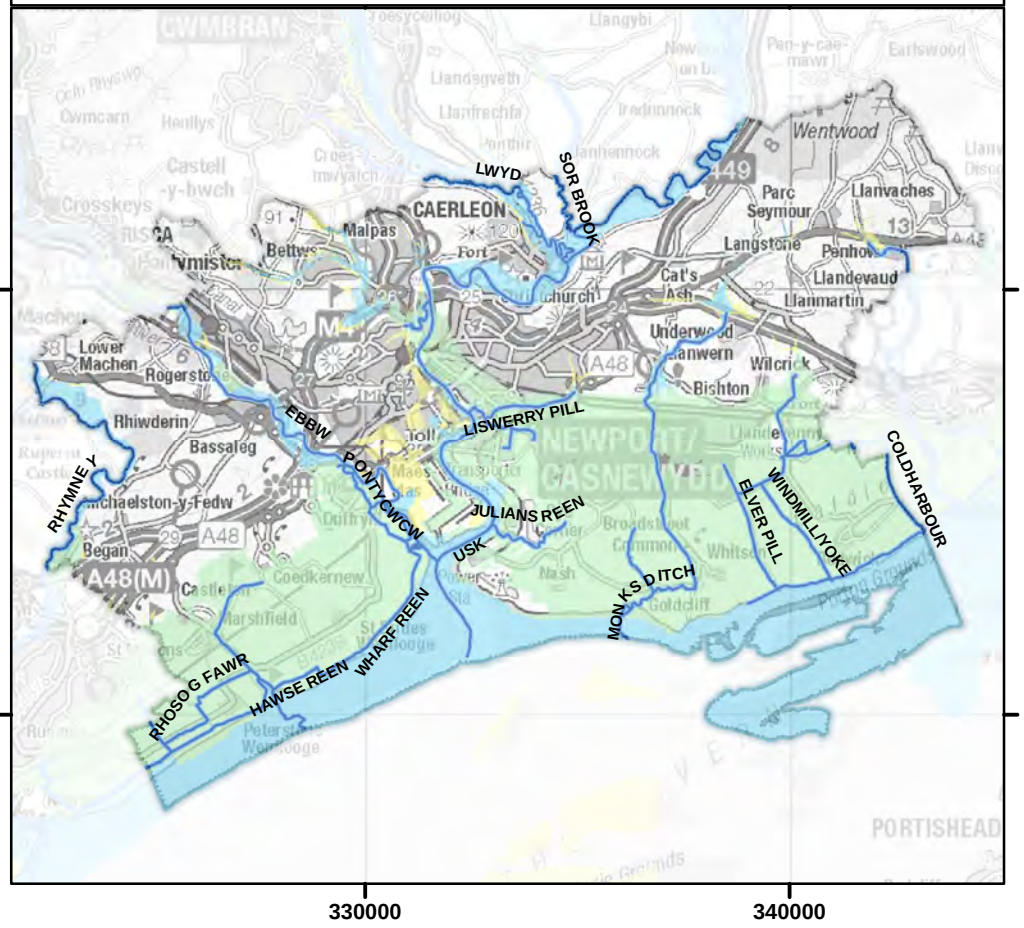
LSOA Code	LSOA Name	ONS LSOA Name	Flood Risk - National Rank	ONS = Office of National Statistics
W01001664	Ringland 2	Newport 010A	1159	
W01001665	Ringland 3	Newport 008D	1159	
W01001666	Ringland 4	Newport 010B	1159	
W01001635	Graig (Newport) 1	Newport 016A	1159	
W01001610	Alway 5	Newport 015C	1159	
W01001651	Malpas 1	Newport 002A	1159	

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Natural Resources Wales Flood Risk Map



Welsh Government Development Advice Maps



Flood Risk Maps

Legend

- Areas benefiting from defences
- Local Authority Boundary
- Flood Storage Areas
- Flood Zone 3
- Flood Zone 2
- Flood Defences
- Local Authority Boundary
- TAN15 DAM Zone C2
- TAN15 DAM Zone C1
- TAN15 DAM Zone B
- Main Rivers

Cyfoeth Naturiol Cymru Natural Resources Wales

2.5 1.25 0 2.5 Km

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Flooding: Flood Risk Maps and Development Advice Maps

Flood Risk Maps

We produce detailed flood maps (see the map on the left on the previous page) that show the potential risk of flooding. These flood maps are available on the Environment Agency web pages *What's in your backyard?*

https://www.gov.uk/check-local-environmental-data

Flood zone 2 – best estimate of the areas of land between Zone 3 and the extent of the flood from rivers or the sea with a 1000 to 1 chance of flooding in any year. It includes those areas defined in flood zone 3

Flood zone 3 – best estimate of the areas of land with a 100 to 1 chance (or greater) of flooding each year from rivers, or with a 200 to 1 chance (or greater) of flooding each year from the sea.

Flood Storage Area - may also be referred to as a balancing reservoir, storage basin or balancing pond. Its purpose is to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel. It may also delay the timing of a flood peak so that its volume is discharged over a longer interval.

Development Advice Maps

The Welsh Government Technical Advice Note TAN15 Development and Flood Risk gives technical guidance in relation to development and flooding.
http://wales.gov.uk/topics/planning/policy/tans/tan15/

TAN15 is supported by Development Advice Maps (DAM). The map on the right on the previous page shows the main rivers and the flooding zones shown on the Development Advice Maps.

Zone B - Areas known to have been flooded in the past evidenced by sedimentary deposits.

Zone C1 - Areas of the floodplain that are developed and served by significant infrastructure, including flood defences.

Zone C2 - Areas of the floodplain without significant flood defence infrastructure

Main rivers – The watercourses shown as main rivers on the second map above right are designated by Defra. Natural Resources Wales has permissive powers to carry out flood defence works, maintenance and operational activities for main rivers only.

Links to further information:

More information and advice on flooding:
http://naturalresourceswales.gov.uk/alerts/

Use the *What's in your backyard?* facility to find out if an area is at risk by entering in the postcode.

Environment Agency - What's in your backyard?

https://www.gov.uk/check-local-environmental-data

The Development Advice Map (DAM) for use with Technical Advice Note (TAN) 15 is available as an Interactive Development Advice Map: http://data.wales.gov.uk/apps/floodmapping/

There is also an early warning system available for people who live in high risk areas called the 'Flood Warning' system.

Ring 0345 988 1188 to sign up to the free service. Warnings can be delivered by phone, text, email, fax or pager.

Coastal Erosion and Shoreline Management Plans

Coastal change is a natural, ongoing process that has always happened.

As sea water meets cliffs and shores, it causes sediment or rocks to be broken down and washed out to sea. In some instances, this material may be moved to a different part of the coast and deposited in large quantities, causing accretion, where shorelines may advance or build up with sediment over time. How the coast is changed depends on the type of rock. Sedimentary rocks, such as sandstone and chalk, naturally erode more easily than hard rocks, so the coast recedes at a faster rate.

Coastal erosion and coastal flooding are often linked. One may lead to the other, especially where shorelines separating the sea from flat, low-lying land are eroding.

Rates of erosion vary, dependent on local conditions and it is not always gradual. Events such as landslips can cause many meters of land to be lost in one go.

Erosion can happen under any conditions, but its rate tends to increase when waves are powerful and water levels are high - for instance during storms or in high winds. Rates of erosion are expected to increase by the end of this century because of increasing storms and rising sea levels, brought about by climate change.

Shoreline Management Plans

Shoreline Management Plans (SMPs) are coastal planning documents produced by coastal groups, which include Local Authorities, Natural Resources Wales and other interested bodies. An SMP provides a large-scale assessment of the risks associated with coastal processes that result in both erosion and flooding and presents a policy framework to reduce these risks to people and the developed, historic and natural environment in a sustainable manner.

The SMPs that cover Wales are:

SMP 19 Anchor Head to Lavernock Point (Severn Estuary)
http://www.severnestuary.net/secg/
Lead Authority Monmouthshire Council

SMP 20 Lavernock Point to St Ann's Head (South Wales)
http://www.southwalescoast.org/
Lead Authority Carmarthenshire Council

SMP 21 St Ann's Head to Great Ormes Head (West of Wales)
http://www.westofwalessmp.org/
Lead Authority Pembrokeshire Council

SMP 22 Great Orme's Head to Scotland (North West England and North Wales)
http://www.allerdale.gov.uk/downloads/nw_shoreline_management_plan_2.pdf
Lead Authority Blackpool Borough Council

A Shoreline Management Plan (SMP) policy describes how a stretch of shoreline is most likely to be managed to address flood and/or erosion. Stretches of coast are divided into 'management units', and for each of these one of four different management policies are agreed, as follows:

No active intervention – There is no planned investment in defending against flooding or erosion, whether or not an artificial defence has existed previously.

Hold the (existing defence) line – An aspiration to build or maintain artificial defences so that the position of the shoreline

remains. Sometimes, the type or method of defence may change to achieve this result.

Managed realignment – Allowing the shoreline to move naturally, but managing the process to direct it in certain areas. This is usually done in low-lying areas, but may occasionally apply to cliffs.

Advance the line – New defences are built on the seaward side.

Coastal Erosion – National Coastal Erosion Risk Mapping (NCERM)

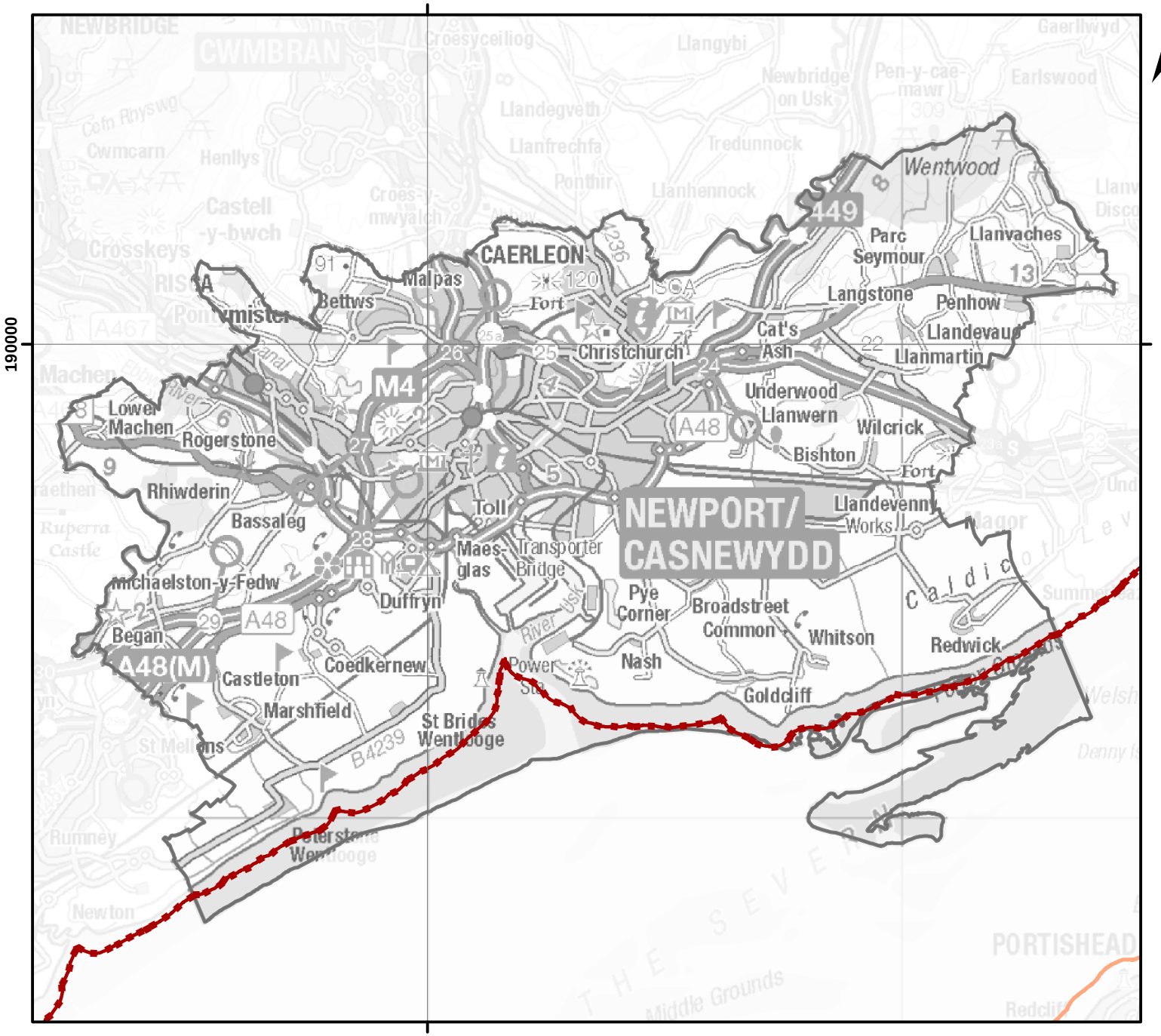
The Environment Agency makes coastal erosion information for Wales and England available to the public on their What's in Your Backyard web pages.

https://www.gov.uk/check-local-environmental-data

You can see this map on the next page.

The erosion data contains three sets of predictions (for approximately 20, 50 and 100 years into the future). In each case these predictions are presented under two scenarios; i) assuming no further investment in coast protection anywhere, and ii) assuming the current SMP policy (e.g. 'hold the existing defence line') is implemented.

Local authorities may have more detailed information on coastal erosion in specific localities. They may wish to use the NCERM and local information together with information in SMPs to inform spatial planning.



Coastal Erosion

Shoreline Management Plan Policies

Legend

Management policy to 2030

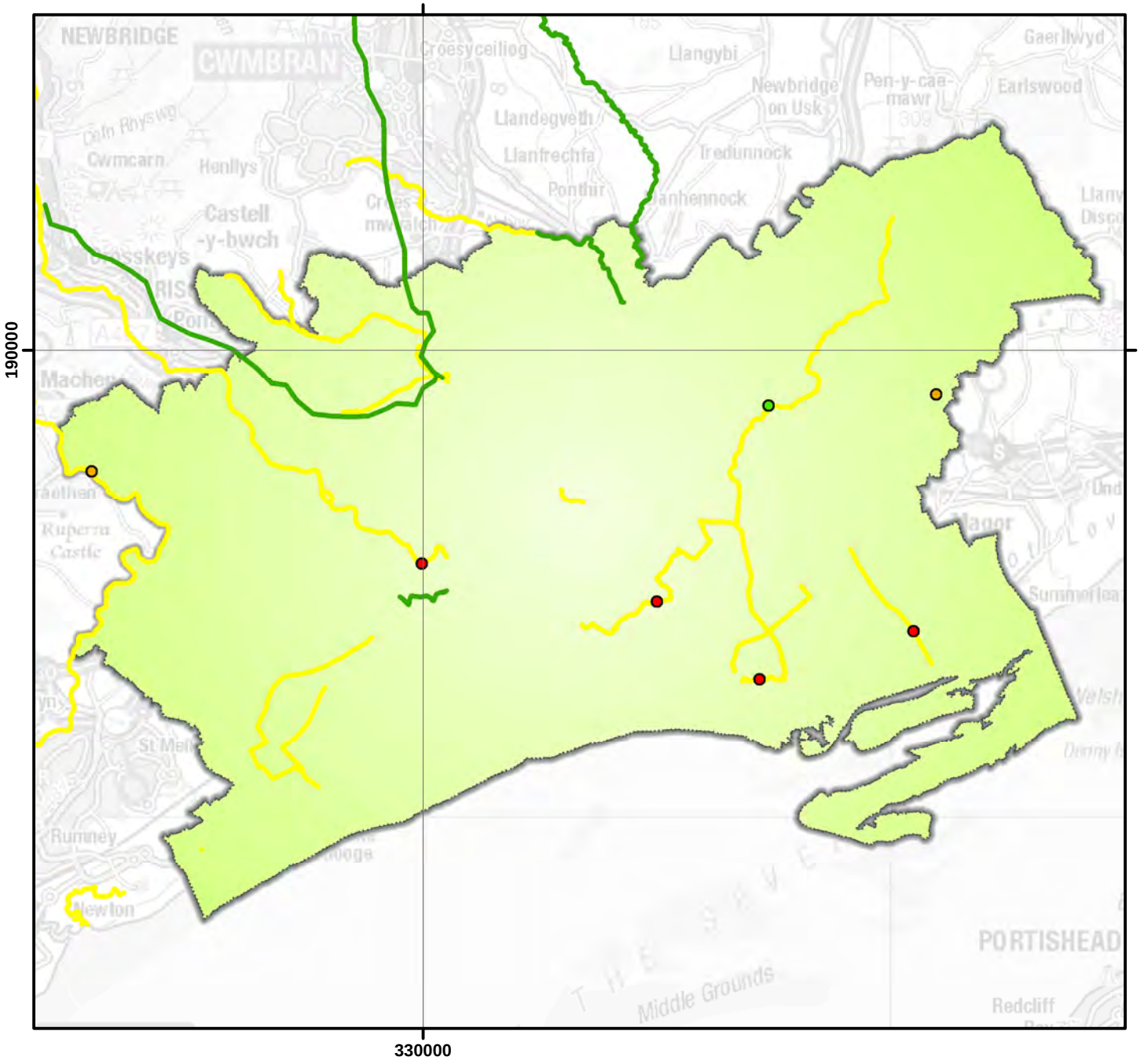
- Hold the existing defence line
- Managed realignment
- No active intervention

Planning Authority Boundary

Cyfoeth Naturiol Cymru
Natural Resources Wales

2 1 0 2
km

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River Habitat Survey

Habitat Modification Class

Legend

Habitat modification class

- 1 - Near-natural
- 2 - Predominantly unmodified
- 3 - Obviously modified
- 4 - Significantly modified
- 5 - Severely modified

WFD Rivers (Baseline 2009)

Ecological Status

- High
- Good
- Moderate
- Poor
- Bad

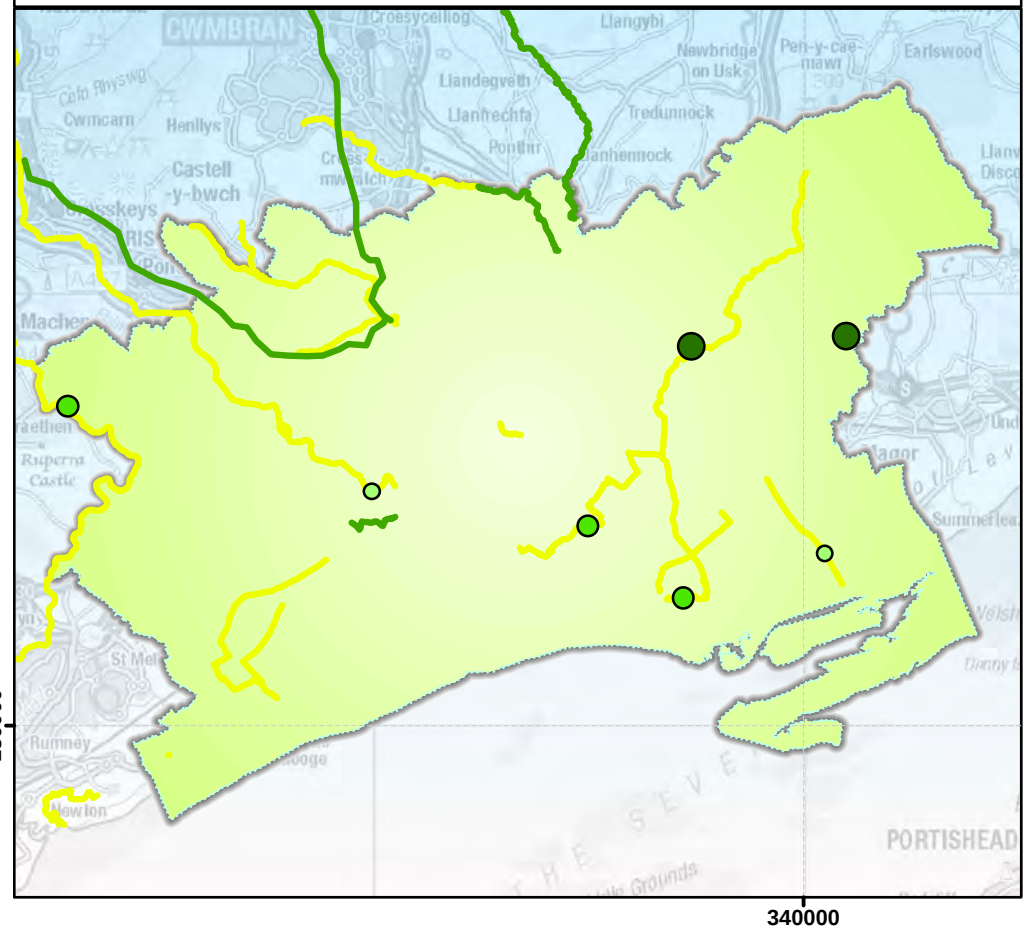
Planning Authority Boundary

Cyfoeth Naturiol Cymru
Natural Resources Wales

2.5 1.25 0 2.5
km

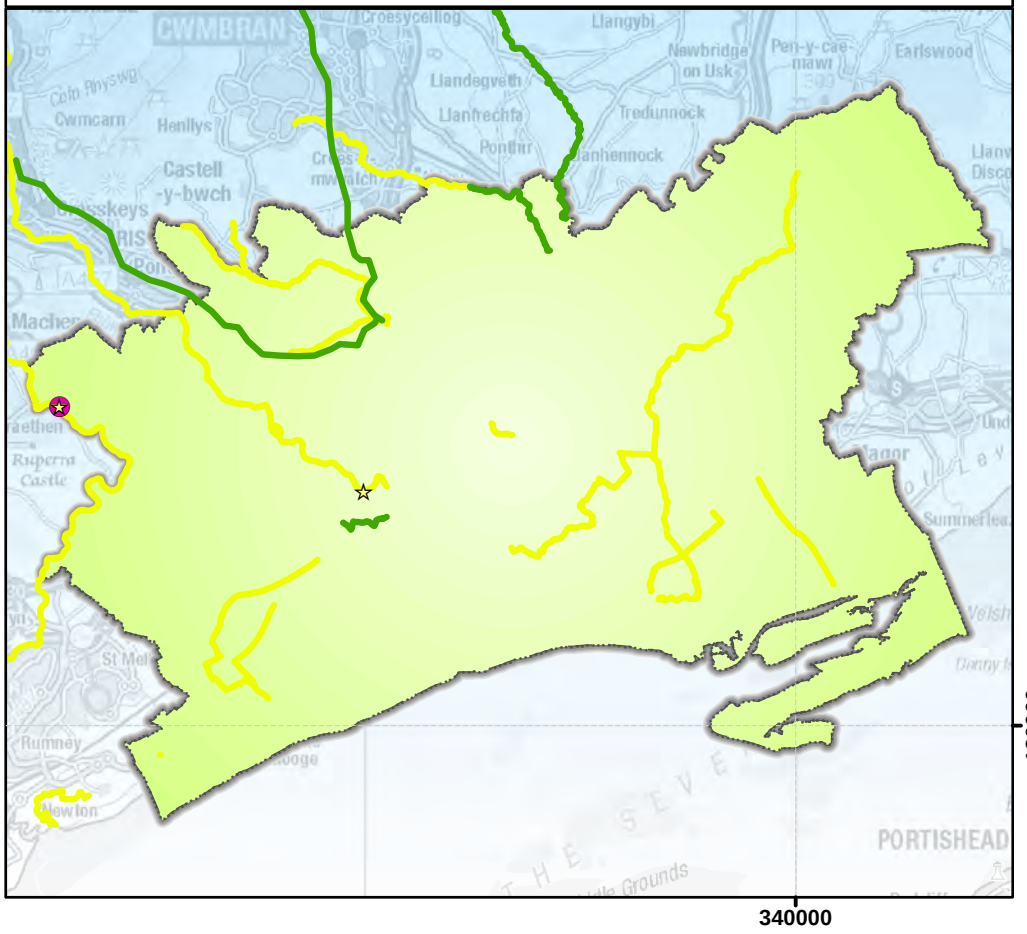
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River Habitat Survey - Shading by Trees



N

River Habitat Survey - Presence of Invasive Species



River Habitat Survey

Tree Shading and Invasive Species

See table following for details of invasive species found

Legend

River Shading by Trees

- Extensive
- Present
- None

Planning Authority Boundary

WFD rivers (Baseline 2009) Ecological Status

- High
- Good
- Moderate
- Poor
- Bad

Invasive species present

- Himalayan Balsam
- Japanese Knotweed
- Giant Hogweed

Cyfoeth Naturiol Cymru Natural Resources Wales

2.5 1.25 0 2.5 Km

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River Habitat Survey Sites

Habitat Modification Class:
1 - Near-natural 2 - Predominantly unmodified 3 - Obviously modified 4 - Significantly modified 5 - Severely modified

E = extensive P = present Y = present (blank if absent)

River	Site Grid Reference	Habitat Modification Class	Tree Shading	Giant Hogweed	Himalayan Balsam	Japanese Knotweed
MONK'S DITCH	ST3739788802	2	E			
UNNAMED	ST3720982952	5	P			
UNNAMED	ST3500684615	5	P			
EBBW	ST2997585422	5			Y	
RHYMNEY	ST2290687402	4	P		Y	Y
UNNAMED	ST4050683975	5				
UNNAMED	ST4099189036	4	E			

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River Habitat Survey

River Habitat Survey

The River Habitat Survey (RHS) baseline survey is a major habitat survey of streams and rivers in England, Wales and the Isle of Man that was carried out, most recently, between May 2006 and September 2008.

The RHS is a standard field survey of 500 metre stretches of river. Data are collected about the physical character of the banks and channel. This includes specific details about the bank and channel structure such as natural features, artificial modifications, land-use and bankside vegetation structure. Other key features and modifications (for example, the extent of tree shading and the presence of invasive species) are recorded as absent, present (up to 33 per cent of the site) or extensive (more than 33 per cent) across the 500m stretch.

Note: The main aim of RHS baseline surveys is to provide an authoritative assessment of the physical character of river habitats and assess changes across the whole of England and Wales. The sample size is not big enough to provide statistically valid summary results at scales smaller than this, but the results are indicative on a site basis.

Habitat Modification Class

The Habitat Modification Class (HMC) is based on an assessment of the presence and extent of artificial modifications: bank and channel resectioning; bank and channel reinforcement; culverts and bridges; fords; weirs, dams and sluices; in-stream deflectors and drainage outfalls; embankments and artificial berms (two-stage channels); bankside trampling by livestock.

Where there are long stretches of reinforcement or resectioning, the river is less likely to be able to offer habitats for wildlife.

Riverside trees and shading

Trees are an important feature of river channel and riparian habitats. They help to protect banks by forming a natural barrier to erosion, due to the binding effect of their roots. Trees also act as habitats in their own right. Exposed roots form suitable shelters for otters, overhanging branches act as perches for kingfishers, and fine roots create shelter for invertebrates and fish. Shading of the channel from riverside trees can be important for regulating the temperature of the water, particularly for smaller headwater streams.

Invasive non-native plants on river banks

RHS collects data on three invasive non-native plants - Himalayan balsam, Japanese knotweed and giant hogweed. These plants can cause problems by displacing the natural plant species and also causing bank erosion when they die in winter. As RHS only records plants growing by the riverside, the results only show their distribution in riparian habitats. All these species are widespread elsewhere in the countryside and in particular along paths and railways. It is important to note that although our data may show these plants are not present at a particular site, this does not necessarily mean that they are not found along the river as a whole.

Himalayan balsam

Himalayan (or Indian) balsam (Impatiens glandulifera) grows in dense patches and suppresses the growth of native plants. In winter it dies, providing little shelter and food for wildlife and leaving bare river banks more susceptible to erosion.

Giant hogweed

Giant hogweed (Heracleum mantegazzianum) was introduced as an ornamental plant. It has since escaped from gardens and spread across the country, particularly along watercourses. The sap can cause serious blisters and skin irritation.

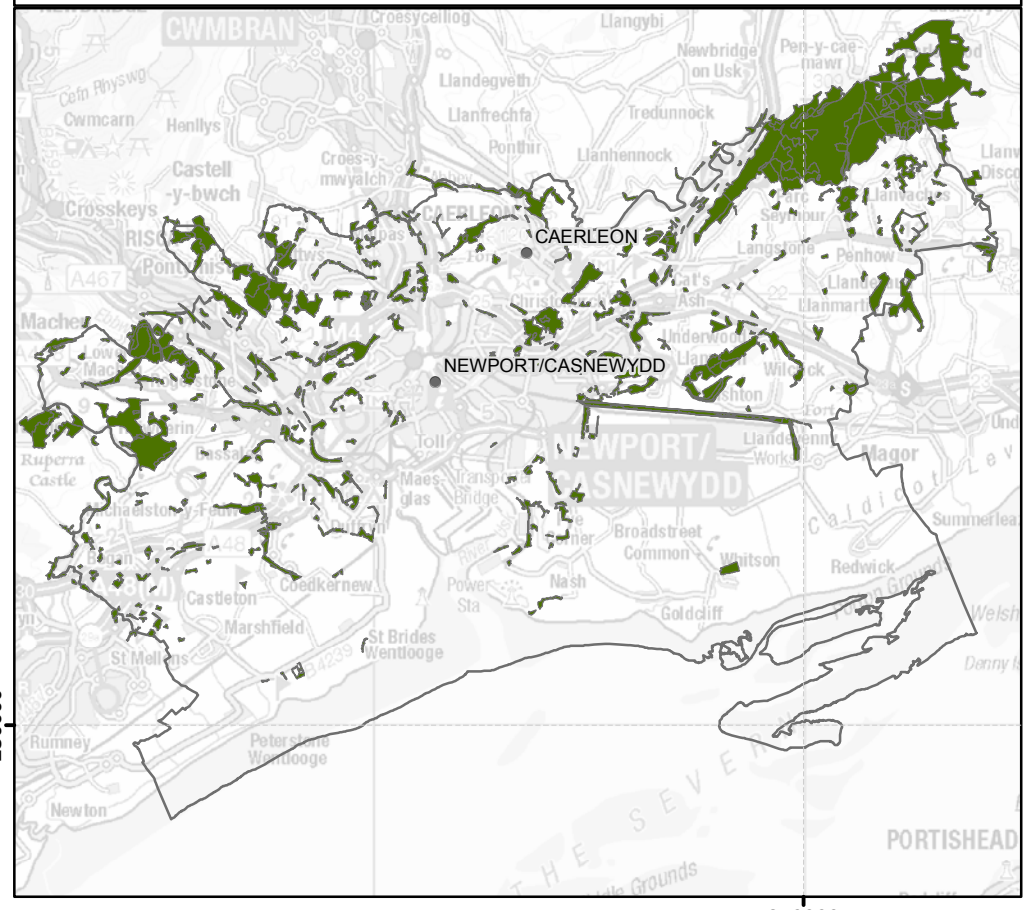
Japanese knotweed

Japanese knotweed (Fallopia japonica) was introduced to Britain in the early nineteenth Century and has spread through a range of habitats and along watercourses. It is very fast growing and can penetrate through concrete, causing structural damage to roads and buildings, as well as displacing native species.

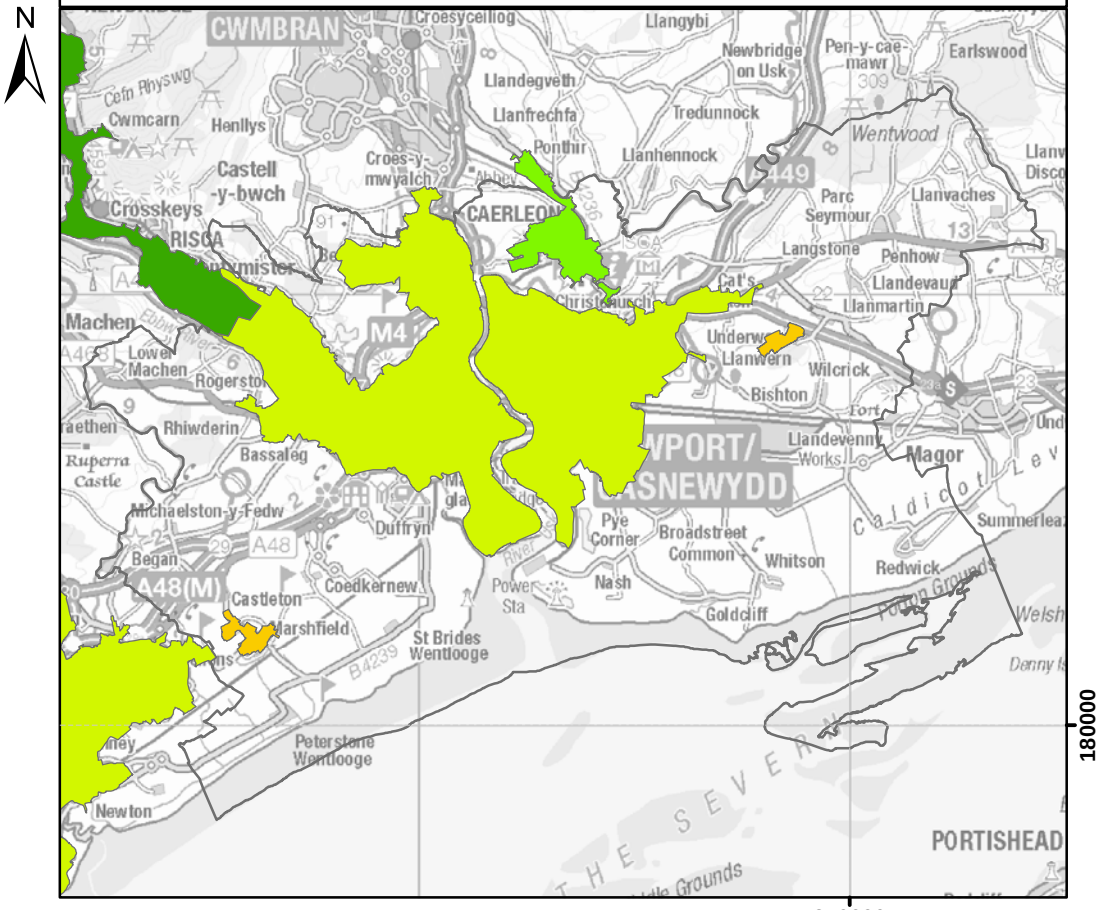
Links to further information:

River habitats in Wales: current state and character
http://webarchive.nationalarchives.gov.uk/20140328084622/http://cdn.environment-agency.gov.uk/geho0910btaj-e-e.pdf

National Forest Inventory



Wales Urban Canopy Cover - Percentage Tree cover



The National Forest Inventory & Wales Urban Canopy Cover

Legend

National Forest Inventory

- Woodland
- Planning Authority Boundary
- Towns & Cities

Tree Cover (%)

- 0-5
- 5-10
- 10-15
- 15-20
- 20-25
- >25

Cyfoeth Naturiol Cymru
Natural Resources Wales

2 1 0 2 km

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The National Forest Inventory and the Wales Urban Canopy Cover Study

The National Forest Inventory

The map on the left on the previous page shows the National Forest Inventory.

This dataset provides a view of the extent and nature of woodlands in Wales. It records all woodland areas greater than 0.5 ha in area in urban and rural areas. National Inventory surveys have been carried out at 10-15 year intervals since 1924 so there is historic data available for comparison. The inventories used to be known as the National Inventory of Woodlands & Trees (NIWT). There are some differences in the survey information due to improvements in technology and the inclusion of urban woods.

Wales Urban Canopy Cover

The benefits of urban woodlands and trees are clear, and the need to protect them and increase their numbers is compelling:

- Providing ecosystem services – temperature regulation, habitat and biodiversity, water regulation, noise reduction, reduction in air pollution, aesthetic benefits.
- Supporting economic regeneration, e.g. through increased town centre shopping, higher property values and provision of employment.
- Their planting, maintenance and presence helps build community ('social capital'), pride and engagement, and reduces anti-social behaviour.
- Urban trees promote better health, both mental and physical

In its strategy for woodlands and trees, *Woodlands for Wales*, the Welsh Government states its aim to ensure that woodlands and trees play a greater and more valued role in towns and cities, improving quality of life and surroundings for people who live in urban areas.

The Wales Urban Canopy Cover dataset shows tree cover for two hundred and twenty urban areas across Wales. The study was carried out in 2006 and again in 2009. The data will be useful to formulate evidence-based policy on urban trees and to target towns and wards in need of trees.

We have recently published a report on the Wales Urban Canopy Cover project.
http://naturalresourceswales.gov.uk/our-work/community-link-working-together-working-with-you/tree-cover-in-wales-towns-and-cities

This report drills down to Lower Super Output Area level and analyses the data in conjunction with the Wales Index of Multiple Deprivation. We also plan to provide reports at Local Authority and town level.

The map on the right on the previous page shows percentage tree cover for the urban areas in this planning authority.

The Wales average tree cover is 17%.

You can see the Wales Urban Canopy Cover data on the Wales Map Viewer (in the Forestry Commission, Policy sub-folder)
http://naturalresourceswales.gov.uk/out-and-about/nrw-web-maps/wales-viewer

Links to further information:

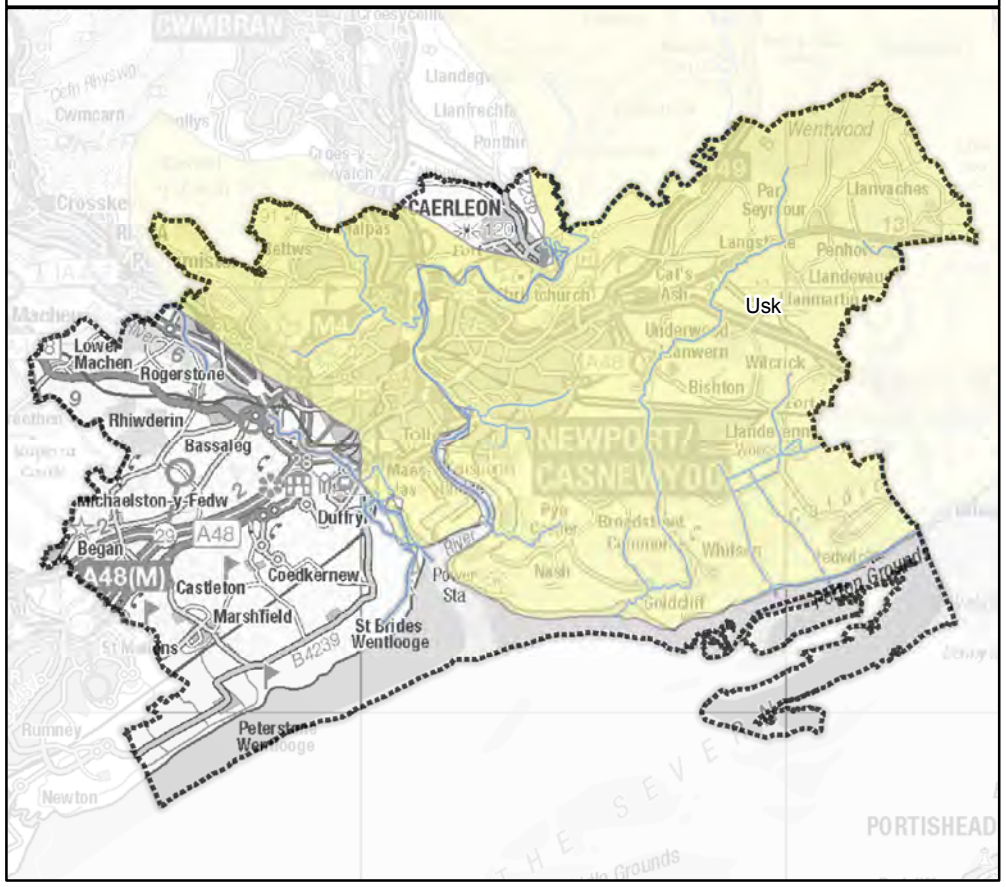
Woodlands for Wales
http://wales.gov.uk/topics/environmentcountryside/forestry/woodlandsforwales/

Forest Research website http://www.forestry.gov.uk/fr/research

Forest Research - Urban trees and greenspace in a changing climate http://www.forestry.gov.uk/fr/urbanclimate

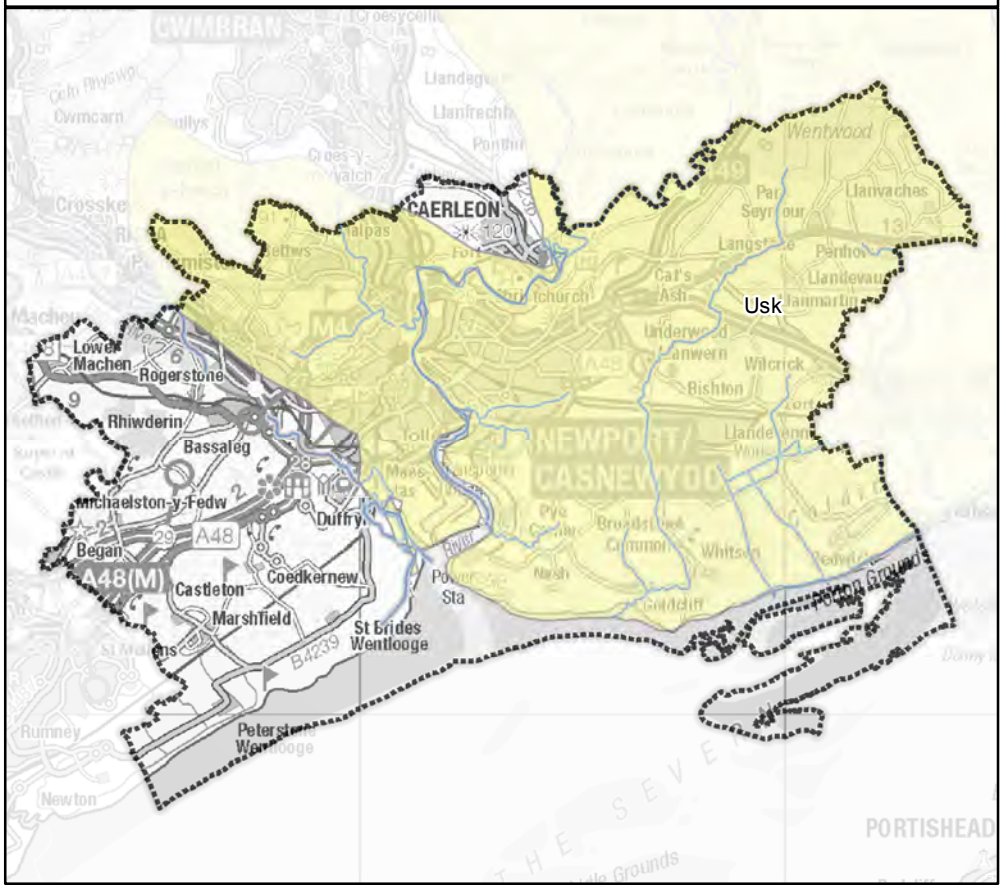
Forestry Commission Wales - Urban Trees (benefits of urban trees and links to further info)
http://www.forestry.gov.uk/forestry/INFD-8J2HGS

Salmon - Conservation Limit Compliance 2012



N

Salmon - Predicted Performance 2017



Salmon Action Plans

Conservation Limit Compliance and Predicted Performance

Legend

- At risk
- Prob at risk
- Probably not at risk
- Not at risk
- Not assessed
- Local Authority Boundary

Cyfoeth Naturiol Cymru Natural Resources Wales

3 1.5 0 3 Km

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Salmon Action Plans

Salmon Action Plans

The two maps on the previous page show current status and five year forecast status for principal salmon rivers indicating level of risk to salmon populations. The main issues for each river are shown in the table following.

Natural Resources Wales has a series of action plans, based on river catchments, setting out what needs to be done to support and restore salmon populations. Salmon Action Plans can be seen here:
http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/research/library/publications/33967.aspx

Natural Resources Wales' Salmon Management Strategy concentrates on four main objectives for the management of salmon:

- optimise number of salmon returning to home water fisheries
- maintain and improve fitness and diversity of salmon stocks
- optimise the total economic value of surplus stocks
- ensure necessary costs are met by beneficiaries

Objectives are addressed by means of local Salmon Action Plans (SAPs) – produced annually for each principal salmon river. Each SAP reviews the salmon stock and salmon fisheries on a particular river, and seeks to identify the main issues responsible for limiting performance. In addition, an annual assessment of performance is made and reported.

There are 23 principal salmon rivers in Wales (including the Severn, which the Environment Agency leads on). This list of principal salmon rivers was determined on catch size in the 1990's.

Key Issues Affecting Performance

A number of contributory factors that may constrain or adversely affect salmon stock performance have been identified. These include: exploitation (fishing); water quality; water quantity; river channel structure and siltation; and in-river obstructions to migration. The severity of each of these factors will be different from river to river. Even rivers where the salmon stock is performing well may have factors that are adversely affecting stocks.

- Channel structure and siltation are a key problem in most rivers across Wales. Intensive agriculture, forestry and the downstream impacts of water supply reservoirs impact on some rivers. New developments may give rise to local impacts by modifying channel structure and/or silt loadings.
- Water quality problems affect many rivers, and may be attributed to industrial discharges, agricultural pollution, metal mining, sewerage systems and acidification. Opportunities to improve water quality should be considered.
- Whilst major obstructions are thought to be significant on only a few rivers, their impact can be substantial. The effects are usually associated with historic mills, water supply, hydropower, aquaculture and tidal barrages, although new developments may give rise to new problems.

The annual assessment for principal salmon rivers includes current and forecast stock performance and main factors responsible for suppressing a river's performance.
http://www.cefas.defra.gov.uk/our-science/fisheries-information/salmonids/salmonid-assessment.aspx

Salmon Action Plans

Key Issues Affecting Performance

River	Exploitation	Water Quality	Water Quantity	Channel Structure and Siltation	Obstructions
Usk	X		X	X	X

List of Abbreviations

AMP	Asset Management Plan (Water Companies)
AQMA	Air Quality Management Area
CAMS	Catchment Abstraction Management Strategies
cBWD	Current Bathing Water Directive
CSO	Combined Sewer Overflow (a combined sewer is one carrying foul sewage and surface water)
DCWW	Dŵr Cymru/Welsh Water
Defra	Department of the Environment, Food and Rural Affairs
EC	European Commission (When referring to bathing waters - bathing waters designated under the EC Bathing Waters Directive (76/160/EEC)
EPR	Environmental Permitting Regulations – the new environmental permitting regime that replaces WML and IPPC
GQA	General Quality Assessment
IPPC	Integrated Pollution Prevention and Control – predecessor permitting regime to EPR
LA	Local Authority
LSOA	Lower Layer Super Output Area – statistical area (containing a population of about 1,500 people). Used in Wales Index of Multiple Deprivation
Natura 2000	Natura 2000 is the European Union-wide network of protected areas under the EC Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora). Includes SACs and SPAs.
NGR	National Grid Reference (location of site)
NO_x	Nitrogen oxides (nitrous oxide and nitrogen dioxide)
NVZ	Nitrate Vulnerable Zone
OFWAT	The economic regulator for the water and sewerage industry in England and Wales
PM_{10}	Particulate Matter – particles of diameter less than 10 µm
RBD	River Basin District
rBWD	The revised EC Bathing Water Directive (2006/7/EC) that was transposed into UK law in 2008
RHS	River Habitat Survey
SAC	Special Areas of Conservation (SAC). SACs are designated under the EC Habitats Directive
SAP	Salmon Action Plan
SEA	Strategic Environmental Assessment
SOx	Sulphur oxides
SPA	Special Protection Areas (SPA). SPAs are classified under the EC Wild Birds Directive (Council Directive 79/409/EEC on the conservation of wild birds).
SPZ	Groundwater Source Protection Zone
SSSI	Site of Special Scientific Interest Identified / notified by the Countryside Council for Wales under the Wildlife and Countryside Act 1981 for its importance to nature conservation.
STW	Sewage Treatment Works
TAN15	Technical Advice Note about Development and Flood Risk (published by the Welsh Government)
TAN15 DAM	Development Advice Map (Used to determine when flood risk issues need to be taken into account in planning future development. Published by the Welsh Government.)
UWWTD	Urban Waste Water Treatment Directive (91/271/EEC)
WG	Welsh Government
WFD	EC Water Framework Directive (2000/60/EC)
WIMD	Wales Index of Multiple Deprivation
WML	Waste Management Licence – now being superseded by EPR permits
WWTW	Waste Water Treatment Works i.e. sewage treatment works

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NEWPORT CITY COUNCIL

Ordinary Watercourse Consent Application

Guidance Notes

Prepared By:

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Streetscene
Civic Centre
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NP20 4UR

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Ordinary Watercourse Consent – Guidance Notes

February 2013-02-13

Rev	Date	Details	Prepared by	Reviewed by	Approved by
01	Feb 2013	Draft	Chris Battersby Technician	Richard Lloyd Principle Engineer	Andrew Morris Head of Streetscene

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Abbreviations

Abbreviations	Definition
Authority	Refers to Newport City Council acting as Lead Local Flood Authority
DEFRS	Department for Environment, Food and Rural Affairs
EA	Environment Agency
NCC	Newport City Council
FWMA	Flood & Water Management Act 2010
LDA	Land Drainage Act 1991
LLFA	Lead Local Flood Authority
SuDS	Sustainable Drainage Systems

1. Introduction

1.1 The purpose of this document is to provide guidance on the procedures to be followed when making an application for works to Ordinary Watercourses within Newport City Council (NCC), under the provisions of Section 23 of the Land Drainage Act 1991.

1.2 Matters that NCC will take into account when considering an application are also outlined.

1.3 These guidelines should be read in conjunction with the application form for Ordinary Watercourse Consent, NCC's Policy regarding Culverts.

Note: Applicants should check with NCC as to whether their proposals require planning permission under the Town and Country Planning Act 1990. Additional consents may also be required for works on third party land.

2. Legal Requirements

2.1 Under the provisions of the Land Drainage Act 1991 (LDA) as amended by the Flood and Water Management Act 2010 (FWMA), Lead Local Flood Authorities (LLFA) now have a duty to control certain activities that might have an adverse impact on flood risk and the environment.

2.2 To meet the requirements of the Act, any person proposing to undertake works likely to affect the flow in an ordinary watercourse, alter an existing structure, or erect a culvert must submit details of their proposals to the Authority. Before considering a consent allowing the works to proceed, the Authority may impose reasonable conditions on any proposals, which it considers necessary to satisfy its environmental duties and to control flood risk.

2.3 Riparian owners, developers, and all other persons proposing to carry out such works must, therefore, obtain Ordinary Watercourse Consent from the Authority before the work commences.

2.4 Details of consentable / non-consentable activities are given in Appendix A of this document.

2.5 The consenting and enforcement of activities on designated Main Rivers remain the responsibility of the Environment Agency.

3. Definitions

3.1 Main Rivers are designated as such on maps held by the Department for the Environment, Food and Rural Affairs (DEFRA) and by the Environment Agency. Works in or near Main Rivers require the consent of the Environment Agency. These Guidance Notes do not cover works affecting Main Rivers and the Environment Agency should be consulted before any works is undertaken.

3.2 The term Ordinary Watercourse, as defined in the LDA1991 is a watercourse that does not form part of a main river. The Authority has regulatory powers in respect of Ordinary Watercourses within its boundaries.

3.3 The term Watercourse, as defined in the LDA1991 includes all rivers and streams and all ditches, drains, cuts, culverts, dikes, sluices, sewers (other than public sewers within the meaning of the Water Industry Act 1991) and passages, through which water flows.

4. Application Fees

4.1 Under Section 23 (2) of the Land Drainage Act 1991, NCC is authorised to charge an application fee in relation to an application for Ordinary Watercourse Consent. The fee payable is to cover the cost of examining and approving the proposals. The fee amount is currently £50.00 and is payable in respect of each separate structure forming part of the works.

4.2 Fees are non-refundable in the event that an application is refused.

4.3 The application form for Ordinary Watercourse Consent should be completed, detailing the number of structures (e.g. culverts, outfalls, crossings etc.) forming the elements of the project, as appropriate. Applicants are advised to confirm the fee payable via a pre-application discussion before submitting an application.

5. Obtaining Consent

5.1 Applicants are advised to discuss their proposals with the Authority before submitting an application, to ensure they are aware of the principal requirements for the work envisaged.

5.2 Completed application forms should be submitted, with the appropriate fee, supporting drawings, calculations and other relevant documentation. Upon receipt of a full and complete application the Authority has two months in which to grant or refuse consent.

5.3 This time period does not start until the Authority is satisfied that the application including, where necessary, all plans, drawings, method statements and design calculations and fee, as may reasonably be required by the authority in order to properly assess the proposals, is complete in every respect. The Authority will notify the applicant on receipt of a satisfactory application.

5.4 3 No. copies of all drawings and documents are required, unless an electronic copy is submitted. In this respect only one copy is required.

5.5 The granting of Ordinary Watercourse Consent may be subject to conditions such as to the time and manner in which the works are to be carried out, forms of

construction, environmental mitigation works required, and the provisions to be made for future maintenance of the completed works.

5.6 A Consent granted by the Authority is given solely for the purposes of the Land Drainage Act 1991and should not be regarded by the applicant as in any way approving the design and soundness of any proposed structure.

5.7 The Authority accepts no liability for the structural integrity, the future stability or the future maintenance of any works for which Consent may be given. These matters are the sole responsibility of the applicant.

5.8 Applicants are advised that an ordinary Watercourse Consent does not override an adjacent landowner's rights nor does it permit interference with legally protected wildlife habitats.

5.9 If the Authority fails, two months after receipt of a full and complete application, to notify the applicant in writing of their determination with respect to the application, then consent is deemed to have been granted.

6. Nature Conservation

6.1 Applicants should be aware that the Authority has a duty under the Land Drainage Act 1991 and other legislation, to conserve and enhance the natural environment. Therefore, we consider the nature conservation implications of any proposal, when determining an Ordinary Watercourse Consent Application.

6.2 The applicant should consider the environmental implications of all options for the works to determine the least environmentally damaging solution.

6.3 The Authority may also consult with the relevant external body directly on any application it receives.

7. General Requirements

7.1 Any works undertaken are to be in strict accordance with the proposals contained in the submitted drawings for which consent is granted.

7.2 Precautions must be undertaken so that all existing surface water discharges flowing through the area is adequately catered for in any design proposals. This includes ensuring that there is no loss of capacity or connectivity in the system and allowing for the construction of storage lagoons/tanks as necessary to limit surface water discharges to greenfield rates, or rates specified by NCC.

7.3 One weeks notice is to be given to the Authority prior to commencement of any works for which consent has been granted. Notice is also to be provided upon completion of works.

7.4 Adequate precautions to be taken to avoid pollution of the local land drainage system to the requirements of the Authority and the Environment Agency. Clear and concise guideline for pollution prevention are contained within the publication Pollution Prevention Guidelines: Works and maintenance in or near water: PPG5 published by the Environment Agency in 2007. A copy of which is available to download from the Environment Agency website.

7.5 Adequate precautions to be taken to avoid any adverse impacts to the nature conservation interests in the area (including Site of Special Scientific Interest areas) to the requirements of the Countryside Council for Wales.

7.6 Adequate provision to be made to cater for any flood situation which may occur during the construction period e.g. due to heavy rainfall/obstruction to watercourses etc.

8. Standards

8.1 Where appropriate, applications for Ordinary Watercourse Consent shall include hydrological and hydraulic calculations consistent with the flood risk management standards applicable at the time of application.

8.2 The Authority recommends that the detailed hydraulic design and structural design of any works is carried out by a suitably qualified Engineer.

8.3 Clear and concise guidelines for the hydraulic designs of culverts are contained within the publication CIRIA report C689 – Culvert Design and Operation Guide published in 2010 by the Construction Industry Research and Information Association.

8.4 These guidelines should be read in conjunction with NCC Policy Regarding Culverts.

8.5 Structures must be designed so they do not cause a restriction to flood flow. They must not increase the risk of flooding or prevent maintenance of the adjacent open watercourse. All structures shall be designed and constructed to accommodate flood flows in the watercourse at the specified standard.

8.6 For small catchments (less that 5km^2) and urban/local drainage sites this will be the predicted flows for the 100 year storm event plus and additional 20% allowance on peak rainfall intensity for climate change. For larger catchments (greater than 5km^2) 20% shall be added to peak flows for climate change allowance. The design should ensure that the required hydraulic capacity is available above watercourse bed level at all times.

8.7 A minimum of three annual probabilities should be considered in any submitted design calculations:

- 1 in 1 year storm event
- 1 in 30 year storm event
- 1 in 100 year storm event
- Including relevant allowances for climate change

8.9 Applicants are also advised that the Authority supports and advocates the use of sustainable drainage systems to minimise the impact of surface water run-off on the environment.

8.10 Under no circumstances shall the standard of protection of the proposed works be lower than the existing standard of flood protection.

9. Culverting

9.1 The proposed culvert length should be as short as possible.

9.2 The shape of the culvert and the materials used for construction should be chosen to satisfy site-specific requirements in terms of channel hydraulics, strength and durability, and should be appropriate to the local environment.

9.3 The use of differently shaped pipes or different cross-sectional details within a culvert length should be avoided unless adequate hydraulic transitions are incorporated into the design. Such transitions are also essential where works to extend an existing culvert are proposed.

9.4 Appropriate inlet and outlet structures should be provided in order to ensure smooth hydraulic transition and avoid erosion. Headwall arrangements at the upstream and downstream ends of a culvert should be suitably keyed into the bed and banks of the watercourse, and should be appropriate to the local environment.

9.5 The responsibility for the future maintenance and clearance of a culvert must be considered. The responsibility for the maintenance of a culvert lies with the land owner unless they can show otherwise.

9.6 Suitable access arrangements for maintenance shall be included in the design. Access chambers must be provided at each change of direction if the culverting is not straight. Sharp bends must be avoided. Manhole spacing should be in accord with the guidance in CIRIA Report 689 Culvert design and Operation Guide (or its successor) but, due to the nature of watercourses and to facilitate maintenance, the maximum spacing between access chambers should not exceed 100 metres.

9.7 Inlet and outlet screen may be appropriate to prevent debris entering the culvert and causing clogging, or where there is a danger to public safety. If screens are included, they need to be sized and designed to reduce the risks of blocking, make provision for adequate cleansing and maintenance, and be sized to permit the passage of fish and other fauna (for example bats) where appropriate. Clear and concise guidelines for the design of culvert screens are contained within the publication Trash and Security Screen Guide (or its successor) published in 2009 by the Environment Agency.

9.8 Over-sized pipes or box culverts should be used wherever possible to maximise the cross-section and capacity. Allowance should be made in the hydraulic design for freeboard. The minimum recommended culvert size will vary according to the size of the watercourse but culverts smaller than a 450 mm diameter pipe or equivalent are particularly prone to blockage and their use is **not permitted.** For long culverts under embankments or similar structures, culverts with at least 1,050 mm of headroom above bed level should be used to facilitate access for inspection and maintenance.

9.9 In most situations it is appropriate for the inverts of culverts to be set below the existing bed level to allow for future maintenance or other works on the watercourse. It also aids the provision of a more “natural” bed to the culvert.

9.10 Multiple culverts should be avoided wherever possible. Multiple small culvert arrangements are prone to blockage by accumulation of waterborne debris at the inlet. NCC does recognise, however, that site conditions may prevent a singe-pipe or box-culvert option being practical, in which case a single-span bridge design is recommended. Where multiple culverts are unavoidable, a minimum number of culverts should be used and cutwaters should be provided between pipes at the culvert inlet.

The design should also incorporate:

- depression of the invert of one culvert to carry low flows;
- facilities to enable temporary diversion of flows to allow inspection or maintenance of each culvert;
- use of the higher "flood" culvert as a wildlife corridor.

9.11 Siphons are a source of continuous maintenance problems and should be avoided.

9.12 Culverts and outfall structures should be designed so that the exit velocities do not create erosion problems at the outlet and downstream.

9.13 On watercourses subject to severe erosion and siltation problems consideration should be given to the provision of silt traps upstream of the culvert.

9.14 Services (for example sewers, water mains etc) should not impinge into the cross-section of the culvert.

9.15 Provision of an overland flood flow route should be made to cater for situations where the capacity of the culvert is exceeded due to blockages etc.

10. Development proposals and building over

10.1 NCC consent is required for any culverting of a watercourse. This consent is independent of the need for planning and third party permissions. The granting of planning and third party permissions does not necessarily imply that Ordinary Watercourse Consent will be granted.

10.2 NCC will normally refuse Ordinary Watercourse Consent on conservation grounds for a development which proposes a culvert where there are reasonable alternatives. Such alternatives solutions might include a revised site layout or an ecologically acceptable diversion of an open watercourse.

10.3 Buildings should not be sited over the top of new or existing culverts. The culvert may, in the future, need to be repaired, replaced or upgraded if conditions in the catchment change. There is also the need to maintain an overland flow route if the culvert is blocked or its capacity exceeded.

11. Environmental Considerations

11.1 Each application for consent is considered on its own merits. Mitigation works to reduce the impact on the environment will be taken into account by NCC when determining a consent application for culverting.

11.2 Advice on environmental considerations is available from NCC staff.

11.3 The following options for environmental mitigation measures may be appropriate:

- Make the culvert slightly larger than needed to accommodate the design flow and then position the invert of the culvert below the natural bed of the watercourse, to enable some “natural” bed features to form. Where flow conditions are such that the natural stream has a gravel bed, the lowered invert could be dressed with appropriately sized gravel. Actively introducing gravel will speed up the process of substrate replenishment, although velocities may need to be controlled to prevent washouts.

- Provide ledges running through the culvert (approximately 500 mm wide and 300 mm above normal water level) to allow for the passage of mammals. These should link to the banks upstream and downstream of the culvert (Note: This will only be applicable for larger culverts).

- Make provision for appropriately located mammal underpasses close to the culvert. Usually, stock-proof fencing will be required to guide wildlife into the underpass. This should be integral to any scheme irrespective of whether ledges are provided within the culvert. An alternative design utilising bridges should be considered, particularly where a road crosses a watercourse valley.

- Ensure water velocities are not too fast to prevent the movement of the resident or migratory fish populations. The height of the invert should not pose an obstruction to fish movement. Baffles or other features providing shelter for fish as they pass upstream through the culvert may be incorporated into the design of a culvert base. (Note: Further information on this should be sought from NCC).

- Provide structures to encourage bat roosting and bird nesting as appropriate (Note: This applies to larger culverts only. Further guidance is available from NCC)

- Propose suitable environmental enhancements, for example opening up a length of previously culverted watercourse elsewhere on the site, enhancing other lengths of the watercourse, creation of a pond/marshy area, scrub/hedge planting (this does not compensate for the loss of aquatic habitats).

- Ensure watercourses are not canalised, upstream and downstream of culverts. Artificial bank reinforcement should be avoided wherever possible.

- Construct headwalls and wingwalls in materials and style which are in keeping with the character of the locality and respect the landscape setting.

12. Right of Appeal

12.1 If an applicant believes that Ordinary Watercourse Consent has been unreasonably withheld, or that the conditions imposed are unreasonable, then the applicant has a right of appeal.

13. Failure to Obtain Ordinary Watercourse Consent

13.1 Failure to Obtain Ordinary Watercourse Consent prior to carrying out the works is an offence. Under Section 24 of the Land Drainage Act 1991, if works are executed in contravention of Section 23, or without first obtaining a formal Consent, the Authority has the power to serve a Notice requiring abatement of the nuisance within a specified time.

13.2 Under Section 24 of the Act, failure to abide by such a notice can result in the Authority carrying out the necessary remedial work and seeking to recover costs.

14. Other Consents and Permissions

14.1 The issue of an Ordinary Watercourse Consent by the Authority does not absolve a person proposing to execute works from the need to obtain such other licences, consents or permissions which may be required by law.

15. Further Information

For further information and guidance in individual cases please contact:

Newport City Council
Streetscene
Civic Centre
Newport
South Wales
NP20 4UR

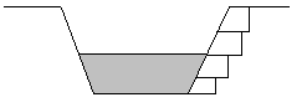
Telephone: 01633 232637
Email: streetscene@newport.gov.uk

APPENDIX A

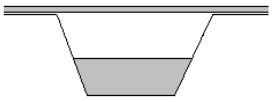
Cross sections of typical non-consentable / consentable activities

The list of following illustrations is not exhaustive. It is advisable to contact the authority (see section 12) prior to submission of an application for Ordinary Watercourse Consent to discuss if consent is required.

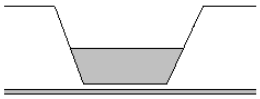
Non-Consentable Activities



Bank Protection Works – May be subject to a Temporary Works consent application under Section 23 1(a) of the Land Drainage Act.



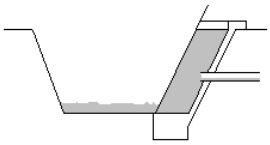
Pipe Crossing (above bank) – If considered that the proposed arrangement does not interfere with flow.



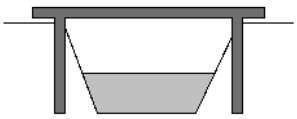
Pipe Crossing (below bed) – This does not interfere with flow if directional drilling is used. Temporary works consent applications may be required if open excavation methods are proposed to install the pipe.



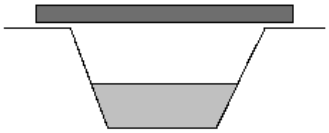
Protruding Pipe Outfall – This is not normally considered to act as an obstruction. It is advisable to ensure the pipe is closely aligned with the existing bank/proposed structure. This is a matter for discussion and prior agreement with the Authority.



Outfall within Bank profile – This usually does not interfere with flow if the structure is constructed without physically entering the channel. May be subject to a Temporary Works consent application under Section 23 1(a) of the Land Drainage Act.

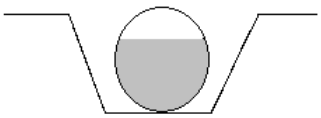


Bridge (abutments protruding but not reducing flow area/width) – This is considered not to interfere with flow.

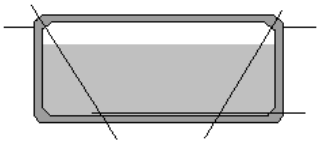


Clear span bridge – This is considered not to interfere with flow. It is recommended that the proposed soffit (dependant on depth of channel) is at least 300mm above the bank tops either side of the watercourse or a minimum of 600mm above the design flood level (if known).

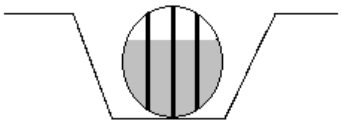
Consentable Activities



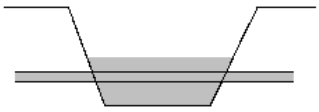
Pipe Culvert (including extension and removal of) – Required under Section 23 1(b) of the Land Drainage Act. Important Note: Only permitted for short lengths as possible for access purposes. Please refer to NCC Policy regarding Culverts.



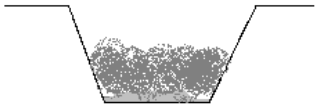
Oversized Box Culvert (including extension and removal of) – Required under Section 23 1(b) of the Land Drainage Act. Important Note: Only permitted for short lengths as possible for access purposes. Please refer to NCC Policy regarding Culverts.



Trash Screens – Required under Section 1(c) of the Land Drainage Act as it is an alteration to a culvert and has the potential to obstruct flow.



Pipe Crossing (in channel) – Required under Section 23 1(a) of the Land Drainage Act. May also be subject to a Temporary Works consent application.



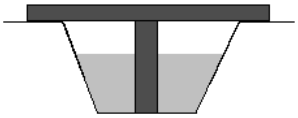
Weir/Dam or impoundment or temporary works e.g. cofferdams, that obstruct flow/reduce channel width – Required under Section 23 1(a) of the Land Drainage Act.



Bridge (where soffit level is below bank top level) – Required under Section 23 1(a) if it has the potential to affect flow. Best practice should ensure that proposed soffit levels (dependant on overall depth of channel) is at least 300mm above the bank tops either side of the watercourse. This may then exclude the requirement for a formal consent application.



Bridge (Abutments restricting flow) or Flume – Required under Section 23 1(b) of the Land Drainage Act as this could be considered to perform like a culvert.



Bridge with supports e.g. piers, in channel – Considered to be an obstruction in a similar way to the Bridge Abutments.

Annex C

Tier 2 Screening Assessment Criteria

Table C1

Human Health Risk Generic Screening Criteria

	S4UL Commercial (mg/kg)	S4UL Public Open Space Park (mg/kg)	Selected Human Health Risk Generic Screening Criteria (mg/kg)
Metals			
Arsenic	640	170	170
Beryllium	12	63	12
Boron	240000	46000	46000
Cadmium	190	560	190
Chromium III	8600	33000	8600
Chromium VI	33	220	33
Copper	68000	44000	44000
Lead	2330	630	630
Elemental Mercury	58 (25.8)[vap]	30[vap]	30
Inorganic Mercury	1100	240	240
Methylmercury	320	68	68
Nickel	980	3400	980
Selenium	12000	1800	1800
Vanadium	9000	5000	5000
Zinc	730000	170000	170000
	1% SOM	**1% SOM**	
Petroleum Hydrocarbons			
Aliphatic EC 5-6	3200 (304)[sol]	95000 (304)[sol]	3200
Aliphatic EC >6-8	7800 (144)[sol]	150000 (144)[sol]	7800
Aliphatic EC >8-10	2000 (78)[sol]	14000 (78)[sol]	2000
Aliphatic EC >10-12	9700 (48)[sol]	21000 (48)[sol]	9700
Aliphatic EC >12-C16	59000 (24)[sol]	25000 (24)[sol]	25000
Aliphatic EC >16-35	1600000	450000	450000
Aliphatic EC >35-44	1600000	450000	450000
Aromatic EC5-7 (benzene)	26000 (1220)[sol]	76000 (1220)[sol]	26000
Aromatic EC >7-8 (toluene)	56000(869)[vap]	87000 (869)[vap]	56000
Aromatic EC >8-10	3500 (613)[vap]	7200 (613)[vap]	3500
Aromatic EC >10-12	16000 (364)[sol]	9200 (264)[sol]	9200
Aromatic EC >12-16	36000 (169)[sol]	10000	10000
Aromatic EC >16-21	28000	7600	7600
Aromatic EC >21-35	28000	7800	7800
Aromatic EC >35-44	28000	7800	7800
Aliphatic + Aromatic EC >44-70	28000	7800	7800
TPH Ali/Aro			
Benzene	27	90	27
Toluene	56000 (869)[vap]	87000 (869)[vap]	56000
Ethylbenzene	5700 (518)[vap]	17000 (518)[vap]	5700
o-xylene	6600 (478)[sol]	17000 (478)[sol]	6600
m-xylene	6200 (625)[vap]	17000 (625)[sol]	6200
p-xylene	5900 (576)[sol]	17000 (576)[sol]	5900
MTBE			
PAHs			
Acenaphthene	84000 (57.0)[sol]	29000	29000
Acenaphthylene	83000 (86.1)[sol]	29000	29000
Anthracene	520000	150000	150000
Benzo(a)anthracene	170	49	49
Benzo(a)pyrene	35	11	11
Benzo(b)fluoranthene	44	13	13
Benzo(g,h,i)perylene	3900	1400	1400
Benzo(k)fluoranthene	1200	370	370
Chrysene	350	93	93
Dibenzo(a,h)anthracene	3.5	1.1	1.1
Fluoranthene	23000	6300	6300
Fluorene	63000 (30.9)[sol]	20000	20000
Indeno(1,2,3-c,d)pyrene	500	150	150
Naphthalene	190 (76.4)[sol]	1200 (76.4)[sol]	190
Phenanthrene	22000	6200	6200
Pyrene	54000	15000	15000
PAH			
Phenol	440[dir] (26000)	440[dir] (7600)	440
Chlorophenols	3500	110	110
Pentachlorophenol	400	110	110
Chloroalkanes & alkenes			
Chloroethene (vinyl chloride)	0.059	4.8	0.059
Dichloroethane	0.67	21	0.67

	S4UL Commercial (mg/kg)	S4UL Public Open Space Park (mg/kg)	Selected Human Health Risk Generic Screening Criteria (mg/kg)
Tetrachloroethanes	270	1800	270
Tetrachloroethene	19	810 (424)[sol]	19
Tetrachloromethane (Carbon Tetrachloride)	2.9	190	2.9
Trichloroethane	660	57000 (1425)[vap]	660
Trichloroethene	1.2	70	1.2
Trichloromethane (Chloroform)	99	2600	99
Explosives			
Trinitrotoluene	1000	260	260
RDX	210000	49000 (18.7)[sol]	49000
HMX	110000	23000 (0.35)[vap]	23000
Pesticides			
Aldrin	170	30	30
Dieldrin	170	30	30
Atrazine	9300	2300	2300
Dichlorvos	140	26	26
Endosulfan	5600 (0.003)[vap]	2400	2400
Hexachlorocyclohexane	170	47	47
Beta-Hexachlorocyclohexane	65	15	15
Chlorobenzenes			
Chlorobenzene	56	1300 (675)[sol]	56
2- Dichlorobenzene	2000 (571)[sol]	24000 (571)[sol]	2000
4- Dichlorobenzene	4400 (224)[vap]	36000 (224)[vap]	4400
1,2,3-Trichlorobenzene	102	770 (134)[vap]	102
1,2,4-Trichlorobenzene	220	1700 (318)[vap]	220
1,3,5-Trichlorobenzene	23	380 (36.7)[vap]	23
1,2,3,4-Tetrachlorobenzene	1700 (122)[vap]	1500 (122)[vap]	1500
1,2,3,5-Tetrachlorobenzene	49 (39.4)[vap]	110 (39)[vap]	49
1,2,4.5 Tetrachlorobenzene	42 (19.7)[sol]	25	25
Pentachlorobenzene	640 (43.0)[sol]	190	190
Hexachlorobenzene	110 (0.20)[vap]	30	30
Others			
Carbon Disulphide	11	1300	11
Hexachlorobutadiene	31	48	31
Dioxins, furans and dioxin-like PCBs	0.24	-	0.24

dir = S4ULs based on a threshold protective of direct skin contact with phenol (guideline in brackets based on health effects following long term exposure)
vap = S4ULs presented exceed the vapour saturation limit, which is presented in brackets
sol = S4ULs presented exceeds solubility saturation limit which is presented in brackets

Table C2

Summary of Water Quality Assessment Criteria

Determinand	Standard Type	Value	Unit	Type	WFD Classification	Water Body	Driver	Status	Additional Notes
Inorganic Parameters									
Aluminium	DWS	200	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	N/A
Antimony	DWS	5	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	N/A
Arsenic	EQS	50	ug/l	AA	Good	Rivers & Freshwater Lakes	WFD-SP	Statutory	N/A
	DWS	10	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	N/A
Boron	EQS	2000	ug/l	AA	N/A	Surface Water	Operational EQS (DSD)	Non-statutory	N/A
	DWS	1000	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	N/A
Cadmium	EQS	0.15	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	100-200 mg/l CaCO3
	EQS	0.9	ug/l	MAC	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	100-200 mg/l CaCO3
	DWS	5	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	N/A
	CCW TL	5	ug/l						
Calcium	CCW TL	300	mg/l						
Antimony	DWS	5	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	N/A
Chromium	DWS	50	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	N/A
Chromium III	EQS	4.7	ug/l	AA	Good	Rivers & Freshwater Lakes	WFD-SP	?	Also a PNEC
	EQS	32	ug/l	Q95	Good	Rivers & Freshwater Lakes	WFD-SP	?	Also a PNEC
Chromium VI	EQS	3.4	ug/l	AA	Good	Rivers & Freshwater Lakes	WFD-SP	?	Also a PNEC
Copper	EQS	10	ug/l	AA	Good	Rivers & Freshwater Lakes	WFD-SP	?	100-250 mg/l CaCO3 Also a PNEC
	EQS	1	ug/l	L-T	N/A	Freshwater	PNEC		
	DWS	2000	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	N/A
Fluoride	EQS	5000	ug/l	AA	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	>50 mg/l CaCO3
	EQS	15000	ug/l	MAC	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	>50 mg/l CaCO3
	DWS	1500	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	N/A
Iron	EQS	1000	ug/l	AA	Good	Rivers & Freshwater Lakes	WFD-SP	?	Also a PNEC
	EQS	730	ug/l	L-T	N/A	Freshwater	PNEC	Non-statutory	
	DWS	200	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	N/A
Lead	EQS	1.2	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	Bioavailable
	EQS	14	ug/l	MAC	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	N/A
	DWS	10	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	N/A
	CCW TL	250	ug/l						
Manganese	EQS	30	ug/l	AA	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	Dissolved
	EQS	300	ug/l	MAC	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	Dissolved
	EQS	123	ug/l	L-T	N/A	Freshwater	PNEC	Non-statutory	
	DWS	50	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	N/A
Mercury	EQS	0.07	ug/l	MAC	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	N/A
	DWS	1	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	N/A
Nickel	EQS	4	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	Bioavailable
	EQS	34	ug/l	MAC	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	N/A
	DWS	20	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	N/A
	CCW TL	100	ug/l						
Selenium	DWS	10	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	N/A
Silver	EQS	0.05	ug/l	AA	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	N/A
	EQS	0.1	ug/l	MAC	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	N/A
Sodium	DWS	200	mg/l	Tap	N/A	Drinking Water	WSR2000	Statutory	N/A
Zinc	EQS	75	ug/l	AA	Good	Rivers & Freshwater Lakes	WFD-SP	?	100-250 mg/l CaCO3 Also a PNEC
	EQS	10.9	ug/l	L-T	N/A	Freshwater	PNEC	Non-statutory	Bioavailable
	CCW TL	1000	ug/l						
Dissolved Oxygen	EQS	60	%sat	Q10	Good	Rivers	WFD-GRC	Statutory	Type 5
	CCW TL	<2	mg/l						Single Occasion
		<5							3 Consecutive Occasions
BOD	EQS	5	mg/l	Q90	Good	Rivers	WFD-GRC	Statutory	Type 3n
	CCW TL	18	mg/l						Single Occasion
		10							3 Consecutive Occasions
Nitrate (as NO3)	DWS	50	mg/l	Tap	N/A	Drinking Water	WSR2000	Statutory	
	CCW TL	1	mg/l						
Total Oxidised Nitrogen	CCW TL	2	mg/l						
Nitrite (as NO2)	DWS	0.5	mg/l	Tap	N/A	Drinking Water	WSR2000	Statutory	
	CCW TL	1	mg/l						
Ammonia (Total or Unionised) as N	EQS	0.6	mg/l	Q90	Good	Rivers & Freshwater Lakes	WFD-GRC	Statutory	Type 5
	EQS	0.3	mg/l	Q90	Good	Freshwater	PNEC	Non-statutory	Phase 1 standard
Ammonium as NH4	DWS	0.5	mg/l	Tap	N/A	Drinking Water	WSR2000	Statutory	
Total Ammonical Nitrogen	CCW TL	1	mg/l						Single Occasion
		0.5							5 Consecutive Occasions
Sulphate (as SO4?)	EQS	400	mg/l	AA	N/A	Inland Surface Waters	Operational EQS (DSD)	Non-statutory	
	DWS	250	mg/l	Tap	N/A	Drinking Water	WSR2000	Statutory	
	CCW TL	300	mg/l						
Chloride	EQS	250	mg/l	AA	N/A	Inland Surface Waters	Operational EQS (DSD)	Non-statutory	
	DWS	250	mg/l	Tap	N/A	Drinking Water	WSR2000	Statutory	
	CCW TL	300	mg/l						
Cyanide	EQS	1	ug/l	AA	Good	Rivers & Freshwater Lakes	WFD-SP	?	
Cyanide	EQS	5	ug/l	Q95	Good	Rivers & Freshwater Lakes	WFD-SP	?	
Cyanide Free (CN / I)	EQS	0.26	ug/l	L-T	N/A	Freshwater	PNEC	Non-statutory	
Cyanide Free (CN / I)	EQS	2.8	ug/l	S-T	N/A	Freshwater	PNEC	Non-statutory	
Cyanide Free (CN / I)	DWS	50	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	
Phosphorous	EQS	120	mg/l	Q90	Good	Rivers	WFD-GRC	Statutory	Type 3n
Orthophosphate	CCW TL	1	mg/l						
Total Suspended Solids	CCW TL	250	mg/l						Single Occasion
		100							3 Consecutive Samples
		60+							4 Consecutive Samples
Electrical Conductivity	CCW TL	2000	MS/cm						
pH	EQS	6-9	pH units	MAC	N/A	Inland Surface Waters	Operational EQS (DSD)	?	
	CCW TL	6.8-8.5	pH units						

Determinand	Standard Type	Value	Unit	Type	WFD Classification	Water Body	Driver	Status	Additional Notes
Organic Parameters									
Petrochemicals	CCW TL	2	mg/l						
Total Oil and Grease	CCW TL	2	mg/l						
Benzene	EQS	10	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
	EQS	50	ug/l	MAC	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
	DWS	1	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	
Toluene	EQS	50	ug/l	AA	N/A	Rivers & Freshwater Lakes	WFD-SP	?	
	EQS	380	ug/l	Q95	N/A	Rivers & Freshwater Lakes	WFD-SP	?	
	EQS	74	ug/l	L-T	N/A	Freshwater	PNEC	Non-statutory	
Ethyl benzene	EQS	20	ug/l	AA	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	Only on EA Chem Database
	EQS	200	ug/l	AA	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	Only on EA Chem Database
Xylenes	EQS	30	ug/l	AA	N/A	Inland Surface Waters	Operational EQS (DSD)	?	List II under SW(DS)Reg98 not specific pollutants
2-Chlorophenol	EQS	50	ug/l	AA	N/A	Inland Surface Waters	Operational EQS (DSD)	?	List II under SW(DS)Reg98 not specific pollutants
Methylphenols	EQS	100	ug/l	AA	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	total methylphenols
	EQS	300	ug/l	MAC	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	
2,4-Dichlorophenol	EQS	20	ug/l	AA	Good	Rivers & Freshwater Lakes	WFD-SP	?	
	EQS	4.2	ug/l	L-T	N/A	Freshwater	PNEC	Non-statutory	
	EQS	140	ug/l	S-T	N/A	Freshwater	PNEC	Non-statutory	
4-Chloro-3-methylphenol	EQS	40	ug/l	AA	N/A	Inland Surface Waters	Operational EQS (DSD)	?	List II under SW(DS)Reg98 not specific pollutants
Pentachlorophenol (PCP)	EQS	0.4	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
	EQS	1	ug/l	MAC	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
Phenol	EQS	7.7	ug/l	AA	Good	Rivers & Freshwater Lakes	WFD-SP	Statutory	
	EQS	46	ug/l	Q95	Good	Rivers & Freshwater Lakes	WFD-SP	Statutory	
Anthracene	EQS	0.1	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
	EQS	0.1	ug/l	MAC	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
Benzo(a)pyrene	EQS	0.00017	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
	EQS	0.27	ug/l	MAC	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
	DWS	0.01	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	
Benzo(b)fluoranthene	EQS	N/A	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
	EQS	0.017	ug/l	MAC	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
	DWS	0.1	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	Sum of 4 [B(b)F, b(k)f, b(ghi)p, I(123)p]
Benzo(k)fluoranthene	EQS	N/A	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
	EQS	0.017	ug/l	MAC	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
	DWS	0.1	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	Sum of 4 [B(b)F, b(k)f, b(ghi)p, I(123)p]
Benzo(k)fluoranthene	EQS	N/A	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
	EQS	0.0082	ug/l	MAC	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
	DWS	0.1	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	Sum of 4 [B(b)F, b(k)f, b(ghi)p, I(123)p]
Indeno(123cd)pyrene	EQS	N/A	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
	EQS	N/A	ug/l	MAC	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
	DWS	0.1	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	Sum of 4 [B(b)F, b(k)f, b(ghi)p, I(123)p]
Fluoranthene	EQS	0.0063	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
	EQS	0.12	ug/l	MAC	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
Naphthalene	EQS	2	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
	EQS	130	ug/l	MAC	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
Bis(2-ethylhexyl) phthalate (DEHP or Diethylexyl phthalate)	EQS	1.3	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
Butylbenzyl phthalate (BBP)	EQS	20	ug/l	AA	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	
	EQS	100	ug/l	MAC	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	
	EQS	7.5	ug/l	L-T	N/A	Freshwater	PNEC	Non-statutory	
	EQS	51	ug/l	S-T	N/A	Freshwater	PNEC	Non-statutory	
Di-n-butyl phthalate (DBP)	EQS	8	ug/l	AA	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	
	EQS	40	ug/l	MAC	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	
Di-n-Octyl phthalate (DOPs)	EQS	20	ug/l	AA	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	
	EQS	40	ug/l	MAC	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	
Diethyl phthalate (DEP)	EQS	200	ug/l	AA	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	
	EQS	1000	ug/l	MAC	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	
Dimethyl phthalate (DMP)	EQS	800	ug/l	AA	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	
	EQS	4000	ug/l	MAC	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	
1,1,1-Trichloroethane	EQS	100	ug/l	AA	N/A	Inland Surface Waters	Operational EQS (DSD)	?	List II under SW(DS)Reg98 not specific pollutants
1,1,2-Trichloroethane	EQS	400	ug/l	AA	N/A	Inland Surface Waters	Operational EQS (DSD)	?	List II under SW(DS)Reg98 not specific pollutants
Trichlorobenzenes	EQS	0.4	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
Dichlorobenzenes (sum of all isomers)	EQS	20	ug/l	AA	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	
	EQS	40	ug/l	MAC	N/A	Freshwater	Operational EQS (DSD)	Non-statutory	
1,2-Dichloroethane	EQS	10	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
	DWS	3	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	
Trihalomethanes (total)	DWS	100	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	chloroform, bromoform, dibromochloromethane, bromodichlorometane
Chloroform (Trichloromethane)	EQS	2.5	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
	DWS	trihalomethane	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	
Dichloromethane	EQS	20	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
Hexachlorobutadiene (HCBD)	EQS	0.6	ug/l	MAC	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
Styrene	EQS	50	ug/l	AA	N/A	Inland Surface Waters	Operational EQS (DSD)	Non-statutory	
	EQS	500	ug/l	MAC	N/A	Inland Surface Waters	Operational EQS (DSD)	Non-statutory	
Tetrachloroethene (tetrachloroethlyene or perchloroethlyene or Perc)	EQS	10	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
Tetrachloroethene and Trichlorethene (Total)	DWS	10	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	
Tetrachloromethane (Carbon Tetrachloride)	EQS	12	ug/l	AA	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	
Vinyl Chloride	DWS	0.5	ug/l	Tap	N/A	Drinking Water	WSR2000	Statutory	
Hexachlorobenzene (HCB)	EQS	0.05	ug/l	MAC	N/A	Inland Surface Waters	PS D2013/39/EC	Statutory	

Annex D

Individual Land Contamination Reports

Welsh Government

M4 Corridor around Newport

Land Contamination Assessment Report Annex D CL-1, Made Ground Adjacent to Junction 29

M4CaN–DJV–EGT–ZG_GEN–RP–EN–0028

At Issue | March 2016

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1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-1) which comprises five former spoil heaps adjacent to Junction 29 on the M4, hereafter referred to as the "Site".

1.1.2 The Site is located at chainages 1,400 to 2,200 (see Figure 1).

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme'). This report informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) of which this document is an appendix to the chapter on Geology and Soils.

1.2.2 In 2014, a Preliminary Sources Study Report (PSSR, 2014) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of the Design Manual for Roads and Bridges (DMRB) Stage 2 Assessment for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. In addition, this report draws upon the 2015 Supplementary Ground Investigation report prepared on behalf of the Welsh Government (Geotechnical Engineering, 2015). This report relates to the area as defined on the Site Plan shown in Figure 1.

1.2.3 The overarching rationale and approach for the assessment of areas of land along the new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the ES).

1.3 Objectives

1.3.1 The key objectives of this report are set out below.

- Undertake a risk assessment of the Site and determine whether potential risks to human health or controlled waters could exist as a result of the Scheme.
- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.
- Provide information to support the Ground Investigation Report (GIR) and Geotechnical Design Report (GDR) required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The subsequent report structure is as follows.

- Section 2: Site Location and Description.
- Section 3: The Scheme – This section details the proposed new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Investigations – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions – This section describes the main findings of the intrusive site investigation including the ground conditions encountered and visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessments.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations – This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and requirements for remediation/mitigation.
- Section 11: References – This section summarises the key documents referred to in this report.
- Section 12: Glossary – This section provides a summary of the terms used in this report.

2 Site Location and Description

2.1 Site Location

2.1.1 The Site is located between the current M4 and the A48 (M), to the north of Castleton, with centre point at National Grid Reference (NGR) ST 248 838. The location and layout of the Site is presented on Figure 1.

2.1.2 The Site is formed of five discrete strips of land ranging between approximately 100 - 300 m long and 40 - 100 m wide. These areas are understood to be spoil heaps and are referred from west to east as No.1 to No.5. The spoil heap areas No.2, No.3 and No.4 are longitudinal in shape and aligned in a north-south direction whilst No.1 and No.5 are longitudinal and aligned in a northeast-southwest direction.

2.1.3 The Site has been identified from review of historical aerial photography as an area of spoil heaps. Anecdotal evidence suggests the spoil heaps No.3 to No.5 were formed from excavation of surplus suitable fill and unsuitable marshy material and topsoil during A48(M) construction during the late 1970s, whilst heaps No.1 and No.2 were formed from excavation of an attenuation pond in 2009.

2.1.4 The Site is undulating and comprises fields with an attenuation pond located in the northern section of soil heaps No.3 and No.4. A track cuts through spoil heap No.5.

2.1.5 A walkover survey was undertaken by RPS personnel on 26th May 2015. Spoil heaps No.1 and No.2 and the northern parts of spoil heaps No.3 and No.4 were not accessible at this time and therefore, the attenuation pond and the stream were not viewed. The topography indicates large amounts of material are in place with sloping batters visible on each of the spoil heap areas. These areas are well vegetated. A discrete area of tipped scrap materials including metals, concrete, an old van, several wooden pallets and chairs have been identified in the centre of spoil heap No.5. No visual evidence of extraneous material has been identified in all other areas accessible elsewhere on Site.

3 The Scheme

3.1.1 The Site is situated at approximate chainages 1,400 to 2,200.

3.1.2 The footprint of the new section of motorway encroaches onto parts of the Site. These areas include spoil heap No.1 and the northern areas of spoil heaps No.3 and No.4, including the existing attenuation pond and a small area in the north of spoil heap No.5.

3.1.3 All areas within the permanent land take are to remain unchanged with no earthworks or landscape planting being proposed.

3.1.4 Figure 1 details the location of the Site in relation to the proposed new section of motorway.

4 Site History

4.1.1 The 2014 PSSR historical searches have been based on Ordnance Survey plans, literature reviews, information provided by Natural Resources Wales (NRW) (formerly Environment Agency Wales), Newport City Council and aerial photographic interpretation.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from Welsh Government. Relevant extracts are presented in Appendix 3.

4.1.3 A summary of the Site history is presented in Table 1 below.

Table 1: Summary of Site History

Date	Use	Source of information
1843 – 1893	The majority of the Site comprises agricultural fields with an area of marshland within the area of spoil heap No.5. Two roads running approximately north-south across the western corner of area No.1. A small spring-fed stream and a hedgerow run along the south-western boundary of area No.3. The Site is surrounded by agricultural fields and access tracks. A small pond is located approximately 30 m east of area No.4. A corn mill and associated mill pond are located approximately 100 m to the south east of area No.5. Farm buildings/a homestead (Pant-rhiw-goch) is located approximately 30 m to the south of area No.1. What appears to be a pond is located between these buildings and area No.1. Further buildings (Pant–rhiw–goch–ganol) are located south of area No.2 and west of area No.3. Coal Pit Lane is present in its current position approximately 120 m to the south-east of the Site.	1:10,560 Historical Mapping
1891 – 1912	No significant change.	1:10,560 Historical Mapping
1904 – 1939	Infrastructure of St Mellons District Council Water Works is now present in the south-western area of area No.5. An area of marshland and an 'intake' building associated with St Mellons District Council Water Works are identified adjacent to the south of area No.1.	1:10,560 Historical Mapping
1947	An area of earthworks/broken ground is identified within area No.5, to the north of the Water Works.	Aerial Photography
1949	The area of earthworks/broken ground is no longer visible.	Aerial Photography
1964 – 1965	Appearance of further buildings in the Pant-rhiw-goch area to the south of area No.1. Adjacent pond is no longer identified; potentially backfilled.	1:10,560 Historical Mapping
1970 – 1973	The site remains largely unchanged with the exception of the 'intake' building which is now demolished.	1:10,000 Historical Mapping
1979	The M4 and A48 (M) are visible in their current positions to the north and south of the Site. The M4 appears to be under construction. **Earthworks/broken ground** are present across areas No.3, No.4 and the western half of No.5 including possible spoil heaps. The PSSR attributes the formation of the spoil heaps to be in the late 1970s in association with the construction of the A48(M). An earthworks/construction site is present to the south-west of area No.5. The roads crossing area No.1 have been re-routed to their current positions.	Aerial Photography
1981 – 1989	The M4 and A48 (M) are present in their current positions to	1:10,000 Historical

Date	Use	Source of information
	the north and south of the Site. Water Works infrastructure no longer identified.	Mapping
1985 – 1996	No significant change.	1:10,000 Historical Mapping
1998	The Site appears revegetated as agricultural fields and scrubland within area No.5. The potential footprint of previous **stockpiled material** may be observed in affected areas within areas No.3, No.4 and No.5. **Potential caravans/storage containers** are indicated in the western corner of area No.1, associated with Pant-rhiw-goch.	Aerial Photography
2006	An access track, area of hardstanding and potential bike racing track are identified within area No.5. Farm buildings/warehouses are present approximately 75 m so the south-west of area No.5. Location of potentially infilled pond south of area No.1 appears to be partially covered by hardstanding.	Aerial Photography
2009 – 2010	**Earthworks/construction/maintenance** in progress along the southern boundary of the M4, within areas No.1, No.3 and No.4. Works include excavation of what appears to be an attenuation pond in the northern part of areas No.3 and No.4. Storage of **stockpiled soil material** within areas No.1 and 2 and storage of construction materials within area No.2. Potential bike racing track within area No.5; which is now shown as revegetated.	Aerial Photography
2013	Construction works have ended and all areas now appear re–vegetated. No evidence of spoil heaps remaining in area No.2. The western section of area No.1 appears to comprise an embankment planted with sapling trees. Waste materials identified on hardstanding/track in area No.5. Expansion of hardstanding and construction of a warehouse type building within Pant-rhiw-goch-ganol area to the south of area No.1. Area now listed as David O'Brien Treecare Services. Expansion of farm to the south of area No.5.	Aerial Photography
2013	Spoil heap No.1 is indicated to comprise a linear bund of approximately 3 m height. Spoil heap No.2 is not evident. Spoil heap No. 3 is indicated to be mounded to a maximum height of approximately 11 m in the central eastern area. Limited stockpiled material is evident within spoil heap No. 4 (approximately 1 to 3 m height) with the exception of material forming the bunds of the attenuation pond. Limited material evident within spoil heap No. 5 which generally indicates a rise to the east to a maximum height of approximately 5 m.	Lidar Image (Figure 3)

Notes: Potential sources of contamination are underlined. Those within the temporary and permanent land take are shown in **bold**.

4.1.4 The sources of information presented above supplement those used in the 2014 PSSR. In particular, the 2009 aerial photographs have identified new potential sources of contamination. Relevant photographic extracts are presented in Appendix 3. Earthworks within spoil heap Nos. 3, 4 and 5 were first recorded in 1979 with spoil heap Nos. 1 and 2 identified within 2009/2010. In 2013 spoil heap No. 2 is indicated to have been removed and limited material is indicated within spoil heap No. 4 save the attenuation pond bunds. All spoil heaps now appear to have been planted/vegetated.

4.1.5 Historically the Site is located in proximity to areas which may have been bombed during World War II, which is discussed in the Explosive Ordnance Threat

Assessment Report (Bactec, 2014). This report categorises the Site as low risk with respect to unexploded ordnance.

5 Environmental Setting

5.1 Geology

5.1.1 British Geological Survey (BGS) data indicates that the Site is underlain by Glacial Till deposits with the exception of a small portion of the southern part of the site (spoil heap No.5) which is underlain by alluvium. These deposits overlie bedrock of the St Maughans Formation comprising interbedded argillaceous rocks and sandstones.

5.2 Hydrology

5.2.1 A spring fed stream originating within the northern area of spoil heap No.1 proceeds to flow in a southerly direction along the western boundary. The stream is shown on available Ordnance Survey and Natural Resource Wales (NRW) maps to terminate at the edge of the field south of spoil heap No.3, indicating a possible low and intermittent flow.

5.2.2 The attenuation pond associated with the drainage of the existing M4 is situated within the northern part of spoil heap areas No.3 and No.4.

5.2.3 Several issues, sinks and drainage ditches are recorded within a 300 m radius of the Site.

5.3 Hydrogeology

5.3.1 The superficial deposits at the Site are classed by NRW as unproductive strata. The bedrock at the Site is classified as a Secondary A Aquifer.

5.3.2 The Site does not lie within a groundwater source protection zone.

5.4 Environmental Information

5.4.1 The 2014 PSSR indicates that NRW records do not identify any pollution incidents, sewage discharges, abstraction licences, landfills/waste management facilities within 300 m radius of the Site.

5.4.2 No further environmental information relevant to this Site has been identified.

6 Scope of Investigations

6.1 General

6.1.1 No previous ground investigations have been undertaken at this Site. However, a number of holes were advanced within 100 m of the Site. These have been considered in order to support understanding of ground conditions beneath the Site and inform on the groundwater quality and gas regime, if relevant.

6.2 Scope of Works

6.2.1 Table 2 presents the offsite intrusive investigations that were undertaken in the near vicinity of the Site.

Table 2: Ground Investigation Summary (off site)

Date	Contractor	Boreholes	Location from Site	Sampling
1997	Norwest Holst	BHA2, BHA1	10 m south and 75 m north	None
2015	Geotechnical Engineering	BH303, BH302, BH301	35 m south, 85 m north-east and 100 m north-east	Soil

6.2.2 No monitoring wells were constructed within off site boreholes within 100 m of the Site during the previous ground investigations.

6.3 Surface Water Quality Sampling

6.3.1 No surface water sampling has been undertaken in the vicinity of the Site during the previous investigations.

6.4 Field Testing

6.4.1 Photo-ionisation detector (PID) monitoring for Volatile Organic Compounds (VOCs) was undertaken on soil samples from three of the selected off site boreholes:

- three soil samples from BH301 at 0.4-0.5 mbGL, 0.7-0.8 mbGL and 0.9-1.0 mbGL,
- three soil samples from BH302 at 0.4-0.5 mbGL, 0.8-0.9 mbGL and 1.0-1.1 mbGL and
- two soil samples from BH303 at 0.4-0.5 mbGL and 1.0-1.2 mbGL.

6.5 Groundwater Monitoring

6.5.1 No groundwater monitoring is reported. There are no off site boreholes with monitoring installations within the vicinity of the Site.

6.6 Laboratory Chemical Testing

6.6.1 No analytical data is available for the Site from the previous ground investigations.

6.6.2 No chemical analysis of soil, leachate or groundwater was undertaken or is available from the off site boreholes within the vicinity of the Site associated with the previous ground investigations.

6.7 Gap Analysis of Available Data

6.7.1 No intrusive investigation and chemical analysis data is available for this Site and therefore, no quantitative risk assessment has been undertaken.

7 Ground Conditions

7.1 Geological Sequence Summary

7.1.1 The geological logs for all available exploratory holes excavated in close proximity to the Site are provided in Appendix 1. The observed sequence of natural material is consistent with that described in the 2014 PSSR report and is summarised below. Information from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) has also been used.

7.1.2 Excluding holes located within the footprint of the M4 and A48(M) (BH301, 302 and 303), topsoil was encountered in the exploratory hole locations BHA1 and BHA2 to 0.4 m bGL. Within the M4 and A48 highways, the boreholes proved 150-350 mm thick Tarmacadam over gravelly subbase to 1.1-1.6 m bGL. At boreholes BH302 and BH303, the subbase was underlain by reddish brown gravelly clay Made Ground, probably reworked Glacial Till material, to 2.1-2.9 m bGL.

7.1.3 Unconsolidated superficial deposits were encountered directly beneath the topsoil and Made Ground, increasing in thickness to the south west. This comprised Glacial Till, a firm to very stiff reddish brown slightly gravelly sandy clay with occasional cobbles. Within BH303 to the south of the Site, this unit appears to grade into a basal gravel.

7.1.4 The St Maughans Formation was encountered immediately below the Glacial Till. This typically comprised reddish brown fractured mudstone with a sandstone horizon encountered within BHA2 from 5.6 m bGL to termination depth at 5.78 m bGL. The mudstone is highly weathered in the upper horizons becoming typically moderately weak with depth. Reduction spots are observed in the upper horizons.

7.1.5 Excluding Made Ground encountered within the footprint of the M4 and A48(M), the general geological sequence identified during the off site ground investigation works is summarised in Table 3.

7.1.6 The spoil heaps will consist of Made Ground, most likely re-worked natural soils excavated from the A48(M) construction (spoil heap Nos. 3, 4 and 5) and the attenuation pond (spoil heap Nos. 1 and 2). The maximum thickness of Made Ground that could be present based on LiDAR/site observations is 11 m in the east of spoil heap No. 3.

Table 3: Summary of Geological Sequence

Unit	Description	Thickness Range (m)	Basal depth (m bGL)
Topsoil	–	0.3-0.4	0.3-0.4
Superficial Deposits (Glacial Till)	Firm to very stiff reddish brown slightly gravelly sandy Clay with occasional cobbles.	2.4-12.95	4-14.7
St Maughans Formation (Mudstone)	Reddish brown becoming purplish brown thinly laminated fractured weak Mudstone, highly weathered in the upper horizons.	>5.8	Unproven
St Maughans Formation (Sandstone horizon)	Light reddish brown fine to medium grained moderately strong Sandstone. Highly weathered.	>0.18	Unproven

7.2 Visual and Olfactory Evidence of Contamination (off site)

7.2.1 No visual or olfactory evidence of contamination was identified during drilling within these selected off site locations.

7.2.2 PID monitoring was undertaken on three soils samples from BH301, three soil samples from BH302 and two soil samples from BH303. The PID meter recorded negligible levels of between zero and 1.7 ppm within the Made Ground.

7.2.3 Full details and observations noted during the drilling programme are presented on the exploratory logs attached in Appendix 1.

7.3 Gas Monitoring

7.3.1 No ground gas monitoring was undertaken in the vicinity of the Site during the previous ground investigations.

7.4 Groundwater

Groundwater Encountered During Investigation (off site)

7.4.1 No groundwater strikes were observed during the advancement of boreholes in the immediate vicinity of the Site. Within rotary boreholes BH301, 302 and 303, any potential groundwater strikes may have been obscured by the use of water flush during drilling.

Groundwater Summary

7.4.2 There is no available monitoring data confirming the resting groundwater level within boreholes in the immediate vicinity of the Site.

7.4.3 The main groundwater body has been identified at depth within the St Maughans Formation beneath the potentially contaminated land area CL-2, approximately 100 m east of the Site. This has been assessed due to a groundwater strike at 10.3 m bGL within BHB2, approximately 300 m to the east. As ground conditions have been found to be similar beneath the Site and CL-2, this is considered to be broadly representative of the groundwater conditions beneath the Site.

8 Contamination Assessment

8.1 Introduction

8.1.1 The Conceptual Site Model (CSM) presented within the 2014 PSSR has been reviewed. Further information has been made available for this Site since 2014 and the spoil heap material associated with the attenuation ponds have been added to CL-1.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 The historical land use of the Site is understood to have included storage of spoil material. A walkover survey undertaken by RPS personnel in May 2015 identified evidence of this material remaining in place, however, the thickness and nature of the Made Ground across the Site is not known and no chemical analysis data is available. It is understood from anecdotal evidence that the historical heaps comprised unsuitable 'marshy' fill material and topsoil excavated during the construction of the A48 (M) and more recently the attenuation pond. These materials are therefore considered unlikely to contain significant contamination.

8.2.2 A number of scrap materials including metals, an old van and wooden pallets/chairs were identified to have been tipped in the centre of area No.5. Waste 'fly' tipping activity in this area may present a small scale localised contamination sources. Widespread, gross contamination at the Site is not expected.

Potential Receptors

8.2.3 The following potential receptors have been identified for the operational phase. There are no proposed earthworks or landscape works within the Site so no construction receptors have been considered relevant.

Operational

8.2.4 The operational receptors are as follows.

- General public end users/neighbouring general public.
- Maintenance workers.
- Surface water features (spring, streams, drainage ditches).
- Secondary A Aquifer within the St Maughans Formation.

Potential Pathways

8.2.5 Pathways during the operational stages of the Scheme that have been considered are as follows.

- Dermal contact, ingestion and inhalation of impacted soils for general public end users, off site general public and maintenance workers (dust only).

- Contaminated surface water run-off into surface water features including existing/new drainage system.
- Leaching of contaminants from the spoil heap material and tipped materials to groundwater.

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the new data described herein, the following risk evaluation has been reconsidered.

- The Site has been subject to potential contaminative uses including the historical deposition of spoil material across the Site and very localised storage/tipping of waste materials and vehicles.
- Accidental spillages and leakages of oils and fuels may have occurred during the earthworks and localised tipping, potentially locally contaminating underlying soils and groundwater.
- Sections of the former spoil heap areas fall within the proposed land take areas for the Scheme although no construction works are being proposed.
- Site neighbours are considered potential receptors however they are unlikely to be exposed to potentially contaminated soils due to a distance >250 m from neighbouring land uses and any potentially impacted temporary land take area.
- A public footpath crosses the Site from the boundary of the A48(M) located in the south to a footbridge crossing the current M4 located to the north. There is a potential for the general public (M4 or footpath users) to come into contact with potentially impacted soil derived dust during construction of the Scheme as well as during the operational phase.
- Contact with potentially impacted soil derived dust pathways may also exist for maintenance workers during the operational phase. A reen/drainage ditch which runs adjacent to spoil heap No.3 cuts through the proposed temporary land take area in the north. Leaching of contaminants from the heaps, if present, may impact on controlled water quality. The sensitivity of the stream is noted to be low given its short flow path.
- The spoil heaps are anticipated to comprise natural soils excavated during the A48 and from attenuation pond construction. Very low leaching potential is anticipated given the natural origin of the material.
- The Superficial Deposits at the Site are classified as non-productive and are present at a thickness > 2.4 m. Thickness of the low permeability Glacial Till is seen to increase across the Site from north-east to south-west within off site boreholes. This is considered to represent a geological barrier against vertical migration of contaminants from the Made Ground into the deeper groundwater body within the Secondary A Aquifer.

8.4 Human Health and Controlled Waters Risk Assessment

8.4.1 No chemical analysis data is available for this Site and therefore no risk assessment has been undertaken.

9 Refined Conceptual Model

9.1.1 The incorporation of data from the 2015 Supplementary Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. The assessment is based on the Scheme during its construction and operational phases.

9.1.2 A CSM representing general ground conditions, overall Scheme layout and relevant source-pathway-receptors (each of which having a specific alpha-numerical symbol attached) are presented in Figure 2 and is described in Table 4.

Table 4: Conceptual Site Model

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
On Site. Soils in the area of former spoil heaps of materials of unconfirmed nature. Limited fly tipping.	**Operation**					
	Maintenance Workers (B)	Direct dermal (1)	Likely	Low	Low	Made Ground encapsulated by grass cover reducing potential of exposure. No chemical data available. Exposure duration will be short term only. Site specific risk assessment will be required in line with health and safety legislation. This will enable safe methodology and an appropriate level of PPE to be put in place. As such all risks will be duly considered and suitably mitigated. Maintenance workers may be exposed to ground gas potentially generated by the material heaps. Material anticipated to be of low gas generation potential. No on site ground gas data. End users to be within open space. Provision and implementation of a suitable verification sampling inspection strategy during construction to confirm risks. Current contamination status is not foreseen to represent abnormal constraints to maintenance workers health and safety over and above those typical of a brownfield site.
		Ingestion (3)	Likely	Low	Low	
		Inhalation of soil dust (2)	Likely	Low	Low	
		Inhalation of soil gas or vapours (2)	Likely	Low	Low	
	Motorway Users (A) and off site General Public (C)	Direct Dermal contact of soil dust (1)	Unlikely	Low	Very low	Dermal and ingestion pathways associated to soil dust only. Short term exposure only. End users to be within open space. Areas have established vegetation, reducing potential of exposure. Chemical analysis for potential Made Ground unknown. Provision and implementation of a suitable verification sampling inspection strategy during construction to confirm risks is recommended.
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Surface waters (E)	Contaminated surface water run–off (4)	Likely	Low	Low	The nearest water course is an unnamed stream located within the northern area of former spoil heap No.3. There is potential for surface water run-off to this receptor containing leached contaminants from the soils in the spoil heaps. No chemical data is available. Low leaching potential anticipated from soil materials. Chemical analysis for potential Made Ground unknown. Provision and implementation of a suitable verification sampling inspection strategy during construction to confirm risks is recommended. Low sensitivity of the surface water receptor.
	Groundwater – Aquifer (Da) from the St Maughans Formation	Leaching/migration (4) if contamination in Made Ground	Low	Low	Very low	Groundwater within the St Maughans Formation anticipated to be at depth (>10 m) and separated from the material within the spoil heaps by predominantly cohesive Glacial Till. These limit any potential contaminant mobilisation and migration to impact groundwater. Low leaching potential anticipated from soil materials. Chemical analysis for potential Made Ground unknown. Provision and implementation of a suitable verification sampling inspection strategy during construction to confirm risks is recommended.

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 Historical aerial photography and anecdotal evidence suggest the Site was previously used for deposition of spoil heaps associated with the construction of the A48 (M) and the more recently the attenuation pond. Evidence of remaining stockpiled material was confirmed during a site walkover by RPS personnel in May 2015, as well as evidence of storage of scrap/waste materials within Area No.5 (outside the land take).

10.1.2 Spoil heap No.1, the northern area of spoil heaps No.3 and No.4 and the northern boundary of spoil heap No.2 fall within the proposed land take area. However, very limited construction works are planned at the Site. It is indicated that any potentially contaminated materials in the north of spoil heap Nos. 3 and 4 would have been partially excavated during the formation of the existing attenuation pond. Anecdotal evidence suggests that these materials formed spoil heap Nos. 1 and 2. Since this time it is indicated that material within spoil heap No.2 has been removed with the remaining spoil heaps planted/vegetated.

10.1.3 No intrusive investigation has been undertaken within the Site and therefore risks to human health and controlled waters have not been quantitatively assessed. However, risk to identified receptors is anticipated to be low on the basis of the walkover survey, historical information and an assessment of plausible contaminant linkages.

10.2 Recommendations

10.2.1 A remediation strategy for the Scheme will be developed that will include a 'discovery strategy' for the Site. This will enable any contamination to be managed appropriately in the unlikely event any is encountered during any minor earthworks.

10.2.2 The remediation strategy for the Scheme should include a remediation options appraisal, remediation implementation plan and remediation verification plan. The remediation strategy should be supported by a Scheme wide Material Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

11 References

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Geotechnical (2015) M4 Corridor Around Newport, Factual Report on Ground Investigation, 30238

Highways Agency (2008) Design Manual for Roads and Bridges. Vol. 4. Geotechnics and Drainage. Section 1. Earthworks; Part 2. HD22/08. Managing Geotechnical Risk

Ove Arup & Partners (2014) M4 Corridor Around Newport, Preliminary Sources Study Report, 14/9197

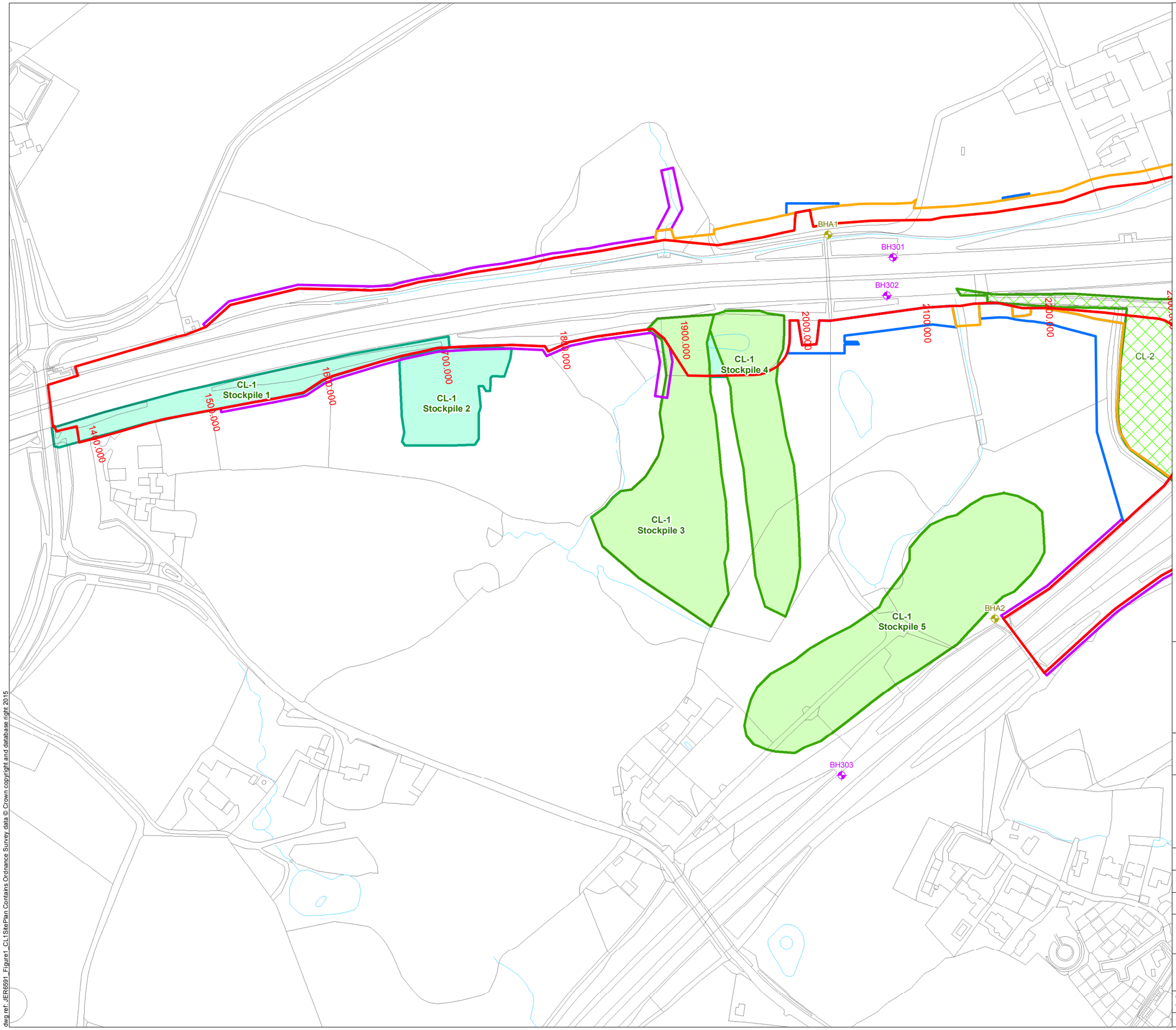
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12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GDR	Geotechnical Design Report
GIR	Ground Investigation Report
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum

mb	Millibars
mbGL	Metres below Ground Level
MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Potential Area of Land Contamination based on 2014 PSSR
- Revised Potential Area of Land Contamination
- Other Potential Area of Land Contamination

Investigation Locations

2015 (Geotechnical Engineering)

- Borehole

1997 (Norwest Holst)

- Borehole



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Appendix 11.1 Annex D CL-1

Site Plan for CL-1

Figure: 1	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:3,000

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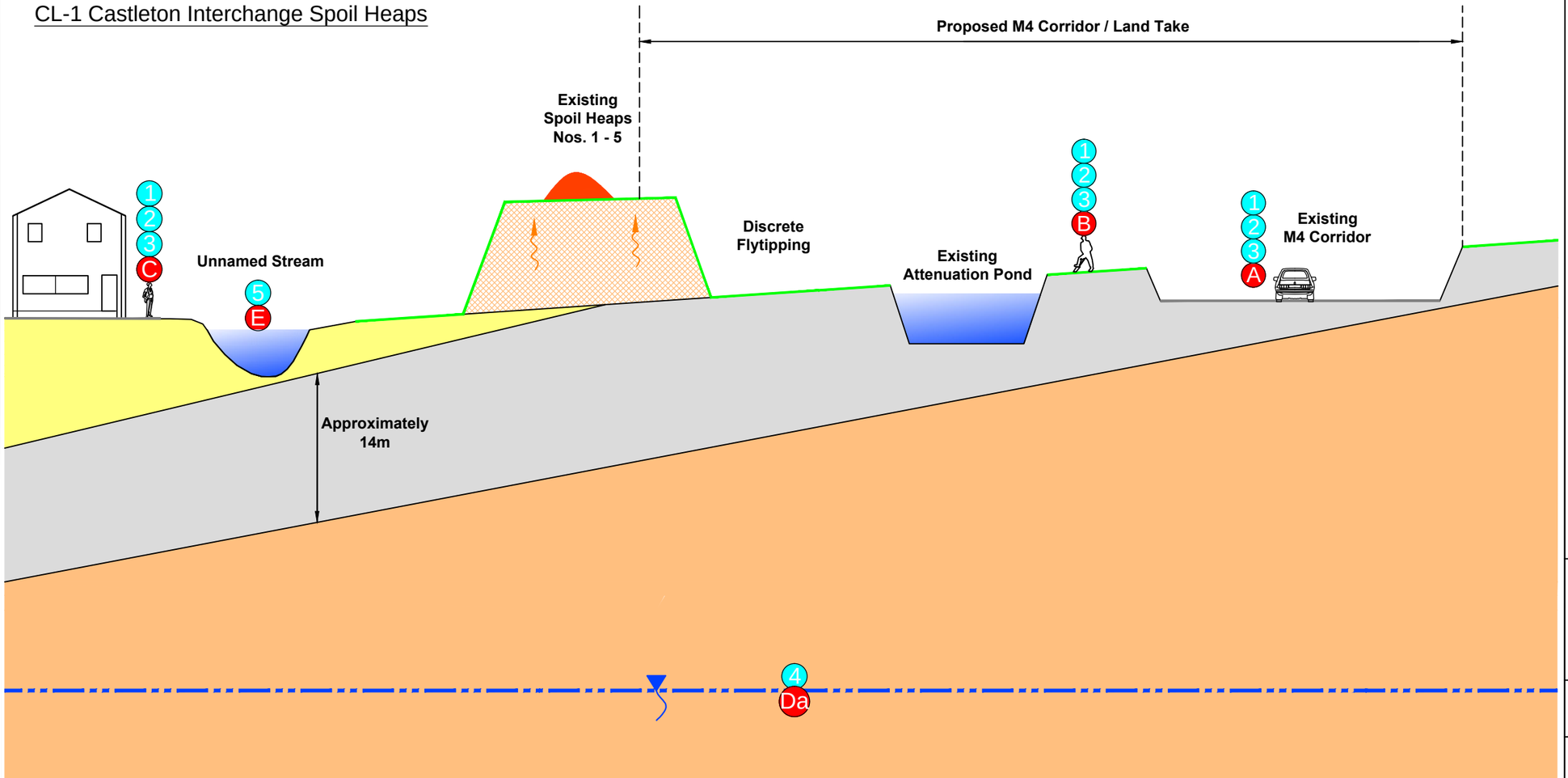
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dwg ref: JER6591_Figure1_CL1SitePlan

dwg ref: JER6591_Figure1_CL1SitePlan.Contains Ordnance Survey data © Crown copyright and database right 2015

CL-1 Castleton Interchange Spoil Heaps



Ground conditions based on available information

Legend

- Stockpiled Material
- Flytipped Material
- Alluvium
- Glacial Till Deposits - GT
- St. Maughans Formation - SMF
- Hardstanding
- Rough Grassland
- Groundwater (Aquifer)
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (M4 User)
- B Humans On-Site (Construction/Maintenance)
- C Humans Off-Site (Site Neighbours)
- Da Groundwater (Aquifer)
- E Surface Water

Potential Pathways

- 1 Dermal Contact
- 2 Inhalation
- 3 Ingestion
- 4 Leaching / Migration
- 5 Surface Run Off

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Soils in the area of former spoil heaps (5)
- The central area of stockpile No. 3 from small scale waste tipping

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0123 (January 2014)

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Appendix 11.1 Annex D CL-1

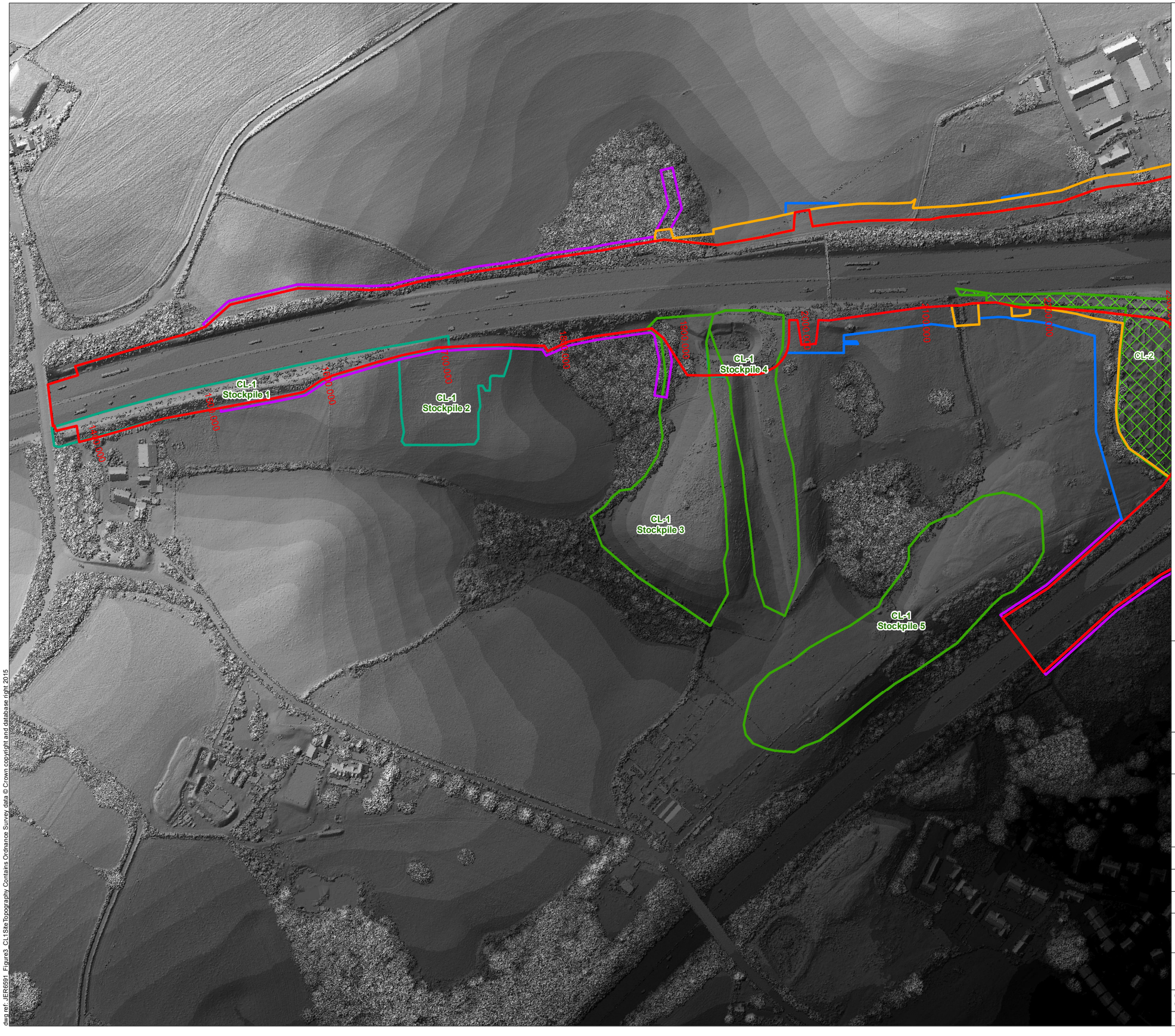
Conceptual Site Model for CL-1

Figure: 2	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL1ConceptualSiteModel

dwg ref: JER6591_Figure2_CL1ConceptualSiteModel



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Potential Area of Land Contamination based on 2014 PSSR
- Revised Potential Area of Land Contamination
- Other Potential Area of Land Contamination

LiDAR Digital Surface Model (2013)

Elevation (m)

- >75.0
- 72.5 -< 75.0
- 70.0 -< 72.5
- 67.5 -< 70.0
- 65.0 -< 67.5
- 62.5 -< 65.0
- 60.0 -< 62.5
- 57.5 -< 60.0
- 55.0 -< 57.5
- 52.5 -< 55.0
- 50.0 -< 52.5
- 47.5 -< 50.0
- 45.0 -< 47.5
- 42.5 -< 45.0
- 40.0 -< 42.5
- 37.5 -< 40.0
- 35.0 -< 37.5
- <35.0



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Appendix 11.1 Annex D CL-1

Site Topography for CL-1

Figure: 3	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:3,000

0 50 100 m

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dwg ref: JER6591_Figure3_CL1SiteTopography

dwg ref: JER6591_Figure3_CL1SiteTopography Contains Ordnance Survey data © Crown copyright and database right 2015

Appendices

A1 Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No. **BHA1** Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	324942.0 E
Project	M4 Relief Road Magor to Castleton Stage 2				184060.0 N
		Drilling Rig	Pilcon	Ground Level	58.60m AOD
Client	Welsh Office	Driller	I.D	Orientation	Vertical
		Logged by	T.R	Date Started	14/10/1997
Consultant	Ove Arup and Partners			Date Completed	14/10/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
14/10/1997	1800	8.35	6.80	Dry	

DRILLING DETAILS

Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
5.10	5.43	0.50	
5.80	6.00	0.50	
7.15	7.80	0.50	
7.80	8.10	0.50	
8.10	8.35	0.50	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	8.35	150	6.80

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
2.00	S	N=13 (2,3,3,3,4,3)
4.00	S	N=20 (1,3,3,4,6,7)
7.80	S	71/150mm (7,16,21,50)

* Seating blows only.

NB All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	CP HEADER
Version	2.00
Revised	25/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No. **BHA1** Sheet 1 of 1

Contract No.	F10895	Method	Cable Percussion	Coordinates	324942.0 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		184060.0 N
		Driller	I.D	Ground Level	58.60m AOD
Client	Welsh Office	Logged by	T.R	Orientation	Vertical
				Date Started	14/10/1997
Consultant	Ove Arup and Partners			Date Completed	14/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install-ation
TOPSOIL		0.40	58.20	B 0.50 - 0.90			
Firm reddish brown sandy CLAY with some fine to medium subangular to subrounded mudstone and sandstone gravel and occasional coarse gravel and cobbles. (Morainic Drift)				D 0.90 U 1.00 - 1.45	(21)		
				D 1.45			
---at 2.00m with occasional fine gravel sized angular coal fragments				D 2.00	S13	S 2.00 - 2.45	
				B 2.45 - 3.00			
				D 3.00 - 3.50 U 3.05	(32)		
				D 3.50			
---at 4.00m firm to stiff				D 4.00	S20	S 4.00 - 4.45	
				B 4.45 - 4.80			
				B 4.80 - 6.00			
				U 5.00	(99)		
				D 6.05 - 6.55 U 6.10	(37)		
				D 6.55			
		6.75	51.85				
Reddish brown mottled greyish green highly weathered silty MUDSTONE weak to very weak. (St. Maughans Group)				U 7.00 - 7.45	(40)		
				B 7.80 - 8.10 D 7.80	S71/150mm	S 7.80 - 8.10	
		8.35	50.25	D 8.35			
Cable Percussion boring complete at 8.35 m.							

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No. **BHA2** Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	325079.0 E
Project	M4 Relief Road Magor to Castleton Stage 2				183745.0 N
		Drilling Rig	Pilcon	Ground Level	41.10m AOD
Client	Welsh Office	Driller	A.M	Orientation	Vertical
		Logged by	C.D	Date Started	02/11/1997
Consultant	Ove Arup and Partners			Date Completed	02/11/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
02/11/1997	1600	5.78	5.60	Dry	

DRILLING DETAILS

Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
3.20	3.30	0.25	
5.30	5.50	0.25	
5.60	5.78	2.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	5.78	150	5.60

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Borehole drilled on steep slope.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.95	C	N=41 (3,6,9,12,10,10)
3.30	C	N=97 (4,7,9,15,23,50)
4.10	C	N=63 (2,5,9,15,18,21)
5.00	S	76/150mm (2,8,26,50)
5.60	C	50/75mm*

* Seating blows only.

NB All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	CP HEADER
Version	2.00
Revised	25/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No. **BHA2** Sheet 1 of 1

Contract No.	F10895	Method	Cable Percussion	Coordinates	325079.0 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		183745.0 N
		Driller	A.M	Ground Level	41.10m AOD
Client	Welsh Office	Logged by	C.D	Orientation	Vertical
				Date Started	02/11/1997
Consultant	Ove Arup and Partners			Date Completed	02/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install-ation
TOPSOIL		0.30	40.80	B 0.30 - 0.90			
Firm to stiff reddish brown occasionally thinly laminated very silty sandy CLAY with occasional to some sub-angular and sub-rounded gravel and cobbles of sandstone and mudstone. (Morainic Drift)				D 0.95 - 1.30 U 1.00 D 1.30	(50)		
				D 1.80 B 1.95 - 3.00 D 1.95	C41	C 1.95 - 2.40	
—from 2.00m very stiff							
—from 3.00m hard				D 3.05 - 3.20 U 3.10 B 3.30 - 4.00 D 3.30	NR C97	C 3.30 - 3.75	
Hard reddish brown very silty sandy CLAY with some to much sub-angular and sub-rounded gravel and cobbles of sandstone and mudstone. (Morainic Drift)		4.00	37.10	B 4.10 - 5.00 D 4.10	C63	C 4.10 - 4.55	
				D 5.00	S76/150mm	S 5.00 - 5.30	
		5.60	35.50	D 5.60	C50/75mm*	C 5.60 - 5.68	
Light reddish brown fine to medium grained moderately to highly weathered SANDSTONE, moderately strong. (St Maughans Group)		5.78	35.32				
Cable Percussion boring complete at 5.78 m.							

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Geotechnical Engineering Limited

BOREHOLE LOG

BH301

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 2

Start Date 16 February 2015 — Easting 324995.4 — Scale 1 : 50

End Date 17 February 2015 — Northing 184041.2 — Ground level 52.35mOD — Depth 9.80 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
16/02/15 2230hrs	1C	0.00 - 0.30			100			MADE GROUND comprising black TARMACADAM. (MG)	0.30	52.05	
	2B	0.40 - 0.50						Yellowish brown clayey sandy angular to subrounded fine to coarse sandstone and siliceous GRAVEL with a medium sandstone cobble content. (MG)			
	3D*	0.40 - 0.50		Vo 0.3							
	4B	0.70 - 0.80									
	5D*	0.70 - 0.80		Vo 0.0							
	6B	0.90 - 1.00									
	7D*	0.90 - 1.00		Vo 0.1							
		1.00 - 1.20	Nil	C*143					1.60	50.75	
	9X	1.00 - 2.00						Firm reddish brown slightly gravelly CLAY. Gravel is subangular fine and medium sandstone. (GTD)			
	10D	2.00 - 2.45	2.00	S 20							
	11X	2.00 - 3.00									
	12D*	2.10 - 2.20									
	13D*	2.70 - 2.80									
	14D	3.00 - 3.45	3.00	S 30							
	15C	3.00 - 4.00			65	NA		3.00 - 4.00m: Limited recovery. Purple. Possible loss of fines.			
		4.00 - 4.32	3.00	C*88					4.00	48.35	
	16C	4.00 - 5.30			100 0 0			Firm fissured purplish brown sandy gravelly CLAY. Gravel is subangular fine and medium sandstone. (SMG)			
						NI			4.75	47.60	
								Extremely weak and very weak thinly laminated purplish brown mottled greenish grey MUDSTONE. Fractures are subhorizontal to 20° very closely spaced planar rough locally infilled (up to 2mm) with greenish grey clay. Surfaces locally stained black. (SMG)			
	17C	5.30 - 6.80	3.00		100 0 0	NA			5.50	46.85	
								Firm fissured purplish brown mottled greenish grey gravelly CLAY. Gravel is subangular fine and medium grey and yellowish brown sandstone. (SMG)	6.10	46.25	
						NI		Extremely weak and very weak thinly laminated greenish grey mottled reddish brown SILTSTONE. Fractures are subhorizontal to 20° very closely spaced planar rough locally stained black locally infilled (up to 2mm) with reddish brown clay. (SMG)			
17/02/15 0320hrs 2.14m									6.80	45.55	
17/02/15 2215hrs 2.36m	18C	6.80 - 8.30	3.00		100 0 0	NI		Extremely weak and very weak thinly bedded greenish grey mottled reddish brown MUDSTONE. Fractures are subhorizontal to 20° and 80° to subvertical very closely spaced planar rough locally stained black. (SMG)	7.60	44.75	
						NI		Extremely weak and very weak very thinly bedded reddish brown mottled greenish grey MUDSTONE. Fractures are			
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Waterflush rotary core drilled (300mm) 0.00-0.30m. Hand dug inspection pit 0.30-1.00m. Dynamic sampled (113mm) 1.00-3.00m. Waterflush rotary core drilled (116mm) 3.00-9.80m.

CASING: 140mm diam to 3.00m.

BACKFILL: On completion, hole backfilled with bentonite pellets 9.80-1.00m, concrete 1.00-0.10m and tarmacadam 0.10-0.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
				Groundwater not encountered prior to use of water flush.

AGS

CONTRACT	CHECKED
30238	EC

Geotechnical Engineering Ltd. Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 13:53:51 RM EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH301

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 2 of 2

Start Date 16 February 2015 — Easting 324995.4 — Scale 1 : 50

End Date 17 February 2015 — Northing 184041.2 — Ground level 52.35mOD — Depth 9.80 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
17/02/15 2355hrs 1.74m	19C	8.30	9.80	3.00		100 0 0			subhorizontal to 20° and 70° to subvertical very closely spaced planar rough locally stained black infilled (up to 2mm) with greenish grey clay. (SMG)	9.80	42.55	
									Borehole completed at 9.80m.	{18.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

Groundwater not encountered prior to use of water flush.

AGS

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Ltd. Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 13:53:51 RM EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH302

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 2

Start Date 24 March 2015 — Easting 324990.3 — Scale 1 : 50

End Date 26 March 2015 — Northing 184009.9 — Ground level 51.70mOD — Depth 11.80 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
24/03/15 2315hrs	C	0.00 - 0.35			100			MADE GROUND comprising black TARMACADAM. (MG)			
	1B	0.40 - 0.50							0.35	51.35	
	2D*	0.40 - 0.50		Vo 0.0				Light brown sandy angular and subangular fine to coarse sandstone GRAVEL. (MG)			
	3B	0.80 - 0.90							0.70	51.00	
	4D*	0.80 - 0.90		Vo 0.0				0.70m: Angular sandstone boulder.			
	5B	1.00 - 1.10									
	6D*	1.00 - 1.10		Vo 0.0				Dark brown sandy angular and subangular fine to coarse sandstone GRAVEL. (MG)			
		1.20 - 1.65	Nil	C 17					1.20	50.50	
	7X	1.20 - 2.20						Stiff reddish brown slightly sandy gravelly CLAY. Gravel is subangular and subrounded fine to coarse mudstone and sandstone. (MG)			
	8D*	1.50 - 1.60									
		2.20 - 2.65	Nil	C 16					2.10	49.60	
	9X	2.20 - 3.20						Firm becoming stiff reddish brown slightly gravelly sandy CLAY with low sandstone cobble content. Gravel is subangular to rounded fine to coarse sandstone and quartzite with frequent lenses (up to 4mm) of yellowish brown sand. (GTD)			
	10D*	2.50 - 2.60									
		3.20 - 3.65	Nil	C 22							
	11X	3.20 - 4.20	3.20								
	12D*	3.50 - 3.60									
		4.20 - 4.65	4.20	C 31							
	13C	4.20 - 5.70			31	NA		4.20 - 5.70m: Limited recovery.			
25/03/15 0320hrs 0.98m	14X	5.70 - 6.20	4.20								
		6.20 - 6.52	6.20	C*88					6.25	45.45	
25/03/15 2210hrs 1.59m	15C	6.20 - 7.30			85	NA		Stiff fissured reddish brown gravelly CLAY with frequent bluish grey reduction spots (up to 20mm). Gravel is subangular and subrounded fine to coarse lithorelicts of very stiff clay to extremely weak mudstone. (SMG)			
		7.33 - 7.43	6.20	C*375							
	16C	7.30 - 8.80			100						
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Waterflush rotary core drilled (300mm) 0.00-0.35mm. Hand dug inspection pit 0.35-1.20m. Dynamic sampled (113mm) 1.20-4.20m and 5.70-6.20m. Waterflush rotary core drilled (116mm) 4.20-5.70m and 6.20-11.80m.

CASING: 168mm diam to 6.20m.

BACKFILL: On completion, hole backfilled with bentonite pellets 11.80-0.80m, concrete 0.80-0.10m and tarmacadam 0.10-0.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
				Groundwater not encountered prior to use of water flush.

AGS

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BOREHOLE LOG



BH302

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 2 of 2

Start Date 24 March 2015 — Easting 324990.3 — Scale 1 : 50

End Date 26 March 2015 — Northing 184009.9 — Ground level 51.70mOD — Depth 11.80 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	17C	8.80	10.30	6.20		93						
							NA		Very stiff fissured reddish brown gravelly CLAY with frequent bluish grey reduction spots (up to 20mm). Gravel is subangular and subrounded fine to coarse lithorelicts of extremely weak and very weak mudstone. (SMG)	9.80	41.90	
	18C	10.30	11.80	6.20		100						
26/03/15 1230hrs NR									11.40m: Cobble sized lithorelict of extremely weak mudstone.	11.80	39.90	
									Borehole completed at 11.80m.	{18.00}		

water strike (m)	casing (m)	rose to (m)	time to rise (m)	remarks
				Groundwater not encountered prior to use of water flush.

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BOREHOLE LOG

BH303

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 3

Start Date 5 March 2015 — Easting 324953.1 — Scale 1 : 50

End Date 11 March 2015 — Northing 183616.5 — Ground level 41.55mOD — Depth 20.20 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
05/03/15 2215hrs	C	0.00 - 0.34			100			MADE GROUND comprising black TARMACADAM. (MG)	0.15	41.40	
	1B	0.40 - 0.50						MADE GROUND comprising grey CONCRETE. (MG)	0.35	41.20	
	2D*	0.40 - 0.50		Vo 1.7				Reddish brown slightly clayey sandy angular to rounded fine to coarse siltstone GRAVEL. (MG)			
	3B	0.80 - 0.90									
	4B	1.00 - 1.20									
	5D*	1.00 - 1.20		Vo 0.0					1.10	40.45	
	6D	1.20 - 1.65	Nil	S 16				Firm to stiff reddish brown slightly sandy slightly gravelly CLAY. Gravel is angular to rounded fine to coarse sandstone, siltstone and mudstone. (MG)			
	7X	1.20 - 2.20									
	8D*	1.20 - 1.40							2.00	39.55	
	9D	2.20 - 2.65	2.20	S 16				MADE GROUND comprising grey CONCRETE. (MG)	2.25	39.30	
	10X	2.20 - 3.20						Firm to stiff reddish brown locally dark grey slightly sandy slightly gravelly CLAY. Gravel is angular to rounded fine to coarse medium sandstone, siltstone and mudstone. (MG)			
	11D*	2.20 - 2.40							2.90	38.65	
	12D	3.20 - 3.65	3.20	S 32				Very stiff reddish brown slightly gravelly sandy CLAY. Gravel is subangular to rounded fine to coarse sandstone, mudstone and siltstone. (GTD)			
	13X	3.20 - 4.20									
	14D*	3.20 - 3.40									
	15D	4.20 - 4.65	4.20	S 37							
	16X	4.20 - 5.20									
	17D	5.20 - 5.65	4.20	S 41				5.10m: Subrounded sandstone cobble (100x80mm).			
	18X	5.20 - 6.70									
06/03/15 0240hrs 1.04m	19D	6.70 - 7.15	6.70	S 33							
06/03/15 2310hrs 2.69m	20X	6.70 - 8.02	7.05								
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Waterflush rotary core drilled (300mm) 0.00-0.34m Hand dug inspection pit 0.34-1.20m. Dynamic sampled (113mm) 1.20-8.02m and 10.30-14.70m. Waterflush rotary core drilled (116mm) 8.02-10.30m and 14.70-20.20m.

CASING: 140mm diam to 14.70m.

BACKFILL: On completion, hole backfilled with bentonite pellets 20.20-1.20m, concrete 1.20-0.20m and tarmacadam 0.20-0.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
				Groundwater not encountered prior to use of water flush.

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BOREHOLE LOG

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CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 2 of 3

Start Date 5 March 2015 — Easting 324953.1 — Scale 1 : 50

End Date 11 March 2015 — Northing 183616.5 — Ground level 41.55mOD — Depth 20.20 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	21C	8.02 - 8.60	8.02		96	NA		8.02 - 8.80m: Rounded coarse sandstone gravel. Fines probably washed away. 8.30 - 8.70m: Conglomerate boulder.			
		8.60 - 8.68	8.02	C*500							
	22C	8.60 - 9.60			30			8.60 - 9.60m: Limited recovery. Fines probably washed away.			
	23D	9.60 - 9.76	9.60	S*750							
	24C	9.60 - 10.30			28			9.60 - 9.70m: Rounded sandstone cobble (150x80mm). 9.60 - 10.30m: Limited recovery. Fines probably washed away.			
07/03/15 0250hrs 0.89m											
		10.30 - 10.50	10.30	S*157							
09/03/15 2200hrs 0.14m	25X	10.30 - 11.80						10.80m: Subrounded siltstone cobble (80x70mm). 10.85 - 11.30m: Sandy gravelly clay.			
									11.30	30.25	
		11.80 - 11.91	11.80	S*231				Very dense reddish brown slightly gravelly medium and coarse SAND. Gravel is subrounded fine to coarse sandstone and siltstone. (GTD)			
	26X	11.80 - 13.30									
									12.60	28.95	
	27D	13.30 - 13.47	13.30	S*176				Very dense reddish brown slightly sandy subrounded and rounded fine to coarse sandstone and siltstone GRAVEL with medium rounded siltstone cobble content. (GTD)			
	28X	13.30 - 14.70						13.30 - 14.70m: Limited recovery.			
									14.35	27.20	
		14.70 - 14.79	14.70	C*231				Firm reddish brown slightly gravelly sandy CLAY. Gravel is rounded fine to coarse sandstone and siltstone. (GTD)	14.70	26.85	
	29C	14.70 - 16.00			100 0 0	NA		Stiff fissured reddish brown slightly sandy gravelly CLAY with frequent light greenish grey reduction spots (up to 30mm). Gravel is subangular fine and medium lithorelicts of extremely weak mudstone. Frequent relict fissures are randomly orientated extremely closely spaced planar smooth. (SMG)			
						NI			15.85	25.70	
	30C	16.00 - 17.50	14.70		100 10 0	NI 60		Extremely weak and very weak thinly laminated reddish brown MUDSTONE with rare light greenish grey reduction spots (up to 30mm). Fractures are randomly orientated very closely spaced planar smooth. (SMG)			
									17.10	24.45	
						NI NI 50		Weak thinly laminated reddish brown MUDSTONE with rare light greenish grey reduction spots (up to 30mm). Fractures are subhorizontal to 20° and 70° to subvertical very closely to closely spaced planar smooth. (SMG)			
10/03/15 0255hrs 0.75m	31C	17.50 - 17.90	14.70		100 13 0						
								Continued Next Page	{18.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

Groundwater not encountered prior to use of water flush.

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BOREHOLE LOG

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CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 3 of 3

Start Date 5 March 2015 — Easting 324953.1 — Scale 1 : 50

End Date 11 March 2015 — Northing 183616.5 — Ground level 41.55mOD — Depth 20.20 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
10/03/15 2155hrs 0.17m	32C	17.90 - 19.40	14.70		100 42 38	NI 90 140					
	33C	19.40 - 20.20	14.70		100 11 0	NA			19.70	21.85	
11/03/15 0055hrs 0.92m						50		Very stiff fissured reddish brown very gravelly CLAY. Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced. (SMG)	20.10	21.45	
								Weak thinly laminated reddish brown MUDSTONE. Fractures are subhorizontal to 20° very closely spaced planar smooth. (SMG)	20.20	21.35	
								Borehole completed at 20.20m.			
									{28.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

Groundwater not encountered prior to use of water flush.

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A2 Appendix 2

Site Walkover Photographs



Plate 01: CL1 – View looking north toward spoil heap Nos. 1 and 2



Plate 02: CL1 – View looking east over spoil heap No. 3

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Sept 2015



Plate 03: CL1 – View looking northwest over spoil heap Nos. 1 and 2



Plate 04: CL1 – View looking north over spoil heap Nos. 1 and 2

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Sept 2015



Plate 05: CL1 – View looking northeast toward spoil heap No. 2



Plate 06: CL1 – View looking southeast over spoil heap No. 3

Client:	Welsh Government
Project:	M4CaN
Job Ref: JER6591	Checked By: Date: Sept 2015



Plate 07: CL1 – Various materials located within spoil heap No. 3



Plate 08: CL1 – Various materials located within spoil heap No. 3

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Sept 2015



Plate 09: CL1 – View looking west over spoil heap No. 3

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Sept 2015

A3 Appendix 3

Relevant Extract Of Additional Environmental Data

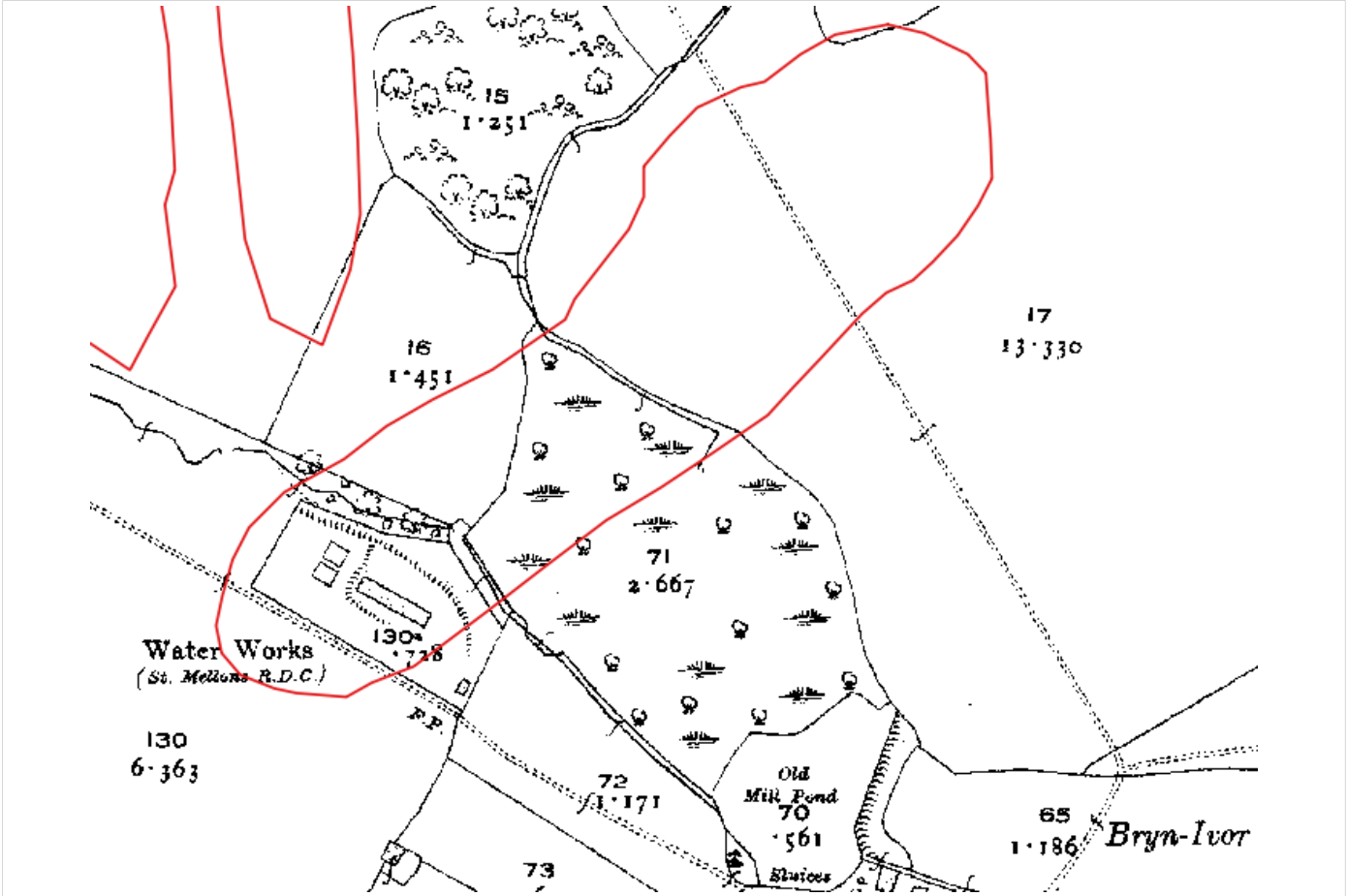


Plate 01: Extract of 1904-1939 Historic Map

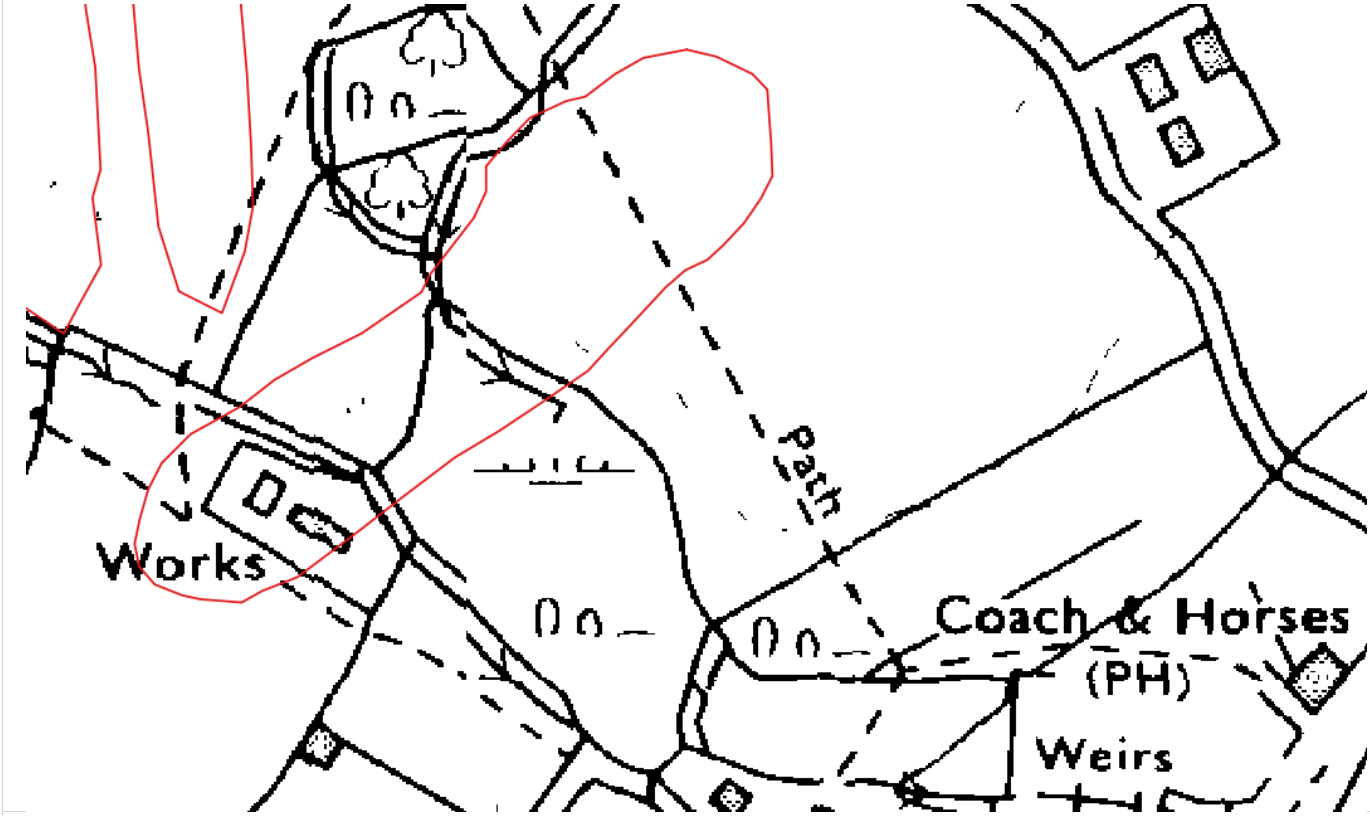


Plate 02: Extract of 1970-1973 Historic Map

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: Jan 2016



Plate 03: Extract of 2009 Aerial Photograph

Client:	Welsh Government			
Project:	M4CaN			
Job Ref:	JER6591	Checked By:	Date:	Jan 2016

Welsh Government

M4 Corridor around Newport

Land Contamination Assessment Report Annex D CL-2, Former Construction Storage Compound

M4CaN-DJV-EGT-ZG_GEN-RP-EN-0005

At Issue | March 2016

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Figure 2 Conceptual Site Model

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Appendix 1 Exploratory Records
Appendix 2 Site Walkover Photographs
Appendix 3 Relevant Extract of Additional Environmental Data

1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-2) known as the 'Former Construction Storage Compound' hereafter referred to as the Site.

1.1.2 The Site is located between chainage 2,200 and 2,400 (see Figure 1) and is believed to have been used as a storage compound during M4/A48(M) construction and maintenance.

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) of which this document is an appendix to the chapter on Geology and Soils.

1.2.2 In 2014, a Preliminary Sources Study Report (2014 PSSR) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. In addition, this report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015). This report relates to the area defined on the Site Plan Figure 1.

1.2.3 The overarching rationale and approach for the assessment of areas of land along the proposed new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the ES).

1.3 Objectives

1.3.1 The key objectives of this report are set out below:

- Undertake a risk assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.
- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.
- To provide information to support the Ground Investigation Report (GIR) and Geotechnical Design Report (GDR) required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The subsequent report structure is as follows:

- Section 2: Site Location and Description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Ground Investigations Work – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions – This section describes the main findings of the intrusive site investigation including the ground conditions encountered and any visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessments.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations – This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and requirements for remediation/mitigation.

2 Site Location and Description

2.1.1 The Site is located adjacent to the current M4/A48(M) Castleton Interchange, with the centre point at NGR of ST252 840. It comprises a roughly triangular parcel of land covering an area approximately 1.77 hectares. The Site is a former storage compound for machinery and materials used for the M4/A48(M) construction and maintenance work. The land is adjacent to the existing M4/A48(M), within the slip road alignment. Following completion of the M4, it is thought the Site continued to be used for storage purposes when required for maintenance. The location and layout of the Site is presented on Figure 1.

2.1.2 A walkover survey of the Site undertaken by Ove Arup and Partners in 1995 confirmed it was being used as a maintenance storage compound (Ove Arup and Partners, 2014). A recent walkover survey undertaken in May 2015 (access was permitted to the western part of the Site only) noted the Site to be grassed/partly wooded and undulating with many areas of ridged ground. Occasional tyres and scrap metal were observed across the Site. A reduced level area lined by mature trees was noted crossing through the Site. Photographs taken during this site walkover are presented in Appendix 2.

3 The Scheme

3.1.1 The Site is situated on the M4 Corridor around Newport at approximate chainage 2,200 to 2,400 as shown on Figure 1.

3.1.2 The footprint of the new section of motorway would encroach slightly on the northern boundary of the Site due to the reconstruction of the Castleton Interchange with widening of the existing M4 in cutting as it approaches the junction. A slip road joining the A48(M) would also be constructed in a shallow cutting and would encroach on the Site at the southern boundary.

3.1.3 The area of the cut would be excavated and the soils with potentially elevated contaminant concentrations would be removed.

3.1.4 It is envisaged that the excavated soils would be reused within the Scheme, if proven to be suitable for reuse with disposal to landfill as a last resort.

4 Site History

4.1.1 The 2014 PSSR's historical searches have been based on Ordnance Survey plans, literature reviews, information provided by Natural Resources Wales (NRW) (formerly Environment Agency Wales), Newport City Council and aerial photographic interpretation.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from the Welsh Government. Relevant extracts are presented in Appendix 3.

4.1.3 A summary of the Site's history is presented in Table 1 below.

Table 1: Site History Summary

Date	Use	Source of information
1843 - 1893	The Site comprises agricultural fields with a road running north-south through the north western corner of the Site and then bounds it to the west. The Site is predominantly surrounded by agricultural fields. A road bounds the Site to the west. A small development labelled 'New Park' is located approximately 75 m to the north. A small pond is located approximately 100 m to the west.	1:10,560 Historical Mapping
1891 - 1912	No significant change.	1:10,560 Historical Mapping
1904 - 1939	No significant change.	1:10.560 Historical Mapping
1964 - 1965	No significant change on Site. A development of 4 buildings is present approximately 50 m to the south. Cottages have been built adjacent to 'New Park' to the north.	1:10,560 Historical Mapping
1970 - 1973	No significant change.	1:10,000 Historical Mapping
1979	No significant change.	Aerial Photography
1981 - 1989	The Site is now bound by the M4 to the north and the A48 to the south and the Castleton Interchange to the east. The M4 is depicted as being within a cutting relative to the Site whilst the interchange is on **embankment.** **A track joining the M4 and A48(M) crosses the centre of the site.** This track is currently intended for use by maintenance and emergency vehicles only. A 'Garden Centre' is located approximately 100 m to the southeast.	1:10,000 Historical Mapping

Date	Use	Source of information
1985 - 1996	No significant change. Walkover survey reported in 1995 observed the Site being used as a **storage compound for highway construction and maintenance**.	1:10,000 Historical Mapping and 1995 walkover survey and 2014 PSSR
1998	The eastern half of the Site is identified as pasture land whilst the western half is wooded with an area of disturbed ground/stockpile of material along the track.	Aerial Photography
2006	The western half of the assessment Site is in use as a **race track (dirt track)**, whilst the eastern half remains wooded. The area identified in 1998 as a possible stockpile of material is now seen as exposed ground.	Aerial Photography
2009 - 2010	The race track on the western section of the Site now appears overgrown and disused. The eastern half of the Site consists of a **storage/construction compound**, in apparent association with the attenuation pond excavation along the M4. Exposed ground is seen within the area of the compound (wood removed). Cabins and construction material are located along the western half of the compound area and trucks are evident stockpiling material within the south eastern half of the site. Construction works are present along the M4 to the north of the Site and 500 m to the east of the Site between the M4 and A48.	Aerial Photography
2014	The eastern half of Site is overgrown with rough vegetation and the western half now has a few trees. Construction works are complete and areas where works were taking pace are overgrown with rough vegetation. The garden centre has been demolished.	Aerial Photography

Notes: Potential sources of contamination are underlined. Those within the temporary and permanent land take are shown in **bold**.

4.1.4 The information presented above supplements that used in the 2014 PSSR (Ove, Arup and Partners, 2014). In particular, the 1998, 2006 and 2009 aerial photographs and the 1981 historical map have identified new potential sources of contamination. Relevant extracts of the photographs are presented in Appendix 3.

4.1.5 The Site is indicated to be used as a storage/construction compound during the construction of the M4 *c*.1995 and more recently in 2009/2010 in apparent association with the excavation of an attenuation pond. Review of the most recent aerial photography confirms that currently the Site is no longer in use as a storage compound.

4.1.6 From review of current web based mapping the historical garden centre to the south east of the Site is indicated to have been redeveloped as a care home.

4.1.7 Historically the Site is located in proximity to areas which may have been bombed during World War II which is discussed in the Explosive Ordnance Threat

Assessment Report (Bactec, 2014). This categorises the Site as low risk with respect to unexploded ordnance.

5 Environmental Setting

5.1 Geology

5.1.1 The British Geological Society (BGS) records indicate the Site to be underlain by Glacial Till Deposits overlying bedrock of the St Maughans Formation comprising interbedded argillaceous rocks and sandstones.

5.2 Hydrology

5.2.1 There are no surface water features located within the Site boundary. A stream flowing in a southerly direction is located approximately 100 m to the west of the Site.

5.3 Hydrogeology

5.3.1 The superficial deposits at the Site are classed by NRW as unproductive strata. The bedrock at the Site is classified as a Secondary A Aquifer.

5.3.2 The Site does not lie within a groundwater source protection zone.

5.4 Environmental Information

5.4.1 The 2014 PSSR indicates that NRW records do not identify any pollution incidents, sewage discharge, abstraction licence, landfills/waste management facilities within 300 m radius of the Site.

5.4.2 No further environmental information relevant to this Site has been identified.

5.4.3 Residual levels of potential contamination are considered unlikely to be present on Site.

6 Scope of Investigations

6.1 General

6.1.1 One previous ground investigation included works undertaken within the former construction storage compound site. The information provided is within the Site boundary and is intersected by the new section of motorway. This is summarised below.

6.2 Scope of Works

6.2.1 The various intrusive ground investigations undertaken within the Site area are summarised in Table 2.

Table 2: Site Investigation Summary

Date	Contractor	Site Location	Boreholes	Window Sampler	Trial Pits	Sampling
1997	Norwest Holst	East	BHB2	-	-	None

6.2.2 No monitoring well was constructed within this borehole.

6.3 Surface Water Quality Monitoring

6.3.1 Surface water quality monitoring was not undertaken during the previous ground investigations of the Site.

6.4 Field Testing

6.4.1 PID monitoring was not undertaken during the previous ground investigation.

6.5 Groundwater Monitoring

6.5.1 No groundwater monitoring is reported during the previous ground investigation. There are no off site boreholes within the immediate vicinity of the Site.

6.6 Laboratory Chemical Testing

6.6.1 No chemical soil, leachate or groundwater analysis was undertaken or is available from off site boreholes within the Site during the previous ground investigations.

6.7 Gap Analysis of Available Data

6.7.1 The investigation data available for the Site is considered limited both in relation to Site coverage and in the laboratory analysis.

6.7.2 It is also noted that the only intrusive investigation refers to 1997 data which is prior to the establishment of the construction compound and dirt race track, identified as the principal potential sources of contamination.

6.7.3 No chemical analysis data is available for this Site and therefore no quantitative risk assessment has been undertaken.

7 Ground Conditions

7.1 Geology

7.1.1 The geological logs for the single borehole available (BHB2) on the Site is provided in Appendix 1. The observed geological sequence is as described in the 2014 PSSR report and is summarised in the following sections.

Topsoil

7.1.2 Topsoil was encountered in the exploratory hole location to 0.4 mbGL. No Made Ground was encountered.

7.1.3 The existing interchange embankment is assumed to have been constructed by engineered placement of imported material. Detail of the composition of this material is currently unknown.

Superficial Deposits

7.1.4 Unconsolidated superficial deposits were encountered directly beneath the topsoil. This comprised Glacial Till, a medium dense reddish brown clayey sand with much fine to medium gravel to 2.5 mbGL.

Solid Geology

7.1.5 The St Maughans Formation was encountered immediately below the Glacial Till. This comprised reddish brown highly fractured mudstone with a sandstone horizon encountered between 7.31 and 9.6 mbGL. The mudstone is highly weathered in the upper horizons becoming typically moderately weak to moderately strong with depth.

Geological Sequence Summary

7.1.6 The general geological sequence identified during the previous ground investigation is summarised in Table 3.

Table 3: Summary of Geological Sequence

Unit	Description	Thickness (m)	Basal Depth (mbGL)
Topsoil	-	0.4	0.4
Superficial Deposits (Glacial Till)	Medium dense reddish brown clayey sand with much gravel.	2.16	2.56
St Maughans Formation (Mudstone)	Reddish brown highly fractured mudstone, moderately weak to moderately strong. Highly weathered upper horizon.	>22.79	unproven
St Maughans Formation (Sandstone horizon)	Purplish brown fractured sandstone, moderately strong to strong.	2.29	9.6

7.1.7 The conceptual site model included within the 2014 PSSR report has been revised in light of the 2015 information and is presented within Figure 2.

7.2 Visual and Olfactory Evidence of Contamination

7.2.1 No visual or olfactory evidence of contamination was identified.

7.3 Gas Monitoring

7.3.1 No ground gas monitoring was undertaken.

7.4 Groundwater

Groundwater Encountered During Investigation

7.4.1 A single water strike encountered during the advancement of borehole BHB2 is detailed on the geological log provided in Appendix 1. This is summarised in Table 4.

Table 4: Summary of Groundwater Level Data Encountered During Drilling

Location	Strike Depth (mbGL)	Geological Formation	Level after 20 minutes (mbGL)
BHB2	10.3	St Maughans Formation	-

7.4.2 There are no available monitoring data confirming the resting groundwater level for borehole BHB2.

Groundwater Summary

7.4.3 The main groundwater body was identified to be at depth within the St Maughans Formation. Based on knowledge within the wider motorway alignment, resting water levels within the St Maughans Formation tend to remain at or within 1 m of the strike depth.

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The conceptual site model presented within the 2014 PSSR has been reviewed. No data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) relates to this Site and no further information has been made available for this Site since 2014.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 The historical land use of the Site includes the storage of motorway maintenance machinery, vehicles and materials as well as a dirt race track. These may have resulted in accidental spillages and leakages of oils and fuels.

8.2.2 Whilst no Made Ground has been encountered to date, this is based on a single borehole and it is considered the presence of Made Ground is likely.

8.2.3 Material forming the existing A48(M) embankment is not considered as a potential source of contamination although this will require confirmation through a suitable verification sampling inspection strategy during construction.

Potential Receptors

8.2.4 Receptors during the construction and the operational stages of the Scheme have been considered:

Construction

- Construction workers during Site development works.
- Adjacent users north and south of the existing M4 and A48(M) - New Park settlement and care home respectively.
- Secondary A Aquifer within the St Maughans Formation.

Operational

- General public end users.
- General public adjacent to the permanent land take.
- Maintenance workers.
- Secondary A Aquifer within the St Maughans Formation.

Potential Pathways

8.2.5 Pathways during the construction and the operational stages of the Scheme have been considered:

- Dermal contact, ingestion, inhalation pathways (dust and vapours) arising from potentially contaminated soils possible during construction and maintenance works.
- Dermal contact, ingestion and inhalation of dust possible for general public end users and adjacent general public/workers.
- Leaching of contaminants from the Made Ground into the groundwater.
- Vertical or lateral migration of free phase hydrocarbon product or dissolved product, if present, to groundwater.
- Vertical or lateral migration of ground gas/vapours associated with Made Ground and soils with elevated hydrocarbon contamination or groundwater.

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008.

- The Site has been subject to potential contaminating uses (storage of motorway maintenance machinery, vehicles and materials). Accidental spillages and leakages of oils and fuels may have occurred, potentially contaminating the underlying soils and groundwater.
- Presence of a containment barrier such as concrete slab has not been identified within the former storage compound land use.
- Considering the known land use, organic compounds are considered as the main contaminants of concern.
- Proposed widening of the A48(M) hardstanding cover would reduce exposure pathways to motorway users and is likely to limit infiltration thereby reducing leaching.
- Proposed widening of the existing M4 in an area of cut.
- Proposed cut for the A48(M) slip road for soft landscape (no construction).
- Thin superficial deposits are classified as non-productive and overlie a Secondary A Aquifer associated with the mudstone.
- No surface water features within or in close proximity to the Site.
- Motorway users will be within open environment with no proposed structure or other confined spaces.

8.4 Human Health and Controlled Waters Risk Assessment

8.4.1 No chemical analysis data is available for this Site from the previous ground investigation and therefore no risk assessment has been undertaken.

9 Refined Conceptual Site Model

9.1.1 The original CSM presented in the 2014 PSSR has been updated. The assessment is based on the Scheme during construction and operational phases.

9.1.2 A CSM representing general ground conditions, overall layout of the new section of motorway and relevant source-pathway-receptors (each of which having a specific alpha-numerical symbol attached) are presented in Figure 2 and is described in Table 5.

Table 5: Site Conceptual Model

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Potentially contaminated soil from oil and fuel leaks / spillages.	**Construction**					
	Construction Workers (B)	Direct dermal (1)	Likely	Low	Low	Construction workers will possibly be exposed to soils with elevated contamination concentrations during construction works; however exposure duration will be short term only. Prior to construction, a specific risk assessment will be required in line with CDM and health and safety guidance. This will enable safe methods of work and appropriate levels of PPE to be put in place. As such all risks will be duly considered and suitably mitigated to protect construction workers. No chemical analysis has been undertaken at the Site. No Made Ground has been encountered and no visual / olfactory evidence of contamination was identified. The contamination status is not foreseen to represent abnormal constraints to construction workers health and safety over and above those typical of a brownfield site. Localised areas of elevated hydrocarbon concentrations, if present, may however require specific precautions and possibly specialist contractors to enable remediation. Given the Site has remained un-occupied for a number of years, some level of degradation/deterioration of organic contaminant may have occurred.
		Ingestion (3)	Likely	Low	Low	
		Inhalation of soil dust (2)	Likely	Low	Low	
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						Construction to be within open space. Any earthworks within confined space would require specific risk assessment, control measures and PPE. Further investigation is required to establish whether any localised contamination exists and any associated risks.
	Off site users during construction works (C)	Dermal contact with soil dust (1)	Unlikely	Low	Very low	During construction there is the possibility of dermal contact with, and inhalation of, soil dust, however exposure duration will be short term only. Dust suppression measures are recommended during construction works. Off-site receptors (existing M4/M48 users) are adjacent from proposed earthworks. Further investigation is required to establish whether any localised contamination exists and any associated risks.
		Ingestion of soil dust (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Groundwater aquifer (Da)	Leaching of potentially contaminated soils (4)	Low	Moderate	Moderate to low	Groundwater is expected to be at around 10 mbGL. There is a risk that pollutants may migrate down to groundwater level. Further investigation is required to establish whether any localised contamination exists and any associated risks.
Operation						
Potentially contaminated soil from oil and fuels leaks / spillages.	Maintenance Workers (B)	Direct dermal (1)	Unlikely	Low	Very low	Potential Made Ground/soils with any elevated contaminant concentrations will be largely encapsulated by the embankment/vegetation or hardstanding and removed within cutting reducing potential for exposure. Exposure duration will be short term only. Site specific risk assessment will be required in line with health and safety guidance. This will enable safe methods of work and appropriate levels of PPE to be put in place. As such all risks will be duly considered and suitably mitigated to protect maintenance workers. Current contamination status is not foreseen to represent abnormal constraints to maintenance workers health and safety over and above those typical of a brownfield site. Further investigation is required to establish whether any localised contamination exists and any associated risks.
		Ingestion (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	Construction to be within open space. Any earthworks within confined space would require specified risk assessment, control measures and PPE.
	Future motorway users (A) and off-site users (C)	Direct dermal (1)	Unlikely	Low	Very low	Potential Made Ground/soils with elevated contaminant concentrations will be largely encapsulated by the embankment/vegetation or hardstanding within cutting reducing potential for exposure. Exposure duration will be short term only for motorway users. Off-site receptors are some 70 m from proposed earthworks. Further investigation is required to establish whether any localised contamination exists and any associated risks.
		Ingestion (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	
Potentially contaminated soil from oil and fuels leaks / spillages.	Groundwater aquifer (Da)	Leaching of potentially contaminated soils (4)	Low	Moderate	Moderate to low	Groundwater is expected to be at around 10 mbGL. There is a risk that pollutants may migrate down to groundwater level. Further investigation is required to establish whether any localised contamination exists and any associated risks.

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 Ground investigations have been undertaken at the Site to assess risks from land contamination associated with the construction and operation of the Scheme including human health and controlled waters risks.

10.1.2 There is a low potential for soils with elevated hydrocarbon concentrations to be encountered at the Site due to its historical land use.

10.1.3 The nature and extent of the potential contamination has not been confirmed. However, it is to pose a low risk to the Scheme. Any areas of elevated hydrocarbon concentration are likely to be localised.

10.1.4 It is anticipated that materials encountered within the Site are unlikely to be contaminated and are likely to pose a low risk to human health and a low to moderate risk to controlled waters both during construction and operation.

10.1.5 Materials are likely to be suitable for reuse subject to the provision and compliance of reuse criteria under a Materials Management Plan.

10.1.6 During construction it is expected that standard mitigation measures consistent with that of a development on brownfield site will reduce risks to acceptable levels.

10.1.7 Any soil arisings are considered likely to be suitable for reuse within the Scheme subject to development of a remediation strategy including appropriate reuse criteria and adoption of a Materials Management Plan.

10.1.8 During the operation, the embankment will cover part of the Site with remaining areas as hard or soft cover which will limit the infiltration of rainwater through soils and the potential leaching of any soil contaminants into groundwater.

10.1.9 Post construction, the embankment/hard cover and soft cover outside the motorway corridor will remove linkages of potential concern to end users and maintenance workers. Topsoil material will be required to meet appropriate contamination criteria.

10.1.10 In order to confirm the low to moderate risks associated with the Site in relation to both construction and operational phases, and the suitability for reuse within the Scheme, it is recommended that intrusive investigations including testing of soils, soil leachate and groundwater are undertaken. The investigatory works should target the area of proposed works but should also consider the area within the confirmed land take for the Scheme.

10.2 Recommendations

10.2.1 Only limited ground investigation has been undertaken at the Site and although the likelihood of any contamination at the Site is relatively low, due to the Site's history, localised contamination may have occurred. As such it is recommended that a limited ground investigation is undertaken to verify the risk levels described in this report. Should contamination be identified that could cause an

unacceptable risk to the identified receptors, then remedial requirements would be identified within a remediation strategy for the Scheme.

10.2.2 A remediation strategy for the Scheme should be developed for this Site that includes:

- addressing potential human health risk and controlled water risk identified by the proposed additional ground investigation;
- dealing with unexpected contamination;
- verification sampling strategy to confirm suitability for soils for retention / re-use;
- control measures to prevent risks to construction workers and the general public during construction; and
- verification of imported topsoils.

10.2.3 The remediation strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan.

10.2.4 The remediation strategy should be supported by a Scheme wide Material Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

11 References

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Titan Environmental Surveys Ltd (2008) New M4 Magor to Castleton Baseline Surface Water Quality Final Report for Arup, Report Number HS0442/F1/2

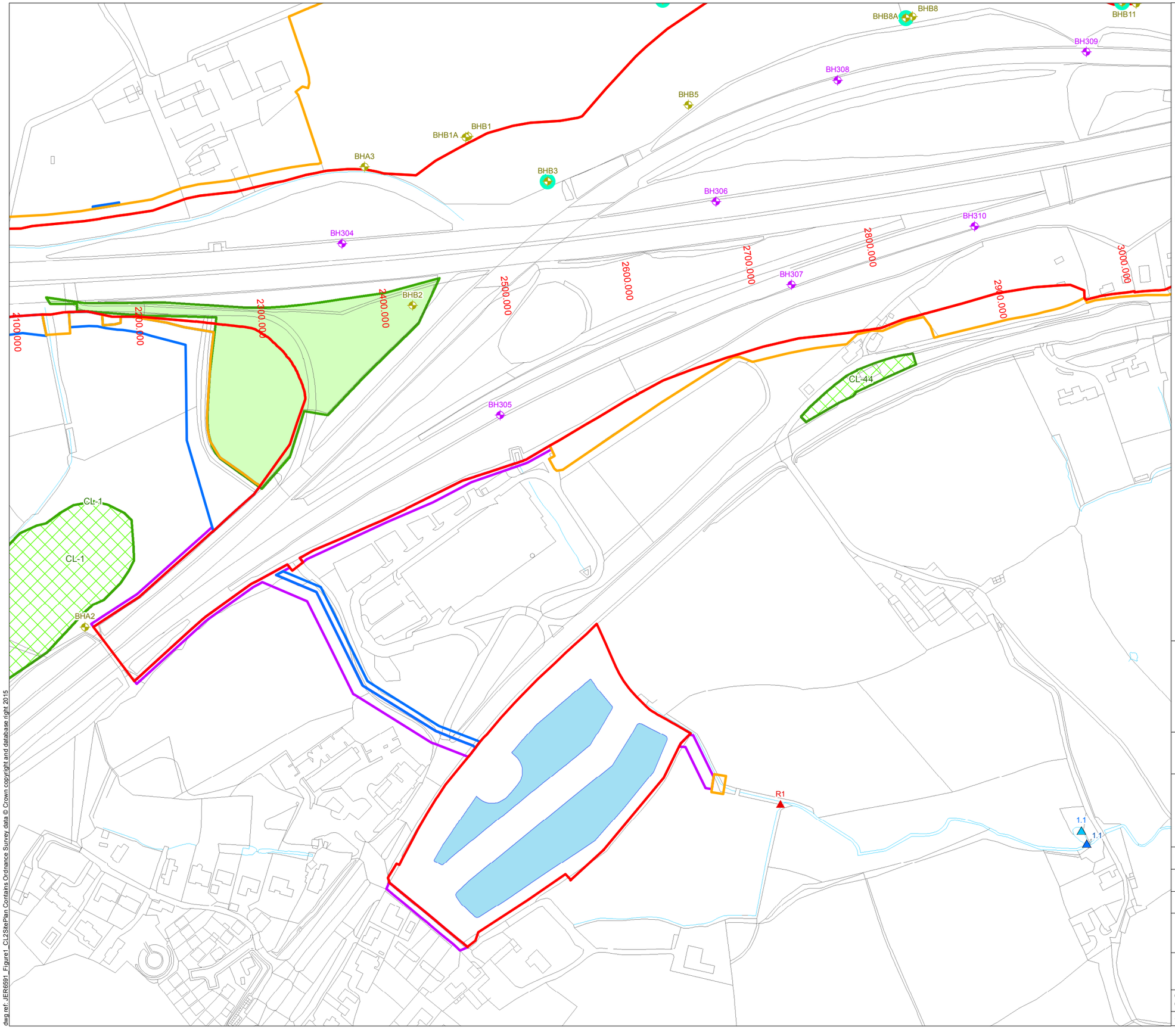
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12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GDR	Geotechnical Design Report
GIR	Ground Investigation Report
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum

mb	Millibars
mbGL	Metres below Ground Level
MTBE	Methyl Tert-Butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area (WTA)
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination

Investigation Locations

2015 (RPS)

- Surface Water Monitoring Location - Q2
- Surface Water Monitoring Location - Q1

2015 (Geotechnical Engineering)

- Borehole

2008-2009 (Titan Surveys)

- Surface Water Monitoring Location

1997 (Norwest Holst)

- Borehole
- Monitoring Well Installation



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Appendix 11.1 Annex D CL-2

Site Plan for CL-2

Figure: 1	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:3,000
0 50 100 m

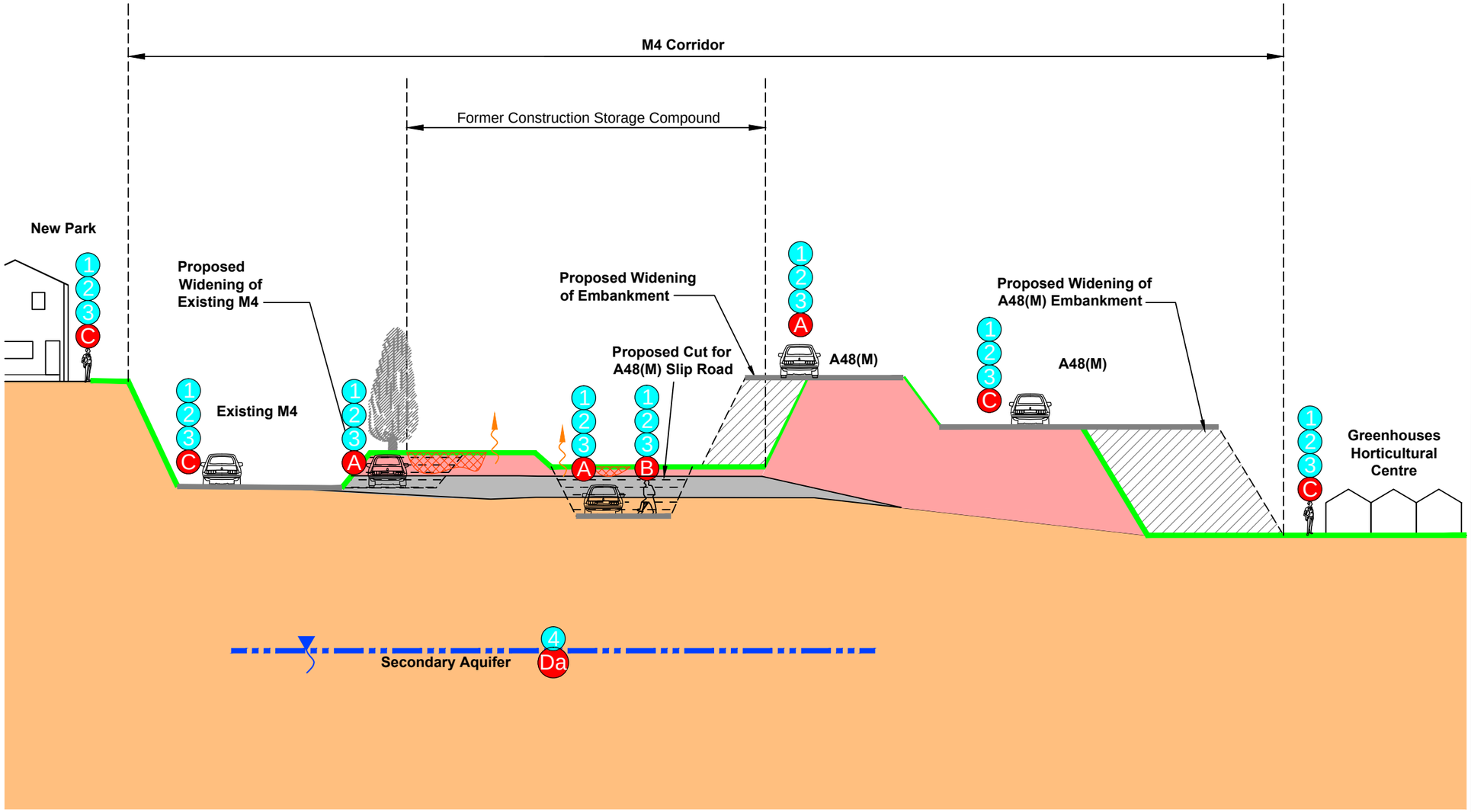
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dwg ref: JER6591_Figure1_CL2SitePlan

dwg ref: JER6591_Figure1_CL2SitePlan Contains Ordnance Survey data © Crown copyright and database right 2015

CL-2 Former Construction Storage Compound



Legend

- Made Ground - MG
- Potential Fuel Spills
- Glacial Till - GT
- St. Maughans Formation - SMF
- Hardstanding
- Rough Grassland
- Proposed Embankment
- Proposed Band Drain
- Groundwater (Aquifer)
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (M4 User)
- B Humans On-Site (Construction/Maintenance)
- C Humans Off-Site (Site Neighbours)
- Da Groundwater (Aquifer)

Potential Pathways

- 1 Dermal Contact
- 2 Inhalation
- 3 Ingestion
- 4 Leaching / Migration

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Potential for contamination to be present on site associated with possible stockpile of material, oil and fuel spills

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0132 (April 2014)

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Appendix 11.1 Annex D CL-2

Conceptual Site Model for CL-2

Figure: 2	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL2ConceptualSiteModel

dwg ref: JER6591 Figure2_CL2ConceptualSiteModel

Appendices

A1 Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No. **BHB2** Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	325348.0 E
Project	M4 Relief Road Magor to Castleton Stage 2				184009.0 N
		Drilling Rig	Pilcon/Knebel 77	Ground Level	52.10m AOD
Client	Welsh Office	Drillers	A.M/E.D	Orientation	Vertical
		Logged by	C.D/ T.R	Date Started	02/11/1997
Consultant	Ove Arup and Partners	Core barrel	S	Date Completed	13/11/1997
		Core bit	Geocube		

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
02/11/1997	1600	3.60	3.60	Dry	
03/11/1997	0800	3.60	3.60	Dry	
03/11/1997	1200	4.72	4.30	Dry	
13/11/1997	1800	25.35	4.50	11.30	

CABLE PERCUSSION DETAILS

Hard strata from depth	Hard strata to depth	Hours	Remarks
4.35	4.61	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	4.72	150	4.30

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
13/11/1997	0000	10.30	NR	NR		4.50	0.00

ROTARY DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
4.50	25.35	mist	100%	112

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=24 (3,4,5,6,6,7)
2.05	C	N=11 (1,3,2,2,3,4)
2.80	S	N=13 (1,2,2,3,4,4)
4.60	S	84/125mm

* Seating blows only.

GENERAL NOTES

NB All depths in metres, all diameters in millimetres, water strike rise time in minutes, hard strata time in hours

Form	COMBINED HEADER
Version	2.00
Revised	26/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No. **BHB2** Sheet 1 of 3

Contract No.	F10895	Method	Cable Percussion	Coordinates	325348.0 E
Project	M4 Relief Road Magor to Castleton Stage 2				184009.0 N
		Drilling Rig	Pilcon/Knebel 77	Ground Level	52.10 m AOD
Client	Welsh Office	Drillers	A.M/E.D	Orientation	Vertical
		Logged by	C.D/ T.R	Date Started	02/11/1997
Consultant	Ove Arup and Partners	Core Barrel	S	Date Completed	13/11/1997
		Core Bit	Geocube		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
TOPSOIL	0.40	51.70	B 0.40 - 0.95						
Medium dense reddish brown clayey SAND with much to some fine to medium sub-angular to sub-rounded gravel. (Morainic Drift)			B 1.00 - 2.00 D 1.00 D 1.00					S24 1.00 1.45	
			D 2.05					C11 2.05 2.50	
	2.56	49.54	D 2.50						
Reddish brown mottled greyish green completely to highly weathered MUDSTONE, very weak to weak. (St. Maughans Group) ---from 3.60m highly weathered weak			B 2.80 - 3.60					S13 2.80 3.25	
	4.72	47.38	D 4.60					S84/125mm 4.60 4.73	
Reddish brown medium bedded slightly to moderately weathered slightly sandy silty MUDSTONE, moderately strong with very closely spaced inclined fractures planar rough tight. (St. Maughans Group) ---from 5.50 to 5.70m completely fractured	5.70	46.40	4.50 - 5.70	98	83	0	12 NI		
Purplish brown fine to medium grained thinly to medium inclined bedding slightly to moderately weathered silty MUDSTONE, moderately strong to strong with very closely spaced inclined fractures planar smooth tight. (St. Maughans Group) ---from 5.70 to 5.90m completely fractured	6.18	45.92	5.70 - 6.80	100	54	0	NI 6 12 NI		
Purplish brown thinly to medium inclined bedding slightly to moderately weathered very sandy silty MUDSTONE, moderately strong with very closely spaced inclined fractures planar rough tight. (St. Maughans Group)	7.31	44.79	6.80 - 7.60 7.60 - 8.10	100 100	44 90	0 46	8 5 NI 5		
Purplish brown fine to medium grained thinly inclined bedding fresh to slightly weathered slightly silty SANDSTONE, moderately strong to strong with extremely to very closely spaced sub-horizontal to inclined undulating laminations of calcite and closely spaced inclined fractures planar rough tight. (St. Maughans Group)	9.60	42.50	8.10 - 8.70 8.70 - 10.30	100 84	63 69	27 8	NI 11 6		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No. **BHB2** Sheet 2 of 3

Contract No.	F10895	Method	Cable Percussion	Coordinates	325348.0 E
Project	M4 Relief Road Magor to Castleton Stage 2				184009.0 N
		Drilling Rig	Pilcon/Knebel 77	Ground Level	52.10 m AOD
Client	Welsh Office	Driller	A.M/E.D	Orientation	Vertical
		Logged by	C.D/ T.R	Date Started	02/11/1997
Consultant	Ove Arup and Partners	Core barrel	S	Date Completed	13/11/1997
		Core bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Purplish to reddish brown mottled green thinly to medium inclined bedding slightly to moderately weathered very sandy MUDSTONE, moderately weak to moderately strong with closely spaced inclined fractures planar rough tight. (St. Maughans Group)		10.30	41.80					NA		
				10.30 - 11.80	88	87	40	7		
Reddish brown mottled green medium horizontal to inclined bedded slightly weathered very sandy MUDSTONE, (very weak to) moderately weak with medium spaced inclined fractures planar rough tight. (St Maughans Group)								NA		
				11.80 - 13.30	100	100	80	8		
---from 12.80m purplish to reddish brown										
				13.30 - 14.80	99	97	64	5		
---from 14.70 to 14.80m with extremely to very closely spaced gravel size pockets of calcite		14.80	37.30					0		
				14.80 - 16.30	100	85	30	7		
Reddish brown thinly inclined bedding slightly to moderately weathered sandy MUDSTONE, moderately strong with very closely to closely spaced inclined fractures planar rough tight. (St. Maughans Group)								3		
---from 14.80 to 15.05m with extremely closely spaced gravel size pockets of calcite										
---from 15.05 to 15.65m moderately weathered weak				16.30 - 17.80	100	85	33	12		
---from 15.65 to 15.85m very sandy very weak										
---from 15.85 to 16.30m moderately weathered moderately weak to moderately strong				17.80 - 19.30	95	91	0	8		
---from 16.30 to 17.80m very sandy moderately strong										
---from 17.80m purplish brown										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No. **BHB2** Sheet 3 of 3

Contract No.	F10895	Method	Cable Percussion	Coordinates	325348.0 E
Project	M4 Relief Road Magor to Castleton Stage 2				184009.0 N
		Drilling Rig	Pilcon/Knebel 77	Ground Level	52.10 m AOD
Client	Welsh Office	Driller	A.M/E.D	Orientation	Vertical
		Logged by	C.D/ T.R	Date Started	02/11/1997
Consultant	Ove Arup and Partners	Core barrel	S	Date Completed	13/11/1997
		Core bit	Geocube		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown thinly inclined bedding slightly to moderately weathered sandy MUDSTONE, moderately strong with very closely to closely spaced inclined fractures planar rough tight. (St. Maughans Group)				19.30 - 20.85	100	87	55	9		
---from 20.85 to 21.45m with extremely closely to very closely spaced gravel size pockets of calcite								2		
				20.85 - 22.35	100	97	41	9		
---from 21.10 to 21.85m very closely spaced inclined fractures planar rough tight		22.05	30.05					3		
Purplish brown mottled green thinly to medium sub-horizontally to inclined bedded slightly to moderately weathered silty MUDSTONE, moderately weak to moderately strong with very closely to closely spaced sub-horizontal to inclined fractures planar rough tight. (St. Maughans Group)				22.35 - 23.85	100	93	22	14		
		23.85	28.25							
Reddish brown mottled green medium sub-horizontally bedded slightly to moderately weathered silty MUDSTONE, moderately weak to moderately strong with closely to medium spaced sub-horizontal to inclined fractures planar rough tight. (St. Maughans Group)				23.85 - 25.35	93	90	57	7		
---from 24.35 to 25.35m extremely closely to closely spaced inclined undulating thin laminations of calcite		25.35	26.75							
Borehole complete at 25.35 m.										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

A2 Appendix 2

Site Walkover Photographs



Plate 01: CL2 – Uneven Ground – Western Part of Site



Plate 02: CL2 – Mounded Ground / Occasional Fly Tipping – Western Part of Site

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: May 2015



Plate 03: CL2 – Lower Level Ground and Fly Tipping – Western Part of Site

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: May 2015

A3 Appendix 3

Relevant Extract of Additional Environmental Data

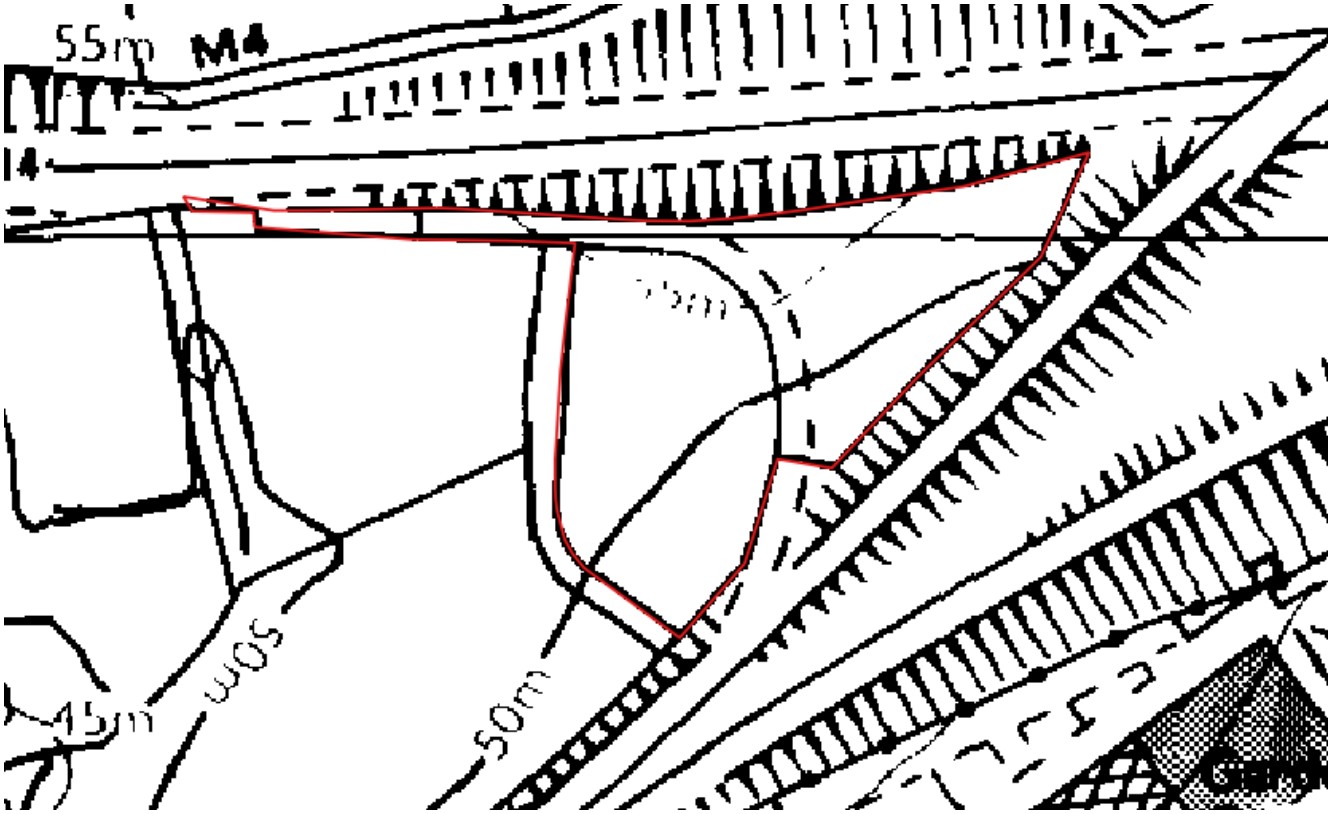


Plate 01: Extract of 1981-1991 Ordnance Survey map (1:10,000)



Plate 02: Extract of 1998 aerial photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015



Plate 03: Extract of 2006 aerial photograph



Plate 04: Extract of 2009/10 aerial photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Welsh Government

M4 Corridor around Newport

Land Contamination Assessment Report Annex D
CL-3, Pound Hill Backfilled Pit Land Contamination Assessment Report

M4CaN-DJV-EGT-ZG_GEN-RP-EN-0006

At Issue | March 2016

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Appendix 3 Soil Laboratory Data
Appendix 4 Groundwater Laboratory Data
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Appendix 6 Site Walkover Photographs
Appendix 7 Relevant Extracts of Additional Aerial Photography

1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-3) known as the 'Pound Hill Backfilled Pit' hereafter referred to as the Site.

1.1.2 The Site is located at chainage 3,350 (See Figure 1).

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) of which this document is an appendix to the Geology and Soils Chapter (Chapter 11).

1.2.2 In 2014, a Preliminary Sources Study Report (2014 PSSR) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. In addition, this report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015). This report relates to the area defined on the Site Location Plan Figure 1.

1.2.3 The overarching rationale and approach for the assessment of areas of land along the proposed new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the ES).

1.3 Objectives

1.3.1 The key objectives of this report are set out below:

- Undertake a risk assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.
- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.
- To provide information to support the Ground Investigation Report (GIR) and Geotechnical Design Report (GDR) required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The subsequent report structure is as follows:

- Section 2: Site Location and Description.

- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Ground Investigations Work – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions - This section describes the main findings of the intrusive site investigation including the ground conditions encountered and any visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessments.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations - This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and requirements for remediation / mitigation.

2 Site Location and Description

2.1.1 The Site is located approximately 500 m east of Michaelstone-y-Fedw, within a field adjacent to Pound Hill Road, approximately 200 m south of Gwaunshonbrown Farm. It is centred on National Grid Reference ST262883. Refer to Figure 1 for the Site location. The Site covers an area of approximately 0.06 ha.

2.1.2 The Site is at an elevation of approximately 79 mAOD on a southerly sloping hill side and is bounded to the south by the existing M4 motorway cutting, to the west by Pound Hill Road and to the north and east by agricultural fields. At the time of the 1995 and 2014 site walkovers the Site was noted to comprise an approximately 15 m diameter depression which is thought to mark the location of a backfilled pit/hollow. This was observed to be covered at surface level with tyres.

2.1.3 A site walkover conducted in May 2015 identified a small mound of spoil, approximately 5 m x 8 m, (less than approximately 40 m^3) within a slight depression located in the southwestern corner of the Site. Manmade inclusions were prevalent within the spoil including tyres, demolition rubble, metals and plastics. Photographs of the Site walkover are provided in Appendix 6.

3 The Scheme

3.1.1 The Site is located at approximate chainage 3,350, as shown on Figure 1, within part of the alignment of the new motorway Castleton Interchange, which will comprise a cutting of up to 10 m in depth.

3.1.2 The potential cutting is anticipated to result in any material within the backfilled pit being removed from its current location and either disposed of off-site, or if suitable reused within the Scheme.

4 Site History

4.1.1 The 2014 PSSR historical searches have been based on Ordnance Survey plans, literature reviews, information provided by Natural Resources Wales (NRW) (formally Environment Agency Wales), Newport City Council and aerial photographic interpretation.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from Welsh Government. Relevant extracts are presented in Appendix 7.

4.1.3 A summary of the Sites history is presented in Table 1 below.

Table 1: Site History

1995 Feature ID	Date	Use	Source of information
	1843 - 1893	The Site comprises part of an agricultural field. The Site is predominantly surrounded by agricultural fields. Two residential cottages are located approximately 10m to the south. A road running north-south bounds the western boundary. A footpath runs east-west along the southern boundary of the Site.	1:10,560 Historical Mapping
	1891 - 1912	No significant change	1:10,560 Historical Mapping
	1904 - 1939	No significant change	1:10,560 Historical Mapping
	1947 and 1969	No significant change	Aerial photograph interpretation
	1964 – 1965	No significant change	1:10,560 Historical Mapping
	1970 - 1973	No significant change	1:10,000 Historical Mapping
	1979	A track runs east to west from Pound Hill road through the centre of the Site. The M4 motorway cutting now bounds the Site to the south.	Aerial Photography
	1981 - 1989	No significant change	1:10,000 Historical Mapping
	1985 - 1996	No significant change	1:10,000 Historical Mapping
GF5/5	1995	**Backfilled pit**	Walkover, aerial photographs (unconfirmed)
	2006	The southwestern corner of the field appears stripped.	Aerial Photography
	2009 - 2010	The northwestern corner of the field is now bare ground with possible low level stockpiled material.	Aerial Photography

1995 Feature ID	Date	Use	Source of information
	2014	No significant change	Aerial Photography
	2015	**Spoil mound with man-made inclusions.**	Walkover survey

Note: Potential sources of contamination are underlined. Those within the temporary and permanent land take are shown in bold.

4.1.4 The historical data shows that the Site has consistently remained as agricultural fields and no significant change has taken place with the exception of a backfilled pit, evidence of which was identified during the previous and current site walkovers.

4.1.5 The source of information presented above supplements that used in the 2014 PSSR (Ove Arup 2014). In particular, the 2006 and 2009 aerial photographs provide some evidence of possible low level stockpiled material. Relevant extracts of the photographs are presented in Appendix 7.

4.1.6 The Site is located in proximity to areas which may have been bombed during World War II which is discussed in the Explosive Ordnance Threat Assessment Report (Bactec, 2014). This categorises the Site as low risk with respect to unexploded ordnance.

5 Environmental Setting

5.1 Geology

5.1.1 The British Geological Survey (BGS) geological maps show no superficial deposits overlying the Site. The Site is underlain by the St Maughans Formation, which comprises inter-bedded sequences of calcareous silty mudstones, sandstones, limestones and conglomerates. Silty mudstones predominate although coarse sandstone beds are frequently encountered..

5.2 Hydrology

5.2.1 There are no surface water features in close proximity to the backfilled pit. The nearest surface water feature is an unnamed stream approximately 200 m north of the Site with an easterly flow direction. Two wells are in the vicinity of Gwaunshonbrown farm over 225 m to the north.

5.3 Hydrogeology

5.3.1 NRW records indicate that the St Maughans Formation bedrock strata is classified as a Secondary A aquifer (permeable layers), with overlying soils of intermediate leaching potential.

5.3.2 The Site does not lie within a groundwater source protection zone.

5.3.3 The water table underlying the Site is anticipated to be deep, being drained by the existing motorway cutting. However, springs, issues and wells are annotated on recent Ordnance Survey plans in the vicinity, therefore shallow groundwater bodies may be encountered during excavation of the cutting.

5.4 Environmental Information

5.4.1 The 2014 PSSR indicates that NRW records do not identify any pollution incidents, sewage discharge, abstraction licence, landfills/waste management facilities within 300 m radius of the Site.

5.4.2 No further environmental information relevant to this Site has been identified.

6 Scope of Investigations

6.1 General

6.1.1 Two previous ground investigations have been undertaken within the Site. This has been summarised below.

6.1.2 For the purpose of meeting the requirements of Volume 4, Section 1, Part 2 of the DMRB (HD22/08 – Managing Geotechnical Risk – 2008 (Highways Agency 2008), the historical data used to support the PSSR has been differentiated from additional 2015 Supplementary Ground Investigation data (Geotechnical Engineering, 2015).

6.2 Scope of Works

6.2.1 The various intrusive ground investigations undertaken within the Site area are summarised in Table 2:

Table 2: Site Investigation Summary

Date	Contractor	Site Location	Boreholes	Window Sampler	Trial Pits	Sampling
2008	Norwest Holst	Central	-	-	STPB 02 STPB 02A	Soil
2015	Geotechnical Engineering	South and Northeast	BH313	-	TP309	Soil & groundwater

6.2.2 The construction details of all boreholes installed on the Site are summarised in Table 3.

Table 3: Summary of Borehole Well Construction Details

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (mbGL)	Base of Slotted Well Casing / Gravel Pack (mbGL)	Targeted Geology
BH313	50	12.5	1.0	12.5	St Maughans Formation

6.3 Surface Water Quality Monitoring

6.3.1 Surface water quality monitoring was not undertaken during the previous ground investigations of the Site.

6.4 Field Testing

6.4.1 Monitoring of Volatile Organic Compounds (VOCs) was undertaken on:

- two soil samples from STPB02A at 0.3 mbGL and 1.53 mbGL;
- four soil samples from BH313 at 0.1-0.3 mbGL, 0.3-0.7 mbGL, 2.0-2.3 mbGL and 3.0-3.1 mbGL; and
- two soil samples from TP309 at 1.0 mbGL and 2.0 mbGL

6.5 Groundwater Monitoring

6.5.1 A summary of the groundwater sampling, groundwater monitoring and ground gas monitoring rounds undertaken in the onsite boreholes is shown in Table 4:

Table 4: Summary of Monitoring Rounds

Location Ref.	Number of rounds (Date of sampling)	Monitoring details	Notes
BH313(50mm)	4 no. (25th February 2015, 4th March 2015, 11th March 2015, 5th May 2015)	Groundwater – level & sampling Soil Gas	Located at the Site boundary

6.6 Laboratory Chemical Testing

6.6.1 A summary of all laboratory analysis undertaken on soil, groundwater and leachate from the previous site investigations is shown in Table 5 below.

Table 5: Summary of Previous Investigation Sampling

Site Investigation date	No. of soil samples	No. of leachate samples	No. of water samples	Suites of testing
2008	2	1	0	Metals, PAH, TOC, TPH, MTBE, Cyanide, BTEX, PCBs, asbestos (soils only)
2015	2	0	2	Metals, PAH, cyanide, TPH, phenols, pH, moisture content (soils only)

6.7 Soil Analysis

6.7.1 The following sections summarise the laboratory chemical analytical results for soil samples collected during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 3 with supporting laboratory certificates available in the relevant original ground investigation reports.

6.7.2 From a conceptual ground model, the analytical data from the Made Ground has been assessed separately from those of the natural soils (St Maughans Formation specifically).

6.7.3 The available information used in this assessment is summarised in Table 6:

Table 6: Summary of Analytical Soil Data

Formation Unit	Number of Soil Analysis per Analytical Suite - 2015 data / All GI data						
	Metals & inorganics	Asbestos	PAHs	TPH	Phenol	BTEX	PCBs
Made Ground	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1	0 / 1
Natural Soils	2 / 3	1 / 1	2 / 3	1 / 2	1 / 2	1 / 1	1 / 2

6.8 Soil Leaching Analysis

6.8.1 Similarly to the soils data, the leachate results have been considered for the Made Ground and natural soils separately. The available information is presented in Appendix 5 and summarised in Table 7.

Table 7: Summary of Analytical Leachate Data

Formation Unit	Number of Soil Leachate Analysis per Analytical Suite - 2015 data / All GI data						
	Metals & Inorganics	PAHs	TPH	Phenol	BTEX	Volatile Organic Compounds	Semi Volatile Organic Compounds
Made Ground	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0

6.9 Groundwater Analysis

6.9.1 The following sections summarise the laboratory analytical results for groundwater samples collected during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 4 with supporting laboratory certificates available in the relevant original ground investigation reports.

6.9.2 The available data relates to samples taken from a well installed within the groundwater of the St Maughans Formation.

6.9.3 The available information is summarised in Table 8 below.

Table 8: Summary of Analytical Groundwater Data

Groundwater Unit	Number of Groundwater Analysis per Analytical Suite (number of well locations) – 2015 data / All GI data				
	Metals & inorganics	PAHs	TPH	Phenol	BTEX
Groundwater (St Maughans Formation)	2 (1) / 2 (1)	2 (1) / 2 (1)	2 (1) / 2 (1)	1 (1) / 1 (1)	2 (1) / 2 (1)

6.10 Gap Analysis of Available Data

6.10.1 The investigation data available for the site is considered limited in relation to coverage within the backfilled pit.

7 Ground Conditions

7.1 Geology

7.1.1 The geological logs for all available exploratory holes excavated on or in close proximity to the Site are provided in Appendix 1. The observed geological sequence is consistent with that discussed in the 2014 PSSR report and is summarised in the following sections. Information from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) has also been used.

7.2 Topsoil / Made Ground

7.2.1 Made Ground was encountered within trial pit STPB02A, excavated within the expected pit boundary and TP309, excavated adjacent to the expected boundary. The boundary of the pit was assessed in the field as the extent of a depression, approximately 15 m in diameter (Ove Arup & Partners 2014).

7.2.2 Within STPB02A Made Ground was identified to 0.62 mbGL as a gravelly Clay with occasional cobble and boulder size fragments of concrete. Gravel comprised concrete, ceramic, glass, plastics and mudstone. Within TP309 Made Ground was identified to 0.30 mbGL, as a slightly sandy gravelly Clay with gravel of siltstone and ceramic.

7.2.3 Topsoil was encountered within STPB02 to 0.30 mbGL only with no evidence of Made Ground. This location is therefore considered to be outside of the backfilled pit boundary. BH313 is located on ground which appears to have been reworked by agricultural processes, no topsoil was encountered.

7.3 Superficial Deposits

7.3.1 Unconsolidated superficial deposits were reported beneath the topsoil and Made Ground in STPB02 and STPB02A. These were described as soft and stiff reddish brown Clays with variable proportions of sand and gravel and occasional cobbles and were considered to represent Head Deposits.

7.3.2 Head deposits are not recorded within BH313 or TP309.

7.4 Solid Geology

7.4.1 With the exception of STPB02A where the distinction between superficial deposits and the St Maughans Formation has not been clearly made, all exploratory holes encountered the St Maughans Formation comprising interbedded mudstones, siltstones and sandstones. The sequence is highly weathered, including horizons comprising soft, firm and stiff clays and clayey gravels.

7.5 Geological Sequence Summary

7.5.1 The general geological sequence identified during the previous ground investigations is summarised in Table 9.

Table 9: Summary of Geological Sequence

Unit	Description	Thickness Range (m)	Basal depth (mbGL)
Made Ground	Gravelly clay with mad made inclusions, including ceramic, glass, plastic and concrete.	Absent – 0.62	0.3 – 0.62
Superficial Deposits (Head Deposits)	Sandy, gravelly clays. Possible head deposits as clayey gravel within STPB02A.	Absent – 1.84	0.6 – 2.46
St Maughans Formation	Interbedded siltstone, sandstone and mudstone with weathered horizons of clay and gravel.	>12.5	unproven

7.5.2 The conceptual ground model included within the 2014 PSSR report has been revised in light of the 2015 information and is presented within Figure 2.

7.6 Visual and Olfactory Evidence of Contamination

7.6.1 A summary of visual and olfactory evidence of contamination encountered during the previous ground investigations is summarised in Table 10.

Table 10: Visual and Olfactory Evidence of Contamination Summary

Location ID	Depth (mbGL)	Strata	Evidence of Potential Contamination
STPB02A	GL to 0.62	Made Ground	Ceramic, glass, plastic and concrete.

7.6.2 PID monitoring was undertaken on two soil samples from STPB02A at 0.3 m and 1.53 mbGL. The PID meter recorded zero levels, indicating no VOCs were present.

7.6.3 PID monitoring was also undertaken on four soil samples from BH313 and two soil samples from TP309. The PID meter recorded levels of between zero and 3.5 ppm within the St Maughans Group indicating the presence of low level naturally occurring VOCs.

7.7 Gas Monitoring

7.7.1 The gas monitoring dataset collected during each of the previous three monitoring rounds is summarised on the field data sheets provided in Appendix 2. The maximum gas concentrations are presented in Table 11.

Table 11: summary of Gas Monitoring Data

Location ID	Flow (l/hr) Max	VOCs (ppm) Max	CH_4 (%/vol) Max	Peak LEL (%) Max	CO_2 (%/vol) Max	O_2 (%/vol) Min	CO (ppm) Max	H_2S (ppm) Max
BH313 50mm	0.6	0.8	0	9.7	11	2.2	10	0

7.8 Groundwater Encountered During Investigation

7.8.1 Groundwater strikes were not encountered during the advancement of any of the exploratory holes.

7.9 Groundwater Level During Monitoring Rounds

7.9.1 The groundwater level dataset gathered on Site is provided in Appendix 2 and summarised in Table 12.

Table 12: Summary of Groundwater Level Data

Location	Installation	Depth of response zone (mbGL) and Geological Formation	No. Measurements	Min Depth (mbGL)	Max Depth (mbGL)	Comments
BH313	50 mm	1.0-12.5 m (St Maughans Formation)	4	10.65	Dry (>12.5)	Very slow recharge noted on two occasions.

7.10 Groundwater Summary

7.10.1 The intrusive investigation confirms the generic hydrogeological model outlined in the Groundwater Baseline Report (Appendix 16.2).

7.10.2 The main ground water body is at about 11 m depth within the St Maughans Formation.

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The outline Conceptual Site Model (CSM) presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the M4CaN Scheme. The main alteration to the 2014 PSSR model are summarised as follows:

- Removal of perched groundwater within the Glacial Till as this was not encountered during the more recent investigations; and
- Update of the source/pathway/receptor linkages.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 The Made Ground within the backfilled pit was identified in the 2014 PSSR as a potential source of contamination. No new data is available within the area of the backfilled pit.

8.2.2 The extent of the backfilled pit was defined in the field by Ove Arup & Partners (2014) by an approximately 15 m diameter depression on the Site. Presence of Made Ground beyond the expected pit boundary was identified by the 2015 investigation.

8.2.3 Made Ground (both within and outside the expected pit boundary) was identified to a maximum thickness of 0.62 mbGL.

8.2.4 The presence of demolition type material within a small mound was identified during the 2015 walk over survey. Full composition of the waste material is unknown and no sampling was undertaken.

Potential Receptors

8.2.5 Receptors during the construction and the operational stages of the Scheme have been considered:

Construction

- Construction workers during site development works.
- M4 site users / general public adjacent to the construction works.
- Secondary A Aquifer within the St Maughans Formation.

Operational

- None – the source will be removed.

Potential Pathways

8.2.6 Pathways during the construction stage of the Scheme have been considered.

- Dermal contact, ingestion and inhalation during construction works.
- Leaching of contaminants from the Made Ground into the groundwater during construction works.

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the new data described herein, the following risk evaluation has been reconsidered and included::

- The Site has been the subject of unregulated backfilling of waste;
- Proposed cutting of up to 25 m depth is anticipated to remove the fill material in its entirety;
- Superficial Deposits are classified as non-productive and overlie a Secondary A Aquifer associated with the St Maughans Formation.
- Abnormal gas regime is identified in the borehole outside the pit with presence of methane, carbon dioxide and gas flow.

8.4 Human Health Risk Assessment

8.4.1 The rationale and approach for the human health (Tier 2) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1). Soil chemical analysis results and the findings of the generic tier 2 human health risk assessments presented in Appendix 3.

8.4.2 No exceedances of the applied assessment criteria have been identified and no asbestos fibres were detected within the Made Ground sample analysed in the laboratory. Chromium concentrations are considered to be within normal background data range and therefore are not considered to represent a contaminant of concern. Further sampling and speciated analysis is recommended during construction to confirm low risks (Appendix 11.1).

8.5 Controlled Water Screening Assessment

8.5.1 The rationale and approach for the controlled waters (Tier 1) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1) and the groundwater chemical results are presented in Appendix 4. All exceedances to the relevant criteria are summarised in Table 13 for soil leachate.

8.5.2 Where an EQS is dependent on water hardness (i.e. some heavy metals), the hardness of the surface water receptor should normally be used. The Baseline Water Environment Report (Appendix 16.2 of the ES) indicates surface water to be generally moderately hard with hardness concentrations within a range of 100 to 150 mg/l as calcium carbonate. Therefore EQSs within this water hardness range have been used for screening purposes.

8.6 Soil Leachate Results

8.6.1 One soil sample was tested for leachate analysis. The majority of the determinants were below the applied screening criteria, with the exception of the contaminant in Table 13.

Table 13: Controlled Waters Screening Exceedances - Soil Leachate

Determinant	Units	Range	EQS	DWS	No. exceeded EQS Screening Criteria (Total number of results)	Location (formation)	No. exceeded DWS Screening Criteria (Total number of results)	Location (formation)
Arsenic	µg/l	17	50	10	0 (1)	-	1 (1)	STPB02A (Made Ground)

8.6.2 The laboratory detection levels for cadmium and cyanide are higher than applied screening criteria. This is not considered to pose a significant risk to controlled waters.

8.7 Groundwater Results

8.7.1 Groundwater analysis results have been assessed from samples collected over a number of monitoring rounds of groundwater monitoring results from BH313 constructed in 2015. The groundwater samples were taken from the St Maughans Formation aquifer beneath the Site. The location is considered to be lateral up-gradient to the Site, based on a general south east groundwater flow.

8.7.2 There are no exceedances of the applied assessment criteria.

8.7.3 Certain laboratory detection levels in samples used in previous ground investigation for mercury, cyanide, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)preylene, benzo(k)fluoranthene are higher than the screening criterion. This is not considered to pose a risk to controlled waters.

8.8 Ground Gas Risk Assessment

8.8.1 The only ground gas data available relates to borehole BH313. This has a response zone within the St Maughans Formation between depths of 1 m and 12.5 mbgl. Of the 4 no rounds available, the following comments may be made:

8.8.2 No monitoring was undertaken during low barometric pressure (less than 1000 mb), with the lowest conditions being 1008 mb. As such worst case atmospheric conditions for potential ground gas generation may have not been monitored.

8.8.3 Gas flow was recorded absent in the first 3 no. rounds and peaking to 0.6 l/hr in the final round.

8.8.4 Methane has been recorded nil during all 4 no. rounds although the Lower Explosion Limit of up to 9.7 % is noted in the last round.

8.8.5 Carbon dioxide is identified between 2-3 % in the first three rounds, increasing to 11 % in the fourth. The last round data exceeds the Work Place exposure limit of 5 %.

8.8.6 Traces of volatile organic compounds of up to 0.8 ppm have been recorded.

8.8.7 Hydrogen sulphide was recorded zero throughout.

8.8.8 Carbon monoxide was recorded absent on all monitoring rounds with the exception of the February visit which identified 10 ppm concentration at the initial reading, dropping to zero after one minute.

8.8.9 Oxygen has been recorded to be typically depleted with concentrations as low as 2.4 %.

8.8.10 The gas regime at the Site does not appear to have been influenced by previous historical uses and is instead driven by soil gas within natural soils. A gas risk assessment has been undertaken and is set out within the Land Contamination Assessment Report (Appendix 11.1 of the ES).

8.9 Summary

8.9.1 Elevated contaminant soil concentrations are not identified within the Made Ground encountered onsite.

8.9.2 A single leachate sample indicated leachable concentrations of arsenic above the Drinking Water Standard.

8.9.3 The groundwater data of the St Maughans Formation aquifer at the boundary (up-gradient) of the Site presents no exceedances to the applied EQS and DWS assessment criteria.

8.9.4 Abnormal ground gas has been recorded in the single gas monitoring installation during one of the visits. This is installed outside the area of Made Ground. It is currently unclear whether the gas source originates from the backfilled pit. No obvious off-site sources to CL-3 have been identified by the environmental baseline data.

9 Refined Conceptual Model

9.1.1 The incorporation of data from the 2015Supplementary Ground Investigation h has enabled the original CSM presented in the 2014 PSSR to be updated. Relevant contaminant (Source-Pathway-Receptor) linkages are considered within the refined CSM. The assessment is based on the Scheme during construction and operational phases.

9.1.2 A CSM representing general ground conditions, overall layout of the new section of motorway and relevant source/pathway/receptors are presented in Figure 2 and is described in Table 14. A specific alpha-numerical symbol has been attached to each relevant source/pathway/receptor for referencing purposes.

Table 14: Site Conceptual Model

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Pit backfilled with Made Ground materials including tyres and scrap metal.	**Construction**					
	Construction Workers (A)	Direct dermal (1)	Likely	Low	Low	Construction workers will be exposed to Made Ground materials during construction works; however exposure duration will be short term only. Prior to construction, a specific risk assessment will be required in line with CDM and H&S guidance. This will enable safe methodology and appropriate level of PPE to be put in place. All risks will be duly considered and suitably mitigated to protect construction workers. No elevated soil chemical concentrations were reported for a sample of the Made Ground. No visual / olfactory evidence of contamination was identified other than man-made inclusions within the Made Ground. Current contamination status is not foreseen to represent abnormal constraints to construction workers health and safety over and above those typical of a brownfield site. Construction to be within open space. Any earthworks within confined space would require specified risk assessment, control
		Ingestion (3)	Likely	Low	Low	
		Inhalation of soil dust (2)	Likely	Low	Low	

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						measures and PPE. Data for the Made Ground (and waste mound) based on limited information.
		Inhalation of soil gas or vapours (2)	Likely	Low	Low	Limited putrescible material identified within the Made Ground. Abnormal gas regime encountered outside backfilled pit with depleted oxygen, elevated carbon dioxide, traces of methane and carbon monoxide. Low concentration of VOC and SVOC recorded. No gas data within the pit itself. Limited thickness of Made Ground present within the backfill pit and high gas flux not anticipated. Construction to be largely within open space. Any earthworks within confined space would require specific risk assessment, control measures and PPE. Data for the Made Ground (and waste mound) based on limited information and further assessment is required to establish the possible source and any associated risks.
	Off site general public during construction	Dermal contact with soil dust (1)	Unlikely	Low	Very low	During construction there is the possibility of dermal contact and inhalation of soil dust, short term exposure only. Dust suppression

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	works (B)	Ingestion of soil dust (3)	Unlikely	Low	Very low	measures are recommended during construction works. Data for the Made Ground (and waste mound) based on limited information and the provision and implementation of a suitable verification sampling inspection strategy during construction to confirm risks.
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
Pit backfilled with Made Ground materials including tyres and scrap metal.		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	Limited putrescible material identified within the Made Ground. Abnormal gas regime encountered outside backfill pit with depleted oxygen, elevated carbon dioxide, traces of methane and carbon monoxide. Low concentration of VOC and SVOC recorded. No gas data within the pit itself. Limited thickness of Made Ground present within the backfill pit and high gas flux not anticipated. Off site general public (road users / farmers) within open space. Data for the Made Ground (and waste mound) based on limited information and further investigation is required to establish the possible source and any associated risks.

Contamination Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Pit backfilled with Made Ground materials including tyres and scrap metal	Deep Groundwater within St Maughans Formation (Ca)	Leaching/migration (4) of contaminant in the Made Ground	Low	Low	Very low	Current data set identifies Made Ground to be present at the surface within the motorway corridor and limited leachability is identified. Groundwater quality recorded in one up-gradient borehole does not indicate obvious impact that may be associated with the Site. No down-gradient groundwater quality is available. Data based on limited information and the provision and implementation of a suitable verification sampling inspection strategy during construction to confirm risks to groundwaters.
	Operation					
None identified						

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 Ground investigations have been undertaken on the Site to assess risks from land contamination associated with the construction and operation of the Scheme including human health and controlled waters risks.

10.1.2 Gross contamination has not been identified from the limited investigation within the backfilled pit and its immediate surroundings. The risk assessment has identified low risks to human health and controlled waters.

10.1.3 Normal construction control measures are required to facilitate the construction and ongoing operation of the Scheme.

10.1.4 The historical and 2015 laboratory testing results confirmed the on-site observations and historical field testing, and showed that the materials encountered within the Site do not contain elevated contaminant concentrations and are unlikely to pose a risk to human health both during construction and during operational phases. Much of the man-made inclusions identified within the Made Ground, including tyres, will require removal off-site to a suitably licenced disposal facility. The remaining soils may be reused within the Scheme subject to the provision of and compliance with reuse criteria under a Material Management Plan.

10.1.5 Groundwater samples obtained from a borehole located at the boundary and up gradient of the backfilled pit have not indicated contaminants of concerns.

10.1.6 The borehole however identified an abnormal gas regime as indicated by elevated ground gas concentrations recorded during one of four monitoring rounds. The source of gas is currently unclear although suspected to be associated with the Made Ground of the backfill pit. No other possible off-site sources for the gas emission have been identified in the environmental data set.

10.1.7 The Made Ground will be removed in its entirety during construction and therefore, a will not pose risk during operation or in the construction phase once removed.

10.1.8 During the construction phase, specified mitigation measures will be required to prevent inhalation pathways of dust to off-site and work force receptors.

10.1.9 The inherent variability of the Made Ground and its assumed abnormal soil gas regime should be mitigated through an intrusive investigation to confirm its extent and possible variability.

10.2 Recommendations

10.2.1 Only limited ground investigation has been undertaken within the backfilled pit although contaminant concentrations are indicated to be low. As such it is recommended that further limited ground investigation is undertaken to verify risk levels described which would include further gas monitoring rounds. Should contamination/gas source be identified that could cause an unacceptable risk to the identified receptors, then remedial requirements would be provided within the remedial strategy for the Scheme.

10.2.2 A remediation strategy for the Scheme will be developed that includes:

- Addressing potential human health risk and controlled water risk identified by the proposed additional ground investigation.
- Dealing with unexpected contamination.
- Verification sampling strategy to confirm suitability of soils for retention/re-use.
- Control measures to prevent risks to construction workers and the general public during construction.
- Verification of material used as topsoils.

10.2.3 The remediation strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan.

10.2.4 The remediation strategy should be supported by a Scheme wide Material Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

11 References

Geotechnical Engineering Limited (2015) M4 Corridor Around Newport, Factual Report on Ground Investigation, 30238

Highways Agency (2008) Design Manual for Roads and Bridges. Vol. 4. Geotechnics and Drainage. Section 1. Earthworks; Part 2. HD22/08. Managing Geotechnical Risk.

Ove Arup & Partners (2014) M4 Corridor Around Newport, Preliminary Sources Study Report, 14/9197

Bactec (2014) Explosive Ordnance Threat Assessment in respect of M4 Corridor around Newport for Hyder Consulting (UK) Limited, 5750TA

CL:AIRE (2011) Definition of Waste. Development Industry Code of Practice, Version 2, March 2011, ISBN 978-1-905046-23-2

12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GDR	Geotechnical Design Report
GIR	Ground Investigation Report
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum
mb	Millibars
mbGL	Metres below Ground Level
MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales

ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures

BHB13
BHB13A
BHB15
BHB15A
TPB105
BH313
STPB02A
STPB02
TP309
BHB16B
BHB16A
BHB16
BHB14
BHB14A
BH312
BH314
BH311
BH315

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Potential Borrow Pit Area
- Potential Area of Land Contamination based on 2014 PSSR

Investigation Locations

2015 (Geotechnical Engineering)

- Borehole
- Trial Pit

2007 (Norwest Holst)

- Trial Pit

1997 (Norwest Holst)

- Borehole
- Trial Pit
- Monitoring Well Installation



Llywodraeth Cymru
Welsh Government

Appendix 11.1 Annex D CL-3

Site Plan for CL-3

Figure: 1	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:1,000
0 15 30 m

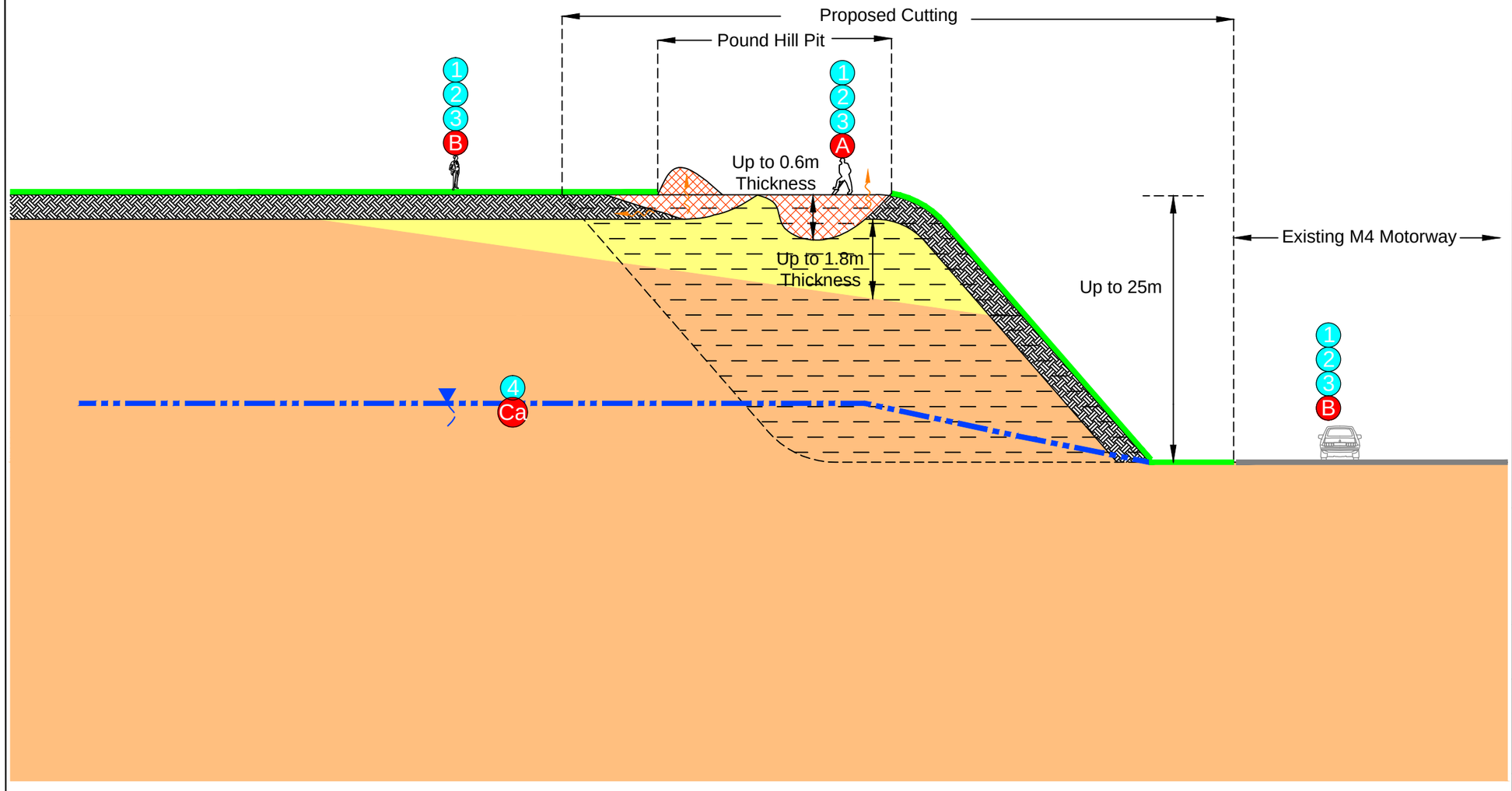
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dwg ref: JER6591_Figure1_CL3SitePlan

dwg ref: JER6591_Figure1_CL3SitePlan Contains Ordnance Survey data © Crown copyright and database right 2015

CL-3 Pound Hill



Ground conditions based on available information

Legend

- Topsoil
- Made Ground (Waste Material)
- Head Deposits (Variably Clay, Sand & Gravel)
- St. Maughans Formation - SMF
- Proposed Cutting
- Rough Grassland
- Groundwater (SMF)
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (Construction/Maintenance)
- B Humans Off-Site (Site Neighbours/Existing M4 Users)
- Ca Groundwater (Aquifer)

Potential Pathways

- Dermal Contact
- Inhalation
- Ingestion
- Leaching / Migration

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Potential for contamination to be present on site associated with backfilled Made Ground within the pit

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0121 (April 2014)

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Welsh Government

Appendix 11.1 Annex D CL-3

Conceptual Site Model for CL-3

Figure: 2	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL3ConceptualSiteModel

dwg ref: JER6591_Figure2_CL3ConceptualSiteModel

Appendices

A1 Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

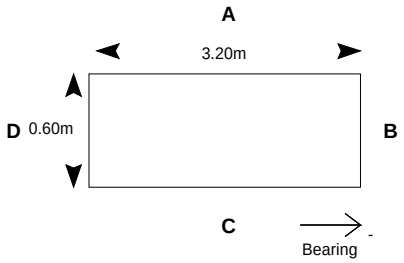
Hole ID.
STPB02
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	326211.95 E
Project	New M4 - Second Preliminary Ground Investigation				184277.40 N
		Equipment	JCB 3CX	Ground Level	78.89m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	15/11/2007
		Logged by	WA	Date Completed	15/11/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
Brown slightly sandy slightly gravelly clayey TOPSOIL. Gravel is subangular to subrounded fine to coarse of mixed lithologies.		0.30	78.59	D1 B2	0.40 0.40	
Stiff friable dark reddish brown slightly sandy gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of sandstone and siltstone. Cobbles are subangular to subrounded of sandstone and siltstone. (Head Deposits)		0.60	78.29	D3 B4	0.70 0.70	
Very stiff grey gravelly CLAY. Gravel is angular to subangular fine to coarse of mudstone (Weathered Mudstone). (St Maughans Group)				D5	1.70	
Moderately weak grey SILTSTONE with thin beds of very weak reddish light grey mudstone. Recovered as subangular fine to coarse gravel and cobble sized fragments of mudstone and siltstone. (St Maughans Group)		2.30	76.59	B6 D7 B8	2.20 2.40 2.40	
Trial pit complete at 3.30 m.		3.30	75.59	D9 B10	3.30 3.30	

Stability	All faces stable
Shoring	None used
Groundwater	None encountered during excavation
Remarks	1.Trial pit terminated at 3.30m due to hard strata.

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

HAND VANE AND HAND PENETROMETER TESTS

Hole ID.
STPB02
Data Sheet

Contract No.	F15056	Method	Machine Excavated	Coordinates	326211.95E
Project	New M4 - Second Preliminary Ground Investigation				184277.40 N
		Equipment	JCB 3CX	Ground Level	78.89m AOD
Client	Transport Wales, Welsh Assembly Government			Orientation	Vertical
		Logged by	WA	Date Started	15/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	15/11/2007

Hand Vane				Hand Penetrometer		
Depth	Test No	Peak	Remoulded	Depth	Test No	Result
0.70	01	130.0	30.0			
0.70	02	120.0	20.0			
0.70	03	130.0	30.0			

NOTES: All depths in metres, all diameters in millimetres, test results in kPa.

Form	ARIAL HAND VANE/PEN
Version	3.03
Revised	18/01/2007

Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

Hole ID.
STPB02A
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	326203.59 E
Project	New M4 - Second Preliminary Ground Investigation				184276.74 N
		Equipment	JCB 3CX	Ground Level	78.87m AOD
Client	Transport Wales, Welsh Assembly Government			Date Started	11/12/2007
		Logged by	GS	Date Completed	11/12/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADE GROUND: Brown gravelly clay. With low cobble and boulder content. Gravel sized fragments are angular fine to coarse of concrete, mudstone, ceramic, glass and plastic. Cobble and boulder sized fragments are angular of concrete.				ES1	0.30	
		0.62	78.25			
Soft reddish brown occasionally mottled grey silty slightly andy slightly gravelly CLAY. With low cobble content Gravel is angular to subangular fine to coarse of mudstone. Cobbles are angular of mudstone. (Head Deposits)				D2 B3 B4	1.00 1.00 1.00 - 1.53	
				D5 ES6	1.50 1.53	
				B7	2.00 - 2.48	
		2.46	76.41	D8	2.46	
Reddish brown slightly clayey angular fine to coarse GRAVEL. With low cobble content, cobbles are angular of mudstone. (Head Deposits?)				B9	3.00 - 3.09	
		3.09	75.78	D10	3.09	
Trial pit complete at 3.09 m.						

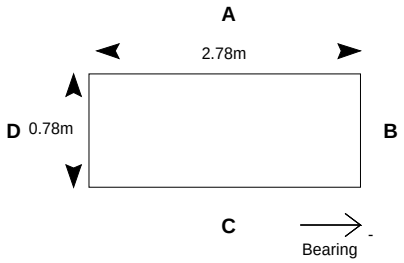
Stability: All faces stable

Shoring: None used

Groundwater: None encountered during excavation

Remarks: 1.Trial pit terminated at 3.09m

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
Version	3.06
Revised	17/12/2007

Geotechnical Engineering Limited

BOREHOLE LOG

BH313

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 2

Start Date 9 February 2015 — Easting 326217.5 — Scale 1 : 50

End Date 10 February 2015 — Northing 184286.7 — Ground level 79.80mOD — Depth 12.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
09/02/15 1140hrs	1B	0.10 - 0.30						Grass over reddish brown silty very sandy subangular and subrounded fine to coarse sandstone and mudstone GRAVEL with low subrounded sandstone cobble content. (SMG)			
	2D*	0.10 - 0.30		Vo 0.2							
	3B	0.30 - 0.70									
	4D*	0.30 - 0.70		Vo 0.0							
	5D	0.70 - 1.08	Nil	S*64	60	NI			0.70	79.10	
	6C	0.70 - 2.00	0.70		34 0	40 60		Limited recovery. Extremely weak and very weak thinly bedded reddish brown fine SANDSTONE. Fractures are horizontal to 20° extremely closely and very closely spaced planar smooth and rough. (SMG)			
	7C	2.00 - 3.50	0.70		97	NA			2.00	77.80	
	8D*	2.00 - 2.30		Vo 1.6	10 0			Soft (drilling disturbed?) reddish brown and black slightly sandy slightly gravelly CLAY. Gravel is subrounded fine lithorelicts of very stiff clay and extremely weak mudstone. (SMG)	2.60	77.20	
						70		Weak laminated brownish yellow fine and medium SANDSTONE. Fractures are horizontal very closely and closely spaced planar rough. (SMG)	2.80	77.00	
	9D*	3.00 - 3.10		Vo 1.1		NA					
	10C	3.50 - 5.00	0.70		100			Stiff fissured reddish brown gravelly CLAY. Gravel is randomly orientated subangular and subrounded fine and medium lithorelicts of very stiff clay and extremely weak mudstone. (SMG) 4.00m: Sandy gravelly. 4.40 - 4.45m: 50° fissure planar smooth. 4.70 - 4.75m: 40° fissure planar smooth. 4.70 - 5.00m: Frequent light greenish grey reduction spots (up to 30mm).			
	11C	5.00 - 6.50	0.70		86			5.00m: Very sandy gravelly.	5.20	74.60	
09/02/15 1645hrs 2.60m								Firm reddish brown slightly sandy CLAY with frequent light greenish grey reduction spots (up to 20mm). (SMG)			
10/02/15 0900hrs 3.40m	12C	6.50 - 8.00	0.70		96			6.50m: Very sandy. 7.40 - 7.45m: 20° fissure planar rough.			
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-0.70m. Waterflush rotary core drilled (116mm) 0.70-12.50m.

CASING: 140mm diam to 0.70m.

BACKFILL: On completion, a slotted standpipe (50mm) was installed to 12.50m, granular response zone 12.50-1.00m, bentonite seal 1.00-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: Driller notes reduced flush returns (30%) 9.50-11.00m and loss of flush 11.00-12.50m.

Downhole magnetometry for UXO risk mitigation undertaken on 11/02/2015 at 0.00-0.70m. No anomalies encountered.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
				Groundwater not encountered prior to use of water flush.

AGS

CONTRACT	CHECKED
30238	EC

Geotechnical Engineering Ltd. Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 13:54:34 DJ EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH313

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 2 of 2

Start Date 9 February 2015 — Easting 326217.5 — Scale 1 : 50

End Date 10 February 2015 — Northing 184286.7 — Ground level 79.80mOD — Depth 12.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	13C	8.00 - 9.50	0.70		99 71 59						
						35 130 210		Extremely weak and weak thinly laminated reddish brown MUDSTONE with frequent light greenish grey reduction spots (up to 50mm). Fractures are subhorizontal to 10° very closely to medium closely spaced planar smooth and rough. (SMG) 9.20 - 9.30m: 70° fracture. 9.50 - 9.90m: 80° fracture with calcite infill.	8.90	70.90	
	14C	9.50 - 11.00	0.70		100 95 50			10.50 - 10.60m: 80° fracture planar rough.			
	15C	11.00 - 12.50	0.70		87 13 13	NA		Very stiff reddish brown very gravelly CLAY. Gravel is angular and subangular fine to coarse lithorelicts of very stiff clay and extremely weak mudstone. (SMG) 11.70 - 11.80m: Frequent reduction spots (up to 20mm). 12.10 - 12.20m: Medium strong reddish brown mudstone.	11.20	68.60	
10/02/15 1630hrs 10.70m									12.50	67.30	
								Borehole completed at 12.50m.	{18.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

Groundwater not encountered prior to use of water flush.

AGS

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Ltd, Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 13:54:34 DJ EC

Geotechnical Engineering Limited

TRIAL PIT LOG

TP309

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 1

Start Date 9 February 2015 — Easting 326212.3 — Scale 1 : 50

End Date 9 February 2015 — Northing 184274.5 — Ground level 78.70mOD — Depth 2.70 m

water record	sample/test no/type	sample/test result	sample/test depth (m)	description	depth (m)	level (m)	legend
				Grass over firm locally stiff dark brown slightly sandy gravelly CLAY. Gravel is angular and subangular fine to coarse siltstone and ceramic. (MADE GROUND)	0.30	78.40	
				Dark reddish brown clayey angular and subangular fine to coarse siltstone GRAVEL.			
	1B	Vo 3.5	1.00				
	2D*		1.00				
	3B	Vo 0.5	2.00	2.00m: With rare siltstone gravel.			
	4D*		2.00				
Dry				2.50 - 2.70m: Low cobble content. Cobbles are angular to subangular siltstone.	2.70	76.00	
				Trial pit completed at 2.70m.			

DRAFT

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater not encountered.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.75x2.80x2.70m.
On completion, the trial pit was backfilled with materials arising.
Trial pit terminated at 2.70m due to no effective penetration.

Sketch of Foundation - Not to scale. All dimensions in metres.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

AGS

CONTRACT	CHECKED
30238	

A2 Appendix 2

Gas and Groundwater Monitoring Data

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH313	25/02/15 12:15:00	1008	0								0.0	11		
BH313	25/02/15 12:16:00										0.0			
BH313	25/02/15 12:17:00										0.0			
BH313	25/02/15 12:18:00										0.0			
BH313	25/02/15 12:19:00										0.0			
BH313	25/02/15 12:20:00			1.5	0.0	4.6	0.0	0	10	0.7				
BH313	25/02/15 12:21:00			1.6	0.0	4.5	0.0	0	0	0.6				
BH313	25/02/15 12:22:00			1.6	0.0	4.4	0.0	0	0	0.5				
BH313	25/02/15 12:23:00			1.7	0.0	4.3	0.0	0	0	0.5				
BH313	25/02/15 12:24:00			1.7	0.0	4.2	0.0	0	0	0.5				
BH313	25/02/15 12:25:00			1.8	0.0	4.1	0.0	0	0	0.5				
BH313	25/02/15 12:26:00			2.0	0.0	4.0	0.0	0	0	0.5				
BH313	25/02/15 12:27:00			2.1	0.0	4.1	0.0	0	0	0.5				
BH313	25/02/15 12:28:00			2.1	0.0	4.1	0.0	0	0	0.4				
BH313	25/02/15 12:29:00			2.1	0.0	4.2	0.0	0	0	0.4			10.65	
BH313	04/03/15 10:00:00	1023	0								0.0	6		
BH313	04/03/15 10:01:00										0.0			
BH313	04/03/15 10:02:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH313	04/03/15 10:03:00										0.0			
BH313	04/03/15 10:04:00										0.0			
BH313	04/03/15 10:05:00			0.3	0.0	18.1	0.0	0	0	0.6				
BH313	04/03/15 10:06:00			0.5	0.0	17.1	0.0	0	0	0.6				
BH313	04/03/15 10:07:00			0.6	0.0	16.6	0.0	0	0	0.6				
BH313	04/03/15 10:08:00			0.8	0.0	15.8	0.0	0	0	0.6				
BH313	04/03/15 10:09:00			1.2	0.0	14.4	0.0	0	0	0.6				
BH313	04/03/15 10:10:00			2.3	0.0	9.6	0.0	0	0	0.6				
BH313	04/03/15 10:11:00			2.5	0.0	8.9	0.0	0	0	0.6				
BH313	04/03/15 10:12:00			2.8	0.0	8.0	0.0	0	0	0.6				
BH313	04/03/15 10:13:00			3.0	0.0	7.4	0.0	0	0	0.6				
BH313	04/03/15 10:14:00			3.2	0.0	6.9	0.0	0	0	0.6			10.98	
BH313	11/03/15 09:30:00	1019	0								0.0	9		9 litres purged, base depth 12.50m. Very slow recharge.
BH313	11/03/15 09:31:00										0.0			
BH313	11/03/15 09:32:00										0.0			
BH313	11/03/15 09:33:00										0.0			
BH313	11/03/15 09:34:00										0.0			
BH313	11/03/15 09:35:00			2.6	0.0	5.8	0.0	0	0	0.8				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH313	11/03/15 09:36:00			2.6	0.0	5.7	0.0	0	0	0.7				
BH313	11/03/15 09:37:00			2.6	0.0	5.6	0.0	0	0	0.6				
BH313	11/03/15 09:38:00			2.6	0.0	5.6	0.0	0	0	0.6				
BH313	11/03/15 09:39:00			2.5	0.0	5.7	0.0	0	0	0.5				
BH313	11/03/15 09:40:00			2.5	0.0	5.7	0.0	0	0	0.5				
BH313	11/03/15 09:41:00			2.4	0.0	5.8	0.0	0	0	0.4				
BH313	11/03/15 09:42:00			2.4	0.0	5.8	0.0	0	0	0.4				
BH313	11/03/15 09:43:00			2.4	0.0	5.8	0.0	0	0	0.3				
BH313	11/03/15 09:44:00			2.4	0.0	5.8	0.0	0	0	0.3			10.94	Very slow recharge during purging.
BH313	05/05/15 09:10:00	1002	0	11.0							0.0	0		
BH313	05/05/15 09:11:00										0.0	0		
BH313	05/05/15 09:12:00										0.0	0		
BH313	05/05/15 09:13:00										0.0	0		
BH313	05/05/15 09:14:00										0.0	0		
BH313	05/05/15 09:15:00				0.0	2.2	9.7	0	0	0.0	0.5			
BH313	05/05/15 09:16:00				0.0	2.2	9.7	0	0	0.0	0.6			
BH313	05/05/15 09:17:00				0.0	2.2	9.7	0	0	0.0	0.6			
BH313	05/05/15 09:18:00				0.0	2.3	9.6	0	0	0.0	0.3			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH313	05/05/15 09:19:00				0.0	2.3	9.5	0	0	0.0	0.3			
BH313	05/05/15 09:20:00				0.0	2.3	9.6	0	0	0.0	0.3			
BH313	05/05/15 09:21:00				0.0	2.3	9.5	0	0	0.0	0.3			
BH313	05/05/15 09:22:00				0.0	2.4	9.5	0	0	0.0	0.4			
BH313	05/05/15 09:23:00				0.0	2.4	9.5	0	0	0.0	0.3			
BH313	05/05/15 09:24:00				0.0	2.4	9.5	0	0	0.0	0.3			
BH313	05/05/15 09:25:00												Dry	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.

CONTRACT	CHECKED
30238	**EC**

A3 Appendix 3

Soil Laboratory Data

M4CAN
Soil Analysis Results & Screening Assessment
CL-3
09/07/2015

Geological Formation Legend

MG	Made Ground
MORD	Moranic Drift
SMG	St Maughans Group

Screening Values and Assessment

	Exceeds S4ULs Criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Location	Units	STPB02A	STPB02A	BH313	TP309	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		0.3	1.53	0.1 - 0.3	1							
OD Level (m)		78.57	77.34	79.7	77.7							
Sample Type				ES	ES							
Geology Code		MG	MORD	SMG	SMG							
Cluster Code		2008	2008	2015 GI	2015 GI							
Metals												
Arsenic	mg/kg	23	<3	2.6	3.3	4	3	23	3.3	STPB02A @ 0.3mbGL	170	0
Boron	mg/kg	<3.5	<3.5	<0.4	<0.4	4	0	None > LOD	None > LOD		46000	0
Barium	mg/kg	790	410			2	2	790	0	STPB02A @ 0.3mbGL		
Cadmium	mg/kg	0.4	<0.3	0.19	<0.1	4	2	0.4	0	STPB02A @ 0.3mbGL	190	0
Chromium	mg/kg	31	38	58	41	4	4	58	41	BH313 @ 0.1 - 0.3mbGL	33	3
Copper	mg/kg	40	<6	9.7	7.3	4	3	40	7.3	STPB02A @ 0.3mbGL	44000	0
Iron	mg/kg	37000	30000			2	2	37000	0	STPB02A @ 0.3mbGL		
Mercury	mg/kg	<0.6	<0.6	<0.1	<0.1	4	0	None > LOD	None > LOD		30	0
Molybdenum	mg/kg	3.8	<0.6			2	1	3.8	0	STPB02A @ 0.3mbGL		
Nickel	mg/kg	39	48	57	37	4	4	57	37	BH313 @ 0.1 - 0.3mbGL	980	0
Lead	mg/kg	120	5	13	18	4	4	120	18	STPB02A @ 0.3mbGL	1300	0
Antimony	mg/kg	5.8	3.5			2	2	5.8	0	STPB02A @ 0.3mbGL		
Selenium	mg/kg	<3	<3	<0.2	0.53	4	1	0.53	0.53	TP309 @ 1mbGL	1800	0
Zinc	mg/kg	220	53	140	69	4	4	220	69	STPB02A @ 0.3mbGL	170000	0
PAH												
Acenaphthylene	mg/kg	0.02	<0.005	<0.1	<0.1	4	1	0.02	0	STPB02A @ 0.3mbGL	29000	0
Acenaphthene	mg/kg	0.034	<0.014	<0.1	<0.1	4	1	0.034	0	STPB02A @ 0.3mbGL	29000	0
Anthracene	mg/kg	0.068	<0.009	<0.1	<0.1	4	1	0.068	0	STPB02A @ 0.3mbGL	150000	0
Benz(a)anthracene	mg/kg	0.39	<0.012	<0.1	<0.1	4	1	0.39	0	STPB02A @ 0.3mbGL	49	0
Benzo(a)pyrene	mg/kg	0.28	<0.012	<0.1	<0.1	4	1	0.28	0	STPB02A @ 0.3mbGL	11	0
Benzo(b)fluoranthene	mg/kg	0.45	<0.016	<0.1	<0.1	4	1	0.45	0	STPB02A @ 0.3mbGL	13	0
Benzo(ghi)perylene	mg/kg	0.23	<0.010	<0.1	<0.1	4	1	0.23	0	STPB02A @ 0.3mbGL	1400	0
Benzo(k)fluoranthene	mg/kg	0.24	<0.025	<0.1	<0.1	4	1	0.24	0	STPB02A @ 0.3mbGL	370	0
Chrysene	mg/kg	0.5	<0.010	<0.1	<0.1	4	1	0.5	0	STPB02A @ 0.3mbGL	93	0
Dibenzo(ah)anthracene	mg/kg	0.058	<0.008	<0.1	<0.1	4	1	0.058	0	STPB02A @ 0.3mbGL	1.1	0
Fluorene	mg/kg	0.046	<0.012	<0.1	<0.1	4	1	0.046	0	STPB02A @ 0.3mbGL	20000	0
Fluoranthene	mg/kg	0.6	<0.025	<0.1	<0.1	4	1	0.6	0	STPB02A @ 0.3mbGL	6300	0
Indeno(123cd)pyrene	mg/kg	0.17	<0.011	<0.1	<0.1	4	1	0.17	0	STPB02A @ 0.3mbGL	150	0
Naphthalene	mg/kg	0.32	<0.010	<0.1	<0.1	4	1	0.32	0	STPB02A @ 0.3mbGL	190	0
Phenanthrene	mg/kg	0.43	<0.021	<0.1	<0.1	4	1	0.43	0	STPB02A @ 0.3mbGL	6200	0
Pyrene	mg/kg	0.48	<0.022	<0.1	<0.1	4	1	0.48	0	STPB02A @ 0.3mbGL	15000	0
Total PAH	mg/kg	4.3	<0.025	<2	<2	4	1	4.3	0	STPB02A @ 0.3mbGL		
PCBs												
PCBs Aroclors 1254	mg/kg	<0.04	<0.02			2	0	None > LOD	None > LOD			
PCB 105	mg/kg				<0.01	1	0	None > LOD	None > LOD		0.24	0
PCB 114	mg/kg				<0.01	1	0	None > LOD	None > LOD		0.24	0
PCB 123	mg/kg				<0.01	1	0	None > LOD	None > LOD		0.24	0
PCB 126	mg/kg				<0.01	1	0	None > LOD	None > LOD		0.24	0
PCB 157	mg/kg				<0.01	1	0	None > LOD	None > LOD		0.24	0
PCB 167	mg/kg				<0.01	1	0	None > LOD	None > LOD		0.24	0
PCB 169	mg/kg				<0.01	1	0	None > LOD	None > LOD		0.24	0
PCB 189	mg/kg				<0.01	1	0	None > LOD	None > LOD		0.24	0
PCB 77	mg/kg				<0.01	1	0	None > LOD	None > LOD		0.24	0
PCB 81	mg/kg				<0.01	1	0	None > LOD	None > LOD		0.24	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg				<0.01	1	0	None > LOD	None > LOD		0.24	0
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg				<0.01	1	0	None > LOD	None > LOD		0.24	0
TPH												
TPH >C6-C8.	mg/kg				<1	1	0	None > LOD	None > LOD		7800	0
TPH >C8-C10.	mg/kg				<1	1	0	None > LOD	None > LOD		2000	0
TPH >C10-C12.	mg/kg				<1	1	0	None > LOD	None > LOD		9200	0
TPH >C12-C16.	mg/kg				<1	1	0	None > LOD	None > LOD		10000	0
TPH >C16-C21.	mg/kg				<1	1	0	None > LOD	None > LOD		7600	0
TPH >C21-C35.	mg/kg				<1	1	0	None > LOD	None > LOD		7800	0
Aliphatics C5-C6	mg/kg	<0.01	<0.01			2	0	None > LOD	None > LOD		3200	0
Aliphatics >C6-C8	mg/kg	<0.01	<0.01			2	0	None > LOD	None > LOD		7800	0
Aliphatics >C8-C10	mg/kg	<0.01	<0.01			2	0	None > LOD	None > LOD		2000	0
Aliphatics >C10-C12	mg/kg	<0.01	<0.01			2	0	None > LOD	None > LOD		9700	0
Aliphatics >C12-C16	mg/kg	1.8	<0.1			2	1	1.8	0	STPB02A @ 0.3mbGL	25000	0
Aliphatics >C16-C21	mg/kg	0.27	<0.1			2	1	0.27	0	STPB02A @ 0.3mbGL	450000	0
Aliphatics >C21-C35	mg/kg	5.4	<0.1			2	1	5.4	0	STPB02A @ 0.3mbGL	450000	0
Total Aliphatics C5-C35	mg/kg	7.5	<0.1			2	1	7.5	0	STPB02A @ 0.3mbGL		
Aromatics C6-C7	mg/kg	<0.01	<0.01			2	0	None > LOD	None > LOD		7800	0
Aromatics >C7-C8	mg/kg	<0.01	<0.01			2	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01			2	0	None > LOD	None > LOD		3500	0
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01			2	0	None > LOD	None > LOD		9200	0
Aromatics >EC12-EC16	mg/kg	0.94	<0.1			2	1	0.94	0	STPB02A @ 0.3mbGL	10000	0
Aromatics >EC16-EC21	mg/kg	2.5	<0.1			2	1	2.5	0	STPB02A @ 0.3mbGL	7600	0
Aromatics >EC21-EC35	mg/kg	26	<0.1			2	1	26	0	STPB02A @ 0.3mbGL	7800	0
Total Aromatics C6-C35	mg/kg	29	<0.1			2	1	29	0	STPB02A @ 0.3mbGL		
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	37	<0.1			2	1	37	0	STPB02A @ 0.3mbGL		
Phenols												
Phenols	mg/kg				<0.3	1	0	None > LOD	None > LOD		440	0
Phenols Monohydric	mg/kg	<0.15	1.9			2	1	1.9	0	STPB02A @ 1.53mbGL	440	0
Other												
Loss on Ignition	%	6	1.1			2	2	6	0	STPB02A @ 0.3mbGL		
Total Organic Carbon	%	6.5	<0.2			2	1	6.5	0	STPB02A @ 0.3mbGL		
Asbestos Presence Screen	NONE	NFD	NFD			2	0	None > LOD	None > LOD			
pH	pH units	8.04	8.1	7.8	7.3	4	4	8.1	7.3	STPB02A @ 1.53mbGL	6-9	0
Water Soluble Sulphate	g/l	0.027	0.032			2	2	0.032	0	STPB02A @ 1.53mbGL		
BTEX												
Benzene	mg/kg	<0.01	<0.01			2	0	None > LOD	None > LOD		27	0
Toluene	mg/kg	<0.01	<0.01			2	0	None > LOD	None > LOD		56000	0
Ethyl benzene	mg/kg	<0.01	<0.01			2	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg	<0.01	<0.01			2	0	None > LOD	None > LOD		5900	0
o Xylene	mg/kg	<0.01	<0.01			2	0	None > LOD	None > LOD		6600	0
MTBE	mg/kg	<0.01	<0.01			2	0	None > LOD	None > LOD			
GRO (C4-C12)	mg/kg	<0.01	<0.01			2	0	None > LOD	None > LOD			
Total Cyanide	mg/kg	<1	<1	<0.5	<0.5	4	0	None > LOD	None > LOD			
Cyanide Free	mg/kg			<0.5	<0.5	2	0	None > LOD	None > LOD			
SVOC Suite												
Benzene	ug/kg	<9	<9			2	0	None > LOD	None > LOD		27	0
Toluene	ug/kg	<5	<5			2	0	None > LOD	None > LOD		56000	0
Ethylbenzene	ug/kg	<4	<4			2	0	None > LOD	None > LOD		5700	0
p/m-Xylene	ug/kg	<14	<14			2	0	None > LOD	None > LOD			
o-Xylene	ug/kg	<10	<10			2	0	None > LOD	None > LOD		6600	0
Methyl Tertiary Butyl Ether (MTBE)	ug/kg	<11	<11			2	0	None > LOD	None > LOD			

A4 Appendix 4

Groundwater Laboratory Data

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-3
09/07/2015

Monitoring Round	Units	Screening Criteria		1	2
Location		EQS	DWS	BH313	BH313
Location Type				BH	
Response Zone (RZ) Details				SMF	SMF
Depth				10.65	11.75
Date Sampled				25/02/2015	11/03/2015
Metals					
Arsenic	ug/l	50	10	<1	<1
Boron	ug/l	2000	1000	53	410
Cadmium	ug/l	0.15	5	<0.08	<0.08
Chromium	ug/l		50	<1	3.9
Copper	ug/l	10	2000	2.1	8.8
Lead	ug/l	1.2	10	<1	<1
Mercury	ug/l	0.07	1	<0.5	<0.5
Nickel	ug/l	4	20	<1	2
Selenium	ug/l		10	4.2	<1
Zinc	ug/l	75		<1	<1
Non-Metal Inorganics					
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05
Free Cyanide	mg/l			<0.05	<0.05
pH Value	pH units	6-9	6.5-10	8.2	8.3
Phenols					
Phenols	mg/l	0.0077			<0.03
BTEX					
Benzene	ug/l	10	1	<1	<1
Toluene	ug/l	50		<1	<1
Ethyl benzene	ug/l	20		<1	<1
m & p Xylene	ug/l	30		<1	<1
o Xylene	ug/l	30		<1	<1
TPH					
Aliphatics C5-C6	ug/l			<0.1	<0.1
Aliphatics >C6-C8	ug/l			<0.1	<0.1
Aliphatics >C8-C10	ug/l			<0.1	<0.1
Aliphatics >C10-C12	ug/l			<0.1	<0.1
Aliphatics >C12-C16	ug/l			<0.1	<0.1
Aliphatics >C16-C21	ug/l			<0.1	<0.1
Aliphatics >C21-C35	ug/l			<0.1	<0.1
Aliphatics >C35-44	ug/l			<0.1	<0.1
Aromatics >C5-C7	ug/l			<0.1	<0.1
Aromatics >C7-C8	ug/l			<0.1	<0.1
Aromatics >EC8-EC10	ug/l			<0.1	<0.1
Aromatics >EC10-EC12	ug/l			<0.1	<0.1
Aromatics >EC12-EC16	ug/l			<0.1	<0.1
Aromatics >EC16-EC21	ug/l			<0.1	<0.1
Aromatics >EC21-EC35	ug/l			<0.1	<0.1
Aromatics >C35-44	ug/l			<0.1	<0.1
Total Aliphatic TPH	ug/l			<5	<5
Total Aromatic TPH	ug/l			<5	<5
Total petroleum hydrocarbons	ug/l			<10	<10
PAH					
Acenaphthene	ug/l			<0.1	<0.1
Acenaphthylene	ug/l			<0.1	<0.1
Anthracene	ug/l	0.1		<0.1	<0.1
Benz(a)anthracene	ug/l			<0.1	<0.1
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.1	<0.1
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.1	<0.1
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1
Chrysene	ug/l			<0.1	<0.1
Dibenzo(ah)anthracene	ug/l			<0.1	<0.1
Fluoranthene	ug/l	0.0063		<0.1	<0.1
Fluorene	ug/l			<0.1	<0.1
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.1	<0.1
Naphthalene	ug/l	2		<0.1	<0.1
Phenanthrene	ug/l			<0.1	<0.1
Pyrene	ug/l			<0.1	<0.1
PAH 16 Total	ug/l			<2	<2

Screening Values and Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Geological Formation Legend

SMF	St Maughans Formation

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Round of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
2	0	None > LOD	None > LOD		0	0
2	2	410	53	BH313 @ 2	0	0
2	0	None > LOD	None > LOD		0	0
2	1	3.9	3.9	BH313 @ 2		0
2	2	8.8	2.1	BH313 @ 2	0	0
2	0	None > LOD	None > LOD		0	0
2	0	None > LOD	None > LOD		0	0
2	1	2	2	BH313 @ 2	0	0
2	1	4.2	4.2	BH313 @ 1		0
2	0	None > LOD	None > LOD		0	0
2	0	None > LOD	None > LOD		0	0
2	0	None > LOD	None > LOD			0
2	2	8.3	8.2	BH313 @ 2	0	0
1	0	None > LOD	None > LOD		0	0
2	0	None > LOD	None > LOD		0	0
2	0	None > LOD	None > LOD		0	0
2	0	None > LOD	None > LOD		0	0
2	0	None > LOD	None > LOD		0	0
2	0	None > LOD	None > LOD		0	0
2	0	None > LOD	None > LOD			0
2	0	None > LOD	None > LOD			0
2	0	None > LOD	None > LOD			0

A5 Appendix 5

Soil Leachate Data

M4CAN
Leachate Analysis Results & Screening Assessment
CL-3
09/07/2015

Screening Values and Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Geological Formation Legend

MG	Made Ground

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		STPB02A
Specimen Depth		EQS	DWS	0.3
Level				78.57
Sample Type				ES
Geology Code				MG
Cluster Code				2007 GI
2:1 Leachate Results				
Arsenic Dissolved	ug/l	50	10	17
Boron Dissolved	ug/l	2000	1000	70
Barium Dissolved	ug/l			34
Cadmium Dissolved	ug/l	0.15	5	<0.4
Chromium Dissolved	ug/l		50	<1
Copper Dissolved	ug/l	10	2000	3
Molybdenum Dissolved	ug/l			19
Nickel Dissolved	ug/l	4	20	<1
Lead Dissolved	ug/l	1.2	10	<1
Antimony Dissolved	ug/l		5	<5
Selenium Dissolved	ug/l		10	<1
Zinc Dissolved	ug/l	75		<3
Total Cyanide	mg/l	0.001	0.05	<0.05

No. Data Exceeding EQS	No. Data Exceeding DWS
0	1
0	0
0	0
	0
0	0
0	0
0	0
	0
	0
0	
0	0

A6 Appendix 6

Site Walkover Photographs



Plate 01: CL3 – Mounded Spoil Containing Man Made Inclusions



Plate 02: CL3 – Borehole BH313 Located North of Mounded Spoil

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: May 2015



Plate 03: CL3 – Field Access Adjacent to Mounded Spoil

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: May 2015

A7 Appendix 7

Relevant Extracts of Additional Historical Aerial Photography



Plate 01: Extract of 2006 aerial photograph



Plate 02: Extract of 2009/10 aerial photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Welsh Government

M4 Corridor around Newport

Land Contamination Assessment Report Annex D

CL-4 Cefn Llogell

M4CaN-DJV-EGT-ZG_GEN-RP-EN-0029

At Issue | March 2016

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Figure 2 Conceptual Site Model

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Appendix 2 Tabulated Surface Water Data
Appendix 3 Site Walkover Photographs
Appendix 4 Relevant Extract of Additional Environmental Data

1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-4) which comprises several plots of agricultural land identified as having previously been used as an inert landfill, herein referred to as the 'Site'.

1.1.2 The Site is located at approximate chainage 3,600 and 4,000 (see Figure 1).

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) of which this document is an appendix to the chapter on Geology and Soils.

1.2.2 In 2014, a Preliminary Sources Study Report (2014 PSSR) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities. In addition, this report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015). This report relates to the area defined on the Site Location Plan Figure 1.

1.2.3 The overarching rationale and approach for the assessment of areas of land along the new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the ES).

1.3 Objectives

1.3.1 The key objectives of this report are set out below:

- Undertake a risk assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.
- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.
- To provide information to support the Ground Investigation Report (GIR) and Geotechnical Design Report (GDR) required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The subsequent report structure is as follows:

- Section 2: Site Location and Description – This section summarises the Site's description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Ground Investigation Work – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions – This section describes the main findings of the intrusive site investigation including the ground conditions encountered and visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessments.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations – This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and requirements for remediation/mitigation.

2 Site Location and Description

2.1.1 The Site is located adjacent to the north of the current M4 motorway between Castleton and Duffryn, to the east of the existing Castleton Interchange. Cefn Llogell Farm is adjacent to the north-eastern Site boundary. The Site is centred at National Grid Reference (NGR) ST 268 846 and covers an area of approximately 20 hectares (ha). The location and layout of the Site are shown on Figure 1.

2.1.2 The Site has been identified by Natural Resources Wales (NRW) (formerly Environment Agency Wales) as a historical landfill which reportedly accepted inert waste. The Site currently comprises predominantly agricultural land associated with Cefn Llogell Farm.

2.1.3 The Site slopes gently to the south-east (approximately 70 mAOD to 40 mAOD) and a small watercourse flowing west – east is located in the centre of the Site and is joined by a tributary from the north in the centre of Site. This eventually joins the Percoed Reen.

2.1.4 A partial walkover survey of the Site was undertaken by RPS personnel on 27th May 2015. This was restricted to the south-eastern part of the Site. A track cuts through this section of the Site in an approximate west – east orientation, and is understood to have been used as a riding gallop. South of this track the land is heavily vegetated. A footpath cuts through this area bounding the existing cutting of the M4.

2.1.5 No evidence of landfilling activities was noted during the review of historical aerial photography or the walkover survey, although much of the ground was covered with thick vegetation. Site photographs are included in Appendix 3.

3 The Scheme

3.1.1 The Site is situated at approximate chainage 3,600 and 4,000. Refer to Figure 1 for the Site location in relation to the Scheme.

3.1.2 The current Scheme design will only result in the south-western part of the Site to be within the permanent land take. This area of the Scheme is to be landscaped, to include grassland and woodland.

3.1.3 During construction, the Site within the permanent land take is to be used for temporary stockpiling of soils, including topsoil, during construction.

4 Site History

4.1.1 The 2014 PSSR historical searches have been based on Ordnance Survey plans, literature reviews, information provided by NRW, Newport City Council and aerial photographic interpretation.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from Welsh Government. Relevant extracts are presented in Appendix 4.

4.1.3 A summary of the Site's history is presented in Table 1 below.

Table 1: Summary of Site History

Date	Use	Source of Information
1843 – 1893	The Site predominantly comprises agricultural fields with a watercourse lined by trees running across the centre in an easterly direction. An Old Quarry is identified in the south-eastern corner. A small house/outbuilding ('Ty-coch') is located in the central western area. A track leads to it from the north, which then continues to the southern boundary, and another track leads to it from the west. The Site is surrounded by agricultural fields and access tracks. Tavern Farm is located approximately 80 m to the south and Cefn Llogell approximately 60 m to the north. A road is present in the position of the current A48, approximately 100 m to the south-east of the Site and a smaller road runs north – south along the eastern boundary. A Smithy is identified approximately 70 m to the south-east at the intersection of these roads. A spring is located approximately 20 m to the north-east and Cefn Wood is located approximately 75 m north.	1:10,560 Historical Mapping
1891 – 1912	No significant change. Two tanks of unknown use are identified approximately 50 m and 100 m to the north-east, associated with Cefn Llogell Farm.	1:10,560 Historical Mapping
1904 – 1939	Small rectangular building identified in north-eastern corner of the Site. 'Ty-coch' no longer identified, potentially demolished, though the tracks remain. A footpath running southwest – northeast now cuts across the north of the Site. Reservoir identified 300 m to the north.	1:10,560 Historical Mapping
1964 – 1965	No significant change.	1:10,560 Historical Mapping
1970 – 1973	The Old Quarry appears to have been infilled and the small building in the north-east no longer identified. Residential development to the south-east of the road is expanding.	1:10,000 Historical Mapping
1979	No significant change. The M4 is visible in its current position to the south of the Site. No evidence of the Old Quarry – area appears infilled and vegetated.	Aerial Photography
1981 – 1989	A mast is located 400 m to the north-west.	1:10,000 Historical Mapping
1985 – 1996	No significant change.	1:10,000 Historical Mapping

Date	Use	Source of Information
1998	Area of material stockpiles in the central and western areas of the Site, considered to be associated with farming activity however this is unconfirmed.	Aerial Photography
2006	Area of scrub and marshland identified in the central and western areas of the Site, in the position of stockpiles identified in the 1998 image. Mounds of material appear to remain *in situ*. Track understood to be used for the racing of horses is now present crossing the Site.	Aerial Photography
2009 – 2010	No significant change.	Aerial Photography
2014	No significant change. A gas governor is identified adjacent to the mast, 400 m to the north west. A public footpath is identified running along the southern boundary of the Site, adjacent to the current M4.	Aerial Photography and 1:10,000 VectorMap

Notes: Potential sources of contamination are underlined. Those within the temporary and permanent land take are shown in **bold**.

4.1.4 The sources of information presented above supplement those used in the 2014 PSSR (Ove Arup and Partners, 2014). In particular the 2006 aerial image appears to show stockpiles identified in 1998 to remain *in situ*. Relevant extracts of the maps and photographs are presented in Appendix 4.

4.1.5 It is noted that both the old quarry and the material stockpiles features identified in Table 1 are located 240 m and 25 m outside the proposed land take, respectively and thus are not anticipated to affect or be affected by the Scheme.

4.1.6 Historically the Site was in an area bombed during World War II which is described in detail within the 2014 PSSR (Ove Arup and Partners, 2014) and the Explosive Ordnance Threat Assessment Report (Bactec, 2014). There is thus a risk from unexploded ordnance at the Site which is categorised as a medium risk site.

5 Environmental Setting

5.1 Geology

5.1.1 British Geological Survey (BGS) data indicates that the Site is underlain by bedrock of the St Maughans Formation which comprises interbedded argillaceous rocks and sandstones. No superficial deposits are recorded at the Site.

5.2 Hydrology

5.2.1 The Site slopes gently to the south-east with a topographical low across the centre of the Site associated with a small watercourse, which flows in an easterly direction. This appears to have been culverted beneath the horse gallop in the western area of the Site. A tributary adjoins from a spring located approximately 100 m to the north, meeting in the eastern area of the Site. This watercourse flows into Nantymoor Reen and subsequently Percoed Reen. Another watercourse flows in a southerly direction along the eastern boundary of the Site.

5.2.2 A number of issues, springs and wells are recorded within a 200 m radius of the Site.

5.3 Hydrogeology

5.3.1 NRW classifies the St Maughans Formation as a Secondary A Aquifer and the Site does not lie within a groundwater source protection zone.

5.4 Environmental Information

5.4.1 NRW records report the entirety of the Site as a historical landfill. The landfill is reported to have accepted inert waste however dates of use are unknown. NRW have not been able to provide any further details regarding the landfill.

5.4.2 Residual level of potential contamination may be present associated with the historical landfill.

5.4.3 The 2014 PSSR indicates that NRW records do not identify any discharge consents, abstraction licence, or further landfills/waste management facilities within 300 m radius of the Site.

6 Scope of Investigations

6.1 General

6.1.1 No previous intrusive ground investigations have been undertaken at this Site. However a number of exploratory holes were advanced within 150 m of the Site. These have been considered in order to support understanding of ground conditions beneath the Site and inform the groundwater quality and gas regime if relevant.

6.2 Scope of Works

6.2.1 The various off site intrusive ground investigations undertaken in the vicinity of the Site are summarised in Table 2.

Table 2: Site Investigation Summary (Off Site)

Date	Contractor	Boreholes	Location from Site	Sampling
1997	Norwest Holst	BHB17, BHB18, BHB19A, BHB19	145 m west, 145 m south-west, 145 m south and 150 m south	None
2015	Geotechnical Engineering	BH316, BH318	140 m south-west and 26 m south	Soil and leachate

6.2.2 The well construction details of the two off site boreholes that had monitoring wells installed are summarised in Table 3.

Table 3: Summary of Borehole Construction Details (Off Site)

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (mbGL)	Base of Slotted Well Casing / Gravel Pack (mbGL)	Targeted Geology
BHB18	146	15.1	5.5	10.5	St Maughans Formation Mudstone & Sandstone
BHB19A	140	20.70	14	19.7	St Maughans Formation Mudstone

6.3 Surface Water Quality Sampling

6.3.1 Surface water monitoring has been undertaken by RPS at two locations in the vicinity of the Site (3.1 up gradient and 4.2 down gradient) in 2015 during the first quarterly round (Q1) as summarised in Table 4. The surface water sampling locations are shown on Figure 1.

6.3.2 The results for these samples are reported within the Baseline Water Environment Report (Appendix 16.2 of the ES). Tabulated results data are included in Appendix 3.

Table 4: Surface Water Monitoring Locations

Surface Water Monitoring Point ID	Date of Sampling	Water Body	Position	Field Observations
3.1 / Q1	26th May 2015	Unnamed Watercourse	Approximately 175 m west of the Site	-
4.2 / Q1	28th May 2015	Nantymoor Reen	Approximately 400 m south-east of the Site	-

6.4 Field Testing

6.4.1 Photo Ionisation Detector (PID) monitoring for VOCs was undertaken on three soil samples from BH316 at 0.7-0.8 mbGL, 0.8-0.9 mbGL and 1.0-1.2 mbGL, and three soil samples from BH318 at 0.4-0.5 mbGL, 0.8-0.9 mbGL and 1.0-1.2 mbGL.

6.5 Groundwater Monitoring

6.5.1 A summary of the groundwater monitoring from off site boreholes are shown in Table 5.

Table 5: Summary of Monitoring Rounds (Off Site)

Location Ref.	Number and Date of Rounds	Monitoring Details	Notes
BHB18	**4 no**. 26th November 1997, 2nd December 1997, 12th December 1997, 18th December 1997	Groundwater level	-
BHB19A	**3 no**. 6th December 1997, 9th December 1997 and 18th December 1997	Groundwater level	-

6.6 Laboratory Chemical Testing

6.6.1 Analytical data was not undertaken during the previous ground investigations of the Site.

6.6.2 Off site soil and leachate data is not considered to be representative of Site conditions and is therefore not considered further in this assessment.

6.6.3 No chemical groundwater sample analysis was undertaken or is available from off site boreholes within the vicinity of the Site from the previous ground investigations.

Surface Water Analysis

6.6.4 The following section summarises the laboratory analytical results for surface water samples collected during the 2015 investigation phase. The available data set has been tabulated in a table format and is presented in Appendix 2 with supporting laboratory certificates available in the Baseline Water Environment Report (Chapter 16.2 of the ES).

Table 6: Summary of Analytical Surface Water Data

Surface Water System	Number of Water Analysis per Analytical Suite (number of locations) – 2015 data / All GI data				
	Metals & Inorganics	Water Quality Parameters	Polycyclic Aromatic Hydrocarbons	Total Petroleum Hydrocarbon	BTEX
Un-named watercourse (3.1)	1 (1) / 1 (1)	1 (1) / 1 (1)	1 (1) / 1 (1)	1 (1) / 1 (1)	1 (1) / 1 (1)
Nantymoor Reen (4.2)	1 (1) / 1 (1)	1 (1) / 1 (1)	1 (1) / 1 (1)	1 (1) / 1 (1)	1 (1) / 1 (1)

6.7 Gap Analysis of Available Data

6.7.1 There is no ground investigation data available for the Site as such no chemical analysis data is available and therefore no quantitative risk assessment can be undertaken.

7 Ground Conditions

7.1 Geological Sequence Summary

7.1.1 The geological logs for sampling exploratory holes in the vicinity of the Site are provided in Appendix 1. The observed sequence of natural material is consistent with that described in the 2014 PSSR report and summarised in the following sections. Information from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) has also been used.

7.1.2 With the exception of boreholes BHB19A, BH316 and BH318, located within the footprint of the A48, a thin veneer of topsoil was encountered in all boreholes overlying sandy clay with occasional gravels thought to represent Glacial Till Deposits. This till material was encountered at a maximum thickness of 0.9 m and is not expected to be present at significant thickness across the Site.

7.1.3 In BH316 and BH318 tarmac or concrete was found to overlie Made Ground consisting of sub-base gravels.

7.1.4 The St Maughans Formation was encountered immediately beneath the superficial deposits or Made Ground, comprising interbedded sandstone and mudstone of varying proportions. The bedrock is highly to slightly weathered in the upper horizons with mudstone typically becoming moderately weak to moderately strong from >9 mbGL and sandstone becoming moderately strong to strong from >4.5 mbGL. A 0.7 m horizon of strong siliceous conglomerate was encountered within BHB17 at 11.65 mbGL. Strata horizontally bedded to 4.5 to 7 mbGL, followed by inclined strata (approximately 23°).

7.1.5 The general geological sequence identified during the off site ground investigation works is summarised in Table 7. With the exception of unknown details including thickness of potential Made Ground as a result of landfill activity and historic buildings/tracks, the geological sequence beneath the Site is anticipated to be similar to that described below.

Table 7: Summary of Anticipated Geological Sequence

Unit	Description	Thickness Range (m)	Basal Depth (m bGL)
Topsoil	-	0.1 - 0.3	0.1 - 0.3
Made Ground	Concrete/tarmac over sub-base of sandy gravel	1.6 - 2.05	1.6 - 2.05
Superficial Deposits (Glacial Till Deposits)	Soft to firm reddish brown sandy slightly gravelly clay.	0.3 - 0.9	0.6 - 2
St Maughans Formation (Interbedded Mudstone & Sandstone)	Reddish brown mottled greyish green, becoming purplish brown fractured silty mudstone, highly weathered in the upper horizons.	>19.8	Unproven
	Grey to dark greenish grey fine to coarse grained micaceous sandstone. Occasional thin laminations and cross bedding observed.		

7.2 Visual and Olfactory Evidence of Contamination (Off Site)

7.2.1 No visual or olfactory evidence of contamination was identified during the various drilling within off site exploratory hole locations.

7.2.2 PID monitoring was undertaken on three soil samples from BH316 and three soil samples from BH318. The PID meter recorded low levels of VOCs between zero and 0.1 ppm within the Made Ground.

7.2.3 Full details and observations noted during the drilling are presented on the exploratory logs attached in Appendix 1.

7.3 Gas Monitoring (Off Site)

7.3.1 No ground gas monitoring data is available in the vicinity of the Site from the previous ground investigations.

7.4 Groundwater

Groundwater Encountered During Investigation (Off Site)

7.4.1 All water strikes encountered during the investigation of the selected off site boreholes are detailed on the geological logs provided in Appendix 1. These are summarised in Table 8.

Table 8: Summary of Groundwater Level Data (Off Site)

Location	Strike Depth (m bGL)	Geological Formation	Level after 20 minutes (mbGL)
BHB19A	14.0	St Maughans Formation	-

Groundwater Level During Monitoring Rounds (Off Site)

7.4.2 Groundwater levels recorded within two boreholes (both located south of the south-western part of the Site) during subsequent monitoring rounds are provided in Table 9.

Table 9: Summary of Groundwater Level During Monitoring Rounds

Location	Installation	Depths of Response Zone (mbGL) and Geological Formation	No. Measurements	Minimum Depth (mbGL)	Maximum Depth (mbGL)	Comments
BHB18	146 mm	5.5 - 10.5 (St Maughans Formation)	4	9.9	10 (Dry)	Water level approx. 38 mAOD
BHB19A	140 mm	14 - 19.7 (St Maughans Formation)	3	9.3	9.62	Water level approx. 22 mAOD

Groundwater Summary

7.4.3 The main groundwater body as seen from off site boreholes is within the St Maughans Formation, which is likely to be present within fractures and sandy horizons within the mudstone.

7.4.4 The groundwater levels of the off site boreholes indicate water levels beneath the south-western part of the Site will be at greater depths (approximately 30 to 40 mbGL).

7.4.5 The above groundwater regime correlates with that seen elsewhere along the western section of the proposed motorway corridor and is considered to be representative of the typical conditions beneath the Site and in the general area.

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The outline Conceptual Site Model (CSM) presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the Scheme. The main alterations to the 2014 PSSR model are summarised as follows:

- An update of potential sources to include potential construction/demolition wastes associated with a previous small building within the land take area.
- Inclusion of surface water as a potential receptor due to proximity of surface water features on Site to the land take area and expected connectivity to Percoed Reen.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 NRW records identify the Site as an historical landfill, reportedly licenced to accept inert waste and the likelihood of contaminated materials being present is low. Furthermore the potential for leachate or gas generation is considered to be low as organic rich, gas generating materials are unlikely to be present. However, there is no ground investigation data available to confirm the nature of fill materials. The possibility therefore remains that the fill materials may provide a source of gas or leachate, particularly as the dates of operation and areas affected by landfill activity are not definitively known.

8.2.2 Infilling of old quarries on the boundary of the south-eastern area of the Site has been amended and examination of historical and current maps show this area to be within the footprint of the existing M4, including the current cutting. It is therefore likely a portion of any infilling of the old quarry will have been already excavated/reworked during the construction of the existing M4.

8.2.3 There is low potential for the presence of a small amount of demolition waste within the land take area in the south-western area of the Site due to the demolition of a small building in the central-western area of the Site between 1843 and 1912.

Potential Receptors

8.2.4 Receptors during the construction and the operational stages of the Scheme have been considered:

Construction

- Construction workers during site development works.

- General public/site neighbours adjacent to construction works (farm buildings adjacent to the north/users of the racehorse training facilities and public footpaths).
- Groundwater within the St Maughans Formation.
- Surface water on Site (unnamed watercourse).

Operational

- Maintenance workers.
- Site end users (users of the racehorse training facilities and public footpaths).
- Groundwater within the St Maughans Formation.
- Surface water on Site (un-named watercourse).

Potential Pathways

8.2.5 Pathways during the construction and the operational stages of the Scheme have been considered:

- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils possible during construction and maintenance works.
- Vertical or lateral migration of ground gas associated with infilled waste.
- Vertical migration of potentially contaminated perched water (if present) within the waste mass into aquifer of the St Maughans Formation.
- Surface water run-off and leaching of fill materials or contaminated soils (if present) to surface waters on Site (un-named watercourse).

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the other data described herein, the following risk evaluation has been reconsidered and included:

- The Site has been reported to have received inert waste although no details are available. With the exception of the possible backfill of a small quarry, historical information has not identified evidence that may be associated with landfilling activity. The former quarry is located within the cutting of the existing M4 and some of its backfill material would have been removed during any construction. It is assumed any potential risks to the existing M4 users have been suitably mitigated at the time and are therefore not considered further within this report. On the basis of the above, widespread and deep deposition of waste at the Site is not anticipated.
- The former quarry is located some 240 m east of the proposed new land take associated with the Scheme and is therefore not anticipated to affect the Scheme.
- Activities during construction are therefore considered to be limited to stockpiling soils during tree planting and general placement of topsoil.
- The southern quadrant of the Site forms part of the permanent land take where landscaping arrangement is to take place. The provision of topsoil and

vegetation cover will reduce exposure risks to motorway users and maintenance workforce.

- Risk of ground gas emission from any landfill materials (if present) is considered low. There are no suitable boreholes with monitoring wells within 250 m of the Site to assess the gas regime. End users of the site will be within open environment with no proposed structures or other confined spaces.
- Groundwater within the St Maughans Formation is anticipated to be at considerable depth beneath the area of permanent land take and is not considered further in this report.

8.4 Human Health and Controlled Waters Risk Assessment

8.4.1 No chemical analysis soil sample data from the previous ground investigations is available for this Site and therefore quantitative generic risk assessments have not been undertaken for human health nor for risks to groundwater and ground gas.

8.5 Surface Water

8.5.1 A summary of the surface water screening assessment undertaken for the Site is presented in Table 10. This includes the results for the two monitoring locations as identified in Table 4. Location 3.1 is understood to be up gradient of the Site and location 4.2 to be down gradient, on Nantymoor Reen.

8.5.2 The results for all sample locations are presented within the Baseline Water Environment Report (Appendix 16.2 of the ES).

Table 10: Surface Water Screening Exceedances

Parameter	Unit	No. Analyses	No. Analyses Above LOD	Min Conc	Max Conc	Location & Round with Max Conc	EQS	No. Analyses Exceeding EQS	DWS	No. Analyses Exceeding DWS	CCW Trigger Levels	No. Analyses Exceeding CCW Trigger Levels
Nitrate as NO3	mg/l	2	2	13.9	37.4	3.1 / Q1	-	-	50	0	1	2
Total Oxidised Nitrogen	mg/l	2	2	3.15	8.47	3.1 / Q1	-	-	50	0	2	2
Benzo(a)pyrene	µg/l	2	1	0.016	0.016	3.1 / Q1	0.00017	1	0.01	1	-	-
Benzo(b)fluoranthene	µg/l	2	1	0.0362	0.0362	3.1 / Q1	0.017	1	0.1	0	-	-
Benzo(ghi)perylene	µg/l	2	1	0.0205	0.0205	3.1 / Q1	0.0082	1	0.1	0	-	-
Fluroranthene	µg/l	2	1	0.0365	0.0365	3.1 / Q1	0.0063	1	-	-	-	-
Dissolved Oxygen	%	2	2	10.6	10.8	4.2 / Q1	60	2	-	-	-	-

8.5.3 Water quality within the Nantymoor Reen at location 4.2, which is understood to be connected with and down gradient of the unnamed water course crossing the Site, is generally observed to be good with no exceedances of the screening criteria.

8.5.4 Exceedance of the Environmental Quality Standard (EQS) for 4 individual PAHs (benzo(a)pyrene, benzo(g,h,i)perylene, fluoranthene and benzo(b)fluoranthene) were observed only at the up gradient location 3.1/Q1. The total PAH concentration at this location is below the laboratory limit of detection. No exceedances of organic EQS were observed at the down gradient location 4.2, with the majority of analyses below respective laboratory limits of detection.

8.5.5 Location 4.2 is down gradient of a housing development, Celtic Springs Business Park, and a culvert passing beneath the current M4 (located between the Site and the monitoring location) and these land uses may influence surface water quality at location 4.2. Based on the available information it is considered unlikely that the Site is impacting surface water quality.

8.6 Summary

8.6.1 There is no available chemical or monitoring data to assess groundwater quality, gas risk or potential contaminants within soils at the Site. However, it is considered unlikely that contaminated materials have ever been placed in large quantities at the Site, if indeed any inert wastes were even tipped. The risks to human health and controlled waters are thus considered low based on available information.

8.6.2 A review of off site surface water data shows reduced water quality in the majority of parameters down gradient of the Site in comparison to an up gradient location. This may suggest a possible contaminant linkage between the Site and surface water. Alternatively, the reduced quality seen in the sample from the Nantymoor Reen may be representative of the quality of the Reen itself impacted from potential up gradient off site contaminant sources. Additional monitoring points would be required to confirm linkages.

9 Refined Conceptual Site Model

9.1.1 The incorporation of data from the 2015 Supplementary Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. Relevant contaminant (source-pathway-receptor) linkages are considered within the refined CSM. The assessment is based on the Scheme during its construction and operational phases.

9.1.2 A CSM representing general ground conditions, overall Scheme layout and relevant source-pathway-receptors (each of which having a specific alpha-numerical symbol attached) are presented in Figure 1 and is described in Table 11.

Table 11: Conceptual Site Model

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
On Site Possible inert landfilled materials	**Construction**					
	Construction workers (B)	Direct dermal (1)	Low	Moderate	Moderate to low	From the review of historical information widespread landfilling is not indicated and if landfilling has occurred NRW records indicate it is unlikely that contaminated wastes will have been deposited. Construction workers will possibly be exposed to infill materials if present during landscaping and stockpiling works, however exposure duration will be short term only. Prior to construction, a specific risk assessment will be required in line with CDM Regulations and health and safety legislation to protect construction workers and general public off site. This will enable safe methods of work and appropriate levels of PPE to be put in place. As such all risks will be duly considered and suitably mitigated to protect construction workers. Ground investigation has been undertaken at the Site and further investigation is required to establish whether waste has actually been deposited at the Site.
		Ingestion (3)	Low	Moderate	Moderate to low	
		Inhalation of soil dust (2)	Low	Moderate	Moderate to low	
		Inhalation of landfill gases (2)	Low	Moderate	Moderate to low	
	Off site general public during construction works (C)	Direct dermal of soil dust (1)	Unlikely	Moderate	Low	During construction there is the possibility of dermal contact and inhalation of soil dust. Dust control measures will be required. Further investigation is required to establish whether waste has actually been deposited.
		Ingestion of soil dust (3)	Unlikely	Moderate	Low	
		Inhalation of soil dust (2)	Unlikely	Moderate	Low	
		Inhalation of landfill gases (2)	Unlikely	Moderate	Low	
	Surface waters (D)	Contaminated surface water run-off and leaching (4 and 5)	Low	Moderate	Moderate to low	During construction activities, infiltration and subsequent leaching and migration of potential contaminants may enter the surface water course with connection to the Nantymoor and Percoed Reens. Surface water run-off may deteriorate the quality of

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						surface water. Construction process will adopt surface water control and management. Further investigation is required to establish whether waste has actually been deposited.
On Site Infill material (inert of unconfirmed nature, possibility of gas or leachate generation), construction and demolition materials	**Operational**					
	Future motorway users (A) and adjacent off site users (C)	Direct dermal (1)	Unlikely	Low	Very low	Infill materials (if present) to have topsoil cover and be vegetated therefore reducing potential exposure. Potential exposure duration will be short-term only. Receptors will be in the open environment with no proposed structures or other confined spaces. Absence of site data and presence of other Made Ground/waste material is unknown. Further investigation is required to establish whether waste has actually been deposited.
		Ingestion (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
		Inhalation of landfill gases (2)	Unlikely	Low	Very low	
	Maintenance workers (B)	Direct dermal (1)	Unlikely	Moderate	Low	Infill materials are to have topsoil cover and be vegetated therefore reducing potential exposure. Potential exposure duration will be short-term only. Maintenance workers will be in the open environment with no proposed structures or other confined spaces. Further investigation is required to establish whether waste has actually been deposited.
		Ingestion (3)	Unlikely	Moderate	Low	
		Inhalation of soil dust (2)	Unlikely	Moderate	Low	
		Inhalation of landfill gases (2)	Unlikely	Moderate	Low	
	Surface water (land drainage) (D)	Contaminated surface water run-off and leaching (4 and 5)	Unlikely	Moderate	Low	During operation infill materials are to be vegetated limiting infiltration and subsequent leaching and migration of potential contaminants to surface waters. No chemical soils/groundwater data is available for the Site. Possible degradation of the surface quality is

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						identified by the currently available monitoring data although additional monitoring points would be required to confirm linkages. Further investigation is required to establish whether waste has actually been deposited.

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 The south-western area of the Site is included in the land take area for the alignment and is to be used for landscaping (planting) the Scheme.

10.1.2 Review of historical maps and NRW records indicate the potential for fill material of inert nature in this area as a result of historical landfill activity. The extent of the landfill area and type of waste material deposited is not known and NRW do not hold any records of waste and therefore the possibility of associated ground gas and leachate generation cannot be discounted. Historical aerial photographs and mapping have not identified evidence of substantial landfilling with the only infill associated with a discrete backfill of an old quarry. This has been partially removed during the existing M4's construction.

10.1.3 Whilst no intrusive investigation was undertaken within the Site, limited thickness of Made Ground (or landfilling), if at all present is anticipated from the review of the aerial and historical mapping data.

10.1.4 No intrusive investigation has been undertaken within the Site and therefore risks to human health and controlled waters have not been quantitatively assessed. Notwithstanding this, the risks to identified receptors is considered to be moderate to low.

10.1.5 Surface water quality recorded in the nearest reen down gradient of the Site is generally of good quality with a few slight exceedances of respective EQS. It is considered unlikely that the water quality is being affected by the Site.

10.1.6 The landscaping and associated clean soil cover will further mitigate potential linkages of concern to maintenance workers and end users of the Site beyond the construction phase. Any placed topsoil material will need to be checked for contamination.

10.2 Recommendations

10.2.1 In order to confirm the low to moderate to low risks associated with the Site in relation to both construction and operational phases, it is recommended that intrusive investigation is undertaken to verify risk levels described which would include testing of soils, soil leachate and possible gas and groundwater monitoring.

10.2.2 Upon review and assessment of the recommended ground investigation information, any contamination identified that could cause an unacceptable risk to the identified receptors will require appropriate remedial mitigation measures. These measures would be identified within a remediation strategy for the Scheme that would include:

- Addressing potential human health risk and controlled water risk identified by the recommended ground investigation.
- Dealing with unexpected contamination.
- Verification sampling strategy to confirm suitability for potentially contaminated soils for retention and reuse.

- Control measures to prevent risks to construction workers and the general public during construction.
- Verification of material used as topsoil.

10.2.3 The remediation strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan.

10.2.4 The remediation strategy should be supported by a Scheme wide Materials Management Plan in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

11 References

CL:AIRE (2011) The Definition of Waste: Development Industry Code of Practice, ISBN 978-1-905046-23-2.

Geotechnical Engineering (2015) M4 Corridor Around Newport, Factual Report on Ground Investigation, 30238

Highways Agency (2008) Design Manual for Roads and Bridges. Vol. 4. Geotechnics and Drainage. Section 1. Earthworks; Part 2. HD22/08. Managing Geotechnical Risk.

Ove Arup and Partners (2014) M4 Corridor Around Newport, Preliminary Sources Study Report, 14/9197

Bactec (2014) Explosive Ordnance Threat Assessment in respect of M4 Corridor around Newport for Hyder Consulting (UK) Limited, 5750TA

12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GDR	Geotechnical Design Report
GIR	Ground Investigation Report
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum

mb	Millibars
mbGL	Metres below Ground Level
MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area (WTA)
- Potential Borrow Pit Area
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination

Investigation Locations

2015 (RPS)

- Surface Water Monitoring Location - Q2
- Surface Water Monitoring Location - Q1

2015 (Geotechnical Engineering)

- Borehole
- Trial Pit

2000 (Exploration Associates)

- Window Sample

1997 (Norwest Holst)

- Borehole
- Monitoring Well Installation



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Appendix 11.1 Annex D CL-4

Site Plan for CL-4

Figure: 1	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:4,000

0 65 130 m

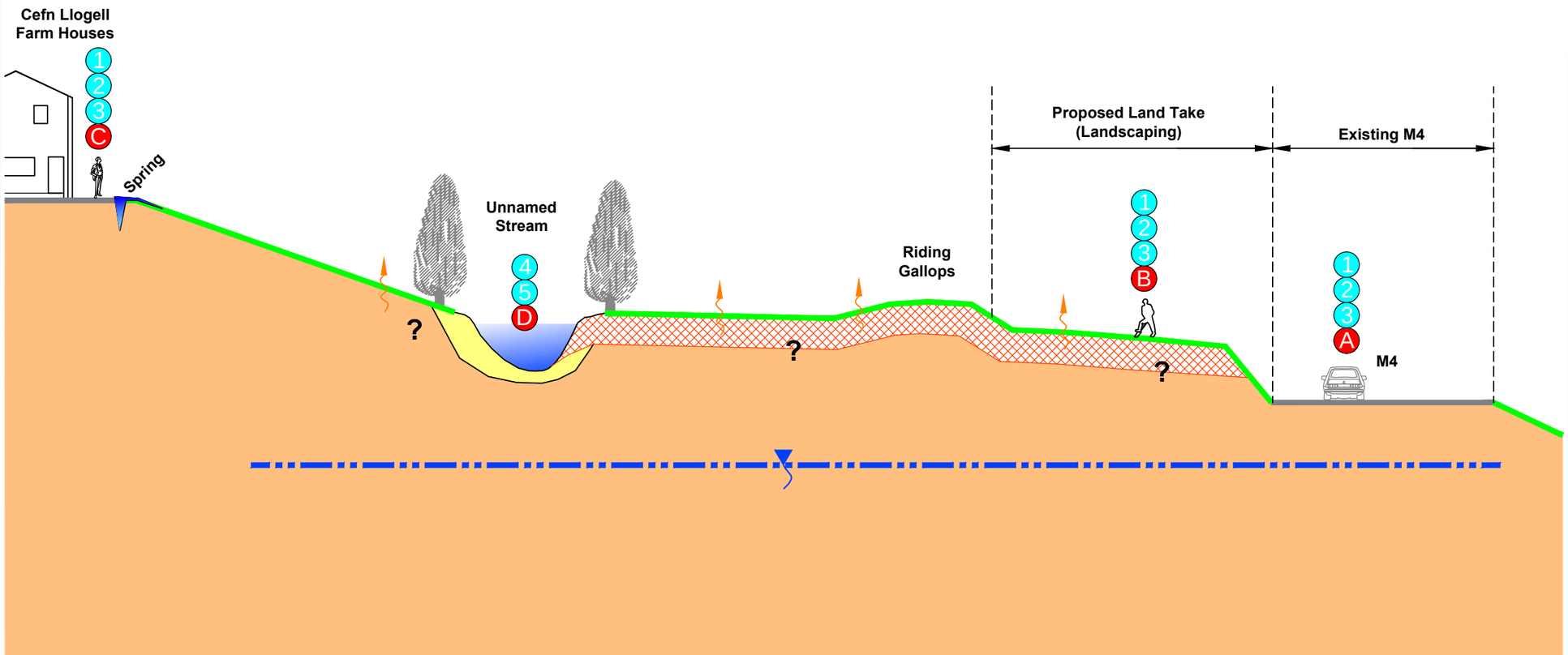
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dwg ref: JER6591_Figure1_CL4SitePlan

dwg ref: JER6591_Figure1_CL4SitePlan Contains Ordnance Survey data © Crown copyright and database right 2015

CL-4 - Cefn Llogell



Ground conditions based on available information

Legend

- Landfill Material (May Not Be Present)
- St. Maughans Formation - SMF
- Alluvium
- Hardstanding
- Rough Grassland
- Groundwater (Aquifer)
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (M4 Users)
- B Humans On-Site (Construction/Maintenance)
- C Humans Off-Site (Site Neighbours)
- D Surface Water

Potential Pathways

- 1 Dermal Contact
- 2 Inhalation
- 3 Ingestion
- 4 Leaching / Migration
- 5 Surface Run Off

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- The landfill material of unknown nature and extent could potentially be a source of gas or leachate

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0133 (January 2014)

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Welsh Government

Appendix 11.1 Annex D CL-4

Conceptual Site Model for CL-4

Figure: 2	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL4ConceptualSiteModel

dwg ref: JER6591_Figure2_CL4ConceptualSiteModel

Appendices

A1 Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No. **BHB17** Header

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	326443.0 E 184310.3 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Edeco	Ground Level	65.30m AOD
Client	Welsh Office	Drillers	J.M	Orientation	Vertical
		Logged by	T.R/M.B/C.D	Date Started	15/10/1997
Consultant	Ove Arup and Partners	Core barrel	S	Date Completed	20/10/1997
		Core bit	ST		

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
15/10/1997	1800	3.00	1.70	Dry	
17/10/1997	1430	3.00	3.00	Dry	
17/10/1997	1600	5.75	3.00	Dry	
18/10/1997	1600	9.35	4.20	Dry	
19/10/1997	1600	17.50	4.20	Dry	
20/10/1997	1800	20.40	4.20	Dry	

CABLE PERCUSSION DETAILS

Hard strata from depth	Hard strata to depth	Hours	Remarks
2.30	3.00	1.50	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	20.40	150	4.20

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

ROTARY DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
3.00	5.75	air/mist	good	112
5.75	9.35	air/mist	good	112
9.35	17.50	air/mist	good	112
17.50	20.40	air/mist	good	112

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
2.00	S	50/75mm (2,11,50)
2.80	S	50/60mm*

* Seating blows only.

GENERAL NOTES

NB All depths in metres, all diameters in millimetres, water strike rise time in minutes, hard strata time in hours

Form	COMBINED HEADER
Version	2.00
Revised	26/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No. **BHB17** Sheet 1 of 3

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	326443.0 E 184310.3 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Edeco	Ground Level	65.30 m AOD
Client	Welsh Office	Drillers	J.M	Orientation	Vertical
		Logged by	T.R/M.B/C.D	Date Started	15/10/1997
Consultant	Ove Arup and Partners	Core Barrel	S	Date Completed	20/10/1997
		Core Bit	ST		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	Blow count to drive U100	TCR	SCR	RQD	SPT N & depth	Installation
TOPSOIL	0.30	65.00							
Soft reddish brown sandy CLAY with some angular to subrounded mudstone gravel. (Morainic Drift)	0.60	64.70	D 0.50 B 0.60 - 1.00						
Reddish brown mottled greyish green highly to completely weathered silty MUDSTONE, very weak. (St. Maughans Group)			U 1.00 - 1.45	(39)					
			D 1.45						
			D 1.80						
---at 2.00m becoming moderately weathered			D 2.00					S50/75mm 2.00 2.23	
			D 2.80					S50/60mm* 2.80 2.86	
	3.00	62.30							
Reddish brown mottled greyish green medium to thickly horizontally bedded moderately weathered silty MUDSTONE, moderately weak with medium spaced sub-horizontal to sub-vertical fractures irregular, rough, tight. (St. Maughans Group)			3.00 - 4.50		97	90	90	0 NI 1	
---from 3.00 to 3.28m highly weathered very weak completely fractured								1 NI	
	4.50	60.80						0	
---from 4.35 to 4.50m highly weathered very weak completely fractured								NI 2	
	4.95	60.35	4.50 - 5.40		107	68	40	NI	
	5.02	60.28						8	
Reddish brown mottled greyish green medium horizontally bedded slightly weathered sandy micaceous MUDSTONE, strong with closely spaced horizontal fractures planar rough tight. (St. Maughans Group)								NI	
			5.40 - 5.75		103	63	0	NI	
---from 4.58 to 4.65m completely fractured								NI	
			5.75 - 7.10		101	81	58	8	
Reddish brown mottled greyish green thinly bedded highly weathered silty MUDSTONE ,weak, completely fractured. (St. Maughans Group)								3	
	7.10	58.20							
Reddish brown thinly to medium sub-horizontally bedded (23°) slightly to moderately weathered sandy MUDSTONE, moderately weak and moderately strong closely spaced sub-horizontal discontinuities, planar, rough, tight. (St. Maughans Group)			7.10 - 8.25		89	83	77	3	
---at 5.35m highly weathered weak to very weak completely fractured									
---from 6.70m occasionally mottled greyish green very closely spaced thick laminations of fine to medium grained sandstone			8.25 - 9.35		95	94	35	9	
SANDSTONE As Sheet 2									

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No. **BHB17** Sheet 2 of 3

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	326443.0 E
Project	M4 Relief Road Magor to Castleton Stage 2				184310.3 N
		Drilling Rig	Edeco	Ground Level	65.30 m AOD
Client	Welsh Office	Driller	J.M	Orientation	Vertical
		Logged by	T.R/M.B/C.D	Date Started	15/10/1997
Consultant	Ove Arup and Partners	Core barrel	S	Date Completed	20/10/1997
		Core bit	ST		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Light greyish pink fine to coarse grained medium to thickly sub-horizontally bedded (26°) thinly and thickly cross laminated micaceous SANDSTONE, very strong medium to widely spaced sub-horizontal discontinuities planar smooth tight. (St. Maughans Group)				9.35 - 10.80	96	96	90	2		
				10.80 - 12.22	99	99	97	2		
		11.65	53.65							
White to light grey fine to coarse grained thickly sub-horizontally bedded (26°) fresh siliceous CONGLOMERATE, very strong with widely spaced sub-horizontal discontinuities planar smooth tight. (St. Maughans Group)								0		
		12.36	52.94					0		
		12.77	52.53					2		
Dark greenish grey fine to coarse grained medium sub-horizontally bedded (48°) thinly and thickly laminated fresh to slightly weathered micaceous SANDSTONE, very strong with closely spaced and medium spaced sub-horizontal discontinuities planar rough tight occasionally infilled with calcite (<6mm). (St. Maughans Group)				12.22 - 13.55	101	74	42	NI		
								6		
		13.87	51.43					1		
Green thinly to medium sub-horizontally bedded slightly to moderately weathered silty MUDSTONE, moderately weak to moderately strong with closely to medium spaced horizontal to inclined discontinuities, undulating smooth tight. (St. Maughans Group) ---at 12.69m fracture with striations ---from 12.77 to 12.96m highly weathered, very weak, completely fractured				13.55 - 15.00	106	97	53	6		
		14.87	50.43					3		
				15.00 - 16.00	98	83	75	6		
Purplish brown thinly to medium sub-horizontally bedded slightly to moderately weathered silty MUDSTONE, moderately weak to moderately strong with closely to medium spaced horizontal to inclined discontinuities undulating smooth tight. (St. Maughans Group)								6		
				16.00 - 17.50	97	77	25	NI		
								6		
Reddish brown occasionally mottled greyish green fine to medium grained thinly to medium sub-horizontally bedded (24°) slightly weathered slightly micaceous SANDSTONE, moderately strong to strong with closely spaced sub-horizontal to inclined discontinuities planar rough tight. (St. Maughans Group) ---from 14.87 to 15.00m argillaceous ---from 15.00 to 15.37m vertical to sub-vertical fracture (70-90°) ---from 16.60 to 18.50m with vertical to sub-vertical undulating fracture rough, tight to open (quartz infill) ---from 16.60 to 18.50m planes of				17.50 - 18.95	98	93	13	6		
								NI		
								3		
				18.95 - 20.40	101	94	52	4		
								7		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No. **BHB17** Sheet 3 of 3

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	326443.0 E 184310.3 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Edeco	Ground Level	65.30 m AOD
Client	Welsh Office	Driller	J.M	Orientation	Vertical
		Logged by	T.R/M.B/C.D	Date Started	15/10/1997
Consultant	Ove Arup and Partners	Core barrel	S	Date Completed	20/10/1997
		Core bit	ST		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown occasionally mottled greyish green fine to medium grained thinly to medium sub-horizontally bedded (24°) slightly weathered slightly micaceous SANDSTONE, moderately strong to strong with closely spaced sub-horizontal to inclined discontinuities planar rough tight. (St. Maughans Group)		20.40	44.90							
---at 19.55m bedding planar with slight polishing										
Borehole complete at 20.40 m.										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No. **BHB18** Header

Contract No.	F10895	Method	Rotary Coring	Coordinates	326501.6 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Knebel 77		184229.9 N
		Driller	E.D	Ground Level	48.20m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	S	Date Started	17/11/1997
Consultant	Ove Arup and Partners	Core bit	Geocube	Date Completed	18/11/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
17/11/1997	1800	12.00	2.00	Dry	
18/11/1997	0800	12.00	2.00	Dry	
18/11/1997	1800	15.10	2.00	Dry	

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	2.00	mist	100%	0*
2.00	15.10	mist	100%	112

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
112	15.10	146	2.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Bedding dips and dip direction on separate sheet.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	S	N=26 (6,6,6,6,7,7)
2.00	S	50/70mm (12,13,50)

NB All depths in metres, all diameters in millimetres, water strike rise time in minutes.

Form	ROTARY HEADER
Version	2.00
Revised	25/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No. **BHB18** Sheet 1 of 2

Contract No.	F10895	Method	Rotary Coring	Coordinates	326501.6 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Knebel 77		184229.9 N
		Driller	E.D	Ground Level	48.20m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	S	Date Started	17/11/1997
Consultant	Ove Arup and Partners	Core bit	Geocube	Date Completed	18/11/1997

Description of Strata	Depth Below G.L.	O.D. Level	Coring and Sampling	TCR	SCR	RQD	FI	SPT N & depth	Installation
TOPSOIL	0.10	48.10							
Reddish brown sandy CLAY (drillers description). (Morainic Drift)								26 1.00 1.45	
Greenish pink to pinkish brown fine to coarse very thinly bedded slightly weathered micaceous SANDSTONE, very weak to weak with very closely to closely spaced inclined fractures planar rough tight. (St. Maughans Group)	2.00	46.20						S50/70mm 2.00 2.22	
	2.38	45.82	2.00 3.00	100	52	0	NI 5 3		
Reddish brown mottled green medium bedded moderately to highly weathered silty MUDSTONE, weak to moderately weak. (St. Maughans Group)	2.90	45.30					NI		
			3.00 4.50	100	87	7	13		
Purplish brown mottled green fine to coarse grained very thinly to thinly inclined bedding slightly weathered micaceous SANDSTONE, strong with closely to medium spaced inclined fractures planar rough tight. (St. Maughans Group) ---from 3.00 to 3.15m completely fractured	4.20	44.00							
			4.50 6.00	97	43	30	5 NI		
Reddish brown mottled green medium bedded moderately weathered silty MUDSTONE, very weak to moderately strong with medium to widely spaced sub-horizontal to inclined fractures planar rough tight. (St. Maughans Group) ---from 5.50m moderately to highly weathered weak to moderately weak completely fractured ---from 6.20 to 6.50m slightly to moderately weathered moderately weak to moderately strong completely fractured ---from 6.50 to 6.80m slightly calcitic ---from 6.50m slightly to moderately weathered moderately strong with medium spaced sub-horizontal fractures planar rough tight							2 NI		
			6.00 7.50	87	52	43	3 NA		
			7.50 8.80	100	94	45	8		
Reddish brown occasionally mottled green fine to medium grained medium bedded occasionally thinly and cross laminated fresh to slightly weathered silty micaceous SANDSTONE, moderately strong to strong. (St. Maughans Group)	8.65	39.55							
	9.25	38.95	8.80 10.40	85	78	37	0 10		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH ROTARY LOG
Version	1.00
Revised	16/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No. **BHB18** Sheet 2 of 2

Contract No.	F10895	Method	Rotary Coring	Coordinates	326501.6 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Knebel 77		184229.9 N
		Driller	E.D	Ground Level	48.20m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	S	Date Started	17/11/1997
Consultant	Ove Arup and Partners	Core bit	Geocube	Date Completed	18/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Coring and Sampling	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown very thinly to thinly inclined bedded moderately weathered silty MUDSTONE, very weak to moderately weak with very closely to closely spaced inclined fractures planar rough tight. (St. Maughans Group)								NA		
---from 10.40m mottled green thinly to medium sub-horizontally bedded moderately weak to moderately strong				10.40 12.00	94	86	29	9		
---from 11.00m slightly to moderately weathered										
		11.90	36.30							
---from 11.60 to 11.90m very closely spaced gravel size pockets of calcite										
Purplish brown occasionally mottled green medium to thickly sub-horizontally bedded fresh to slightly weathered silty MUDSTONE, moderately strong with widely spaced inclined fractures planar irregular rough tight. (St. Maughans Group)				12.00 13.55	100	100	97	4		
---from 13.95m thinly to medium sub-horizontally bedded moderately weathered				13.55 15.10	97	84	13	11		
		15.10	33.10							
Rotary drilling complete at 15.10 m.										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH ROTARY LOG
Version	1.00
Revised	16/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No. **BHB19** Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	326752.1 E
Project	M4 Relief Road Magor to Castleton Stage 2				184240.9 N
		Drilling Rig	Pilcon	Ground Level	27.40m AOD
Client	Welsh Office	Driller	I.D	Orientation	Vertical
		Logged by	C.D	Date Started	13/11/1997
Consultant	Ove Arup and Partners			Date Completed	14/11/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
13/11/1997	1800	1.00	0.00	Dry	
14/11/1997	0800	1.00	0.00	Dry	
14/11/1997	1800	4.30	1.50	Dry	

DRILLING DETAILS

Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
2.70	3.00	1.00	
3.05	3.20	0.50	
3.20	3.40	0.50	
3.70	4.10	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	4.30	150	1.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.50	S	N=23 (4,5,5,6,6,6)
2.50	S	50/70mm (14,20,50)
3.00	S	50/60mm*
3.20	S	48/75mm*
4.10	S	50/70mm (,36,50)

* Seating blows only.

NB All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	CP HEADER
Version	2.00
Revised	25/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No. **BHB19** Sheet 1 of 1

Contract No.	F10895	Method	Cable Percussion	Coordinates	326752.1 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		184240.9 N
		Driller	I.D	Ground Level	27.40m AOD
Client	Welsh Office	Logged by	C.D	Orientation	Vertical
				Date Started	13/11/1997
Consultant	Ove Arup and Partners			Date Completed	14/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install-ation
TOPSOIL		0.20	27.20				
Firm to stiff reddish brown micaceous sandy CLAY with occasional to some sub-angular gravels of micaceous sandstone. (Morainic Drift)		0.80	26.60	B 0.50 - 1.00			
				D 1.20			
Reddish brown fine to medium grained thinly to thickly laminated highly to completely weathered micaceous silty SANDSTONE, very weak to weak. (St. Maughans Group)				B 1.50 - 2.00	S23	S 1.50 1.95	
---from 1.50 to 1.95m mottled greyish green very silty highly weathered weak to moderately weak				D 2.20			
				B 2.50 - 2.80	S50/70mm	S 2.50 2.72	
---from 2.50m moderately to highly weathered moderately weak				D 2.90			
				D 3.10	S50/60mm*	S 3.00	
---from 3.00 to 3.30m moderately weathered moderately weak to moderately strong				B 3.20 - 3.30	S48/75mm*	S 3.20 3.06 3.28	
				D 3.90			
					S50/70mm	S 4.10 4.25	
		4.30	23.10				
Cable Percussion boring complete at 4.30 m.							

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No. **BHB19A** Header

Contract No.	F10895	Method	Rotary Coring	Coordinates	326742.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	T30		184253.1 N
		Driller	H.J	Ground Level	31.93m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	S	Date Started	27/11/1997
Consultant	Ove Arup and Partners	Core bit	PCD	Date Completed	27/11/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
27/11/1997	1800	20.70	4.40	Dry	

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
1.20	4.50	air	100%	NR
4.50	20.70	air	100%	112

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
120	20.70	140	4.40

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
27/11/1997	0000	14.00	0.00	0	moderate	4.40	0.00

GENERAL NOTES

1. Bedding dips and dip direction on separate sheet.

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm

NB All depths in metres, all diameters in millimetres, water strike rise time in minutes.

Form	ROTARY HEADER
Version	2.00
Revised	25/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No. **BHB19A** Sheet 1 of 5

Contract No.	F10895	Method	Rotary Coring	Coordinates	326742.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	T30		184253.1 N
		Driller	H.J	Ground Level	31.93m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	S	Date Started	27/11/1997
Consultant	Ove Arup and Partners	Core bit	PCD	Date Completed	27/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Coring and Sampling	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
MADE GROUND: Marl fill (drillers description).										
		3.00	28.93							
SANDSTONE (drillers description). (St. Maughans Group)										
		4.50	27.43							
Pinkish grey fine to coarse grained very thinly to thinly sub-horizontally bedded slightly weathered micaceous SANDSTONE, moderately strong to strong with very closely spaced sub-horizontal to inclined fractures planar rough tight. (St. Maughans Group)				4.50 4.90	88	38	25	6		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH ROTARY LOG
Version	1.00
Revised	16/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No. **BHB19A** Sheet 2 of 5

Contract No.	F10895	Method	Rotary Coring	Coordinates	326742.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	T30		184253.1 N
		Driller	H.J	Ground Level	31.93m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	S	Date Started	27/11/1997
Consultant	Ove Arup and Partners	Core bit	PCD	Date Completed	27/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Coring and Sampling	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Pinkish grey fine to coarse grained very thinly to thinly sub-horizontally bedded slightly weathered micaceous SANDSTONE, moderately strong to strong with very closely spaced sub-horizontal to inclined fractures planar rough tight. (St. Maughans Group)		5.15	26.78					2		
---from 5.10m silty				4.90 6.00	91	36	11	NI		
Purplish brown occasionally mottled green very thinly to thinly sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak with very closely spaced sub-horizontal to sub-vertical fractures planar rough tight. (St. Maughans Group)								7		
---from 5.15 to 5.45m moderately to highly weathered completely fractured weak								NI		
---from 5.75 to 6.00m highly weathered very weak completely fractured								9		
---from 6.70 to 6.90m highly weathered very weak completely fractured				6.00 7.50	83	35	7	NI		
---from 7.12 to 7.25m highly weathered very weak completely fractured								1		
---from 7.25 to 7.50m no recovery								NI		
		7.50	24.43					NA		
Reddish brown occasionally mottled green thinly sub-horizontally bedded slightly sandy MUDSTONE, moderately strong with closely spaced sub-horizontal fractures planar smooth tight. (St. Maughans Group)				7.50 8.00	100	46	26	5		
---from 8.00 to 8.40m slightly weathered sub-vertical to vertical fracture planar rough tight 135° to 315° strike				8.00 8.60	100	88	0	4		
---from 8.60 to 8.85m slightly weathered								2		
---from 8.85 to 8.95m moderately weathered weak completely fractured								NI		
---from 9.10m with very closely spaced sub-horizontal to sub-vertical fractures planar irregular rough tight				8.60 9.90	100	50	8	10		
---from 9.50 to 9.60m moderately to highly weathered weak completely fractured								NI		
		9.90	22.03					4		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH ROTARY LOG
Version	1.00
Revised	16/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No. **BHB19A** Sheet 3 of 5

Contract No.	F10895	Method	Rotary Coring	Coordinates	326742.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	T30		184253.1 N
		Driller	H.J	Ground Level	31.93m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	S	Date Started	27/11/1997
Consultant	Ove Arup and Partners	Core bit	PCD	Date Completed	27/11/1997

Description of Strata	Depth Below G.L.	O.D. Level	Coring and Sampling	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Purplish brown mottled green thinly to medium sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak with very closely to closely spaced sub-horizontal to inclined fractures planar irregular rough tight. (St. Maughans Group)							2		
---from 10.30 to 10.45m weak completely fractured							NI		
			9.90 11.20	100	50	9	5		
---from 10.75 to 10.90m moderately to highly weathered weak completely fractured							NI		
							4		
							7		
---from 11.70 to 12.70m very closely spaced sub-horizontal to inclined fractures planar rough tight			11.20 12.70	100	60	7	10		
			12.70 14.00	100	77	8	14		
---from 13.50 to 13.70m moderately to highly weathered weak									
---from 14.00 to 14.25m weak completely fractured							NI		
---from 14.25m slightly sandy									
---at 14.70m discontinuity planes with striations			14.00 15.50	100	70	13	14		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH ROTARY LOG
Version	1.00
Revised	16/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No. **BHB19A** Sheet 4 of 5

Contract No.	F10895	Method	Rotary Coring	Coordinates	326742.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	T30		184253.1 N
		Driller	H.J	Ground Level	31.93m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	S	Date Started	27/11/1997
Consultant	Ove Arup and Partners	Core bit	PCD	Date Completed	27/11/1997

Description of Strata	Depth Below G.L.	O.D. Level	Coring and Sampling	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Purplish brown mottled green thinly to medium sub-horizontally bedded moderately weathered silty MUDSTONE, moderately weak with very closely to closely spaced sub-horizontal to inclined fractures planar irregular rough tight. (St. Maughans Group)	15.35	16.58							
Reddish brown occasionally mottled green thinly to medium sub-horizontally bedded slightly to moderately weathered silty MUDSTONE, moderately weak to moderately strong with closely spaced sub-horizontal to inclined fractures planar rough tight. (St. Maughans Group)							4		
---from 15.50 to 15.75m moderately to highly weathered very weak completely fractured			15.50 16.30	100	81	13	NI		
---from 16.10 to 16.20m moderately to highly weathered very weak completely fractured	16.30	15.63					7		
Purplish brown mottled green thinly sub-horizontally bedded moderately weathered silty MUDSTONE, very weak to moderately weak with closely spaced sub-horizontal to inclined fractures planar rough tight. (St. Maughans Group)									
---from 16.55 to 16.65m highly weathered very weak completely fractured							9		
---from 16.95 to 17.15m highly weathered very weak completely fractured			16.30 17.70	100	93	44	NI		
	17.40	14.53					1		
Reddish brown mottled green thinly to medium sub-horizontally bedded slightly weathered silty MUDSTONE, moderately strong with closely spaced sub-horizontal to inclined fractures planar rough tight. (St. Maughans Group)							1		
---from 17.40 to 17.65m calcitic strong							6		
---from 17.65 to 18.50m very closely spaced horizontal to inclined thin to thick laminations of calcite									
---from 18.70m slightly to moderately weathered moderately weak to moderately strong			17.70 19.20	97	93	57	3		
---from 18.70 to 19.20m very closely spaced sub-horizontal to sub-vertical fractures planar rough tight									
---at 19.70m fracture planes striated			19.20 20.70	100	97	43	9		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH ROTARY LOG
Version	1.00
Revised	16/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No. **BHB19A** Sheet 5 of 5

Contract No.	F10895	Method	Rotary Coring	Coordinates	326742.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	T30		184253.1 N
		Driller	H.J	Ground Level	31.93m AOD
Client	Welsh Office	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	S	Date Started	27/11/1997
Consultant	Ove Arup and Partners	Core bit	PCD	Date Completed	27/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Coring and Sampling	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown mottled green thinly to medium sub-horizontally bedded slightly weathered silty MUDSTONE, moderately strong with closely spaced sub-horizontal to inclined fractures planar rough tight. (St. Maughans Group)		20.70	11.23							
Rotary drilling complete at 20.70 m.										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH ROTARY LOG
Version	1.00
Revised	16/09/96

Geotechnical Engineering Limited

BOREHOLE LOG

BH316

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 2

Start Date 20 February 2015 — Easting 326604.9 — Scale 1 : 50

End Date 24 February 2015 — Northing 184156.4 — Ground level 25.45mOD — Depth 12.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
20/02/15 2140hrs	1C	0.00 - 0.66						MADE GROUND comprising black TARMACADAM. (MG)	0.05	25.40	
	2B	0.70 - 0.80						MADE GROUND comprising grey CONCRETE. (MG)			
	3D*	0.70 - 0.80		Vo 0.1					0.66	24.79	
	4B	0.80 - 0.90						Reddish brown slightly clayey slightly sandy subangular and subrounded fine to coarse mudstone and sandstone GRAVEL. (MG)			
	5D*	0.80 - 0.90		Vo 0.1					1.20	24.25	
	6B	1.00 - 1.20						Firm reddish brown mottled greenish grey slightly sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse mudstone and sandstone. (MG)			
	7D*	1.00 - 1.20		Vo 0.0					1.80	23.65	
	8D	1.20 - 1.65	Nil	S 17				Reddish brown slightly clayey slightly sandy subangular and subrounded fine to coarse mudstone and sandstone GRAVEL. (MG)	2.05	23.40	
	9X	1.20 - 2.20									
	10D*	1.50 - 1.60									
	12D	2.20 - 2.52	2.20	S*88		NI					
	11C	2.20 - 3.20			100 0 0			Extremely weak dark reddish brown mottled bluish grey MUDSTONE. Fractures are subhorizontal to 20° and subvertical very closely and closely spaced undulating smooth. Locally disintegrated to claybound gravel at fracture surfaces. (SMG)			
		3.20 - 3.44	2.20	C*115					3.30	22.15	
	13C	3.20 - 4.20			100 56 12	NI 90 120		Very weak thinly laminated to very thinly bedded reddish brown MUDSTONE. Fractures are 10-20° locally intersecting 45° and subvertical very closely and closely spaced undulating smooth rarely stained bluish grey with gypsum infill (<5mm thick). (SMG)			
	14C	4.20 - 4.70	2.20		100 15 0				4.70	20.75	
	15C	4.70 - 5.20	2.20		100 15 0	NI		Extremely weak thinly laminated to very thinly bedded reddish brown mottled greenish grey MUDSTONE. Fractures are subhorizontal to 20° and subvertical intersecting extremely and very closely spaced planar smooth. (SMG)			
	16C	5.20 - 6.70	5.20		100 37 0				6.10	19.35	
21/02/15 0320hrs 1.97m						20 100 210		Very weak locally extremely weak thinly laminated to very thinly bedded reddish brown locally mottled greenish grey MUDSTONE. Fractures are subhorizontal to 10°, 45° and subvertical locally intersecting very closely to medium spaced undulating smooth. (SMG)			
24/02/15 0010hrs Dry	17C	6.70 - 8.20	6.40		100 77 37						
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Waterflush rotary core drilled (300mm) 0.00-0.66m. Hand dug inspection pit 0.66-1.20m. Dynamic sampled (113mm) 1.20-2.20m. Waterflush rotary core drilled (116mm) 2.20-12.70m.

CASING: 140mm diam to 6.40m.

BACKFILL: On completion, hole backfilled with bentonite pellets 12.70-1.00m, concrete 1.00-0.20m and tarmacadam 0.20-0.00m.

REMARKS: Driller notes reduced flush returns 3.00-4.70m (50% returned) and loss of flush 4.70-5.70m and 8.20-12.70m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
				Groundwater not encountered prior to use of water flush.

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH316

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 2 of 2

Start Date 20 February 2015 — Easting 326604.9 — Scale 1 : 50

End Date 24 February 2015 — Northing 184156.4 — Ground level 25.45mOD — Depth 12.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	18C	8.20 - 9.70	6.40		100 60 41						
						80 200 300		Medium strong reddish brown fine and medium SANDSTONE. Fractures are subhorizontal to 10°, 45° and subvertical very closely to medium spaced planar rough locally stained greenish grey. (SMG) 8.95 - 9.05m: Extremely weak thinly laminated reddish brown mudstone.	8.70	16.75	
	19C	9.70 - 11.20	6.40		95 57 42						
						NI 40 250 290		10.30 - 10.40m: Fractures extremely closely spaced.			
	20C	11.20 - 12.70	6.40		100 99 93				11.50	13.95	
24/02/15 0245hrs Dry						100 350 370		Medium strong greyish brown fine and medium SANDSTONE. Fractures are 5-15° closely and medium spaced planar rough. (SMG) 11.60 - 11.85m: 45° undulating rough fracture.	12.70	12.75	
								Borehole completed at 12.70m.	{18.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

Groundwater not encountered prior to use of water flush.

AGS

CONTRACT **30238**

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Geotechnical Engineering Limited

BOREHOLE LOG

BH318

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 2

Start Date 20 February 2015 — Easting 326727.1 — Scale 1 : 50

End Date 24 February 2015 — Northing 184136.7 — Ground level 18.45mOD — Depth 13.80 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
20/02/15 2215hrs	C	0.00 - 0.35			100			MADE GROUND comprising grey TARMACADAM. (MG)			
	1B	0.40 - 0.50							0.40	18.05	
	2D*	0.40 - 0.50		Vo 0.0				Light brown slightly clayey slightly sandy angular and subangular fine to coarse sandstone GRAVEL. (MG)			
	3B	0.80 - 0.90							0.80	17.65	
	4D*	0.80 - 0.90		Vo 0.0				Medium dense reddish brown and dark grey slightly sandy silty angular and subangular fine and medium crystalline and limestone GRAVEL. (MG)			
	5B	1.00 - 1.20						1.20 - 1.60m: Locally clayey.			
	6D*	1.00 - 1.20		Vo 0.0					1.60	16.85	
		1.20 - 1.65	Nil	C 27				Hard fissured reddish brown gravelly CLAY with frequent light greenish grey reduction spots (up to 15mm). Gravel is angular and subangular fine and medium mudstone lithorelicts. (SMG)			
	7X	1.20 - 2.10									
	8D*	1.50 - 1.60									
		2.10 - 2.34	Nil	C*120	86 14 0						
	9C	2.10 - 3.50	2.10						3.30	15.15	
						NI 100 200		Extremely weak and very weak thinly bedded reddish brown locally mottled brown and grey MUDSTONE. Fractures are subhorizontal to 10° and subvertical closely rarely very closely spaced planar smooth. (SMG)			
	10C	3.50 - 5.00	2.10		100 94 53			3.50 - 3.60m: Locally light greenish grey.			
	11D*	3.50 - 3.60						3.90 - 3.95m: Subvertical fracture.			
								4.75m: 70° to subvertical fracture.			
	12C	5.00 - 6.50	2.10		100 96 36			5.00 - 5.10m: Subvertical fracture.			
								5.50 - 5.55m: 40° fracture planar smooth.			
								6.05 - 6.10m: 30° fracture.			
	13C	6.50 - 8.00	2.10		100 93 7	NI 10 100			6.60	11.85	
								Extremely weak and very weak becoming weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare light greenish grey reduction spots (up to 3mm). Fractures are subhorizontal to 20° and subvertical extremely closely to closely spaced planar smooth locally with a veneer of clay. (SMG)			
21/02/15 0320hrs 2.56m											
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Waterflush rotary core drilled 0.00-0.35m. Hand dug inspection pit 0.35-1.20m. Dynamic sampled (128mm) 1.20-2.10m. Waterflush rotary core drilled (116mm) 2.10-13.80m.

CASING: 140mm diam to 3.00m.

BACKFILL: On completion, hole backfilled with bentonite 13.80-1.00m, concrete 1.00-0.10m and tarmacadam 0.10-0.00m.

REMARKS: Driller notes reduced flush returns 2.10-3.50m (70% returned), 8.00-9.70m (50% returned) and loss of flush 9.70-13.80m. Downhole magnetometry for UXO risk mitigation undertaken 0.00-2.10m. No anomalies encountered.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
				Groundwater not encountered prior to use of water flush.

AGS

CONTRACT	CHECKED
30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH318

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 2 of 2

Start Date 20 February 2015 — Easting 326727.1 — Scale 1 : 50

End Date 24 February 2015 — Northing 184136.7 — Ground level 18.45mOD — Depth 13.80 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
24/02/15 0020hrs 3.78m	14C	8.00 - 9.30	2.00		76 61 0						
	15C	9.30 - 10.80	2.00		100 86 0			9.60 - 9.70m: 70° fracture. 10.20 - 10.30m: 70° fracture.			
	16C	10.80 - 12.30	2.00		100 77 50			11.40 - 11.60m: Disintegrated to claybound subangular fine to coarse gravel sized mudstone lithorelicts.	11.60	6.85	
24/02/15 0300hrs Dry						NI 120 260		Medium strong thinly cross laminated to very thinly bedded dark reddish grey and brown MUDSTONE. Fractures are subhorizontal to 10° closely and medium, rarely very closely spaced planar smooth. (SMG)			
24/02/15 2210hrs Dry	17C	12.30 - 13.80	3.00		90 90 46						
24/02/15 2330hrs Dry									13.80	4.65	
								Borehole completed at 13.80m.	{18.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

Groundwater not encountered prior to use of water flush.

AGS

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A2 Appendix 2

Tabulated Surface Water Data

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL4
14/07/2015

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
NDP - No determination possible

Screening Values and Assessment

EQS	Environmental Quality Standards
MRV	Minimum Reporting values
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory detection level higher than screening criterion
BOL/ITA	Exceeds CCW

Monitoring Round / Location		Screening Criteria			Q1 / 3.1	Q1 / 4.2
Date Sampled					**26/05/2015**	**27/05/2015**
	Units	**EQS**	**DWS**	**CCW**		
Metals & Non-Metal Inorganics						
Total Alkalinity as CaCO3	mg/l					
Arsenic Dissolved	ug/l	50	10		0.531	0.522
Calcium Dissolved	ug/l			300000	40	60.7
Cadmium Dissolved	ug/l	0.15	5	5	<0.1	<0.1
Chromium Dissolved	ug/l		50		8.6	1.4
Copper Dissolved	ug/l	10	2000		1.35	<0.85
Lead Dissolved	ug/l	1.2	10	250	1.07	0.782
Magnesium Dissolved	ug/l					
Mercury Dissolved	ug/l	0.07	1		<0.01	<0.01
Nickel Dissolved	ug/l	4	20	100	0.942	0.868
Selenium Dissolved	ug/l		10		<0.39	<0.39
Zinc Dissolved	ug/l	75		1000	2.81	1.27
Cadmium Total	ug/l	0.15	5	5		
Nickel Total	ug/l	4	20	100		
Zinc Total	ug/l	75		1000		
BOD	mg/l	5		18	<1	<1
Nitrate as N	mg/l		50	1		
Nitrate as NO3	mg/l		50	1	***37.4***	***13.9***
Nitrite as N	mg/l		0.1521739	1		
Nitrite as NO2	mg/l		0.5	1	0.065	<0.05
Nitrogen, Total Oxidised as N	mg/l		50	2	***8.47***	***3.15***
Phosphorus (diss.filt)	mg/l	0.12				
Phosphorus (tot.unfilt)	ug/l	120			63.9	100
Chloride	mg/l	250	250	300	13.7	16.3
Sulphide	mg/l					
Sulphate	mg/l	400	250	300	13.9	42.4
Ammoniacal Nitrogen as N	mg/l	0.6		1	<LOD	0.556
Dissolved Oxygen (Saturation)	%	60				
Dissolved Oxygen	mg/l				10.6	10.8
Suspended Solids	mg/l				10.5	<2
pH Value	pH units	6-9	6.5-10	6.8-8.5		
Organics						
GRO (C5-C12)	ug/l				<50	<50
MTBE	ug/l				<3	<3
Benzene	ug/l	10	1		<7	<7
Toluene	ug/l	50			<4	<4
Ethyl benzene	ug/l	20			<5	<5
m & p Xylene	ug/l	30			<8	<8
o Xylene	ug/l	30			<3	<3
TPH						
TPH	mg/l					
Aliphatics C5-C6	ug/l				<10	<10
Aliphatics >C6-C8	ug/l				<10	<10
Aliphatics >C8-C10	ug/l				<10	<10
Aliphatics >C10-C12	ug/l				<10	<10
Aliphatics >C12-C16 Aqueous	ug/l				<10	<10
Aliphatics >C16-C21 Aqueous	ug/l				<10	<10
Aliphatics >C21-C35 Aqueous	ug/l				<10	<10
Total Aliphatics C12-C35 Aqueous	ug/l				<10	<10
Aromatics >C5-C7	ug/l				<10	<10
Aromatics >C7-C8	ug/l				<10	<10
Aromatics >EC8-EC10	ug/l				<10	<10
Aromatics >EC10-EC12	ug/l				<10	<10
Aromatics >EC12-EC16 Aqueous	ug/l				<10	<10
Aromatics >EC16-EC21 Aqueous	ug/l				<10	<10
Aromatics >EC21-EC35 Aqueous	ug/l				<10	<10
Total Aromatics C12-C35 Aqueous	ug/l				<10	<10
TPH (Aliphatics and Aromatics C5-C3	ug/l				<10	<10
TPH >C6-C8	ug/l					
TPH >C8-C10	ug/l					
TPH >C10-C16	ug/l					
TPH >C16-C24	ug/l					
TPH >C24-C40	ug/l					
TPH >C6-C40	ug/l					
PAHs						
Acenaphthene	ug/l				<0.015	<0.015
Acenaphthylene	ug/l				<0.011	<0.011
Anthracene	ug/l	0.1			<0.015	<0.015
Benzo(a)anthracene	ug/l				0.021	<0.017
Benzo(a)pyrene	ug/l	0.00017	0.01		0.016	<0.009
Benzo(b)fluoranthene	ug/l	0.017	0.1		0.0362	<0.023
Benzo(k)fluoranthene	ug/l	0.017	0.1		<0.027	<0.027
Benzo(ghi)perylene	ug/l	0.0082	0.1		0.0205	<0.016
Indeno(1,2,3-cd)pyrene	ug/l		0.1		0.0141	<0.014
Chrysene	ug/l				0.032	<0.013
Dibenzo(a,h)anthracene	ug/l				<0.016	<0.016
Fluoranthene	ug/l	0.0063			0.0365	<0.017
Fluorene	ug/l				<0.014	<0.014
Naphthalene	ug/l	2			<0.1	<0.1
Phenanthrene	ug/l				<0.022	<0.022
Pyrene	ug/l				0.0289	<0.015
Total PAHs (USEPA 16)	ug/l				<0.344	<0.344
VOCs						
Ethylbenzene	ug/l	20			<5	<5
m,p xylenes	ug/l	30			<8	<8
MTBE	ug/l				<3	<3
O-Xylene	ug/l	30			<3	<3
Toluene	ug/l	50			<4	<4

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS	No. Data Exceeding CCW
0	0	None > LOD	None > LOD				
2	2	0.531	0.522	Q1 / 3.1	0	0	
2	2	60.7	40	Q1 / 4.2			0
2	0	None > LOD	None > LOD		0	0	0
2	2	8.6	1.4	Q1 / 3.1		0	
2	1	1.35	1.35	Q1 / 3.1	0	0	
2	2	1.07	0.782	Q1 / 3.1	0	0	0
0	0	None > LOD	None > LOD				
2	0	None > LOD	None > LOD		0	0	
2	2	0.942	0.868	Q1 / 3.1	0	0	0
2	0	None > LOD	None > LOD			0	
2	2	2.81	1.27	Q1 / 3.1	0		0
0	0	None > LOD	None > LOD		0	0	0
0	0	None > LOD	None > LOD		0	0	0
0	0	None > LOD	None > LOD		0	0	0
2	0	None > LOD	None > LOD		0		0
0	0	None > LOD	None > LOD			0	0
2	2	37.4	13.9	Q1 / 3.1		0	2
0	0	None > LOD	None > LOD			0	0
2	1	0.065	0.065	Q1 / 3.1		0	0
2	2	8.47	3.15	Q1 / 3.1		0	2
0	0	None > LOD	None > LOD		0		0
2	2	100	63.9	Q1 / 4.2	0		0
2	2	16.3	13.7	Q1 / 4.2	0	0	0
0	0	None > LOD	None > LOD				
2	2	42.4	13.9	Q1 / 4.2	0	0	0
2	1	0.556	0.556	Q1 / 4.2	0		0
0	0	None > LOD	None > LOD		0		
2	2	10.8	10.6	Q1 / 4.2	0		
2	1	10.5	10.5	Q1 / 3.1		1	
0	0	None > LOD	None > LOD		0	0	0
2	0	None > LOD	None > LOD				
2	0	None > LOD	None > LOD				
2	0	None > LOD	None > LOD		0	0	
2	0	None > LOD	None > LOD		0		
2	0	None > LOD	None > LOD		0		
2	0	None > LOD	None > LOD		0		
2	0	None > LOD	None > LOD		0		
0	0	None > LOD	None > LOD				
2	0	None > LOD	None > LOD				0
2	0	None > LOD	None > LOD				
2	0	None > LOD	None > LOD				
2	0	None > LOD	None > LOD				0
2	0	None > LOD	None > LOD				0
2	0	None > LOD	None > LOD				0
2	0	None > LOD	None > LOD				
2	0	None > LOD	None > LOD				
2	0	None > LOD	None > LOD			

A3 Appendix 3

Site Walkover Photographs



Plate 01: CL4 – View west along track



Plate 02: CL4 – View west towards agricultural fields

Client:	Welsh Government		
Project:	M4CaN		
Job Ref:	JER6591	Checked By:	Date: Sept 2015



Plate 03: CL4 – Heavy vegetation in area alongside M4 cutting

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Sept 2015

A4 Appendix 4

Relevant Extract of Additional Environmental Data

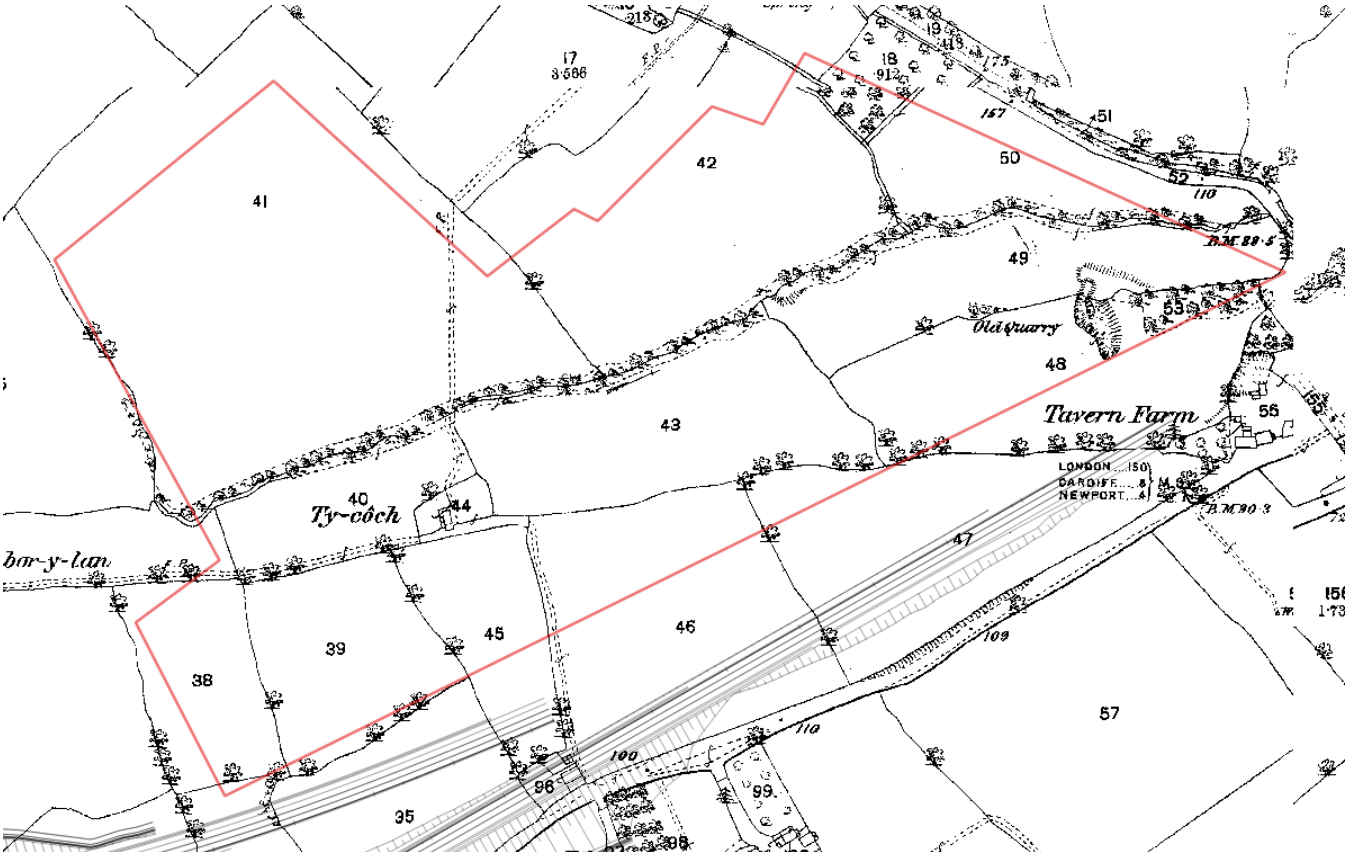


Plate 01: Extract of 1843-1894 map showing the position of the Old Quarry on the Site.



Plate 02: Extract of 1991 Aerial Photograph showing the Site as agricultural land with no evidence of previous quarrying or landfill activity.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015



Plate 03: Extract of 1998 Aerial Photograph showing earthworks in the central and western areas and potential excavation along the southern boundary. This is considered to be connected with landfill activity understood to have occurred on the Site.



Plate 04: Extract of 2006 Aerial Photograph showing scrubland and potential mounds of material in the area of earthworks identified in the 1998 image.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015



Plate 05: Extract of 2014 High Resolution Aerial Photograph showing scrub land / disturbed ground remaining in the central and western areas of the Site.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Welsh Government

M4 Corridor around Newport

Land Contamination Assessment Report Annex D CL-5 Church Road

M4CaN-DJV-EGT-ZG_GEN-RP-EN-0007

At Issue | March 2016

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Figure 2 Conceptual Site Model

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Appendix 3 Tabulated Soil Laboratory Data
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Appendix 6 Site Walkover Photographs
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1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-5) known as 'Church Road' hereafter referred to as the Site.

1.1.2 The Site is located between chainage 4,400 and 4,600 (see Figure 1), and forms part of an existing golf course where some low level fly-tipping has anecdotally been identified.

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) of which this document is an appendix to the chapter on Geology and Soils.

1.2.2 In 2014, a Preliminary Sources Study Report (2014 PSSR) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. In addition, this report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015). This report relates to the area defined on the Site Plan in Figure 1.

1.2.3 The overarching rationale and approach for the assessment of areas of land along the proposed new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the ES).

1.3 Objectives

1.3.1 The key objectives of this report are set out below:

- Undertake a risk assessment of the Site and determine whether potential risks to human health, or controlled waters could exist based upon the Scheme.
- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.
- To provide information to support the Ground Investigation Report (GIR) and Geotechnical Design Report (GDR) required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The remainder of this report is structured as follows:

- Section 2: Site Location and Description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Ground Investigations Work – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions – This section describes the main findings of the intrusive site investigation including the ground conditions encountered and any visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessments.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations – This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and requirements for remediation/mitigation.

2 Site Location and Description

2.1.1 The Site is located along the western reaches of the Scheme, in the northern region of Coedkernew, and in the north of Parc Golf Academy golf course. The Site is centred on National Grid Reference ST274 839 and the location of the Site is presented on Figure 1.

2.1.2 The Site is situated at an elevation of approximately 10.5 mAOD and forms part of the golf course, covering an area of approximately 1.55 hectares. Possible infilling across part of the Site as part of landscaping the course is suspected. Evidence of discrete fly tipping prior to the development of the golf course was also identified during a 1995 walkover survey. This was reported to include builder's demolition rubble in part.

2.1.3 Site walkover surveys undertaken in January 2014 and May 2015 identified the Site to be fenced, surrounded by a high hedgerow and covered in grass as part of the golf course. The land within the footprint of the proposed new section of motorway is generally level with no obvious earth mounds that could indicate the presence of infill earthworks. A dry ditch was identified along the western boundary. Photographs taken during the 2015 site walkover are presented in Appendix 6.

2.1.4 The Site layout is shown in Figure 1.

3 The Scheme

3.1.1 The Site is situated on the M4 Corridor around Newport at approximate chainage 4,400 to 4,600. Refer to Figure 1 for the location of the Site in relation to the Scheme.

3.1.2 The construction of the new motorway is likely to comprise an embankment of 2 to 4 m height within the area of the Site.

4 Site History

4.1.1 The 2014 PSSR historical searches have been based on Ordnance Survey plans, literature reviews, information provided by British Steel, Natural Resources Wales (NRW) (formally Environment Agency Wales), Newport City Council and aerial photographic interpretation.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from Welsh Government. Relevant extracts are presented in Appendix 7.

4.1.3 A summary of the Site's history is presented in Table 1 below.

Table 1: Summary of Site History

Date	Use / Observation	Source of Information
1843 - 1893	Agricultural Field. Bound to the north-east by a field boundary, south-east by a road and north-west by a field drain flowing in a southwesterly direction. The Site is surrounded by agricultural fields. A small copse is present approximately 40 m to the north-west. A few residential properties are located approximately 100 m to the north labelled 'Church Rooms'.	1:10,560 Historical Mapping
1891 - 1912	No significant change.	1:10,560 Historical Mapping
1904 - 1939	No significant change.	1:10.560 Historical Mapping
1964 - 1965	No significant change.	1:10,560 Historical Mapping
1970 - 1973	No significant change The residential properties to the north have expanded into a small estate labelled 'Church Crescent'.	1:10,000 Historical Mapping
1979	No significant change.	Aerial Photography
1981 - 1989	No significant change.	1:10,000 Historical Mapping
1985 - 1996	No significant change. A golf range is now present south of the Site with the club house located approximately 200 m to the south.	1:10,000 Historical Mapping
1995	**Rough ground and tipping waste**.	1995 PSSR report walkover survey
1998	Rough ground.	Aerial Photography
2006	The Site is in use as part of a golf course, with four holes within the southern part of the Site. The northern part of the Site appears to be rough ground and has mature vegetation. A business park has been developed approximately 200m to the east.	Aerial Photography

Date	Use / Observation	Source of Information
2009 - 2010	No significant change.	Aerial Photography
2014	No significant change.	Aerial Photography

Note: Potential sources of contamination are underlined. Those within the temporary and permanent land take are shown in bold.

4.1.4 The source of information presented above supplement the one used in the 2014 PSSR (Ove Arup and Partners, 2014). In particular, the 1998 and 2006 aerial photographs have identified new potential sources of contamination (extent of rough ground). Relevant extract of the photographs are presented in Appendix 7.

4.1.5 Historically there is the potential for the Site to have been bombed during World War II due to its proximity to a decoy site and Newport. This is discussed in detail in the Explosive Ordnance Threat Assessment Report (Bactec, 2014) which categorises the Site as medium risk with respect to unexploded ordnance.

5 Environmental Setting

5.1 Geology

5.1.1 The published geology plans indicate the Site to be underlain by superficial deposits comprising River Terrace Deposits. The superficial deposits are underlain by the relatively impermeable St Maughans Formation, which comprises inter-bedded sequences of calcareous silty mudstones, sandstones, limestones and conglomerates. Silty mudstones predominate although coarse sandstone beds are frequent.

5.2 Hydrology

5.2.1 A surface water drain is located along the north-western boundary of the Site, which was identified as dry during the May 2015 walkover survey. The second nearest surface water is Nant-y-moor Reen located approximately 200 m to the east. Cowleaze Reen is located 415 m south-west with flow direction to the south.

5.3 Hydrogeology

5.3.1 The Natural Resources Wales (NRW) records indicate that the St Maughans Formation strata is classified as a Secondary A aquifer (variably permeable), with soils of intermediate leaching potential.

5.3.2 The River Terrace Deposits are considered to be a secondary B aquifer although within the vicinity of the Site, the 2014 PSSR indicates the formation to be of low permeability.

5.3.3 From a review of the geology, perched groundwater is anticipated at the base of the River Terrace Deposits.

5.3.4 The Site does not lie within a groundwater source protection zone.

5.4 Environmental Information

5.4.1 No pollution incidents, abstraction licences, discharge points or landfill sites have been recorded within the Site or within 300 m of the Site.

6 Scope of Investigations

6.1 General

6.1.1 Three previous ground investigations have been undertaken within the Site.

6.1.2 For the purpose of meeting the requirements of Volume 4, Section 1, Part 2 of the DMRB HD22/08 - Managing Geotechnical Risk - 2008 (Highways Agency 2008), the historical data used to support the PSSR has been differentiated from additional 2015 Supplementary Ground Investigation data (Geotechnical Engineering, 2015).

6.2 Scope of Works

6.2.1 The various intrusive ground investigations undertaken within the Site area are summarised in Table 2.

Table 2: Site Investigation Summary

Date	Contractor	Site Location	Boreholes	Window Sampler	Trial Pits	Sampling
1997	Norwest Holst	North west	BHC4	-	-	Soil
2000	Exploration Associates	Centrally cross the Site	CH1, CH2, CH3, CH4	-	-	Soil
2015	Geotechnical Engineering Limited	North and southeast	BH323	-	TP313 WS	Soil & groundwater

6.2.2 It is noted that the 2014 PSSR considered findings of boreholes BHC5 and BHC5A from the 1997 investigation. Given these fall outside the boundary, approximately 25 m to the south-east, the investigation findings relating to these exploratory locations have been removed in the context of this report.

6.2.3 The construction details of all boreholes installed on the Site are summarised in Table 3.

Table 3: Summary of Borehole Construction Details

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (mbGL)	Base of Slotted Well Casing / Gravel Pack (mbGL)	Targeted Geology
BH323	50	14.7	4.5	14.7	St Maughans Formation
	35		0.5	3	River Terrace Deposits

6.3 Surface Water Quality Monitoring

6.3.1 Surface water quality monitoring was not undertaken during the previous ground investigations of the Site.

6.4 Field Testing

6.4.1 PID monitoring was undertaken during the 2015 ground investigation within BH323 only on three soil samples at 0.2-0.5 mbGL, 0.5-0.8 mbGL and 0.8-1.2 mbGL.

6.5 Groundwater Monitoring

6.5.1 A summary of the groundwater sampling, groundwater/monitoring and ground gas monitoring is shown in Table 4.

Table 4: Summary of Monitoring Rounds

Location Ref. (Borehole Diameter)	Number of Rounds (Date of Sampling)	Monitoring Details	Notes
BH323 (35mm)	3 no. 23rd April 2015, 30th April 2015, 21st May 2015	Groundwater - levels & sampling Soil gas	Dual installation. Gas monitoring from the 35 mm shallow installation only.
BH323 (50mm)			

6.6 Laboratory Chemical Testing

6.6.1 A summary of all laboratory analysis undertaken on soil, groundwater and leachate from the previous site investigations is shown in Table 5 below.

Table 5: Summary of Previous Investigation Sampling - Intrusive Exploratory Locations

Site Investigation Date	No. of Soil Samples	No. of Leachate Samples	No. of Water Samples	Suites of Testing
1997	1	0	0	N/A
2000	3	0	0	Heavy metals, pH, sulphate, cyanide, PAH screening, TPH FTIR, OIL FTIR, phenol
2015	3	1	4	Metals, PAH, cyanide, TPH, phenols, pH, moisture content

6.7 Soil Analysis

6.7.1 The following sections summarise the laboratory analytical results for soil samples collected during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 3 with the supporting laboratory certificates available in the relevant original ground investigation reports (see Table 2).

6.7.2 To inform the conceptual site model, the analytical data from the Made Ground has been assessed separately from those of the natural soils (River Terrace Deposits and St Maughans Formation).

6.7.3 The available soil information is summarised in Table 6.

Table 6: Summary of Soil Analytical Data

Formation Unit	Number of Soil Analysis per Analytical Suite - 2015 Data/ All GI Data			
	Metals & Inorganics	PAH	TPH	Phenol
Made Ground	0/1	0/1	0/1	0/1
Natural Soils	3/6	3/5	3/3	1/4

6.8 Soil Leaching Analysis

6.8.1 Similarly to the soils data, the leachate results have been considered for the Made Ground and natural soils separately. The available information is presented in Appendix 5 and summarised in Table 7.

Table 7: Summary of Soil Leaching Analytical Data

Formation Unit	Number of Soil Leachate Analysis per Analytical Suite - 2015 Data / All GI Data				
	Metals & Inorganics	PAH	TPH	Phenol	BTEX
Made Ground	0/0	0/0	0/0	0/0	0/0
Natural Soils	1/1	1/1	1/1	1/1	1/1

6.9 Groundwater Analysis

6.9.1 The following sections summarise the laboratory analytical results for groundwater samples collected during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 4 with the supporting laboratory certificates available in the relevant original reports.

6.9.2 The available data relates to groundwater samples taken from wells installed within the groundwater of the River Terrace Deposits and/or St Maughans Formation at one location and is summarised in Table 8.

Table 8: Summary of Analytical Groundwater Data

Groundwater Unit	Number of Groundwater Analysis per Analytical Suite (number of well locations) –2015 data						
	Metals & inorganics	PAH	TPH	Phenol	BTEX	VOCs	SVOCs
Perched (River Terrace Deposits)	2 (1)	2 (1)	2 (1)	1 (1)	2 (1)	1 (1)	1 (1)
Groundwater (St Maughans Formation)	2 (1)	2 (1)	2 (1)	1 (1)	2 (1)	1 (1)	1 (1)

6.10 Surface Water Analysis

6.10.1 There is no analytical data available for surface water that has been collected on or within the vicinity of the Site.

6.11 Gap Analysis of Available Data

6.11.1 The investigation data is relatively limited in relation to coverage - investigation locations being confined to the route alignment.

7 Ground Conditions

7.1 Geology

7.1.1 The geological logs for all available exploratory holes excavated on or in close proximity of the Site are provided in Appendix 1. The observed geological sequence is consistent with that discussed in the 2014 PSSR report and is summarised in the following sections. Information from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) has also been used.

7.2 Made Ground

7.2.1 Beneath 0.2 m thick layer of topsoil, Made Ground was encountered within borehole CH3 located in the centre of the Site and included slag, ash and plastic at a thickness of 0.25 m.

7.2.2 Elsewhere, the veneer of topsoil was recorded overlying the superficial deposits.

7.3 Superficial Deposits

7.3.1 Unconsolidated superficial deposits were encountered beneath topsoil / Made Ground in all locations. These comprised River Terrace Deposits, generally soft to firm red brown sandy very silty clays with sub angular to angular gravel of sandstone and mudstone.

7.3.2 A gravel layer generally underlies the more cohesive River Terrace Deposits. The gravel is encountered at a depth of between 0.94 and 2.3 mbGL and at proven thicknesses of between 0.48 and 1.2 m. The layer of gravel was proven absent in borehole BHC4 and the cohesive River Terrace Deposits were found to overlie the rock head directly.

7.4 Solid Geology

7.4.1 Below the River Terrace deposits the St Maughans Formation was encountered at depth of 2.38 to 3.2 mbGL. The St Maughans Formation was typically encountered as completely weathered weak to moderately weak red brown mudstone to an unknown thickness. Although 1 m was its proven thickness, it is likely to be greater than 10 m based upon published geology.

7.4.2 Borehole BH323 confirmed the St Maughans Formation to be predominantly a mudstone formation but included a sandstone band between 5.7 and 6.2 mbGL.

7.5 Geological Sequence Summary

7.5.1 The general geological sequence identified during the previous ground investigation is summarised in Table 9.

Table 9: Summary of Geological Sequence

Unit	Description	Thickness Range (m)	Basal Depth (mbGL)
Topsoil	Brown sandy clay	0.2 - 0.3	0.2 - 0.3
Made Ground (discrete areas – proven in CH3 only)	Sandy silty clayey gravel of sandstone, slag, ash and plastic refuse	0.25	0.35
Superficial Deposits (River Terrace Deposits - cohesive)	Sandy silty clay with gravel of sandstone	0.74 - 2.34	0.94 - 2.64
Superficial Deposits (River Terrace Deposits - granular)	Sandy gravel of sandstone and mudstone	Absent - 1.2	1.12 - 3.2
St Maughans Formation (Mudstone)	Weathered weak red brown mudstone with infrequent sandstone bands	>11	unproven

7.5.2 The conceptual site model included within the 2014 PSSR report has been revised in light of the 2015 information and is included within Figure 2.

7.6 Visual and Olfactory Evidence of Contamination

7.6.1 A summary of visual and olfactory evidence of contamination encountered during the previous intrusive ground investigation is summarised in Table 10.

Table 10: Visual and Olfactory Evidence of Contamination Summary

Location ID	Depth (mbGL)	Strata	Evidence of Potential Contamination
CH3	0.35	Made Ground	Ash, slag and plastic

7.6.2 No visual or olfactory evidence of hydrocarbon contamination was identified during any of the previous ground investigations. PID monitoring was undertaken on three samples within the top 1.2 m. The PID meter recorded levels of between 0.7 ppm and 22 ppm, the maximum recorded within the topsoil horizon, indicating the presence of low level naturally occurring VOCs.

7.6.3 Full details and observations noted during the drilling and trial pitting are presented on the exploratory logs included in Appendix 1.

7.7 Gas Monitoring

7.7.1 The gas monitoring data set available for BH323 is summarised on the field data sheets provided in Appendix 2. The maximum gas concentrations (minimum for oxygen) are presented in Table 11 below.

Table 11: Summary of Gas Monitoring Data

Location ID	Flow (l/hr) Max	VOCs (ppm) Max	CH_4 (%/vol) Max	Peak LEL (%) Max	CO_2 (%/vol) Max	O_2 (%/vol) Min	CO (ppm) Max	H_2S (ppm) Max
BH323	0.6	1.9	0.1	1.0	2.2	17.4	0.0	0.0

7.8 Groundwater Encountered During Investigation

7.8.1 One groundwater strike was encountered during the drilling of borehole BHC4 as detailed on the geological logs provided in Appendix 1 and summarised in Table 12.

Table 12: Summary of Groundwater Strike Data

Location	Strike Depth (mbGL)	Geological Formation	Level after 20 minutes (mbGL)
BHC4	3.85	St Maughans Formation	2.7

7.8.2 Groundwater was not encountered in any other boreholes and trial pits.

7.9 Groundwater Levels During Monitoring Rounds

7.9.1 The entire groundwater level data set gathered on site is provided in Appendix 2 and summarised in Table 13.

Table 13: Summary of Groundwater Level Data

Location	Installation [#1]	Depth of Response Zone (mbGL) and Geological Formation	No. Measurements	Minimum Depth (mbGL)	Maximum Depth (mbGL)	Comments
BH323	(S) 35 mm	0.5 - 3.0 (River Terrace Deposits)	3	1.70	2.26	-
	(D) 50 mm	4.5 - 14.7 (St Maughans Formation)	3	0.74	2.65	-

[#1] S denotes a shallow installation and D denotes deep installation.

7.10 Groundwater Summary

7.10.1 The main groundwater body is within the St Maughans Formation, which appears to be confined. Groundwater strikes and level observations during drilling have identified slow ingress perhaps associated with likely low permeability of the mudstone. The potentiometric surface is monitored to be about 1 mbGL into the superficial deposits.

7.10.2 Perched groundwater within the superficial deposits was not recorded during trial pitting, although standing levels have been monitored within the formation at 1.7 mbGL. Seasonal variability is anticipated with strong influence by both rainfall and surface water levels within the surrounding ditches.

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The outline Conceptual Site Model (CSM) presented within the 2014 PSSR has been reviewed and updated based on data from the supplementary Ground Investigation (Geotechnical Engineering, 2015) and the proposed Scheme. The main alteration to the 2014 PSSR model are summarised as follows:

- Identification of two different soil types that comprise the River Terrace Deposits (cohesive and granular).
- The previously observed fly-tipping appears to have been removed.
- Identification of groundwater body with the St Maughans Formation bedrock.
- Additional soil, leachate and groundwater data from the 2015 Supplementary Ground Investigation.
- Update of the source-pathway-receptor linkages taking account of the above and more detailed assessments.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 The fill/fly-tipped materials observed during the 1995 walkover survey have been identified as a possible source of contamination. These, together with other materials of unknown origin, may have been used in the golf course construction.

8.2.2 The current investigation data has not encountered specific buried fly-tipping material and none was identified above ground level during the 2014 or 2015 walkover survey. Based upon the available data, very limited Made Ground was proven within the Site and the likelihood of contamination being present is considered low.

Potential Receptors

8.2.3 Receptors during the construction and operational stages of the Scheme have been considered:

Construction

- Construction workers during site development works.
- General public/workers and users of Parc Academy Golf Course adjacent to construction works.
- Nearby surface water features including the drainage ditch along the north-western boundary.
- Perched groundwater within the River Terrace Deposits.
- The Secondary A Aquifer within the St Maughans Formation.

Operational

- General public end users.
- Maintenance workers.
- Nearby surface water features including the drainage ditch along the north-western boundary.
- Perched groundwater within the River Terrace Deposits and the Secondary A Aquifer within the St Maughans Formation.

Potential Pathways

8.2.4 Pathways during the construction and the operation stages of the Scheme have been considered.

- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils possible during construction and maintenance works.
- Dermal contact, ingestion and inhalation of soil dust pathways possible for general public end users and adjacent general public/workers in adjacent golf course.
- Leaching of contaminants from the Made Ground to shallow groundwater and then vertical migration into deeper groundwater body or lateral migration to surface water features.
- Surface water run-off to nearby reens during construction phase.
- Exposure to contaminated soils by burrowing animals.

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the other data described herein, the following risk evaluation has been reconsidered and includes:

- The Site had been the subject of historical fly-tipping but no evidence of fly tipped material is currently present.
- The extent of the Made Ground was found to be very limited both laterally and vertically.
- Superficial deposits are classified as being of low productivity and overlie Secondary A Aquifer associated with the mudstone. The latter was found to be confined with a potentiometric surface at about 1 mbGL.
- The low permeability cohesive River Terrace Deposits (of at least 0.5 m thickness) separates the Made Ground and aquifers of the St Maughans Formation.
- The drainage ditch on the Site boundary was reported dry during the 2015 walkover survey. This would suggest an intermittently flowing surface water course.
- Creation of new drainage system may increase leaching of any contaminants from the Made Ground with an associated increase in the risk for migration into surface waters.

- Proposed embankment will encapsulate the Made Ground and reduce exposure to motorway users.
- Hardstanding cover formed by the proposed highway area is likely to limit infiltration reducing leaching.
- Risk of ground gas emissions from the Made Ground is considered negligible given the anticipated thickness and composition. Ground gas has not been considered further in the Conceptual Site Model.
- Motorway users will be within an open environment with no proposed structures or other confined spaces.

8.4 Human Health Risk Assessment

8.4.1 The rationale and approach for the human health (Tier 2) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1) and the soil chemical results are presented in Appendix 3. All exceedances to the relevant generic risk assessment criteria are summarised in Table 14.

Table 14: Summary of Human Health Soil Screening Exceedances

Determinant	Units	Range	Screening Criteria	No. Samples Exceeding Screening Criteria (Total Number of Results)	Locations of Exceedances
PAH	mg/kg	<0.1 - 502	1.1	1 (5)	CH3

8.4.2 The PAH exceedance is identified in a sample of Made Ground analysed without speciation. In this instance the total PAH result has been compared against the most stringent PAH compound (Dibenzo(ah)anthracene) and is therefore considered a conservative approach.

8.4.3 Chromium concentrations are considered to be within normal background range and therefore are not considered to represent a contaminant of concern. Further speciation is recommended during construction to confirm low risks (Appendix 11.1).

8.4.4 There were two instances where the laboratory limit of detection (LoD) was higher than the screening criteria. This was for PAH at locations CH1 and CH2 where the LoD was <10 mg/kg. This is considered unlikely to pose a risk to human health.

8.4.5 There were no other exceedances of the screening criteria in any other boreholes or trial pits on site.

8.5 Controlled Waters Screening Assessment

8.5.1 The rationale and approach for the controlled waters (Tier 1) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1) and the groundwater chemical results are presented in Appendix 4. All exceedances to the relevant criteria are summarised in Table 15.

8.5.2 Where an Environmental Quality Standard (EQS) is dependent on water hardness (i.e. some heavy metals), the hardness of the surface water receptor should normally be used. The Baseline Water Environment Report (Appendix 16.2 of the ES) indicates surface water to be generally moderately hard with hardness within the range of 100 to 150 mg/l as calcium carbonate. Therefore EQS's within this water hardness range have been used for screening purposes.

8.6 Soil Leachate Results

8.6.1 One soil sample of natural soil was subjected to leachate analysis. All of the soil leachate results were below the applied screening criteria. There is no leaching data for the Made Ground.

8.6.2 There were seven instances where the laboratory LoD was greater than the relevant screening criteria. These were <0.03 mg/l for phenols (EQS of 0.0077 mg/l), <0.5 µg/l for mercury (EQS of 0.05 µg/l) and <0.1 µg/l for benzoapyrene, benzo(b)fluoranthene, benzo(ghi)perylene, benzo(k)fluoranthene and indeno(123cd)pyrene whose screening criteria ranged from 0.0002 to 0.1 µg/l). These are considered unlikely to pose a risk to controlled waters.

8.7 Groundwater Results

8.7.1 Groundwater analysis results have been assessed from samples collected over two rounds of groundwater monitoring results from BH323 undertaken in April and May 2015. The groundwater samples were taken from the perched groundwater within the River Terrace Deposits and from the aquifer body within the St Maughans Formation.

8.7.2 A summary of the exceedances of the screening criteria from all available ground results relating to the Site is presented in Table 15 and discussed below.

Table 15: Groundwater Screening Exceedances

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location	No. Exceeded DWS (Total Number of Results)	Location
Perched Groundwater (within the River Terrace Deposits)								
Cadmium	µg/l	0.18 - 1.7	0.09	5	1 (2)	BH323	0 (2)	-
Nickel	µg/l	6 - 6.5	4	20	2 (2)	BH323 x 2	0 (2)	-
Boron	µg/l	89 - 1000	2000	1000	0 (2)	-	0 (2)	-
Lead	µg/l	<1 – 1.9	1.2	10	1 (2)	BH323	0 (2)	-
Aquifer (within St Maughans Formation)								
Cadmium	µg/l	0.27 - 0.34	0.09	5	1 (2)	BH323	0 (2)	-
Nickel	µg/l	3.8 - 4.5	4	20	1 (2)	BH323	0 (2)	-

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS (Total Number of Results)	Location	No. Exceeded DWS (Total Number of Results)	Location
Lead	µg/l	<1 - 2.5	1.2	10	1 (2)	BH323	0 (2)	-

8.7.3 The review of the groundwater chemical testing results indicated that both the deep groundwater and the shallow perched groundwater beneath the Site have elevated concentrations of cadmium (18 times the EQS) nickel (1.5 times the EQS) and lead (1.5 times the EQS) when compared against EQS screening criteria. Boron was identified at the DWS screening criteria during one monitoring round in the perched groundwater.

8.7.4 All PAH, TPH, VOCs, SVOCs, phenol and BTEX results were found below limit of detection. The laboratory limit of detection was greater than the screening criteria for nine determinants, including pentachlorophenol, hexachlorobutadiene, cyanide, mercury and some PAHs.

8.8 Ground Gas Risk Assessment

8.8.1 The only ground gas data available relates to borehole BH323. This has a response zone within the River Terrace Deposits between depths of 0.5 m and 3.0 mbGL. Of the three rounds available, the following comments may be made:

- No monitoring was undertaken during low barometric pressure (less than 1000 mb), with the lowest conditions being 1009 mb. As such, worst case atmospheric conditions for potential ground gas generation may have not been monitored.
- Gas flow was recorded absent or as a negative flow in the last two rounds, peaking at 0.6 l/hr in the first round.
- Methane has been recorded at up to 0.1 %during the first two rounds and zero during the final round.
- Carbon dioxide is identified between 0 and 2.2 % below the Workplace Exposure Limit of 5 %.
- Traces of volatile organic compounds of up to 1.9 ppm have been recorded.
- Hydrogen sulphide and carbon monoxide were recorded as zero throughout.
- Oxygen has been recorded to be slightly lower than ambient with concentrations of 17.4 % recorded during the final monitoring round.

8.8.2 The gas regime at the Site does not appear to have been influenced by previous historical uses. A gas risk assessment has been undertaken and is set out within the Land Contamination Assessment Report (Appendix 11.1 of the ES).

8.9 Summary

8.9.1 Elevated PAH has been identified within one sample from the Made Ground, although the lack of speciation within the analytical data required the use of conservative screening criteria.

8.9.2 The leaching potential of the Made Ground remains undetermined however little Made Ground is present at the Site. No evidence of leachable contaminants that may affect controlled water qualities has been identified in natural soil.

8.9.3 Both the shallow perched groundwater and the deep aquifer have been identified to have elevated cadmium and to a lesser extent nickel and lead when compared to the Environmental Quality Standards. However, due to the absence of any significant contamination sources on Site, it is considered that these are not as a result of historical contaminating activities at the Site. This, together with the ground and groundwater conditions encountered, would indicate the quality of the aquifer observed beneath the Site may have elevated concentrations of contaminants due to off-site source(s) or be representative of the baseline water quality.

8.9.4 An abnormal ground gas has not been recorded in the single available gas monitoring installation. This is installed outside the discrete area of Made Ground encountered at the Site.

9 Refined Conceptual Site Model

9.1.1 The incorporation of data from the 2015 Supplementary Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. Relevant contaminant source-pathway-receptor linkages are considered within the refined CSM. The assessment is based on the Scheme during construction and operational phases.

9.1.2 A CSM representing general ground conditions, overall layout of the new section of motorway and relevant source-pathway-receptors (each of which having a specific alpha-numerical symbol attached) are presented in Figure 2 and is described in Table 16.

Table 16: Site Conceptual Model

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
On-site Localised infill beneath the golf course. Fly tipping waste including builder's rubble.	**Construction**					
	Construction workers (B)	Direct dermal (1)	Likely	Low	Low	Construction workers will possibly be exposed to Made Ground materials during site construction works; however exposure duration will be short term only. Prior to construction, a specific risk assessment will be required in line with CDM and health and safety guidance. This will enable safe methodology and appropriate levels of PPE to be put in place. As such all risks will be duly considered and suitably mitigated. The current data set identifies Made Ground to be present only in discrete areas below a layer of topsoil and limited exceedances to the selected screening criteria are observed. The current contamination status is not foreseen to represent abnormal constraints to construction workers health and safety over and above those typical of a brownfield site. The provision and implementation of a suitable verification sampling inspection strategy during construction is recommended to confirm conditions and risks are as expected and clarify materials for appropriate reuse.
		Ingestion (3)	Likely	Low	Low	
		Inhalation of soil dust (2)	Likely	Low	Low	
	General public/golf course users (C)	Dermal contact of soil dust (1)	Low	Low	Very low	The current data set identifies Made Ground to be present only in discrete areas below a layer of topsoil. Furthermore, limited exceedances above the selected screening criteria are observed. Screening criteria considered conservative when considering exposure and pathway mechanisms.
		Ingestion of soil dust (3)	Low	Low	Very low	
		Inhalation of soil dust (2)	Low	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						During construction there is the possibility of dermal contact and inhalation of soil dust, short term exposure only. Dust suppression measures are recommended during construction works. The provision and implementation of a suitable verification sampling inspection strategy during construction is recommended to confirm conditions and risks are as expected and clarify materials for appropriate reuse.
	Surface waters: drainage ditch leading to Cowleaze Reen (E)	Contaminated surface water run-off (5)	Unlikely	Low	Very low	Surface water run-off may further deteriorate the quality of surface water. However, no widespread contaminated soils have been identified and Made Ground is only identified in limited areas of the Site. Construction process to adopt surface water control and management.
		Leaching (4)	Unlikely	Low	Very low	The current data set identifies Made Ground to be present only in discrete areas below a layer of topsoil. The provision and implementation of a suitable verification sampling inspection strategy during construction is recommended to confirm conditions and risks are as expected and clarify materials for appropriate reuse.
On-site Localised infill beneath the golf course. Fly tipping waste including builder's rubble.	Surface water drainage (proposed) (E)	Leaching (4)	Likely	Low	Low	New drainage may intercept discrete areas of Made Ground. The provision and implementation of a suitable verification sampling inspection strategy during construction is recommended to confirm conditions and risks are as expected and clarify materials for appropriate reuse.
	Operational					
On-site	Future motorway	Dermal contact of	Unlikely	Low	Very	No widespread contaminated soils identified

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Localised infill beneath the golf course. Fly tipping waste including builder's rubble.	users (A) and off-site users (C)	soil dust (1)			low	and Made Ground only identified in limited areas of this Site. Exposure duration will be short term only. The proposed embankment will encapsulate the Made Ground beneath the motorway corridor, removing pathways of exposure. The Made Ground outside of the motorway corridor is covered with a layer of topsoil, reducing the potential for exposure. The provision and implementation of a suitable verification sampling inspection strategy during construction is recommended to confirm conditions and risks are as expected.
		Ingestion of soil dust (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
	Maintenance workers (B)	Dermal contact (1)	Unlikely	Low	Very low	No widespread contaminated soils identified and Made Ground only identified in limited areas of this Site. Exposure duration will be short term only. Site specific risk assessment will be required in line with health and safety guidance. This will enable safe methodology and appropriate levels of PPE to be put in place. As such, all risks will be duly considered and suitably mitigated to protect maintenance workers. The current data set identify limited exceedances to the selected screening criteria. The current contamination status is not foreseen to represent abnormal constraints to maintenance workers health and safety over and above those typical of a brownfield site.
		Ingestion (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 Ground investigations have been undertaken at the Site to assess risks from land contamination associated with the construction and operation of the Scheme including human health and controlled waters risks.

10.1.2 Gross contamination associated with the Site's historical use has not been identified. The risk assessment has identified low risk to human health and low to moderate risk to controlled waters could exist and control measures are required to facilitate the construction and ongoing operation of the Scheme.

10.1.3 The historical and 2015 laboratory testing results confirmed the on-site observations and field testing, and showed that the contaminant levels in soils are considered to be at levels that represent tolerable levels of chronic risk to human health.

10.1.4 During the construction phase, specific mitigation measures will be required to prevent inhalation pathways of dust to the general public off-site construction workers, however such risks are considered limited as limited soil contamination is present on the Site. An appropriate water management strategy will also be required to prevent impact to surface waters from run-offs.

10.1.5 The presence of Made Ground was found to be limited and in discrete areas. Other 'pockets' of Made Ground could be identified during construction and contaminant risks should be mitigated through the provision and implementation of a suitable verification sampling inspection strategy during construction to confirm conditions and risks are as expected and clarify materials are appropriate for reuse. Materials are likely to be suitable for reuse subject to provision of reuse criteria under a Materials Management Plan.

10.1.6 During the operational phase, the embankment will cover part of the Site which will limit the infiltration of rainwater through the soils and thus any potential leaching of soil contaminants into the groundwater.

10.1.7 Existing topsoil cover outside the motorway corridor will remove linkages of concerns from the possible contamination sources to the end users and maintenance workers. Topsoil materials placed will need to be checked for contamination.

10.2 Recommendations

10.2.1 Whilst ground investigation has been undertaken at the Site, this is limited to being within the proposed new section of motorway alignment and excludes areas of landscaping. Limited soil contamination has been identified at the Site and no specific remediation is required. However, to facilitate construction, a number of control measures will need to be put in place. It is recommended that as a remediation strategy is required for the Scheme, the following measures should be included within it with respect to this Site:

- Dealing with unexpected contamination.

- Verification sampling strategy to confirm suitability for soils for retention/reuse.
- Control measures to prevent risks to construction workers and the general public during construction.
- Verification of imported topsoil.

10.2.2 The remediation strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan.

10.2.3 The remediation strategy should be supported by a Scheme wide Materials Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

11 References

Geotechnical Engineering (2015) M4 Corridor Around Newport, Factual Report on Ground Investigation, 30238

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Ove Arup & Partners (2014) M4 Corridor Around Newport, Preliminary Sources Study Report, 14/9197

Titan Environmental Surveys Ltd (2008) New M4 Magor to Castleton Baseline Surface Water Quality Final Report for Arup, Report Number HS0442/F1/2

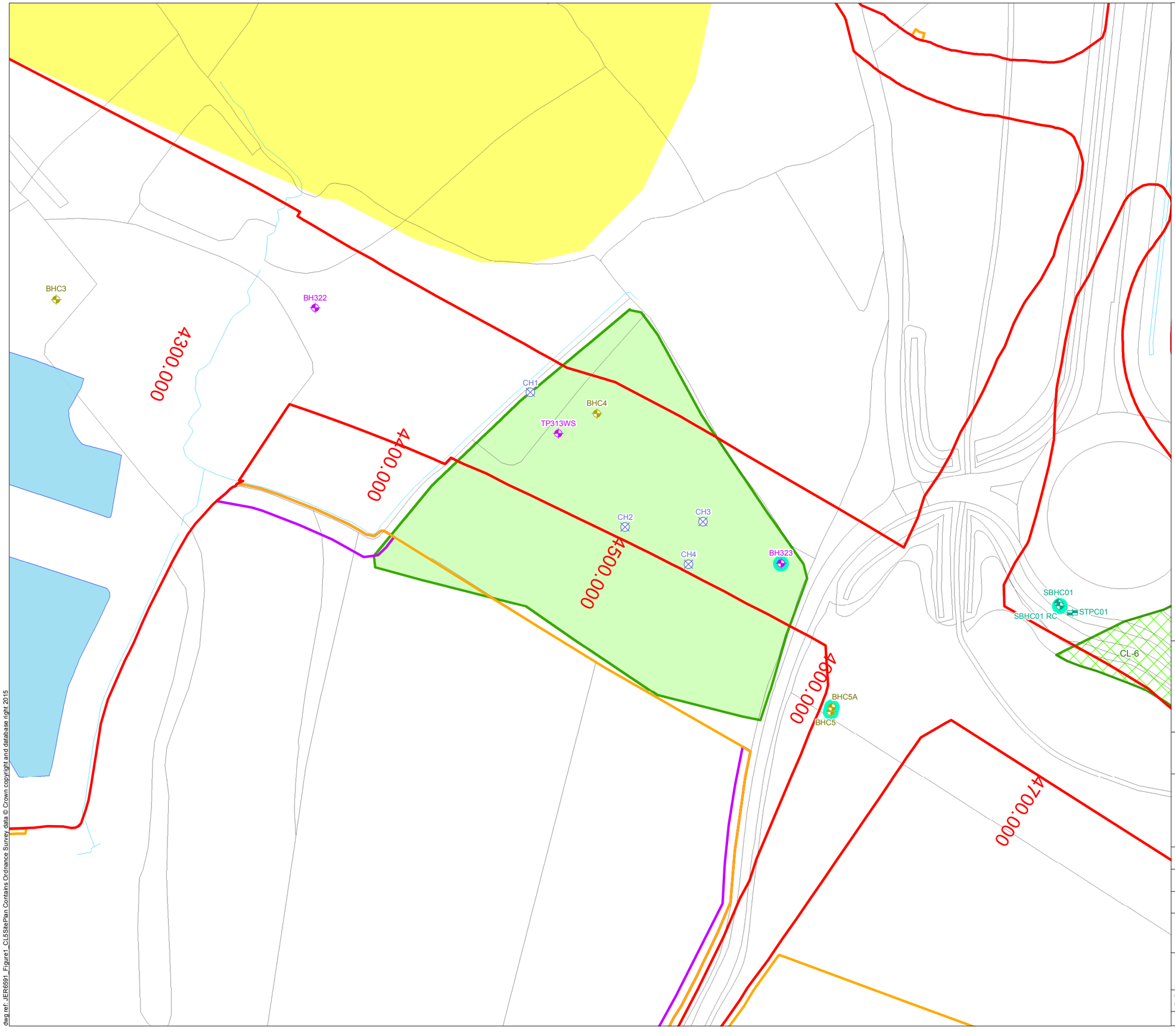
Bactec (2014) Explosive Ordnance Threat Assessment in respect of M4 Corridor around Newport for Hyder Consulting (UK) Limited, 5750TA

Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH4	Methane
CLEA	Contaminated Land Exposure Assessment
CO2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GDR	Geotechnical Design Report
GIR	Ground Investigation Report
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum
mb	Millibars
mbGL	Metres below Ground Level
MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds

WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Easement Only
- Proposed Water Treatment Area (WTA)
- Potential Borrow Pit Area
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination

Investigation Locations

2015 (Geotechnical Engineering)

- Borehole

2007 (Norwest Holst)

- Borehole
- Trial Pit

2000 (Exploration Associates)

- Window Sample

1997 (Norwest Holst)

- Borehole
- Monitoring Well Installation



Llywodraeth Cymru
Welsh Government

Appendix 11.1 Annex D CL-5

Site Plan for CL-5

Figure: 1	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:1,500

0 25 50 m

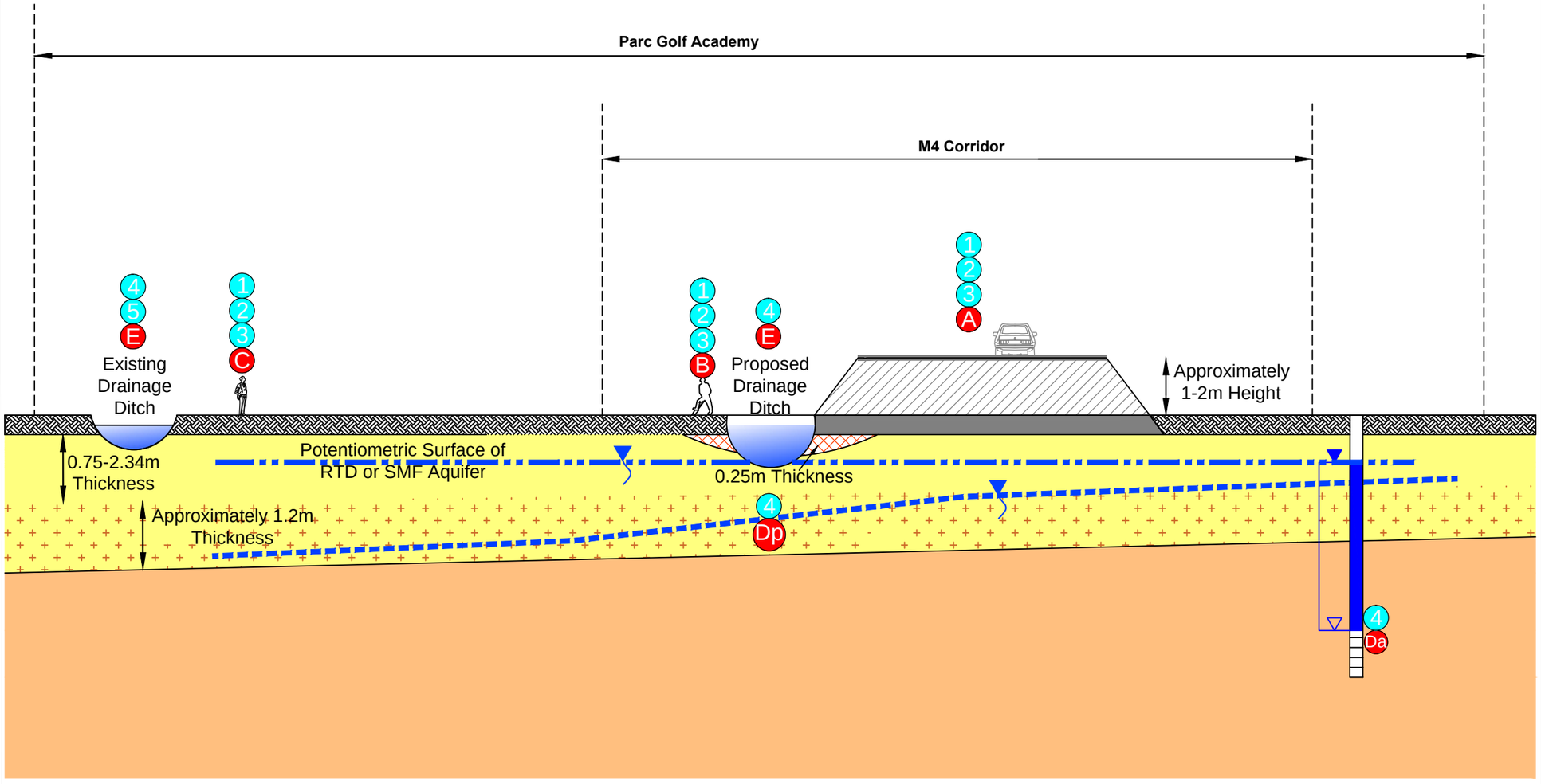
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dwg ref: JER6591_Figure1_CL5SitePlan

dwg ref: JER6591_Figure1_CL5SitePlan Contains Ordnance Survey data © Crown copyright and database right 2015

CL-5 Church Road



Ground conditions based on available information

Legend

- Topsoil
- Made Ground (Waste Material)
- River Terrace Deposits (Predominantly Cohesive) - RTD
- River Terrace Deposits (Predominantly Granular) - RTD
- St. Maughans Formation - SMF
- Proposed Embankment
- Proposed Concrete Foundation
- Perched Groundwater (RTD)
- Groundwater (Aquifer)
- Water Strike
- Rest Water Level
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (M4 User)
- B Humans On-Site (Construction/Maintenance)
- C Humans Off-Site (Site Neighbours)
- Da Groundwater (Aquifer)
- Dp Groundwater (Perched)
- E Surface Water

Potential Pathways

- 1 Dermal Contact
- 2 Inhalation
- 3 Ingestion
- 4 Leaching / Migration
- 5 Surface Run Off

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Potential for contamination to be present on site associated with known fill material
- Groundwater

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0122 (April 2014)

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Welsh Government

Appendix 11.1 Annex D CL-5

Conceptual Site Model for CL-5

Figure: 2	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL5ConceptualSiteModel

dwg ref: JER6591_Figure2_CL5ConceptualSiteModel

Appendices

A1 Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No. **BHC4** Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	327338.0 E
Project	M4 Relief Road Magor to Castleton Stage 2				183987.0 N
		Drilling Rig	Pilcon	Ground Level	10.60m AOD
Client	Welsh Office	Driller	A.M	Orientation	Vertical
		Logged by	C.D	Date Started	20/11/1997
Consultant	Ove Arup and Partners			Date Completed	20/11/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
20/11/1997	1800	4.25	3.00	2.70	

DRILLING DETAILS

Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
3.85	4.10	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	4.25	150	3.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
20/11/1997	0000	3.85	2.70	15.0	fast	0.00	0.00

GENERAL NOTES

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.90	S	N=13 (1,2,3,3,3,4)
2.90	S	N=44 (3,5,8,12,12,12)
4.10	S	50/40mm (25,50)

* Seating blows only.

NB All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	CP HEADER
Version	2.00
Revised	25/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No. **BHC4** Sheet 1 of 1

Contract No.	F10895	Method	Cable Percussion	Coordinates	327338.0 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		183987.0 N
		Driller	A.M	Ground Level	10.60m AOD
Client	Welsh Office	Logged by	C.D	Orientation	Vertical
				Date Started	20/11/1997
Consultant	Ove Arup and Partners			Date Completed	20/11/1997

Description of Strata	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Installation
TOPSOIL	0.30	10.30	B 0.30 - 0.80			
Soft to firm reddish brown mottled greyish brown very silty CLAY with occasional sub-rounded siliceous gravel and rootlets. (River Terrace)	0.85	9.75	D 0.85 - 1.35 U 0.90	(18)		
Firm dark reddish brown occasionally mottled greyish green sandy organic CLAY with occasional sub-angular to sub-rounded fine siliceous gravel. (River Terrace)			D 1.35			
			B 1.90 - 2.64 D 1.90	S13	S 1.90 2.35	
Reddish brown mottled greyish green completely weathered MUDSTONE, very weak. (St. Maughans Group)	2.64	7.96	B 2.64 - 2.85			
			B 2.90 - 3.80 D 2.90	S44	S 2.90 3.35	
---from 2.90m highly to completely weathered weak to moderately weak	3.85	6.75	W 3.85			
Purplish brown mottled greyish green occasionally thinly laminated slightly sandy moderately to highly weathered MUDSTONE, moderately weak. (St. Maughans Group)	4.25	6.35	D 4.10	S50/40mm	S 4.10 4.22	
Cable Percussion boring complete at 4.25 m.						

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			25/01 0000	
0.20-0.45	T		DRY	
0.45-0.90	B			
0.90-1.40	T			
1.45-1.90	B			
1.90-2.38	T			
2.38-2.70	T	NIL	DRY	
2.70				

Strata

Description	Depth (Thickness)	Level
	G.L.	10.41
Brown sandy slightly clayey TOPSOIL	0.20	10.21
Soft to firm brown slightly sandy very silty CLAY with occasional to some fine to coarse rounded to sub-rounded gravel of sandstone	0.45	9.96
Soft to firm red brown sandy very silty CLAY with some rounded to sub-rounded fine to coarse gravel of sandstone	(1.45)	
	1.90	8.51
Moderately compact brown sandy slightly silty clayey sub-rounded fine to coarse GRAVEL of sandstone	(0.48)	
	2.38	8.03
Firm red brown very silty clayey highly weathered MUDSTONE	2.70	7.71
End of Borehole.		

Legend

Equipment: Geotool R780 Tracked Rig

Borehole Dia (mm) Casing Dia (mm)
80 to 1.00m
60 to 2.70m

Groundwater
No. Struck Behaviour Sealed
No groundwater encountered

Ground Level 10.41 m OD
Coordinates 327310.67 mE
183955.65 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Refusal at 2.70 (Stiff)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH1(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			25/01 0000	
0.20-0.75	T		DRY	
0.75-0.94	B			
0.94-1.12	T			
1.12		NIL	DRY	

Strata

Description	Depth (Thickness)	Level
	G.L.	10.78
Brown sandy clayey TOPSOIL	0.20	10.58
Firm orange brown sandy very silty CLAY with occasional to some rounded to sub-rounded gravel of sandstone	(0.74)	
Compact orange brown very sandy slightly silty sub-angular to sub-rounded fine to coarse GRAVEL of sandstone	0.94	9.84
End of Borehole.	1.12	9.66

Legend

Equipment: Geotool R780 Tracked Rig

Borehole Dia (mm) Casing Dia (mm)
80 to 1.00m
60 to 1.12m

Groundwater
No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 10.78 m OD
Coordinates 327349.63 mE
183940.41 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Refusal at 1.12 (Could not penertrate gravels)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH2(1 of 1)

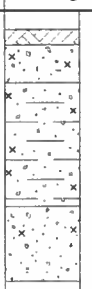
Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
0.10-0.35	T		25/01 2000 DRY	
0.35-0.85	TO			
0.85-1.17	B			
1.17-1.67	T			
1.67		NIL	DRY	

Strata

Description	Depth (Thickness)	Level
	G.L.	10.86
Brown sandy slightly silt clayey TOPSOIL	0.10	10.76
MADE GROUND: Moderately compact brown sandy very silty slightly clayey angular to sub-angular fine to coarse gravel of sandstone, slag,ash and some refuse of plastic.	0.35	10.51
	(0.82)	
Firm brown locally orange brown sandy very silty CLAY with some sub-angular to sub-rounded fine to coarse gravel of sandstone and mudstone with some pockets of orange brown very silty fine to coarse sand.	1.17	9.69
	(0.50)	
Compact red brown and green grey mottled dark grey very sandy slightly silty angular to sub-angular fine to coarse GRAVEL of sandstone and mudstone	1.67	9.19
End of Borehole.		

Legend



Equipment: Geotool R780 Tracked Rig

Borehole Dia (mm) Casing Dia (mm)
80 to 1.00m
60 to 1.67m

Groundwater
No. Struck Behaviour Sealed

No groundwater encountered

Ground Level 10.86 m OD
Coordinates 327381.55 mE
183942.57 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Refusal at 1.67 (Unable to penertrate gravels)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH3(1 of 1)

Sampling

Depth	Type	Casing Depth	Date/ Water	SPT N (Cu)
			25/01 0000	
0.20-0.60	T		DRY	
0.60-1.00	TO			
1.00-1.50	B			
1.00-2.00	T			
		NIL	DRY	
2.17				

Strata

Description	Depth (Thickness)	Level
	G.L.	10.91
Brown sandy slightly silty slightly clayey TOPSOIL	0.20	10.71
	(0.40)	
Firm brown slightly sandy very silty CLAY with occasional sub-rounded fine to coarse gravel of sandstone and mudstone with occasional rootlets	0.60	10.31
	(0.40)	
	1.00	9.91
Firm red brown mottled grey slightly sandy very silty slightly organic CLAY with some rounded to sub-rounded fine to coarse gravel of mudstone and sandstone	(1.00)	
	2.00	8.91
Firm red brown mottled green grey slightly sandy very silty CLAY	2.17	8.74
Compact brown very sandy sub-rounded fine to coarse GRAVEL of sandstone		
End of Borehole.		

Legend

Equipment: Geotool R780 Tracked Rig

Borehole Dia (mm) / Casing Dia (mm)
80 to 1.00m
60 to 2.17m

Groundwater

No.	Struck	Behaviour	Sealed

No groundwater encountered

Ground Level 10.91 m OD
Coordinates 327375.64 mE
183925.14 mN

Drilled by DC
Logged by DC
Checked by AF

Remarks Refusal At 2.17m (could not penertrate gravels)

See key sheet and appendices for explanations.

Form 1/0

Borehole Record

Exploration Associates

Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Borehole CH4(1 of 1)

Geotechnical Engineering Limited

BOREHOLE LOG

BH323

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 2

Start Date 27 March 2015 — Easting 327413.6 — Scale 1 : 50

End Date 30 March 2015 — Northing 183925.5 — Ground level 11.55mOD — Depth 14.70 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
27/03/15 1010hrs	1B	0.20	0.50						Grass over soft yellowish brown slightly gravelly slightly sandy silty CLAY with frequent rootlets (up to 1mm diam). Gravel is subangular and subrounded fine and medium sandstone. (TOP)	0.50	11.05	
	2D*	0.20	0.50		Vo 22.0							
	3B	0.50	0.80									
	4D*	0.50	0.80		Vo 3.2							
	5B	0.80	1.20									
	6D*	0.80	1.20		Vo 0.7							
	7UT	1.20	1.65	Nil					Stiff dark reddish brown slightly sandy slightly gravelly silty CLAY. Gravel is subangular and subrounded fine and medium sandstone. (RTD)			
	8D	1.70	2.15		S 16							
	9X	1.70	2.20									
	10D*	2.00	2.10							2.00	9.55	
	11D	2.20	2.62	3.20	S*57				Medium dense becoming very dense yellowish brown and grey sandy clayey subangular and subrounded fine and medium sandstone GRAVEL. (RTD)			
	12X	2.20	3.20									
	13D*	3.00	3.10									
	14D	3.20	3.65	3.20	S 20					3.20	8.35	
	15X	3.20	4.20						Stiff becoming very stiff dark reddish brown CLAY with rare light greenish grey reduction spots (up to 20mm). (SMG) 3.65 - 3.80m: Locally light greenish grey.			
	16D*	4.00	4.10									
	17D	4.20	4.65	3.20	S 40				4.00 - 4.65m: Locally gravelly.			
	18C	4.20	5.70			100	NA					
		5.70	6.11	3.20	C*58					5.70	5.85	
	19C	5.70	7.20			80 0 0	NI		Orangish brown fine and medium SANDSTONE recovered non intact as subangular and subrounded fine and medium gravel. (SMG)	6.20	5.35	
							NA		Firm reddish brown slightly gravelly slightly sandy CLAY. Gravel is subrounded fine and medium sandstone. (SMG)			
	20C	7.20	8.70	3.20		100 0 0			7.20 - 7.40m: Gravelly.			
										8.00 {8.00}	3.55	
									Continued Next Page			

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (128mm) 1.70-2.20m and (113mm) 2.20-4.20m. Waterflush rotary core drilled (116mm) 4.20-14.70m.

CASING: 140mm diam to 3.20m.

BACKFILL: On completion, a slotted standpipe (50mm) was installed to 14.70m, granular response zone 14.70-4.50m and bentonite seal 4.50-3.00m. A second slotted standpipe (35mm) was installed to 3.00m, granular response zone 3.00-0.50m, bentonite seal 0.50-0.10m, concrete and flush cover 0.10-0.00m.

REMARKS: Driller notes reduced flush returns 7.20-14.70m (80% returned). Downhole magnetometry for UXO risk mitigation undertaken 0.00-4.20m. No anomalies encountered.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
				Groundwater not encountered prior to use of water flush.

AGS

CONTRACT	CHECKED
30238	EC

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Geotechnical Engineering Limited

BOREHOLE LOG

BH323

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 2 of 2

Start Date 27 March 2015 — Easting 327413.6 — Scale 1 : 50

End Date 30 March 2015 — Northing 183925.5 — Ground level 11.55mOD — Depth 14.70 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
27/03/15 1500hrs 1.55m							NI		Extremely weak dark reddish brown MUDSTONE with rare light greenish grey reduction spots (up to 20mm). Fractures are subhorizontal to 20° and subvertical extremely closely spaced planar smooth. (SMG) 8.15 - 8.50m: 60° fracture. 8.60 - 8.70m: Tending to stiff clay.			
30/03/15 1000hrs 2.33m	21C	8.70	10.20	3.20		100 0 0						
							NA		Stiff fissured reddish brown CLAY with rare light greenish grey reduction spots (up to 20mm). (SMG)	9.65	1.90	
	22C	10.20	11.70	3.20		100	NA		Very stiff fissured dark reddish brown very gravelly CLAY with light greenish grey reduction spots (up to 20mm). Gravel is angular and subangular fine to coarse mudstone lithorelicts. Fissures are subhorizontal to 20° extremely closely spaced planar smooth. (SMG)	10.20	1.35	
							NA		Very stiff fissured purplish brown mottled light greenish grey very gravelly CLAY. Gravel is angular and subangular fine to coarse mudstone lithorelicts. Fissures are subhorizontal to 20° extremely closely spaced planar smooth. (SMG)	11.50	0.05	
	23C	11.70	13.20	3.20		100						
	24C	13.20	14.70	3.20		97			13.10 - 13.65m: Tending to extremely weak mudstone.			
30/03/15 1500hrs 1.55m										14.70	-3.15	
									Borehole completed at 14.70m.	{18.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

Groundwater not encountered prior to use of water flush.

AGS

CONTRACT **30238**

CHECKED **EC**

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Geotechnical Engineering Limited

BOREHOLE LOG

TP313WS

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 1

Start Date 26 March 2015 — Easting 327322.1 — Scale 1 : 50

End Date 26 March 2015 — Northing 183978.8 — Ground level 10.55mOD — Depth 4.00 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	instru -ment	description	depth (m)	reduced level (m)	legend
26/03/15 1300hrs	1B	0.20	0.50					Firm dark reddish brown mottled black and yellow slightly gravelly slightly sandy silty CLAY with rare rootlets (up to 2mm diam). Gravel is angular to subrounded fine and medium sandstone.			
	2B	0.50	0.80								
	3B	1.00	1.20								
	4X	1.20	2.50	Nil							
									2.30	8.25	
								Dark yellowish brown sandy subangular and subrounded fine to coarse sandstone GRAVEL.			
	5X	2.50	4.00	Nil					2.80	7.75	
								Firm reddish brown slightly sandy CLAY.			
26/03/15 1500hrs Damp								3.50 - 3.60m: Light greenish grey sandy clay.			
									4.00	6.55	
								Borehole completed at 4.00m.			
									{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (128mm) 1.20-2.50m and (113mm) 2.50-4.00m.

CASING: Not used.

BACKFILL: On completion borehole backfilled with bentonite pellets.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
				Groundwater not encountered prior to use of water flush.

AGS

CONTRACT **30238**

CHECKED

DRAFT

A2 Appendix 2

Tabulated Gas and Groundwater Monitoring

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH323	23/04/15 10:00:00	1026	-1.01								-0.7	9		5 litres purged, base depth 3.00m.
BH323	23/04/15 10:01:00										-1.8			
BH323	23/04/15 10:02:00										-1.2			
BH323	23/04/15 10:03:00										0.4			
BH323	23/04/15 10:04:00										0.6			
BH323	23/04/15 10:05:00			0.0	0.1	20.5	1.0	0	0	1.2				
BH323	23/04/15 10:06:00			0.0	0.1	20.5	1.0	0	0	1.3				
BH323	23/04/15 10:07:00			0.0	0.1	20.5	1.0	0	0	1.3				
BH323	23/04/15 10:08:00			0.1	0.1	20.5	1.0	0	0	1.2				
BH323	23/04/15 10:09:00			0.2	0.1	20.5	1.0	0	0	1.2				
BH323	23/04/15 10:10:00			0.4	0.1	20.5	1.0	0	0	1.4				
BH323	23/04/15 10:11:00			0.6	0.1	20.5	1.0	0	0	1.4				
BH323	23/04/15 10:12:00			0.6	0.1	20.3	1.0	0	0	1.5				
BH323	23/04/15 10:13:00			0.7	0.1	19.8	1.0	0	0	1.6				
BH323	23/04/15 10:14:00			0.7	0.1	19.8	1.0	0	0	1.6			1.70	
BH323	30/04/15 09:30:00	1015	-1.17								0.0	11		5 litres purged, base depth 3.00m.
BH323	30/04/15 09:31:00										0.0			
BH323	30/04/15 09:32:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH323	30/04/15 09:33:00										0.0			
BH323	30/04/15 09:34:00										0.0			
BH323	30/04/15 09:35:00			1.0	0.1	19.7	1.0	0	0	1.9				
BH323	30/04/15 09:36:00			0.9	0.0	19.8	0.0	0	0	1.7				
BH323	30/04/15 09:37:00			0.9	0.1	19.8	1.0	0	0	1.5				
BH323	30/04/15 09:38:00			0.9	0.1	19.9	1.0	0	0	1.3				
BH323	30/04/15 09:39:00			0.9	0.1	19.9	1.0	0	0	1.1				
BH323	30/04/15 09:40:00			0.9	0.1	19.9	1.0	0	0	1.1				
BH323	30/04/15 09:41:00			0.8	0.1	20.0	1.0	0	0	1.1				
BH323	30/04/15 09:42:00			0.8	0.1	20.0	1.0	0	0	1.0				
BH323	30/04/15 09:43:00			0.8	0.1	20.1	1.0	0	0	0.9				
BH323	30/04/15 09:44:00			0.8	0.1	20.1	1.0	0	0	0.9			1.72	
BH323	21/05/15 14:23:00	1009	-2								-0.4	21		
BH323	21/05/15 14:24:00										0.0			
BH323	21/05/15 14:25:00										0.0			
BH323	21/05/15 14:26:00										0.0			
BH323	21/05/15 14:27:00										0.0			
BH323	21/05/15 14:28:00			1.6	0.0	18.2	0.0	0	0	0.1				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH323	21/05/15 14:29:00			1.8	0.0	17.9	0.0	0	0	0.1				
BH323	21/05/15 14:30:00			1.9	0.0	17.8	0.0	0	0	0.1				
BH323	21/05/15 14:31:00			1.9	0.0	17.7	0.0	0	0	0.1				
BH323	21/05/15 14:32:00			1.9	0.0	17.7	0.0	0	0	0.0				
BH323	21/05/15 14:33:00			1.9	0.0	17.7	0.0	0	0	0.0				
BH323	21/05/15 14:34:00			2.0	0.0	17.6	0.0	0	0	0.0				
BH323	21/05/15 14:35:00			2.0	0.0	17.5	0.0	0	0	0.0				
BH323	21/05/15 14:36:00			2.1	0.0	17.5	0.0	0	0	0.0				
BH323	21/05/15 14:37:00			2.2	0.0	17.4	0.0	0	0	0.0				
BH323	21/05/15 14:38:00												2.26	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH323	23/04/15 10:14:00												1.40	79 litres purged, base depth 14.70m.
BH323	30/04/15 09:44:00												0.74	83 litres purged, base depth 14.70m.
BH323	21/05/15 14:39:00												2.65	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT **30238**

CHECKED **EC**

A3 Appendix 3

Tabulated Soil Laboratory Data

M4CAN
Soil Analysis Results & Screening Assessment
CL-5
30/06/2015

Geological Formation Legend

MG	Made Ground
RTD	River Terrace Deposits

Screening Values and Assessment

	Exceeds S4ULs Criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	CH3	BHC4	CH1	CH2	BH323	BH323	TP313WS	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Location Type		WS	BH	WS	WS	BH	BH	TP							
Specimen Depth (m)		0.1	0.3	0.2	0.2	0.2	0.5	0.2							
Geology		MG	RTD	RTD	RTD	RTD	RTD	RTD							
Cluster Code		2000 GI	1997 GI	2000 GI	2000 GI	2015 GI	2015 GI	2015 GI							
Metals															
Arsenic	mg/kg	5.4	9.7	6.4	6.7	11	7.6	7.1	7	7	11	5.4	BH323 @ 0.2mbGL	170	0
Boron	mg/kg	<0.5	0.2	<0.5	<0.5	<0.4	<0.4	<0.4	7	1	0.2	0.2	BHC4 @ 0.3mbGL	46000	0
Cadmium	mg/kg	0.28	<0.2	0.12	0.05	0.17	<0.1	<0.1	7	4	0.28	0.05	CH3 @ 0.1mbGL	190	0
Chromium	mg/kg	17	69.6	19	17	35	37	54	7	7	69.6	17	BHC4 @ 0.3mbGL	33	4
Copper	mg/kg	8	16.1	6	8	10	11	17	7	7	17	6	TP313WS @ 0.2mbGL	44000	0
Lead	mg/kg	30	45.2	30	17	36	17	26	7	7	45.2	17	BHC4 @ 0.3mbGL	1300	0
Mercury	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	7	0	None > LOD	None > LOD		30	0
Nickel	mg/kg	8	31.1	14	15	21	28	37	7	7	37	8	TP313WS @ 0.2mbGL	980	0
Selenium	mg/kg	0.88	0.4			0.23	<0.2	<0.2	5	3	0.88	0.23	CH3 @ 0.1mbGL	1800	0
Zinc	mg/kg	54	61.1	47	47	50	40	60	7	7	61.1	40	BHC4 @ 0.3mbGL	170000	0
Cyanide (total)	mg/kg	<1	<1	<1	<1	<0.5	<0.5	<0.5	7	0	None > LOD	None > LOD			
Cyanide (free)	mg/kg		<0.1			<0.5	<0.5	<0.5	4	0	None > LOD	None > LOD			
Thiocyanate	mg/kg		<1						1	0	None > LOD	None > LOD			
Ferro/ferricyanide	mg/kg		<10						1	0	None > LOD	None > LOD			
Acid Soluble Sulphate	mg/kg	1020		307	77				3	3	1020	77	CH3 @ 0.1mbGL		
Sulphate (total)	mg/kg		492						1	1	492	492	BHC4 @ 0.3mbGL		
pH Value	pH Units	8.2	7	6.4	7.4	7.7	7.7	6.5	7	7	8.2	6.4	CH3 @ 0.1mbGL	6-9	0
Organics															
PAH (Screening)	mg/kg	502		<10	<10				3	1	502	502	CH3 @ 0.1mbGL	1.1	1
TPH FTIR (AR)	mg/kg	1790							1	1	1790	1790	CH3 @ 0.1mbGL	3200	0
OIL FTIR	mg/kg	1920							1	1	1920	1920	CH3 @ 0.1mbGL		
Phenols															
Phenol Index	mg/kg	<0.5		<0.5	<0.5				3	0	None > LOD	None > LOD		440	0
Phenols Monohydric	mg/kg		<1						1	0	None > LOD	None > LOD		440	0
Phenols (total)	mg/kg		<1				<0.3		2	0	None > LOD	None > LOD		440	0
TPH															
TPH >C6-C8.	mg/kg					<1	<1	<1	3	0	None > LOD	None > LOD		7800	0
TPH >C8-C10.	mg/kg					<1	<1	<1	3	0	None > LOD	None > LOD		2000	0
TPH >C10-C12.	mg/kg					<1	<1	<1	3	0	None > LOD	None > LOD		9200	0
TPH >C12-C16.	mg/kg					<1	<1	<1	3	0	None > LOD	None > LOD		10000	0
TPH >C16-C21.	mg/kg					<1	<1	<1	3	0	None > LOD	None > LOD		7600	0
TPH >C21-C35.	mg/kg					<1	<1	<1	3	0	None > LOD	None > LOD		7800	0
PAH															
Acenaphthene	mg/kg					<0.1	<0.1	<0.1	3	0	None > LOD	None > LOD		29000	0
Acenaphthylene	mg/kg					<0.1	<0.1	<0.1	3	0	None > LOD	None > LOD		29000	0
Anthracene	mg/kg					<0.1	<0.1	<0.1	3	0	None > LOD	None > LOD		150000	0
Benz(a)anthracene	mg/kg					<0.1	<0.1	<0.1	3	0	None > LOD	None > LOD		49	0
Benzo(a)pyrene	mg/kg					<0.1	<0.1	<0.1	3	0	None > LOD	None > LOD		11	0
Benzo(b)fluoranthene	mg/kg					<0.1	<0.1	<0.1	3	0	None > LOD	None > LOD		13	0
Benzo(ghi)perylene	mg/kg					<0.1	<0.1	<0.1	3	0	None > LOD	None > LOD		1400	0
Benzo(k)fluoranthene	mg/kg					<0.1	<0.1	<0.1	3	0	None > LOD	None > LOD		370	0
Chrysene	mg/kg					<0.1	<0.1	<0.1	3	0	None > LOD	None > LOD		93	0
Dibenzo(ah)anthracene	mg/kg					<0.1	<0.1	<0.1	3	0	None > LOD	None > LOD		1.1	0
Fluoranthene	mg/kg					<0.1	<0.1	<0.1	3	0	None > LOD	None > LOD		6300	0
Fluorene	mg/kg					<0.1	<0.1	<0.1	3	0	None > LOD	None > LOD		20000	0
Indeno(123cd)pyrene	mg/kg					<0.1	<0.1	<0.1	3	0	None > LOD	None > LOD		150	0
Naphthalene	mg/kg					<0.1	<0.1	<0.1	3	0	None > LOD	None > LOD		190	0
Phenanthrene	mg/kg					<0.1	<0.1	<0.1	3	0	None > LOD	None > LOD		6200	0
Pyrene	mg/kg					<0.1	<0.1	<0.1	3	0	None > LOD	None > LOD		15000	0
PAH 16 Total	mg/kg					<0.1	<0.1	<0.1	3	0	None > LOD	None > LOD			

A4 Appendix 4

Tabulated Groundwater Laboratory Data

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-5
30/06/2015

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

RTD	River Terrace Deposits
SMF	St Maughans Formation
GW	Groundwater

Monitoring Round	Units	Screening Criteria		1		2		No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Location				BH323	BH323	BH323	BH323							
Location Type				BH										
Depth				Shallow	Deep	Shallow	Deep							
Groundwater Body		EQS	DWS	Perched GW (RTD)	Aquifer (SMF)	Perched GW (RTD)	Aquifer (SMF)							
Installation Details				1.72	2.02	1.67	1.86							
Date sampled				23/04/2015		08/05/2015								
Metals														
Arsenic	ug/l	50	10	<1	<1	<1	<1	4	0	None > LOD	None > LOD		0	0
Boron	ug/l	2000	1000	730	840	1000	89	4	4	1000	89	BH323 @ 1.67	0	0
Cadmium	ug/l	0.15	5	<0.08	0.12	0.18	0.27	4	3	0.27	0.12	BH323 @ 1.86	2	0
Chromium	ug/l		50	<1	<1	<1	<1	4	0	None > LOD	None > LOD			0
Copper	ug/l	10	2000	1.8	1.6	<1	1.7	4	3	1.8	1.6	BH323 @ 1.72	0	0
Lead	ug/l	1.2	10	<1	<1	1.9	2.5	4	2	2.5	1.9	BH323 @ 1.86	2	0
Mercury	ug/l	0.07	1	<0.5	<0.5	<0.5	<0.5	4	0	None > LOD	None > LOD		0	0
Nickel	ug/l	4	20	6.4	4.5	6	3.8	4	4	6.4	3.8	BH323 @ 1.72	3	0
Selenium	ug/l		10	<1	<1	1.5	<1	4	1	1.5	1.5	BH323 @ 1.67		0
Zinc	ug/l	75		5.7	2.8	<1	<1	4	2	5.7	2.8	BH323 @ 1.72	0	
Non-Metal Inorganics														
Total Alkalinity as CaCO3	mg/l					530	190	2	2	530	190	BH323 @ 1.67		
Chloride	mg/l	250	250			24	36	2	2	36	24	BH323 @ 1.86	0	0
Ammoniacal Nitrogen as N	mg/l	0.6				0.026	0.046	2	2	0.046	0.026	BH323 @ 1.86	0	
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	4	0	None > LOD	None > LOD		0	0
Free Cyanide	mg/l			<0.05	<0.05	<0.05	<0.05	4	0	None > LOD	None > LOD			
pH Value	pH units	6-9	6.5-10	7.7	7.4	7.5	7.4	4	4	7.7	7.4	BH323 @ 1.72	0	0
Phenols														
Phenol	ug/l	7.7				<0.5	<0.5	2	0	None > LOD	None > LOD		0	
Phenols	mg/l	0.0077				<0.03	<0.03	2	0	None > LOD	None > LOD		0	
BTEX														
Benzene	ug/l	10	1	<1	<1	<1	<1	4	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		<1	<1	<1	<1	4	0	None > LOD	None > LOD		0	
Ethyl benzene	ug/l	20		<1	<1	<1	<1	4	0	None > LOD	None > LOD		0	
m & p Xylene	ug/l	30		<1	<1	<1	<1	4	0	None > LOD	None > LOD		0	
o Xylene	ug/l	30		<1	<1	<1	<1	4	0	None > LOD	None > LOD		0	
Methyl tert-butyl ether (MTBE)	ug/l					<1	<1	2	0	None > LOD	None > LOD			
TPH														
Aliphatics C5-C6	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Aliphatics >C12-C16	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Aliphatics >C16-C21	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Aliphatics >C21-C35	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Aliphatics >C35-44	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Aromatics >EC8-EC10	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Aromatics >EC10-EC12	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Aromatics >EC12-EC16	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Aromatics >EC16-EC21	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Aromatics >EC21-EC35	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Aromatics >C35-44	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l			<5	<5	<5	<5	4	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l			<5	<5	<5	<5	4	0	None > LOD	None > LOD			
Total petroleum hydrocarbons	ug/l			<10	<10	<10	<10	4	0	None > LOD	None > LOD			
PAH														
Acenaphthene	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD		0	
Benz(a)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Dibenzo(ah)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD		0	
Fluorene	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2		<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
Pyrene	ug/l			<0.1	<0.1	<0.1	<0.1	4	0	None > LOD	None > LOD			
PAH 16 Total	ug/l			<2	<2	<2	<2	4	0	None > LOD	None > LOD			
VOCs														
1,1,1,2-Tetrachloroethane	ug/l					<2	<2	2	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	ug/l	100				<1	<1	2	0	None > LOD	None > LOD		0	
1,1,2-Trichloroethane	ug/l	400				<10	<10	2	0	None > LOD	None > LOD		0	
1,1-Dichloroethane	ug/l					<1	<1	2	0	None > LOD	None > LOD			
1,1-Dichloroethene	ug/l					<1	<1	2	0	None > LOD	None > LOD			
1,1-Dichloropropene	ug/l					<1	<1	2	0	None > LOD	None > LOD			
1,2,3-Trichlorobenzene	ug/l	0.4				<2	<2	2	0	None > LOD	None > LOD		0	
1,2,3-Trichloropropane	ug/l					<50	<50	2	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	ug/l	0.4				<1	<1	2	0	None > LOD	None > LOD		0	
1,2,4-Trimethylbenzene	ug/l					<1	<1	2	0	None > LOD	None > LOD			
1,2-Dibromo-3-Chloropropane	ug/l					<50	<50	2	0	None > LOD	None > LOD			
1,2-Dibromoethane	ug/l					<5	<5	2	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	ug/l	20				<1	<1	2	0	None > LOD	None > LOD		0	
1,2-Dichloroethane	ug/l	10	3			<2	<2	2	0	None > LOD	None > LOD		0	0
1,2-Dichloropropane	ug/l					<1	<1	2	0	None > LOD	None > LOD			
1,3,5-Trimethylbenzene	ug/l					<1	<1	2	0	None > LOD	None > LOD			
1,3-Dichloropropane	ug/l					<2	<2	2	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/l	20				<1	<1	2	0	None > LOD	None > LOD		0	
2-Chlorotoluene	ug/l					<1	<1	2	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/l					<1	<1	2	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/l					<1	<1	2	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	<1	<1	<1	<1	4	0	None > LOD	None > LOD		0	0
Bromobenzene	ug/l					<1	<1	2	0	None > LOD	None > LOD			
Bromochloromethane	ug/l		100			<5	<5	2	0	None > LOD	None > LOD			0
Bromodichloromethane	ug/l					<5	<5	2	0	None > LOD	None > LOD			
Bromomethane	ug/l					<5	<5	2	0	None > LOD	None > LOD			
Chlorobenzene	ug/l					<1	<1	2	0	None > LOD	None > LOD			
Chloroethane	ug/l					<1	<1	2	0	None > LOD	None > LOD			
Chloroethene	ug/l					<1	<1	2	0	None > LOD	None > LOD			
Chloroform	ug/l	2.5	100			<1	<1	2	0	None > LOD	None > LOD		0	0
Chloromethane	ug/l					<1	<1	2	0	None > LOD	None > LOD			
cis-1,2-Dichloroethene	ug/l					<1	<1	2	0	None > LOD	None > LOD			
cis-1,3-Dichloropropene	ug/l					<10	<10	2	0	None > LOD	None > LOD			
Dibromochloromethane	ug/l		100			<10	<10	2	0	None > LOD	None > LOD			0
Dibromomethane	ug/l					<10	<10	2	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/l					<1	<1	2	0	None > LOD	None > LOD			
Ethylbenzene	ug/l	20		<1	<1	<1	<1	4	0	None > LOD	None > LOD		0	
Hexachlorobutadiene (HCBD)	ug/l	0.6				<1	<1	2	0	None > LOD	None > LOD		0	
Isopropylbenzene	ug/l					<1	<1	2	0	None > LOD	None > LOD			
m,p xylenes	ug/l	30		<1	<1	<1	<1	4	0	None > LOD	None > LOD		0	
Methyl tert-butyl ether (MTBE)	ug/l					<1	<1	2	0	None > LOD	None > LOD			
n-Butylbenzene	ug/l					<1	<1	2	0	None > LOD	None > LOD			
n-propylbenzene	ug/l					<1	<1	2	0	None > LOD	None > LOD			
O-Xylene	ug/l	30		<1	<1	<1	<1	4	0	None > LOD	None > LOD		0	
Sec-Butylbenzene	ug/l					<1	<1	2	0	None > LOD	None > LOD			
Styrene	ug/l	50				<1	<1	2	0	None > LOD	None > LOD		0	
Tert-Butylbenzene	ug/l					<1	<1	2	0	None > LOD	None > LOD			
Tetrachloroethene	ug/l	10	10			<1	<1	2	0	None > LOD	None > LOD		0	0
Tetrachloromethane (Carbon Tetra Chlorid	ug/l	12	3			<1	<1	2	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		<1	<1	<1	<1	4	0	None > LOD	None > LOD		0	
trans-1,2-Dichloroethene	ug/l					<1	<1	2	0	None > LOD	None > LOD			
trans-1,3-Dichloropropene	ug/l					<10	<10	2	0	None > LOD	None > LOD			
Tribromomethane	ug/l		100			<1	<1	2	0	None > LOD	None > LOD			0
Trichloroethene	ug/l	10	10			<1	<1	2	0	None > LOD	None > LOD		0	0
Trichlorofluoromethane	ug/l					<1	<1	2	0	None > LOD	None > LOD			
SVOCs														
1,3-Dichlorobenzene	ug/l	20				<0.5	<0.5	2	0	None > LOD	None > LOD		0	
2,4,5-Trichlorophenol	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
2,4-Dichlorophenol	ug/l	20				<0.5	<0.5	2	0	None > LOD	None > LOD		0	
2,4-Dimethylphenol	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
2-Chloronaphthalene	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
2-Chlorophenol	ug/l	50				<0.5	<0.5	2	0	None > LOD	None > LOD		0	
2-Methyl-4,6-Dinitrophenol	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
2-Methylnaphthalene	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
2-Methylphenol	ug/l	100				<0.5	<0.5	2	0	None > LOD	None > LOD		0	
2-Nitroaniline	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
2-Nitrophenol	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
3-Nitroaniline	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
4-Bromophenyl Phenyl Ether	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
4-Chloro-3-Methylphenol	ug/l	40				<0.5	<0.5	2	0	None > LOD	None > LOD		0	
4-Chloroaniline	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
4-Chlorophenyl Phenyl Ether	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
4-Methylphenol	ug/l	100				<0.5	<0.5	2	0	None > LOD	None > LOD		0	
4-Nitroaniline	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
Azobenzene	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
Bis(2-ethylhexyl)phthalate	ug/l	1.3				<0.5	<0.5	2	0	None > LOD	None > LOD		0	
Butylbenzylphthalate	ug/l	20				<0.5	<0.5	2	0	None > LOD	None > LOD		0	
Carbazole	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
Dibenzofuran	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
Diethylphthalate	ug/l	200				<0.5	<0.5	2	0	None > LOD	None > LOD		0	
Dimethylphthalate	ug/l	800				<0.5	<0.5	2	0	None > LOD	None > LOD		0	
Di-N-Butyl Phthalate	ug/l	8				<0.5	<0.5	2	0	None > LOD	None > LOD		0	
Di-N-Octyl Phthalate	ug/l	20				<0.5	<0.5	2	0	None > LOD	None > LOD		0	
Hexachlorobenzene (HCB)	ug/l	0.05				<0.5	<0.5	2	0	None > LOD	None > LOD		0	
Hexachlorocyclopentadiene	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
Hexachloroethane	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
Isophorone	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
Nitrobenzene	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
n-nitrosodimethylamine	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
N-Nitroso-Di-N-Propylamine	ug/l					<0.5	<0.5	2	0	None > LOD	None > LOD			
Pentachlorophenol (PCP)	ug/l	0.4				<0.5	<0.5	2	0	None > LOD	None > LOD		0	
Phenol	ug/l	7.7				<0.5	<0.5	2	0	None > LOD	None > LOD		0	

A5 Appendix 5

Tabulated Soil Leachate Data

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-5
30/06/2015

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Geological Formation Legend

RTD	River Terrace Deposits

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		BH323	No. Data Exceeding EQS	No. Data Exceeding DWS
Location Type				BH		
Specimen Depth (m)		EQS	DWS	0.5		
Geology				RTD		
Cluster Code				2015 GI		
Inorganics						
Arsenic	ug/l	50	10	<1	0	0
Boron	ug/l	2000	1000	<20	0	0
Cadmium	ug/l	0.15	5	<0.08	0	0
Chromium	ug/l		50	<1		0
Copper	ug/l	10	2000	1.7	0	0
Lead	ug/l	1.2	10	<1	0	0
Mercury	ug/l	0.07	1	<0.5	0	0
Nickel	ug/l	4	20	1.5	0	0
Selenium	ug/l		10	<1		0
Zinc	ug/l	75		2.1	0	
Total Cyanide	mg/l	0.001	0.05		0	0
Cyanide Free	mg/l					
Total Diss Sulphur	ug/l					
pH	pH units	6-9	6.5-10	8.5	0	0
Phenols						
Phenols	mg/l	0.0077		<0.03	0	
BTEX						
Benzene	ug/l	10	1	<1	0	0
Toluene	ug/l	50		<1	0	
Ethylbenzene	ug/l	20		<1	0	
m,p xylenes	ug/l	30		<1	0	
O-Xylene	ug/l	30		<1	0	
TPH						
Aliphatics >C5-C6	ug/l			<0.1		
Aliphatics >C6-C8	ug/l			<0.1		
Aliphatics >C8-C10	ug/l			<0.1		
Aliphatics >C10-C12	ug/l			<0.1		
Aliphatics >C12-C16	ug/l			<0.1		
Aliphatics >C16-C21	ug/l			<0.1		
Aliphatics >C21-C35	ug/l			<0.1		
Aliphatics >C35-44	ug/l			<0.1		
Aromatics >C5-C7	ug/l			<0.1		
Aromatics >C7-C8	ug/l			<0.1		
Aromatics >C8-C10	ug/l			<0.1		
Aromatics >C10-C12	ug/l			<0.1		
Aromatics >C12-C16	ug/l			<0.1		
Aromatics >C16-C21	ug/l			<0.1		
Aromatics >C21-C35	ug/l			<0.1		
Aromatics >C35-44	ug/l			<0.1		
Total Aliphatic TPH	ug/l			<5		
Total Aromatic TPH	ug/l			<5		
Total petroleum hydrocarbons	ug/l			<10		
PAH						
Acenaphthene	ug/l			<0.1		
Acenaphthylene	ug/l			<0.1		
Anthracene	ug/l	0.1		<0.1	0	
Benz(a)anthracene	ug/l			<0.1		
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.1	0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.1	0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.1	0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.1	0	0
Chrysene	ug/l			<0.1		
Dibenzo(ah)anthracene	ug/l			<0.1		
Fluoranthene	ug/l	0.0063		<0.1	0	
Fluorene	ug/l			<0.1		
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.1	0	0
Naphthalene	ug/l	2		<0.1	0	
Phenanthrene	ug/l			<0.1		
Pyrene	ug/l			<0.1		
PAH 16 Total	ug/l			<2		

A6 Appendix 6

Site Walkover Photographs



Plate 01: CL5 – Golf Course View Looking South



Plate 02: CL5 – Golf Course View Looking North

Client:	Welsh Government			
Project:	M4CaN			
Job Ref:	JER6591	Checked By:	Date:	May 2015

A7 Appendix 7

Relevant Extract of Additional Environmental Data



Plate 01: Extract of 1998 aerial photograph



Plate 02: Extract of 2006 aerial photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Welsh Government

M4 Corridor around Newport

Land Contamination Assessment Report Annex D CL-6, Radiator Manufacturers and Adjacent Land

M4CaN-DJV-EGT-ZG_GEN-RP-EN-0008

At Issue | March 2016

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1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-6) known as the 'Radiator Manufacturers and Adjacent Land' hereinafter referred to as the Site.

1.1.2 The Site is located between chainage 4,700 and 5,800 (see Figure 1), within the grounds of an industrial estate including an operational radiator manufacturers and an existing road where extensive fly tipping has taken place.

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport project (M4CaN) (hereafter referred to as the 'Scheme'). The EIA is reported in the M4CaN Environmental Statement (ES) of which this document is an appendix to the chapter on Geology and Soils.

1.2.2 In 2014, a Preliminary Sources Study Report (PSSR, 2014) was prepared as an initial land contamination appraisal (Ove Arup and Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. In addition, this report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015). This report relates to the area defined on the Site Location Plan (Figure 1).

1.2.3 The overarching rationale and approach for the assessment of areas of land along the new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the ES).

1.3 Objectives

1.3.1 The key objectives of this report are set out below:

- Undertake a risk assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.
- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.
- To provide information to support the Ground Investigation Report (GIR) and Geotechnical Design Report (GDR) required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The remainder of this report is structured as follows:

- Section 2: Site Location and Description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Ground Investigations Work – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions – This section describes the main findings of the intrusive site investigations including the ground conditions encountered and significant visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessment.
- Section 9: Refined Site Conceptual Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations - This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and subsequent requirements for remediation / mitigation.

2 Site Location and Description

2.1.1 The Site comprises part of the Imperial Park Industrial Estate. It covers an area of approximately 64 hectares (ha) and is located south west of Duffryn and 350 m south of the existing M4. The north half of the Site is occupied by large industrial units and warehouses most of which is occupied by Quinn Radiators manufacturing plant. The south half is currently unused but is known to previously have contained large areas of disturbed ground and ponded areas. The southern area is bounded by an un-named and disused road which terminates further south. The location of the Site centred at National Grid Reference (NGR) ST280 840.

2.1.2 The Site elevation ranges from 20 m AOD in the north and east and 10 m AOD in the south and west. The Site is bounded by the A48 to the north, part of the industrial estate to the east and agricultural land to the west and south. The Site location is shown on Figure 1.

2.1.3 A walkover survey in May 2015 identified that the Site is largely used for industrial purposes (part of Imperial Park, industrial estate). The north of the Site comprises large industrial units used by Quinn Radiators, ALUK, Essentra and Smith News. The southern half of the Site is derelict land which includes stockpiles of demolition rubble and a number of reens and ponds. The south eastern corner of the Site was noted as being covered with reeds.

2.1.4 Access to Quinn Radiators and the southern area of land was obtained during the 2015 walkover. Fly tipping was observed along the road at the Site southern boundary including possible asbestos wastes. Quinn Radiators stores and uses approximately 160,000 litres of paint on Site within bunded above ground tanks and Intermediate Bulk Container's (IBCs) on pallets. The majority of the area owned by Quinn Radiators is covered by hardstanding. There was anecdotal evidence of paint within the ponds and reen to the south.

3 The Scheme

3.1.1 The Site is situated at approximate chainage 4,700 to 5,800. The construction of the new section of motorway is likely to comprise an embankment approximately 1-2 m high, as shown on Figure 1.

3.1.2 Generally, the works for the new section of motorway alignment will be along the southern end of the Site over the existing road. No works are proposed within the northern half where the current factory is located. The southern half will be part of the temporary land take which is to accommodate the Scheme's main construction compound.

4 Site History

4.1.1 The 2014 PSSR historical searches have been based on Ordnance Survey plans, literature reviews, information provided by Natural Resources Wales (NRW) (formerly Environment Agency Wales), Newport City Council and aerial photographic interpretation.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from Welsh Government. .

4.1.3 A summary of the Site history is presented in Table 1 below.

Table 1: Summary of Site History

Date	Use	Source of information
1843 - 1893	The Site comprises predominantly agricultural fields with a number of tracks, footpaths and field drains criss-crossing the area. Duffryn Lane runs north-south along the eastern boundary and cuts west into the southern centre of the Site to Great Pen-carn, a farm including a well and a small patch of woodland. The Nant-y-moor Reen runs north-south in the west of the Site with a small copse located in the centre of the Site alongside the eastern bank of the reen. Duffryn encroaches into the north western corner of the Site. Percoed Reen runs east-west along the southern boundary. The Site is surrounded by agricultural fields. To the south the fields are densely crossed by a network of drainage ditches and reens. A road runs northeast – southwest approximately 20m form the northern Site boundary. Duffryn is located and encroaches on the north western corner of the Site.	1:10,560 Historical Mapping
1891 - 1912	The land alongside the reen to the south is now marked as marshy. A small rectangular building has been developed in the centre of the eastern boundary along the road and another in the north eastern corner. A '**pump'** is now labelled at Great Pen-carn. A gravel pit is located approximately 10 m from the eastern Site boundary.	1:10,560 Historical Mapping
1904 - 1939	A small residential building has been developed in the centre of the western boundary.	1:10.560 Historical Mapping
1964 – 1965	A **Tank** is now labelled at Great Pen-carn in the southwest of the Site and a spring labelled in the centre of the eastern boundary. The gravel pit to the east of the Site appears to have been infilled as it is no longer marked.	1:10,560 Historical Mapping
1970 - 1973	No significant change A residential development entitled 'Cleppa park' has been developed approximately 30 m north of the Site.	1: 10,000 Historical Mapping
1979	No significant change	Aerial Photography
1981 - 1989	No significant change The M4 motorway has been developed approximately 300 m north of Site.	1 :10,000 Historical Mapping
1985 - 1996	No significant change A number of roads have been built and three lakes created adjacent to the east of the Site.	1 :10,000 Historical Mapping
1998	The LG semiconductor manufacturing plant is shown built on the north half of the Site. Nant-y-Moor Reen has been diverted to run along the western boundary of the Site.	2014 PSSR Aerial Photo interpretation

Date	Use	Source of information
		BBC News articles.
1998	**Extensive earthworks** including spoil heaps and excavations are shown in the southern half of the Site around Great Pen-carn with four ponds in the southwestern part of the Site. A road network has been constructed associated with the LG plant. Roads now run across the centre of the Site, within the southern boundary and beyond the Site boundary to the west, north and east.	Aerial Photography
2006	A number of industrial warehouses have been developed in the northern half of the Site. The southern section consists of rough sparsely vegetated ground. Earthworks / heaps are no longer visible in the south eastern area. The area around Great Pen-carn remains wooded. The longest N-S orientated pond has been infilled and the two ponds further to the west partially infilled, associated with construction in the northern area of the Site. A compound area of **spoil heaps / storage** associated with this construction is identified in the central area of the Site. **Partial infilling of the pond orientated E-W** in the southern area of the Site has occurred, with **earthworks** around the pond boundary. Electricity pylons have been erected along the south / western boundary. Fly tipping is observed along the disused road in the southern area of the Site. The Nant-y-moor reen no longer runs through the Site. Industrial units have been built adjacent to the east with residential development beyond. An electrical substation has been constructed approximately 30 m to the southeast. A residential development south of the M4 approximately 100 m north of the Site has been built.	Aerial Photography
2006	Final LG operation closes. Quinn Radiators establish their manufacturing plant in one of the LG buildings.	BBC News articles (2014 PSSR)
2007	Quinn Radiators expand the plant adding buildings to set up an insulation and cladding plant near its radiator business.	BBC News articles. Aerial Photo interpretation (2014 PSSR)
2009 - 2010	**Spoil heap and materials / rubble** is noted in the area previously identified as a compound associated with construction activity in the 2006 image (central area of the Site). Rectangular excavations up to approximately 25 m long identified in the eastern area. The buildings of Great Pen-carn have been **demolished**. The southern tip of the Site appears to be in pastoral use.	Aerial Photography
2014	No significant change. **Rubble from demolition of the buildings of Great Pen-carn remains on Site. Fly tipping in the southern area remains evident.**	Aerial Photography

Note: Potential sources of contamination are underlined. Those within the temporary and permanent land take are shown in bold.

4.1.4 The sources of information presented above supplement those used in the 2014 PSSR. In particular, images from 1998 onwards highlight extensive earthworks in the southern area of the Site and fly tipping along the southern boundary. Relevant extracts of photographs are presented in Appendix 8.

4.1.5 Historically the Site is located in proximity to areas which may have been bombed during World War II which is discussed in the Explosive Ordnance Threat Assessment Report (Bactec, 2014). This categorises the Site as medium risk with respect to unexploded ordnance.

5 Environmental Setting

5.1 Geology

5.1.1 British Geological Survey (BGS) data indicates that the Site is predominantly underlain by River Terrace Deposits (undifferentiated). A small area in the south is underlain by Tidal Flat Deposits and a strip of land running north-south across the Site (corresponding to the path of the Nant-y-moor reen prior to its re-routing) is underlain by Alluvium. Underlying the superficial deposits the bedrock at the Site comprises the St Maughans Formation of interbedded argillaceous rocks and sandstones in the north and the Mercia Mudstone Group in the south.

5.2 Hydrology

5.2.1 A field drain runs north-south along the Site's western boundary which flows onto the Site as Nant-y-moor Reen and follows the western boundary south to join Percoed Reen which flows east-west along the Site's southern boundary. There are a number of small ponds and drains in the southern area of the Site. The Gwent Levels (and SSSI designation) to the south consist of a large network of drainage ditches and reens.

5.3 Hydrogeology

5.3.1 NRW classifies the St Maughans Formation at the Site as a Secondary A Aquifer and the Mercia Mudstone Group as a Secondary B Aquifer. The River Terrace Deposits are classified as a Secondary A Aquifer and the Tidal Flat Deposits as a Secondary (undifferentiated) Aquifer. The soils at the Site are of intermediate leaching potential.

5.3.2 The Site does not lie within a groundwater source protection zone.

5.4 Environmental Information

5.4.1 The 2014 PSSR reports five pollution incidents within the Site. Two of these events, occurring in 2007 and 2009, involved chemically contaminated run-off from a containment and control failure, though it is not known who caused these. The chemicals are related to iron and steel manufacturing industry. One event location corresponds to the Nant-y-Moor Reen and the other was at the location of one of the existing ponded areas in the south west of the Site. There was no impact to air and soil and a minor impact to water caused by the two events.

5.4.2 In the south of the Site two more incidents involved sewer failures or overflows in 2005 and 2008. The incidents had minor and no impact to water land or air and would appear to be unrelated to the manufacturing plant at the Site.

5.4.3 The remaining event occurred in 2002 in the middle of the Site, in the south east corner of the manufacturing plant. The incident involved crude sewage overflow from a containment and control failure and had a minor impact, though it is not stated whether to land, air or water.

5.4.4 No landfills, discharge points or abstraction licences have been recorded within the Site.

5.4.5 No further environmental information relevant to this Site has been identified.

5.4.6 Residual levels of potential contamination are unlikely to be present associated with these historical pollution incidents with the possible exception of the minor pollution incident associated with the ponded areas in the south west of the Site which are included within the temporary land take of the Scheme.

6 Scope of Investigations

6.1 General

6.1.1 Two intrusive ground investigations have been undertaken within the southern end of the Site, along the existing disused road. No intrusive investigation has been completed within the Radiator Manufacturer land holding itself.

6.1.2 For the purpose of meeting the requirements of Volume 4, Section 1, Part 2 of the DMRB (HD22/08 – Managing Geotechnical Risk – 2008 (Highways Agency, 2008), the historical data used to support the 2014 PSSR has been differentiated from the additional 2015 Supplementary Ground Investigation data (Geotechnical Engineering, 2015).

6.2 Scope of Works

6.2.1 The various intrusive ground investigations undertaken along the new motorway alignment are summarised in Table 2.

Table 2: Site Investigation Summary

Date	Contractor	Site Location	Boreholes	Window Sampler	Trial Pits	Sampling
1997	Norwest Holst	South	BHD1			
2007	Norwest Holst	South	SBHC01 CP, SBHC01 RC, SBHC02 CP, SBHD01 CP, SBHD02 CP	-	STPD01	Soil
2015	Geotechnical Engineering	South	BH324, BH325, BH325A, BH325B, BH325C, BH326 BH328	-	TP315, TP316, TP317	Soil, groundwater

6.2.2 Exploratory locations are shown on Figure 1. It is noted that BHD1, SBHC01, SBHD02 and BH328 are located within 25 m from the Site boundary and the data has been included in this report for completeness given their close proximity.

6.2.3 The construction details of the monitoring wells installed within boreholes are summarised in Table 3.

Table 3: Summary of Borehole Construction Details

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
SBHC01 RC (off site)	19	15.1	7.65	8.25	St Maughans Formation
BH324	35	15	1	2.1	Made Ground / River Terrace Deposits
	50		8.8	15	St Maughans Formation
BH325C	35	21	3.5	4.5	Tidal Flat Deposits
	50		12	21	Mercia Mudstone Group

6.3 Surface Water Quality Monitoring

6.3.1 Surface water quality sampling was undertaken at sampling points R3 and R4 located approximately 40 m to the south and 400 m south of the Site respectively during previous monitoring rounds (Titan, 2008). An additional five locations were sampled in 2015 by RPS (Appendix 16.2 of the ES). The surface water sampling locations are shown on Figure 1.

6.3.2 Surface water quality monitoring was undertaken on three occasions at the locations shown in Table 4 during winter 2007 and spring and summer 2008.

Table 4: Surface Water Monitoring Locations

Surface water location ID	Monitoring Round	Location description	Comments
R3 / IDB132	E1, E2, E3, E4	Located on Nantymoor Reen, approximately 40 m south of the Site.	Flow was noted as slack to slow.
R4 / IDB128	E1, E2, E3, E4	Located on Percoed Reen, approximately 400 m southwest of the Site.	Flow was noted as slack to slow.
4.2 / IDB132	Q1, Q2	Located 100 m north of the Site on Nantymoor Reen.	Flow noted as slack to slow.
4.3 / IDB132	Q1, Q2	Located approximately 40 m southwest of the Site on Nantymoor Reen.	Flow noted as slack to slow.
4.4 / IDB128	Q1, Q2	Located 460 m southwest of the Site on Percoed Reen.	Flow noted as slack to slow.
5.1 / IDB128	Q1, Q2	Located on the southern Site boundary on Percoed Reen.	No flow noted or attainable with flow meter.
6.1 / IDB128	Q1	Located on the southern Site boundary on Percoed Reen.	No flow noted or attainable with flow meter.

6.3.3 The surface water chemical results are presented in the baseline surface quality monitoring interim report by Titan Environmental Surveys Limited (Titan, 2008),

which also presents the baseline water quality monitoring programme of watercourse located near the Scheme. A summary of the surface water quality screening for both the Titan monitoring results and the data collected by RPS in 2015 at the locations included within Table 4, are discussed in Section 8. The full dataset of water quality data collected for the Scheme is included within the Baseline Water Environment Report (Appendix 16.2 of the ES).

6.4 Field Testing

6.4.1 Monitoring of Volatile Organic Compounds (VOCs) was undertaken on nineteen soil samples from BH324, BH325, BH325A, BH325B, BH325C, TP315, TP316 and TP317 between ground level and 2.5 mbGL.

6.5 Groundwater Monitoring

6.5.1 A summary of the groundwater sampling, groundwater monitoring and ground gas monitoring rounds undertaken at the selected boreholes is shown in Table 5.

Table 5: Summary of Monitoring Rounds

Location Ref.	Number of rounds (date of sampling)	Monitoring details	Notes
SBHC01 RC	**3 no.** No sampling	Groundwater levels	-
BH324 (35 mm)	**4 no.** 26th February 2015, 5th March 2015, 12th March 2015, 5th May 2015	Groundwater sampling & levels Soil gas	Gas monitoring in 35 mm shallow installation only
BH324 (50 mm)			
BH325C (35 mm)	**4 no.** 27th February 2015, 6th March 2015, 13th March 2015, 5th May 2015	Groundwater sampling & levels Soil gas	Gas monitoring in 35 mm shallow installation only
BH325C (50 mm)			

6.6 Laboratory Chemical Testing

6.6.1 A summary of all laboratory analysis undertaken on soils, groundwater, leachate and surface water from the previous site investigations is provided in Table 6.

Table 6: Summary of Previous Investigation Sampling

Site investigation date	No. of soil samples	No. of leachate samples	No. of water samples	Suites of testing
2008	3	-	-	Metals, asbestos
2015	15	2	11	Metals, PAH, TPH, asbestos, pH, cyanide, organic matter, BTEX, phenols, PCBs

Soil Analysis

6.6.2 The following sections summarise the laboratory analytical results for soil samples collected during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 2 with the supporting laboratory certificates available in the relevant original ground investigation reports.

6.6.3 To inform the conceptual ground model, the analytical data from the Made Ground has been assessed separately from those of the natural soils (namely the Tidal Flat Deposits and River Terrace Deposits).

6.6.4 The available information used in this assessment is summarised in Table 7:

Table 7: Summary of Analytical Soil Data

Formation Unit	Number of Soil Analysis per Analytical Suite – 2015 data / All Data							
	Metals & inorganics	Asbestos	PAH	TPH	Phenol	VOC	SVOC	BTEX
Made Ground	12 / 15	10 / 13	12 / 12	12 / 12	8 / 8	2 / 2	1 / 1	2 / 2
RTD	1 / 1	0 / 0	1 / 1	1 / 1	0 / 0	0 / 0	0 / 0	0 / 0
TFD	2 / 2	0 / 0	2 / 2	1 / 1	1 / 1	1 / 1	0 / 0	1 / 1

Soil Leaching Analysis

6.6.5 The leachate results available are for samples of Made Ground only. The available information is presented in Appendix 6 and summarised in Table 8.

Table 8: Summary of Analytical Leachate Data

Formation Unit	Number of Soil Leachate Analysis per Analytical Suite – 2015 data				
	Metals & inorganics	Polycyclic Aromatic Hydrocarbons	Total Petroleum Hydrocarbon	Phenol	BTEX
Made Ground	2	2	2	2	2

Groundwater Analysis

6.6.6 The following sections summarise the laboratory analytical results for groundwater samples collected during the 2015 intrusive investigation. The available data has been tabulated and is presented in Appendix 3 with the supporting laboratory certificates available in the relevant original reports.

6.6.7 The available groundwater data is summarised in Table 9.

Table 9: Summary of Analytical Groundwater Data

Groundwater Unit	Number of Groundwater Analysis per Analytical Suite (number of well locations) – 2015 Data					
	Metals & inorganics	PAH	Total Petroleum Hydrocarbon	Phenols	BTEX	PCBs
Made Ground	3 (1)	3 (1)	3 (1)	2 (1)	3 (1)	1 (1)
Superficial Deposits (TFD)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)
Groundwater (Bedrock)	5 (2)	5 (2)	5 (2)	4 (2)	5 (2)	3 (2)

Surface Water Analysis

6.6.8 There are no surface water samples taken within the Site boundary. Table 10 summarises the surface water sampling that has been undertaken within the vicinity of the Site.

6.6.9 Sampling has been undertaken on Nantymoor Reen and Percoed Reen, located south and southwest of the Site respectively. Nantymoor Reen runs through the Site and connects to Percoed Reen to the south.

Table 10: Summary of Analytical Surface Water Data

Surface Water System	Number of Water Analysis per Analytical Suite (number of locations) – 2015 data / All GI data				
	Metals & inorganics	Water quality parameters	Polycyclic Aromatic Hydrocarbons	Total Petroleum Hydrocarbon	BTEX
Percoed Reen	3 (3) / 7 (4)	3 (3) / 7 (4)	3 (3) / 3 (3)	3 (3) / 7 (4)	3 (3) / 3 (3)
Nantymoor Reen	2 (2) / 6 (3)	2 (2) / 6 (3)	2 (2) / 2 (2)	2 (2) / 6 (3)	3 (3) / 3 (3)

6.7 Gap Analysis of Available Data

6.7.1 Ground investigation data is available only for the southern end of the Site within the new section of motorway footprint. No data is available for the temporary land take area to the north of the Scheme's alignment in the area to be used for the contractor's main compound.

6.7.2 It is recommended that additional investigations are undertaken to mitigate this existing data gap.

7 Ground Conditions

7.1 Geology

7.1.1 The geological logs for all available exploratory holes excavated on or in close proximity to the Site are provided in Appendix 1. The observed geological sequence is consistent with that discussed in the 2014 PSSR report and is summarised in the following sections. Information from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) has also been used.

7.1.2 The conceptual ground model included within the 2014 PSSR report has been updated in light of the 2015 information and is included within Figure 2.

7.1.3 It is noted the existing data covers a narrow strip along the southern boundary of the Site east to west, and as such provides no details on the geological sequence beneath the remaining areas.

Flytipping

7.1.4 Flytipping material is identified to be present along the existing road based on walk over survey and aerial photographs. No intrusive investigation has been undertaken to confirm composition.

Made Ground

7.1.5 Made Ground was encountered at all locations with the exception of SBHD02CP and BHC8 where Topsoil was encountered.

7.1.6 Within the footprint of the existing road, the Made Ground was typically encountered as a layer of hardstanding (predominantly tarmacadam of the existing road) over a gravel including brick and concrete and slag and clinker in SBHC01, SBHC02, BH325, BH325A and BH325B. Thicknesses varied between 1.2 and 3.9 m.

Superficial Deposits

7.1.7 An east to west variation in the superficial deposits is present. No superficial deposits were encountered in the western area of the southern end of the Site (SBHC01, SBHC02, BHC6) with Made Ground overlying directly the St Maughans Formation rockhead. It is noted that borehole BH324 reports the presence of granular River Terrace Deposits (to 3.5 m bGL) which may be reworked natural deposits placed as part of the road construction (i.e. Made Ground).

7.1.8 Heading eastwards along the Scheme, Tidal Flat Deposits (TFD) is encountered in the boreholes. This generally comprised organic silty clays with peat bands. Peat bands were typically less than 0.5 m in thickness although up to 1.5 m was identified in SBHD01. The formation is considered to be thickening eastwards (11.7 m bGL in BH326). Borehole SBHC02 encountered the TFD to be 0.1 m in thickness and probably demarks the westward extent of the formation.

7.1.9 The TFD is generally underlain by a 2-3.5 m of granular deposits which comprised sand and gravel. These deposits are considered to represent

Glaciofluvial Deposits (GFD) although the boreholes records refer to the stratum as River Terrace Deposits or Fluvial Alluvium.

Bedrock

7.1.10 Bedrock was encountered as weathered mudstones of the St Maughans Formation in the west at shallow depths of between 3.15 and 4 m bGL. To the east the bedrock was encountered as weathered mudstones and sandstones of the Mercia Mudstone Group at a greater depth of between 8 and 12.9 m bGL.

Geological Sequence Summary

7.1.11 The general geological sequence identified during the previous ground investigations along the southern Site boundary are summarised in Table 11.

Table 11: Summary of Geological Sequence (Southern End)

Unit	Description	Thickness Range (m)	Basal depth (m bGL)
Made Ground (present within the existing road footprint)	Predominantly granular includes mudstone, brick and concrete.	1.2 - 3.9	1.2 - 3.9
Superficial Deposits (TFD)	Blue grey organic clay with peat bands.	Absent - 7.75 (thickness increasing eastwards)	Absent - 9.4 (basal depth increasing eastwards)
Superficial Deposits (GFD)	Grey clayey gravel and sand.	2 - 4.65 (present beneath TDF only)	Absent - 12.9
Bedrock (St Maughans Formation) – present in northern half of the southern Site boundary)	Reddish brown clay / mudstone	>3.45 - >11.6	unproven
Bedrock (Mercia Mudstone Group) – present in southern half of the southern Site boundary	Reddish brown weathered mudstone	>0.9 - >15.1	unproven

7.1.12 It is anticipated that the southern half of the former earthwork area (temporary land take for the proposed construction compound) is underlain by Superficial Deposits with a thickening sequence going south eastwards. It is likely that reworked natural soils and Made Ground are present across much of this area. The northern half of the former earthwork area and the area occupied by the radiator factory are likely to have no superficial deposits with Made Ground, if present, overlaying directly the weathered St Maughans Formation.

7.2 Visual and Olfactory Evidence of Contamination

7.2.1 A summary of visual and olfactory evidence of contamination encountered during the previous ground investigations is summarised in Table 12.

Table 12: Visual and Olfactory Evidence of Contamination Summary

Location ID	Depth (m bGL)	Strata	Evidence of Potential Contamination
SBHC01 CP	0 - 3.15	Made Ground	Slag and concrete.
SBHC02 CP	0 - 3.9	Made Ground	Slag and charcoal.
SBHD01 CP	0.2 - 1.9	Made Ground	Slag and plastic.
BH324	0 - 0.55	Made Ground	Tarmacadam.
BH325	0 - 1.65	Made Ground	Tarmacadam, clinker and slag with a strong chemical odour between 0.25 - 1.2 m bGL.
BH325A	0 - 0.8	Made Ground	Tarmacadam, clinker and slag.
BH325B	0 - 1.5	Made Ground	Tarmacadam, clinker and slag with a slight chemical odour between 0.3 - 1.5 m bGL.
BH325C	0 - 0.3	Made Ground	Tarmacadam.
BH325C	2.5 - 3	Made Ground	Tarmacadam gravel.
BH326	0 - 0.5	Made Ground	Tarmacadam.
TP315	0 - 1.5	Made Ground	Tarmacadam, brick and concrete.
TP316	0 - 0.3	Made Ground	Tarmacadam.
TP317	0 - 0.3	Made Ground	Tarmacadam.

7.2.2 PID monitoring was undertaken on eighteen soil samples from Made Ground and one soil sample from Glaciofluvial Deposits. The PID meter recorded low levels of VOCs between 0.2 and 4.2 ppm.

7.2.3 Full details and observations noted during the drilling and trial pitting are presented on the exploratory logs attached in Appendix 1.

7.3 Gas Monitoring

7.3.1 The gas monitoring dataset collected during each of the previous three monitoring rounds in 2015 at the off site boreholes is summarised on the field data sheets provided in Appendix 2. The maximum gas concentrations (minimum for oxygen) are presented in Table 13.

Table 13: Summary of Gas Monitoring Data (off site)

Location ID	Flow (l/hr)	VOCs (ppm)	CH_4 (%/vol)	Peak LEL (%)	CO_2 (%/vol)	O_2 (%/vol)	CO (ppm)	H_2S (ppm)
	Max	Max	Max	Max	Max	Min	Max	Max
BH324 (shallow)	0.4	5.2	0.2	88.3	0.9	11.3	10	0
BH325C (shallow)	3.0	1.0	4.3	98.4	3.9	9.9	10	0

7.4 Groundwater

Groundwater Encountered During Investigation

7.4.1 Groundwater strikes encountered during the advancement of the excavation locations are detailed in Table 14.

Table 14: Summary of Groundwater Strike Data

Location	Strike Depth (m bGL)	Geological Formation	Level after 20 minutes (m bGL)	Comments
SBHC01 CP	4.2	St Maughans Formation	4.2	Water level recorded at 5.2 m bGL when borehole completed (6.5 m bGL)
SBHC01 RC	4.5	St Maughans Formation	-	Water level recorded at 3.2 m bGL when borehole completed (15.1 m bGL)
SBHC02 CP	7	St Maughans Formation	6.5	-
SBHD01 CP	9.4	Glaciofluvial Deposits	5.2	Water level recorded at 5.2 m bGL when borehole taken into the top of the Mercia Mudstone (12.9 m bGL)
	-	-	-	Water level recorded at 5.7 m bGL when borehole completed (16.4 m bGL)
SBHD02 CP	-	-	-	Water level recorded at 0.8 m bGL when borehole completed (13.5 m bGL) into the Mercia Mudstone
BH325C	4	Tidal Flat Deposits	3.2	-

Groundwater Level Dataset

7.4.2 The groundwater level data used to consider site conditions is provided in Appendix 3 and summarised in Table 15.

Table 15: Summary of Groundwater Level Data

Location	Installation[#1]	Depth of response zone (m bGL) and Geological Formation	No. Measurements	Minimum Depth (m bGL)	Maximum Depth (m bGL)	Comments
SBHC01 RC (off-site)	19 mm	7.6 - 8.25 St Maughans Formation	6	2.45	2.66	
BH324	(S) 35 mm	1 - 2.1 Made Ground	4	1.10	1.26	
	(D) 50 mm	8.8 - 15 St Maughans Formation	3	2.17	2.38	
BH325C	(S) 35 mm	3.5 - 4.5 Tidal Flat Deposits	4	2.95	3.54	

Location	Installation[#1]	Depth of response zone (m bGL) and Geological Formation	No. Measurements	Minimum Depth (m bGL)	Maximum Depth (m bGL)	Comments
	(D) 50 mm	12 - 21 Mercia Mudstone	3	3.10	3.59	

Notes. 1: S denotes a shallow installation and D denotes deep installation;

Groundwater Summary

7.4.3 Perched groundwater is evident from strikes recorded within the Tidal Flat Deposits with standing levels of around 3 m bGL.

7.4.4 Groundwater was encountered within the Glaciofluvial Deposits and the Mercia Mudstone beneath at depths of 4.2 m bGL to 9.4 m bGL with resting level at 3.1-3.59 m bGL. This implies that the groundwater within the Glaciofluvial Deposits and/or Mercia Mudstone is confined by the overlying low permeability Tidal Flat Deposits.

7.4.5 A shallow perched groundwater body is recorded within the Made Ground with resting water levels of between 1.1 – 2.66 m bGL.

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The outline Conceptual Site Model (CSM) presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the Scheme. The main alterations to the 2014 PSSR model are summarised as follows:

- Additional source of contamination from observed fly tipping in the south of the Site.
- Proposed use of the Site as a construction compound.
- Proposed band drains to be used to accelerate surcharging soft soils considered as new pathway.
- Additional gas pollutant (methane and/or carbon dioxide) considered from peat.
- Sub-artesian groundwater within the Glaciofluvial Deposits and Mercia Mudstone considered within the Scheme.
- Additional pollutant considered as VOCs from the Radiator Manufacturers associated with paints as identified during the 2015 walkover survey.
- Update of the source/pathway/receptor linkages taking account of the above and more detailed assessments.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 The following potential contaminant sources have been identified at the Site:

- Made Ground forming the existing road identified during all investigations may be a potential source of contamination onsite.
- Peat and organic soils within the Tidal Flat Deposits may be a potential source of ground gas.
- Infilled ponds, pond sediments and pond waters.
- Made Ground, if present within the Radiator Manufacturing Plant in the north of the Site or the former earthwork area to the south of the Site.
- VOCs from the use of paints at the Radiator Manufacturing Plant. Residual paint was identified in the pond area during the 2015 walk over survey.
- Pollution incidents including chemically contaminated runoff related to iron and steel manufacturing may mean residual levels of contamination may be present.
- Fly tipped materials within the Site may contain asbestos.

8.2.2 In addition to the above sources, the quality of surface waters, perched groundwater and the deeper aquifer within the Glaciofluvial Deposits and Mercia Mudstone bodies may influence or impact the quality of the others (for instance the groundwater within the Glaciofluvial Deposits and Mercia Mudstone is saline whilst the surface water is not). Surface water, perched groundwater and deeper aquifer are therefore regarded as a source of possible contaminants as well as receptors.

Potential Receptors

8.2.3 Receptors during the construction and the operational stages of the Scheme have been considered:

Construction

- Construction workers during site development works.
- Off site general public / workers adjacent to construction works.
- Surface water features (drainage ditches and Reens).
- Groundwater (Secondary B aquifer) within bedrock.

Operational

- General public Site end users.
- Maintenance workers.
- Off site general public / workers adjacent to permanent land take.
- Groundwater within the St Maughans Formation / Mercia Mudstone.
- Surface water features (drainage ditches and Reens).

Potential Pathways

8.2.4 Pathways during the construction and the operational stages of the Scheme have been considered.

- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils possible during construction and maintenance works.
- Dermal contact, ingestion, inhalation pathways possible for general public end users and adjacent general public/workers. The latter expected to be limited to be from soil dust only;
- Leaching of contaminants from the Made Ground to Nant y Moor Reen and shallow groundwater bodies.
- Surface water run-off into Nant y Moor Reen.
- Vertical or lateral migration of ground gas associated with Made Ground and peat / organic soils.
- Vertical migration of leachate / perched groundwater from the Made Ground into groundwater bodies.
- Vertical migration of groundwater from within the Glaciofluvial Deposits and Mercia Mudstone possibly recharging perched groundwater and/or saturating the Made Ground due to band drain installation.

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the other data described herein, the following risk evaluation has also been considered:

- The Site has been subject to a range of potential contaminating uses including use as a radiator manufacturing plant operations, earthworks operations, road construction and fly tipping.
- It is assumed that fly tipped material will have been removed prior to the construction phase to a licenced suitable waste disposal facility. Risks associated with fly tipping may have lead to residual levels of contamination being present in an area within the construction compound.
- The previous ground investigation information covers the southern end of the Site (within the footprint of the new section of motorway), but there is no data covering the temporary land take to be used as a construction compound.
- At the Site there have been 5 reported pollution incidents including sewer overflows and chemically contaminated runoff related to iron and steel manufacturing.
- The Made Ground encountered to date relates to the existing road which is located partially beneath the footprint of the new motorway alignment. As such part of the Made Ground is to be left in place or excavated and reused subject to satisfying suitability for reuse criteria.
- Tidal Flat Deposits are classified as non-productive and overlie a secondary aquifer associated with the Glaciofluvial Deposits and Mercia Mudstone bedrock.
- Perched groundwater within the Tidal Flat Deposits is not considered a water resource due to its anticipated low vertical hydraulic continuity with the aquifer beneath, low permeability and low storage capacity.
- The low permeability Tidal Flat Deposits thickness which separates the Made Ground and deeper aquifer varies and is anticipated to be absent over the northern half of the Site.
- Groundwater within the Glaciofluvial Deposits and Mercia Mudstone bedrock is confined by the Tidal Flat Deposits.
- The flanks of the proposed new section of motorway embankment and overlying hardstanding is to be placed over most of the motorway corridor which will reduce pathways to motorway users and maintenance personnel. The remaining areas including outside embankment are to be covered by clean soils for planting (landscaping).
- Risk of increase flux of gas emission due to induced consolidation of organic materials within the Made Ground and Tidal Flat Deposits from the proposed surcharge loading.

8.4 Human Health Risk Assessment

8.4.1 The rationale and approach for the human health (Tier 2) screening assessment is detailed in the Land Contamination Preliminary Assessment Report (Appendix

11.1 of the ES). Soil chemical analysis results and the screening results of the generic Tier 2 human health risk assessment are presented in Appendix 2. All exceedances to the relevant generic risk assessment criteria are summarised in Table 16.

Table 16: Summary of Human Health Soil Screening Exceedances

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Locations of Exceedances
Chromium	mg/kg	5.5 - 57	33	3 (18)	BH326, BH325C, TP315
pH	pH units	7.3 - 11.6	6 - 9	11 (16)	SBHC02, BH325B, BH325C (x2), TP315, TP316 (x2), TP317 (x3)

8.4.2 The total chromium concentrations exceeded the screening criteria of 33 mg/kg in 3 samples (two samples of Made Ground and one of Tidal Flat Deposits). The screening criterion is based upon the more toxic and anthropogenic hexavalent chromium and thus the criterion is very conservative. The highest concentration at the Site was in natural soil (sample BH325C taken from 3 m depth). The sample above taken from Made Ground (sample BH325C taken from 2 m depth) only had a concentration of 11 mg/kg. Consequently chromium concentrations are considered to be within normal background data range and therefore are not considered to represent a contaminant of concern.

8.4.3 The Made Ground was found to be alkaline at a number of locations.

8.4.4 No other exceedances of the applied assessment criteria have been identified.

8.4.5 No asbestos fibres were detected visually or in samples (13 no.) analysed in the laboratory from the previous ground investigations.

8.5 Controlled Waters Screening Assessment

8.5.1 The rationale and approach for the controlled waters (Tier 1) screening assessment is detailed in the Land Contamination Preliminary Assessment Report (Appendix 11.1 of the ES) and the groundwater chemical results are presented in Appendix 3. All exceedances to the relevant criteria are summarised in Table 17, Table 18 and Table 19 for soil leachate, groundwater and surface waters, respectively.

8.5.2 Where an Environmental Quality Standard (EQS) is dependent on water hardness (i.e. some heavy metals), the hardness of the surface water receptor should normally be used. The Baseline Water Environment Report (Appendix 16.2 of the ES) indicates surface water to be generally moderately hard with hardness concentrations within a range of 100 to 150 mg/l as calcium carbonate. Therefore EQSs for this water hardness range have been used for screening purposes.

Soil Leaching Results

8.5.3 Two soil samples from Made Ground were subjected to leachate analysis. The majority of the soil leachate results were below the screening criteria, with the exception of the contaminants in Table 17.

Table 17: Controlled Waters Screening Exceedances - Soil Leachate

Determinant	Units	Range	EQS	DWS	No. exceeded EQS (Total number of results)	Location	No. exceeded DWS (Total number of results)	Location
Cadmium	ug/l	<0.08 - 0.25	0.15	5	1 (2)	TP317	0 (2)	-
Selenium	ug/l	4.5 - 13	-	10	-	-	1 (2)	TP317
Lead	ug/l	7.7 - 21	1.2	10	2 (2)	TP315, TP317	1 (1)	TP317
Zinc	ug/l	62 - 340	75	-	1 (2)	TP317	-	-
pH	pH units	8.3 - 12	6-9	6.5-10	1 (2)	TP317	1 (2)	TP317

8.5.4 Cadmium, lead, zinc, selenium and pH were found to exceed the Environmental Quality Standards and Drinking Water Standards within the samples of Made Ground which may pose a potential risk to controlled waters.

8.5.5 The laboratory detection levels for mercury, cyanide, phenols and some PAHs are higher than the applied screening criterion.

Groundwater Results

8.5.6 Groundwater analysis results have been assessed from samples collected over three rounds of groundwater monitoring in boreholes, BH324 and BH325C, undertaken in 2015. The groundwater samples were taken from the bedrock (both St Maughans Formation and Mercia Mudstone Group) and the perched groundwater within the Tidal Flat Deposits and the Made Ground. It is noted that the reported data did not differentiate between the analytical results of the shallow and deep installations on two of the three monitoring rounds for either borehole. As such the analytical results have been considered as 'undifferentiated' for these two monitoring rounds.

8.5.7 A summary of the exceedances of the screening criteria from all available ground results relating to the Site is presented in Table 18 and are discussed below.

Table 18: Groundwater Screening Exceedances

Determinant	Units	Range	EQS	DWS	No. exceeded EQS (Total number of results)	Location of Exceedances	No. exceeded DWS (Total number of results)	Location of Exceedances
Perched Groundwater (Tidal Flat Deposits)								
Arsenic	ug/l	2.4 - 17	50	10	0 (3)	-	3 (3)	BH325C
Boron	ug/l	370 - 41,000	2000	1000	1 (3)	BH352C	1 (3)	BH352C
Chromium	ug/l	<1 - 110	-	50	-	-	1 (3)	BH352C
Nickel	µg/l	12 - 32	4	20	3 (3)	BH325C	1 (3)	BH325C
Selenium	ug/l	4.1 - 48	-	10	-	-	1 (3)	BH325C
Chloride	mg/l	19,000 - 21,000	250	250	3 (3)	BH325C	3 (3)	BH325C
Ammoniacal Nitrogen	mg/l	4400 - 5400	0.6	-	3 (3)	BH325C	-	-
Copper	ug/l	<1 - 25	10	2000	1 (3)	BH325C	0 (3)	-
Phenols[1]	mg/l	<0.03 - 40	0.0077	-	1 (3)	BH325C	-	-
Perched Groundwater (Made Ground)								
Copper	ug/l	<1 - 11	10	2000	1 (3)	BH324	0 (3)	-
Chloride	mg/l	19,000 - 33,000	250	250	2 (2)	BH324	2 (2)	BH324
Ammoniacal Nitrogen	mg/l	26 - 300	0.6	-	2 (2)	BH324	2 (2)	BH324
Aquifer (St Maughans Formation / Mercia Mudstone Group)								
Chloride	mg/l	15000 - 24000	250	250	4 (4)	BH324, BH325C	4 (4)	BH324, BH325C
Ammoniacal Nitrogen	mg/l	18 - 210	0.6	-	4 (4)	BH324, BH325C	-	-

Note: [1] based on phenol criteria

8.5.8 The review of the groundwater chemical testing results indicates that the perched water within the Made Ground has elevated concentrations of copper, chloride and ammoniacal nitrogen.

8.5.9 The perched groundwater within the Tidal Flat Deposits had exceedances in metals (arsenic, boron, chromium, copper, nickel and selenium), inorganics (chloride and ammoniacal nitrogen) and total phenols. The latter has been compared against the criterion for phenol which is considered a conservative approach.

8.5.10 The aquifer within the St Maughans Formation / Mercia Mudstone had elevated inorganics (chloride and ammoniacal nitrogen).

8.5.11 All BTEX, TPH, PAHs and PCBs were at or below the laboratory limit of detection.

8.5.12 Although the Made Ground samples analysed had leachable lead, cadmium, selenium and zinc, only selenium is reported to be in exceedance of the screening criteria for one groundwater sample from BH325C.

8.5.13 The perched groundwater within the Tidal Flat Deposits and the groundwater aquifer quality status is in general keeping with the baseline quality seen within

this area of Newport (Appendix 16.2 of the ES). The current information indicates no obvious impact to groundwater from the land use of CL-6.

8.5.14 The presence of elevated chloride concentrations indicates possible saline intrusion within the perched water in the Made Ground, perched groundwater and deeper aquifer.

Surface Water

8.5.15 A summary of the exceedances identified during the surface water quality screening assessment undertaken for the Site is presented in Table 19. This includes the results for the seven monitoring locations situated on Nantymoor Reen and Percoed Reen.

8.5.16 The results for all the sample locations are also presented in the Baseline Water Environment Report (Appendix 16.2 of the ES).

Table 19: Summary of Surface Water Screening Exceedances

Parameter	Unit	No. Analyses	No. Analyses Above LOD	Min Conc	Max Conc	Location & Round with Max Conc	EQS	No. Analyses Exceeding EQS	CCW Trigger Levels	No Analyses Exceeding CCW Trigger Level	DWS	No Analyses Exceeding DWS
Cadmium	ug/l	13	1	<LOD	0.7	E2 / R3	0.15	1	5	0	5	0
Phosphorus	mg/l	5	5	273	100	Q1 / 5.2	120	4	-	-	-	-
Dissolved Oxygen	%	8	8	49.7	108.9	E3 / R3	60	2	-	-	-	-
Nitrate as N	mg/l	8	8	0.4	3.3	E2 / R3	-	-	1	7	50	0
Nitrate as NO_3	mg/l	13	12	1.65	14.61	E2/R3	-	-	1	12	50	0
TON	mg/l	9	8	0.4	3.3	E2/R3	-	-	2	6	50	0

8.5.17 The quality for Percoed Reen is generally good, with only phosphorus exceeding its respective EQS. A single exceedance was recorded for fluoranthene above its EQS value, at location 6.1. TPH were recorded below the limit of detection at Percoed Reen. Phosphourous also recorded exceedances on the Nantymoor Reen.

8.5.18 Dissolved Oxygen (saturation) was also recorded below the EQS of 60% at one occasion on Nantymoor Reen and Percoed Reen respectively during the Titan monitoring round.

8.5.19 Nitrates (as N and NO_3) and Total Oxidised Nitrogen were recorded above their CCW trigger levels (for additional information see Baseline Environment Report (Appendix 16.2 of the ES) in both Percoed Reen and Nantymoon Reen on several occasions, though not above their respective DWS.

8.5.20 Both Percoed Reen and Nantymoor Reen located are considered to be in hydraulic continuity with the Site. The surface water quality for both reens is considered to be in keeping with the results recorded in surrounding area with no obvious evidence of any impact that may be attributed to the Site.

8.6 Gas Risk Assessment

8.6.1 The only ground gas data available for the Site relates to boreholes BH324 and BH325C. These have monitoring well response zones within the Made Ground and Tidal Flat Deposits respectively. Of the four number monitoring rounds available the following observations have been made:

- No monitoring was undertaken during low barometric pressures (<1000 mb) with the lowest conditions being 1002 mb. As such worst case atmospheric conditions for potential ground gas generation may not have been monitored.
- Gas flow was generally low or absent with the exception of the March 2015 monitoring round for BH325C which recorded an initial peak flow of 3 l/hr before returning to 0 l/hr.
- Methane has been recorded above the 1 % screening criterion during the March 2015 monitoring round for BH325C associated with the Tidal Flat Deposits to a peak of 4.3 % reducing to 2.6 %. An LEL concentration of up to 96.1 % was also recorded during this monitoring round. Within the Made Ground, the methane was generally absent with peak of up to 0.2 %.
- Carbon dioxide is below the 5 % screening criterion (peak recorded at 3.9 %).
- Trace Volatile Organic Compounds of up to 5.2 ppm have been recorded.
- Hydrogen sulphide was not detected throughout the monitoring.
- Carbon monoxide was recorded at 10 ppm for the February 2015 monitoring round for BH324 and BH325C before returning to zero. Zero was recorded for both boreholes for all other monitoring rounds.
- Depleted oxygen levels were recorded in the boreholes with minimum of 9.9 % for BH325C and 11.3 % for BH324.

8.6.2 The monitoring data identified the presence of marginally elevated methane concentration, which may be associated with the organic content of the Tidal Flat

Deposit. The recorded levels and flows are considered within the expected gas regime for the ground conditions based on that observed elsewhere along the Scheme (Geotechnical Engineering, 2015).

8.6.3 The gas regime at the Site does not appear to have been influenced by previous historical uses and is instead driven by soil gas within natural soils. A gas risk assessment has been undertaken and is set out within the Land Contamination Assessment Report (Appendix 11.1 of the ES).

8.7 Summary

8.7.1 Moderate levels of potentially leachable contaminants, lead, cadmium, selenium and zinc have been identified from the Made Ground material.

8.7.2 The perched water, groundwater and the deep groundwater quality are identified to be similar and have elevated levels of some metals, organic and inorganic contaminants albeit at background levels observed elsewhere. Both the aquifer and perched waters in the Tidal Flat Deposits are saline whereas the surface water is not saline indicating no current hydraulic connectivity.

8.7.3 Elevated methane concentrations, carbon dioxide concentrations and gas flow rates considered at levels typical for the peat and organic soils of the Tidal Flat Deposits. The risks associated with ground gas are considered to be moderate for construction workers and low for other potential receptors during construction and operation.

8.7.4 The surface water quality within Percoed Reen and Nantymoor Reen is consistent with other reens in the area, and not considered to have been impacted by any contamination at the Site.

8.7.5 To the north of the new section of motorway several potential sources of contamination have been identified at the Site which have not been subject to intrusive investigation. Further investigation is needed in the area of the proposed contractor compound.

9 Refined Conceptual Model

9.1.1 The incorporation of data from the 2015 Supplementary Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. Relevant contaminant (source-pathway-receptor) linkages are considered within the refined CSM. The assessment is based on the Scheme during construction and operational phases.

9.1.2 A CSM representing general ground conditions, overall Scheme layout and relevant source/pathway/receptors (each of which having a specific alpha-numerical symbol attached) are presented in Figure 2 and is described in Table 20.

Table 20: Site Conceptual Model

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Potentially contaminated soil / sediments and water within the south of Site from Made Ground. Potential contaminants include industrial chemical leachates from discharges, particularly paint.	Construction					
	Construction workers (B)	Direct dermal (1)	Likely	Low	Low	The southern boundary of the Site is within the new section of motorway alignment. The area of Made Ground encountered to date relates to the existing road which is located beneath the footprint of the new motorway alignment. As such the Made Ground is to be left in place or excavated and reused subject to passing reuse criteria. Construction workers will be exposed to Made Ground materials during construction works; however exposure duration will be short term only and contaminant concentrations are not considered as abnormal for a typical brownfield site. Prior to construction, a specific risk assessment will be required in line with Construction (Design Management) (CDM) and Health and Safety guidance. This will enable safe methods of work and appropriate level of Personal Protective Equipment (PPE) to be put in place. As such, all risks will be duly considered and suitably mitigated to protect construction workers. Current data set identifies Made Ground to have limited exceedances to the selected screening criteria. Construction workers are unlikely to be entering any confined spaces during the works. Soil and surface water (ponds) testing
		Ingestion (3)	Likely	Low	Low	
		Inhalation of soil dust (2)	Likely	Low	Low	
		Inhalation of soil gas or vapours (2)	Low likelihood	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						and ground gas monitoring required to confirm the risks. Furthermore, a construction compounds will be located within the areas where former earthworks and backfill of a pond has occurred. There is no available ground investigation data for this area. Further investigations are required to delineate any potential contamination and confirm the risks within the temporary land take.
	Off site users during construction works (C)	Direct dermal of dust (1)	Likely	Low	Low	During construction there is the possibility of dermal contact and inhalation of soil dust, short term exposure only. Dust suppression measures are recommended during construction works. Limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits in the south eastern area of the new section of motorway. Screening criteria considered conservative when considering exposure and pathway mechanisms.
		Ingestion of dust (3)	Likely	Low	Low	
		Inhalation of soil dust (2)	Likely	Low	Low	
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	
	Surface water (E)	Leaching and saturated flow within perched groundwater (Dp) (5)	Likely	Moderate	Moderate	Perched groundwater is likely to have low flow and may be absent seasonally. Perched water within the Tidal Flat Deposits has elevated metals and organics. The perched water is saline and is currently not in hydraulic continuity with the surface water which is not saline. Moderate leaching potential identified from Made Ground materials. Increase in water flux and leachate

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						from Made Ground during surcharge loading via the band drains. Further ground investigation is needed in the proposed contractors compound to enable risks to controlled waters to be better evaluated.
		Contaminated surface water run-off (5)	Unlikely	Moderate	Low	Surface water run-off may deteriorate the quality of surface water. Construction process to adopt surface water control and management.
	Deeper Groundwater aquifer within Bedrock (Da)	Vertical migration of leachate from Made Ground (4)	Likely	Moderate	Moderate	Aquifer quality shown to have elevated metal and inorganic contaminants, however no evidence of soil – groundwater contaminant linkages and is thus considered background water quality. Aquifer identified to be saline and therefore not used as a potable water supply. Increased vertical pathways between possible contaminant and receptor with construction of band drains. Moderate leaching potential identified from soil materials Hydrostatic pressures shown to be below or at base of the Made Ground. Possible risk of Made Ground to become saturated during surcharging. Data based on limited information and the provision and implementation of a suitable verification sampling

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						inspection strategy during construction to confirm risks. Further ground investigation is needed in the proposed contractor's compound to enable risks to controlled waters to be better evaluated.
Peat and organic soils	Construction workers (A)	Inhalation of soil gas / explosion (2)	Likely	High	High	Soil gas data set identifies elevated methane levels within the Tidal Flat Deposits (peat bands) with moderate flow. Peat likely to be associated with high methane concentration but with typically low or absent flux. Peat identified with localised thick bands and overlain by low permeability cohesive soils. Gas flux likely to increase during surcharge loading. Construction to be largely within open space and accumulation is very unlikely to occur. Any construction works within confined space would require specific risk assessment, control measures and PPE. Band drain installations could results in explosive risks during operations and risk assessment and gas migration controls will be needed.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Off site users during construction works (C)	Inhalation of soil gas / explosion (2)	Unlikely	High	Moderate to low	Elevated methane levels within the Tidal Flat Deposits (peat bands) with moderate flow. Peat likely to be associated with high methane concentration but with low or absent flux. Peat identified as localised thick bands and overlain by low permeability cohesive soils. Flux likely to increase during surcharge loading. Limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits in the south eastern area of the new motorway and nearest off-site receptors being over 100 m or greater from new motorway.
Groundwater – Aquifer from the Glaciofluvial Deposits and/or Mercia Mudstone	Surface water (land drainage) (E)	Band drain (5)	Likely	High	High	Aquifer quality shown to have elevated metals, and inorganic contaminants. Aquifer is saline. Hydrostatic pressure of the aquifer potentially near base of Made Ground meaning band drains could create vertical pathways connecting aquifer with shallow perched groundwater that could in turn enter surface water.
Operational Phase						
On Site: Potentially contaminated soil / sediments and water within the	Maintenance workers (A)	Direct dermal (1)	Unlikely	Low	Very low	Made Ground to be largely encapsulated by the embankment and therefore the exposure to contamination will be limited outside the motorway embankment. Areas outside the motorway hardstanding (carriageway) are to
		Ingestion (2)	Unlikely	Low	Very low	
		Inhalation of soil dust (3)	Unlikely	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
south of Site from Made Ground. Potential contaminants include industrial chemical leachates from discharges, particularly paint.						receive subsoil / topsoil cover, reducing potential of exposure. Exposure duration will be short term only. Site specific risk assessment will be required in line with health and safety legislation. This will enable safe methodology and appropriate level of PPE to be put in place. As such all risks will be duly considered and suitably mitigated for instance during future excavations during maintenance. Screening assessment did not identify risk to human health.
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	Soil gas data in Made Ground exceeds screening criteria, however only entry into confined spaces likely to cause a risk and this will be controlled through compliance with health and safety legislation.
	Future motorway users (A)	Dermal contact(1)	Unlikely	Low	Very low	Made Ground to be largely encapsulated by the embankment and therefore the exposure to contamination will be limited outside the motorway corridor. Areas outside the motorway hardstanding will receive subsoil / topsoil cover, reducing potential of exposure. Exposure duration will be short term only for motorway users. Screening criteria not exceeded.
		Ingestion (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	
	Surface Water (E)	Saturated flow within perched groundwater (Dp) (5)	Low likelihood	Moderate	Moderate to Low	Perched (shallow) groundwater is likely to be intercepted by any land drainage and reens. Perched groundwater is likely to have low flow and may be absent seasonally.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						Groundwater quality in perched groundwater is considered to be at background. Perched water is saline and not currently in hydraulic continuity with surface water. Controls needed to prevent perched water entering surface water. Further ground investigation is needed in the proposed contractor's compound to enable risks to controlled waters to be better evaluated.
	Groundwater aquifer (Da)	Leaching/migration (4)	Likely	Moderate	Moderate	Aquifer quality shown to have elevated metal and inorganic contaminants, however no evidence of soil – groundwater contaminant linkages and is thus considered background water quality. Aquifer identified to be saline and therefore not used as a potable water supply. Increased vertical pathways between possible contaminant and receptor via band drain installation.
Groundwater – Aquifer from the Glaciofluvial Deposits and/or Mercia Mudstone	Surface water (land drainage) (E)	Band drain (5)	Likely	High	High	Aquifer quality shown to have elevated metals, and inorganic contaminants. Aquifer is saline. Hydrostatic pressure of the aquifer potentially near base of Made Ground meaning band drains could create vertical pathways connecting aquifer with shallow perched groundwater that could in turn enter surface water.
Peat and organic soils	Maintenance workers (A)	Inhalation of soil gas / explosion (2)	Low likelihood	High	Moderate	Elevated gas flow and methane and carbon dioxide concentrations are present. Embankment may allow

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						methane rich gas pockets to accumulate if not suitably ventilated. Entry into any confined spaces will be controlled through compliance with health and safety legislation.
	Motorway users (B)		Low likelihood	High	Moderate	Elevated gas flow and methane and carbon dioxide concentrations are present. Embankment may allow methane rich gas pockets to accumulate if not suitably ventilated. However, likelihood of accumulation in a confined space that could give rise to an explosive event is considered a very low risk.
	Off site users (C)		Unlikely	High	Moderate to low	Elevated gas flow and methane and carbon dioxide concentrations are present. Limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits to shallow depth. There are no buildings and structures on or near the Site.

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 Ground investigations have been undertaken at the Site to assess risks from land contamination associated with the construction and operation of the Scheme including human health and controlled waters risks.

10.1.2 The available ground investigation data is limited to the area of the Site where the main motorway embankment is proposed. No sampling information is available for the area to the north including an area of former earthworks and the radiator factory which is to be used for the main construction compound area.

10.1.3 Gross contamination beneath the new motorway section crossing the Site has not been identified. The risk assessment has identified that low risks to human health and low to moderate risks to controlled waters could exist and control measures will be required to facilitate the construction and ongoing operation of the Scheme.

10.1.4 Prior to the construction phase, all fly tipped material will require to be removed and suitably disposed of to a suitably licenced waste management facility unless site specific suitability for reuse criteria can be met.

10.1.5 During the construction phase, specific mitigation measures will be required to prevent dust inhalation pathways to the general public off-site and construction workers, although such measures would be no more than typically expected on a construction site.

10.1.6 Any soil arisings are considered likely to be suitable for reuse within the Scheme subject to development of a remediation strategy including reuse criteria and adoption of a Materials Management Plan. The suitability of soil arisings generated by the Scheme is assessed within the Earthworks Specification.

10.1.7 During the operational phase, the embankment will cover part of the Site which will limit the infiltration of rainwater through the soils and thus potential leaching of soil contaminants into the groundwater. However, perched groundwater may be within the Made Ground materials and could remain beneath the embankment.

10.1.8 Surface water quality in the two nearest reens to the Site is generally of good quality with low concentrations of metals. In general, there is no evidence of impact on surface water quality with monitored concentrations generally in keeping with the baseline water quality. A suitable water management strategy will also be required to prevent potential impact to surface waters from contaminant run-offs.

10.1.9 The use of band drains may provide new vertical pathways which may lead to groundwater within the Tidal Flat Deposits and possibly any water bodies within the Made Ground to enter the currently confined aquifer within the Glaciofluvial Deposits and Mercia Mudstone. However, only low levels of contaminant concentrations were observed in soils beneath the proposed new section of motorway embankment associated with the Made Ground used to construct the existing road. Thus the risks are considered low.

10.1.10 The deep aquifer is identified to be saline and has elevated metals, organic and inorganic contaminants which may reduce surface water quality if allowed to enter. Further consideration and risk assessment should be given to the potential impact of the band drains and whether specific precautions or mitigations measures should be implemented prior to construction.

10.1.11 The data has identified methane concentrations exceeding the screening criteria. The methane is anticipated to be associated primarily with the presence of peat and organic soils within the Tidal Flat Deposits. The proposed embankment surcharging and band drains are likely to increase gas flux and create pathways. Gas mitigation controls are needed to protect construction workers during any band drain construction.

10.1.12 Post construction, the embankment and topsoil cover along the motorway corridor will break contaminant linkages protecting end-users and maintenance workers.

10.1.13 Any topsoil materials will need to be verified as chemically suitable.

10.2 Recommendations

10.2.1 Given the identified gap in the data for the temporary land take and in order to verify the risk levels associated with the Site in relation to construction phase, an additional scope of ground investigation works has been agreed and this is awaiting completion. This report shall then be reviewed and updated accordingly once the findings of the additional investigation are made available. The additional investigation will include:

- Trial pits and boreholes to collect soil samples; and
- Installation of groundwater monitoring wells to collect groundwater samples and gas monitoring.

10.2.2 Upon review and assessment of the proposed additional ground investigation information, any contamination identified that could cause an unacceptable risk to the identified receptors will require appropriate remedial mitigation measures to be implemented. These measures would be identified within a remedial strategy for the Scheme. At this stage, the remediation strategy is anticipated to include, but is not limited to the following:

- Addressing potential human health and controlled waters risk identified by the proposed additional ground investigation.
- Detailed risk assessment of band drains creating pathways enabling contaminants entering surface water courses.
- Ground gas mitigation controls.
- Dealing with unexpected contamination.
- Verification sampling to confirm suitability of potentially contaminated soils for re-use.
- Control measures (over and above good practise construction management) to prevent risks to construction workers and the general public during construction.
- Verification of material used as topsoil for suitability of use.

10.2.3 The remediation strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan.

10.2.4 The remediation strategy should be supported by a Scheme wide Material Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

11 References

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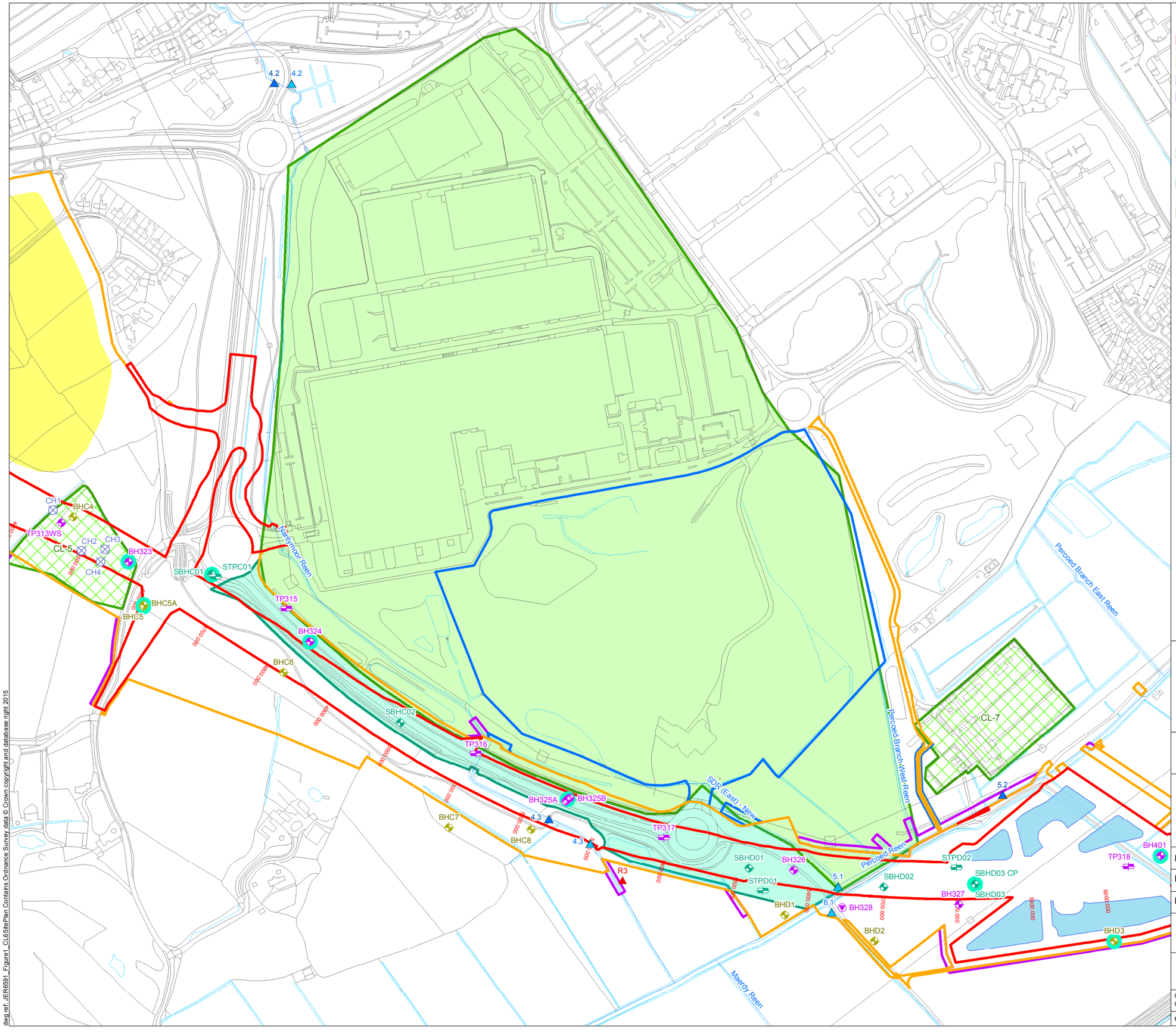
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12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GDR	Geotechnical Design Report
GIR	Ground Investigation Report
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum

mb	Millibars
mbGL	Metres below Ground Level
MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area (WTA)
- Potential Borrow Pit Area
- Potential Area of Land Contamination based on 2014 PSSR
- Revised Potential Area of Land Contamination
- Other Potential Area of Land Contamination

Investigation Locations

2015 (RPS)
- Surface Water Monitoring Location - Q2
- Surface Water Monitoring Location - Q1

2015 (Geotechnical Engineering)
- Borehole
- Dynamic Probe (Proposed Borehole)
- Trial Pit

2008-2009 (Titan Surveys)
- Surface Water Monitoring Location

2007 (Norwest Holst)
- Borehole
- Trial Pit

2000 (Exploration Associates)
- Window Sample

1997 (Norwest Holst)
- Borehole
- Monitoring Well Installation



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Appendix 11.1 Annex D CL-6

Site Plan for CL-6

Figure: 1	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:5,000
0 80 160 m

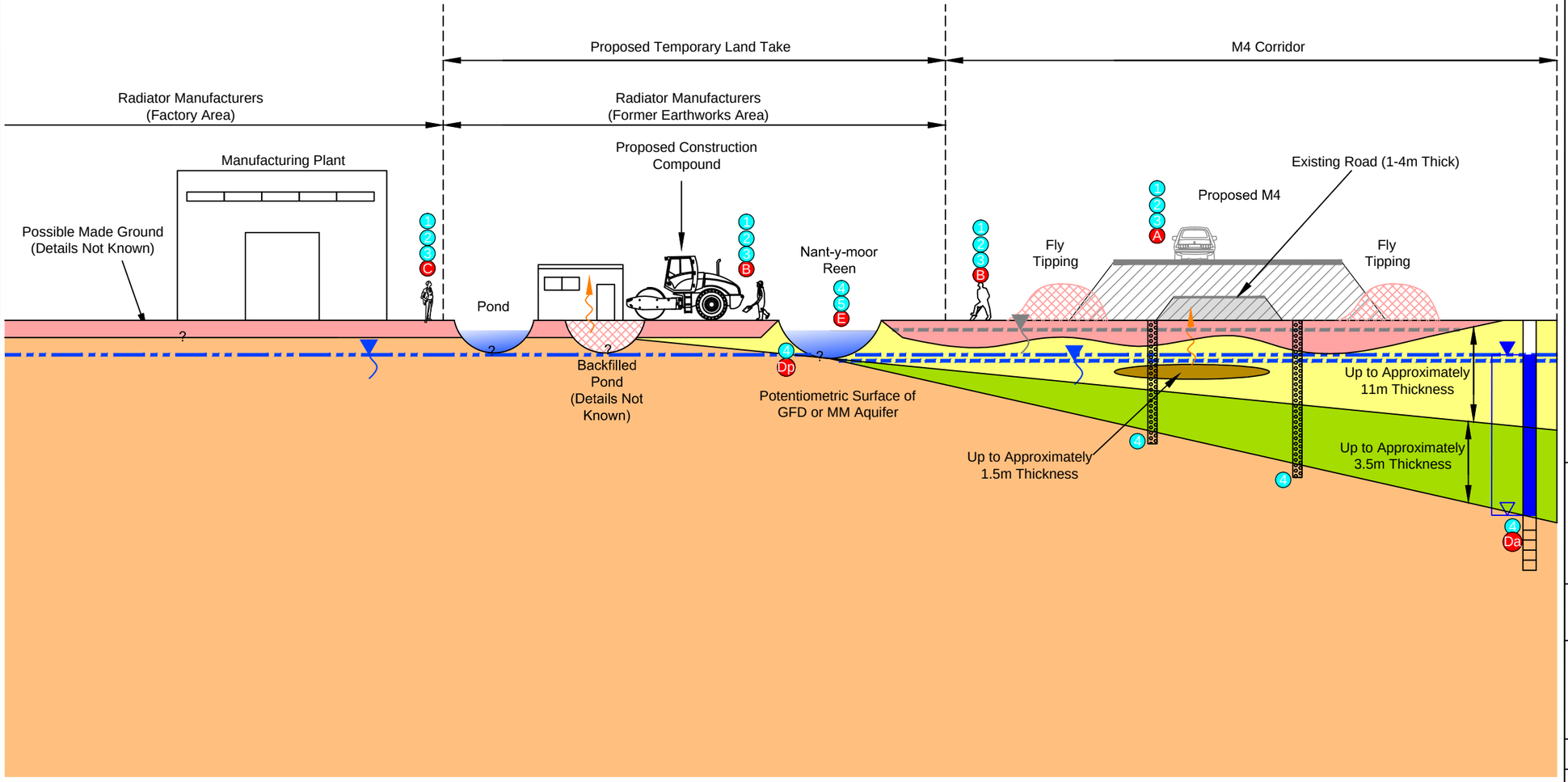
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dwg ref: JER6591_Figure1_CL6SitePlan

dwg ref: JER6591_Figure1_CL6SitePlan Contains Ordnance Survey data © Crown copyright and database right 2015

CL- 6 Radiator Manufacturers



Ground conditions based on available information

Legend

- Made Ground - MG
- Peat
- Tidal Flat Deposits - TFD
- Glaciofluvial Deposits - GFD
- Bedrock (St. Maughans Formation - SMF & Mercia Mudstone - MM)
- Proposed Embankment
- Proposed Band Drain
- Perched Water (MG)
- Perched Water (TFD)
- Groundwater (Aquifer)
- Water Strike
- Rest Water Level
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (M4 User)
- B Humans On-Site (Construction/Maintenance)
- C Humans Off-Site (Site Neighbours)
- Dp Groundwater (Aquifer)
- Dp Groundwater (Perched)
- E Surface Water

Potential Pathways

- 1 Dermal Contact
- 2 Inhalation
- 3 Ingestion
- 4 Leaching / Migration
- 5 Leaching / Migration/Surface Run Off

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Potential for contamination to be present on site associated with Made Ground
- Potential for ground gas
- Aquifer

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0156 (April 2014)

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Welsh Government

Appendix 11.1 Annex D CL-6

Conceptual Site Model for CL-6

Figure: 2	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL6ConceptualSiteModel

dwg ref: JER6591_Figure2_CL6ConceptualSiteModel

Appendices

A1 Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHC01 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	327527.48 E
Project	New M4 - Second Preliminary Ground Investigation				183909.25 N
		Drilling Rig	Dando	Ground Level	10.54m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	JAB	Date Started	06/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	07/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
06/11/2007	1700	5.20	4.50	5.10	End of Shift
07/11/2007	0730	5.20	4.50	4.00	Start of Shift
07/11/2007	1700	6.50	6.00	5.20	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
1.40	1.50	0.75	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	6.50	200	6.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
06/11/2007		4.20	4.20	NR	Seepage	NR	NS

GENERAL NOTES

1. Service inspection pit hand excavated from GL to 1.20m.
2. Cable Percussive boring complete at 6.50m.
3. Borehole grouted upon completion.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.20	C	50/10mm (6,6,50)	1.20	DRY
2.20	C	N=24 (4,6,6,5,7,6)	2.20	DRY
3.20	C	N=25 (4,4,5,6,7,7)	3.20	DRY
4.20	S	N=38 (5,5,8,10,9,11)	4.20	DRY
5.20	S	50/170mm (6,11,20,21,9)	4.50	5.10
6.20	S	50/105mm (10,14,21,29)	6.00	5.20

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	ARIAL CP HEADER
Version	3.05
Revised	17/12/2007

NORWEST HOLST

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHC01 CP
Sheet 1 of 1

Contract No.	F15056	Method	Cable Percussion	Coordinates	327527.48 E
Project	New M4 - Second Preliminary Ground Investigation				183909.25 N
		Drilling Rig	Dando	Ground Level	10.54m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	JAB	Date Started	06/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	07/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Brown fine sand and subangular fine to coarse gravel sized fragments of slag. With frequent rootlets.				ES1	0.30				
		0.90	9.64						
MADE GROUND: Brown slightly clayey fine to coarse sand and subangular to subrounded fine to coarse gravel sized fragments of limestone, slag, sandstone and concrete. With low cobble content, cobble sized fragments are subrounded of limestone.		1.10	9.44	ES2 D3 B4	1.00 1.20 1.20 - 1.50	C50/10mm	C 1.20	1.36	
MADE GROUND: Reddish brown slightly sandy gravelly clay with occasional cobbles. Sand sized fragments are fine to coarse. Gravel sized fragments are subangular to subrounded fine to coarse of limestone, slag and sandstone. Cobble sized fragments are subangular to subrounded of limestone and slag. ---from 2.20m locally mottled grey				D5 ES6 B7	2.00 2.00 2.20 - 2.50	C24	C 2.20	2.65	
		3.15	7.39	D8 ES9 D10 B11	3.00 3.00 3.20 3.20 - 3.50	C25	C 3.20	3.65	
Very stiff reddish brown sandy CLAY (Weathered mudstone). (St. Maughans Group) ---from 3.20m locally speckled grey				D12 ES13 W17 D14	4.00 4.00 4.00 4.20	S38	S 4.20	4.65	
				D15	5.00				
---from 5.20m locally mottled grey				D16 B18	5.20 5.20 - 5.50	S50/170mm	S 5.20	5.52	
				D19	6.00				
---at 6.00m slightly gravelly. Gravel is angular fine to coarse				D20	6.20 - 6.46	S50/105mm	S 6.20	6.46	
		6.50	4.04						
Cable Percussion boring complete at 6.50 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHC01 RC
Header

Contract No.	F15056	Method	Rotary Coring	Coordinates	327528.20 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		183908.05 N
		Driller	CB	Ground Level	10.48m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	JAB	Orientation	Vertical
		Core barrel	PWF	Date Started	09/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	PCD	Date Completed	12/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
09/11/2007	1730	1.80	1.80	DRY	End of Shift
10/11/2007	0730	4.50	1.80	DRY	Start of Shift
10/11/2007	1730	4.50	4.50	DRY	End of Shift
11/11/2007	0730	4.50	4.50	1.85	Start of Shift
11/11/2007	1730	15.10	4.95	3.20	End of Hole

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
1.20	4.50	Air/Mist	100%	0.00*
4.50	15.10	Air/Mist	100%	92.0

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
121	15.10	121	4.95

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
11/11/2007	0800	4.50	NR	NR	NR	4.50	NS

GENERAL NOTES

1. Service inspection pit hand excavated from GL to 1.20m.
2. Rotary Openhole from 1.20m to 4.50m.
3. Rotary Coring complete at 15.10m.
4. 1 No 19mm diameter piezometer installed, tip at 8.05m, response zone from 7.65m to 8.25m.
5. 0.00* indicates openhole drilling.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
5.50	S	N=75 (4,10,19,20,19,17)	4.50	DRY
7.60	S	100/95mm (13,12,41,59)	7.60	NR
9.60	S	100/95mm (10,15,31,69)	9.60	NR

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes.

Form	ARIAL ROTARY HEADER
Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHC01 RC
Sheet 1 of 2

Contract No.	F15056	Method	Rotary Coring	Coordinates	327528.20 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		183908.05 N
		Driller	CB	Ground Level	10.48m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	JAB	Orientation	Vertical
		Core barrel	PWF	Date Started	09/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	PCD	Date Completed	12/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
MADE GROUND: Soil, dry dense sand, gravels and cobbles. (Driller's description)										
		1.20	9.28							
MADE GROUND: Sand, gravel and cobbles. (Driller's description)										
		2.50	7.98							
MADEGROUND: marl/gravels. (Driller's description)										
		3.70	6.78							
Soft MARL. (Driller's description) (St. Maughans Group)										
		4.50	5.98							
Zone of core loss. Soft MARL. (Driller's description)				4.50 5.50	0	0	0	NA		
		5.50	4.98					100	5.50 5.95	
Very strong yellow LIMESTONE. (St. Maughans Group)		5.60	4.88					100 100	S75	
Assumed zone of core loss. Soft MARL. (Driller's description)				5.50 6.50	11	0	0	NA		
		6.50	3.98							
Very weak locally extremely weak reddish brown locally mottled greenish grey MUDSTONE. Discontinuities: 1) 10-20 deg closely spaced locally very closely spaced undulating to planar rough locally smooth locally clay infilled. (St. Maughans Group) ---from 6.50m to 6.54m recovered as non intact core (slightly sandy clay) ---from 6.70m to 6.77m recovered as non intact core (angular to subangular fine to coarse gravel sized fragments) ---from 6.90m to 7.20m 1 No discontinuity 80-90 deg planar smooth locally clay infilled ---from 7.46m to 7.57m 1 No discontinuity 80-90 deg undulating smooth locally stained black ---from 7.60m to 7.68m recovered as non intact core (angular to subangular coarse gravel sized fragments) ---from 7.80m to 7.90m 1 No discontinuity 70-80 deg undulating smooth clay infilled ---from 7.84m to 7.95m heavily mottled green ---from 7.95m to 8.19m recovered as non intact core (slightly sandy clayey angular fine to coarse gravel sized fragments)				6.50 7.60	92	29	23		7.60 7.82 S100/95mm	
				7.60 9.60	74	17	0		9.60 9.82 S100/95mm	

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHC01 RC
Sheet 2 of 2

Contract No.	F15056	Method	Rotary Coring	Coordinates	327528.20 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	T30		183908.05 N
		Driller	CB	Ground Level	10.48m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	JAB	Orientation	Vertical
		Core barrel	PWF	Date Started	09/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	PCD	Date Completed	12/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Remaining Detail : 8.57m - 8.61m : ---from 8.57m to 8.61m recovered as non intact core (angular fine to coarse gravel sized fragments) Detail 8.85m - 8.91m : ---from 8.95m to 8.91m recovered as non intact core (angular fine to coarse gravel sized fragments) Detail 9.05m - 9.15m : ---from 9.05m to 9.15m recovered as non intact core (angular coarse gravel and subangular cobble sized fragments) Detail 9.20m - 9.60m : ---from 9.20m to 9.60m assumed zone of core loss Detail 9.60m - 11.60m : ---from 9.60m to 11.60m weak ---from 10.20m to 10.23m recovered as non intact core (fine to coarse gravel sized fragments) ---from 10.42m to 10.54m mottled green ---from 10.80m to 11.12m 1 No discontinuity 80-90 deg undulating smooth stained black ---from 11.26m to 11.37m heavily mottled green ---from 11.37m to 11.60m assumed zone of core loss ---from 11.60m to 11.72m greenish grey locally reddish brown bands ---from 12.15m to 12.25m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 12.37m to 12.58m recovered as non intact core (clayey angular fine to coarse gravel sized fragments) ---from 12.80m to 12.90m recovered as non intact core (angular medium to coarse gravel sized fragments) ---from 13.00m to 13.18m recovered as non intact core (clayey angular fine to coarse gravel sized fragments and subangular cobble sized fragments) ---from 13.27m to 13.60m assumed zone of core loss ---from 13.70m to 13.75m recovered as non intact core (clayey angular fine to coarse gravel sized fragments) ---from 14.00m to 14.15m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 14.15m to 14.34m recovered as non intact core (greenish grey locally reddish brown slightly sandy clay) ---from 14.50m to 14.54m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 14.88m to 14.98m heavily mottled green Rotary drilling complete at 15.10 m.		15.10	-4.62	9.60 11.60 11.60 13.60 13.60 15.10	85 83 99	23 22 24	5 7 13	NI 40 200		

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHC02 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	327786.09 E
Project	New M4 - Second Preliminary Ground Investigation				183705.55 N
		Drilling Rig	Dando	Ground Level	8.87m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	JAB	Date Started	07/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	11/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
07/11/2007	1700	2.50	2.50	DRY	Start of Shift
10/11/2007	0730	2.50	2.50	DRY	Start of Shift
10/11/2007	1700	8.50	8.00	6.50	End of Shift
11/11/2007	0730	8.50	8.00	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
1.70	2.50	3.00	Chiselling
2.50	3.90	3.50	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	8.50	200	8.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
10/11/2007		7.00	6.50	15	Moderate	7.00	NS

GENERAL NOTES

1. Service inspection pit hand excavated from GL to 1.20m.
2. Cable Percussive boring complete at 8.50m.
3. Borehole grouted upon completion.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.20	C	50/160mm (9,11,15,19,16)	1.20	DRY
2.00	C	50/0mm (25,50)	2.00	DRY
3.20	C	N=64 (9,11,21,14,19,10)	3.20	DRY
4.70	S	N=18 (2,3,4,4,5,5)	4.10	DRY
6.70	S	N=27 (5,6,6,6,7,8)	7.00	6.50
8.20	S	50/95mm (5,15,25,25)	8.00	6.50

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	ARIAL CP HEADER
Version	3.05
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHC02 CP
Sheet 1 of 1

Contract No.	F15056	Method	Cable Percussion	Coordinates	327786.09 E
Project	New M4 - Second Preliminary Ground Investigation				183705.55 N
		Drilling Rig	Dando	Ground Level	8.87m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	JAB	Date Started	07/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	11/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
MADE GROUND: Reddish brown slightly sandy gravelly clay with occasional rootlets. Gravel sized fragments are angular to subrounded fine to coarse of limestone, sandstone and charcoal.				ES1	0.30				
		0.80	8.07						
MADE GROUND: Greyish brown silty coarse sand and subangular to subrounded fine to coarse gravel sized fragments of slag with low cobble content, cobble sized fragments are subangular of slag and limestone.				ES2	1.00				
				D3	1.20	C50/160mm	C	1.20	
				B4	1.20 - 1.50				1.51
---from 2.00m grey				D5	2.00	C50/0mm	C	2.00	
				ES6	2.00				2.01
				B7	2.20 - 2.50				
				D8	3.00				
				ES9	3.00				
				B10	3.20 - 3.50	C64	C	3.20	3.65
		3.90	4.97						
Soft brown locally slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to coarse of sandstone and limestone. (Estuarine Alluvium)		4.00	4.87	D11	4.00				
				ES12	4.00				
				U13	4.20 - 4.65	(36)			
Stiff low strength reddish brown locally mottled grey sandy CLAY (Weathered Mudstone). (St. Maughans Group)				D14	4.70	S18	S	4.70	
				D15	4.70				5.15
				B16	4.70 - 5.00				
				D17	5.00				
				D18	6.00				
				U19	6.20 - 6.65	(63)			
				D20	6.70	S27	S	6.70	
				D21	6.70				7.15
				D22	7.00				
				D23	8.00				
---from 8.00m gravelly. Gravel is angular fine to medium				D24	8.20	S50/95mm	S	8.20	
									8.45
		8.50	0.37						
Cable Percussion boring complete at 8.50 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD01 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	328263.22 E
Project	New M4 - Second Preliminary Ground Investigation				183506.02 N
		Drilling Rig	Dando	Ground Level	6.63m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	JAB	Date Started	11/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	13/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
11/11/2007	1700	8.00	7.70	DRY	End of Shift
12/11/2007	0730	8.00	7.70	DRY	Start of Shift
12/11/2007	1700	12.50	12.50	4.20	End of Shift
13/11/2007	0730	12.50	12.50	5.20	Start of Shift
13/11/2007	1700	16.40	16.00	5.70	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
12.50	12.90	1.50	Chiselling
13.50	13.70	1.00	Chiselling
15.60	16.00	1.00	Chiselling
16.00	16.40	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	16.40	200	16.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
12/11/2007		9.40	5.20	5	Rapid	9.40	NS

GENERAL NOTES

1. Service inspection pit hand excavated from GL to 1.20m.
2. Cable Percussive boring complete at 16.58m.
3. Borehole grouted upon completion.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.20	C	N=47 (6,9,16,10,10,11)	1.00	DRY
3.00	S	N=1 (1,0,0,1,0,0)	3.00	DRY
4.70	S	N=1 (1,0,0,0,1,0)	4.00	DRY
7.00	S	N=3 (1,0,1,0,1,1)	6.00	DRY
8.70	S	N=7 (1,2,2,1,2,2)	8.00	DRY
10.20	C	N=45 (6,8,11,15,9,10)	10.20	5.20
13.50	S	50/235mm (9,14,14,15,15,6)	13.50	5.50
15.50	S	50/170mm (9,12,14,15,21)	15.50	5.50
16.40	S	50/95mm (10,12,19,31)	16.00	5.50

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD01 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	328263.22 E
Project	New M4 - Second Preliminary Ground Investigation				183506.02 N
		Drilling Rig	Dando	Ground Level	6.63m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	JAB	Date Started	11/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	13/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Grass over TOPSOIL.		0.20	6.43						
MADE GROUND: Reddish brown clayey slightly sandy subangular to subrounded fine to coarse gravel sized fragments of slag, marl, limestone, sandstone and plastic with low cobble content. Cobble sized fragments are subangular to subrounded of limestone and sandstone.				ES1	0.30				
				ES2	1.00				
				D3	1.20	C47	C	1.20	
				B4	1.20 - 1.50			1.65	
Soft to firm grey locally mottled reddish brown silty slightly gravelly CLAY with extremely closely spaced fine to coarse gravel sized pockets of fine sand and occasional organic material. Gravel is angular to subangular fine to medium of mudstone. (Estuarine Alluvium)		1.90	4.73	D5	2.00				
				ES6	2.00				
				U7	2.20	(5)			
				D8	2.70				
Plastic dark brown fibrous PEAT. (Peat)		3.00	3.63	D9	3.00	S1	S	3.00	
				B10	3.00 - 3.50			3.53	
				D11	4.00				
				U12	4.20	(6)			
Very soft grey slightly sandy CLAY with occasional organic material and rootlets. (Estuarine Alluvium)		4.50	2.13						
---from 4.50m to 7.00m locally mottled brown				D13	4.70	S1	S	4.70	
				D14	4.70			5.23	
				D15	6.00				
---from 6.20m with extremely closely spaced medium to coarse gravel sized lenses of peat				U16	6.20	(7)			
				D17	6.70				
				D18	7.00	S3	S	7.00	
								7.53	
				D19	8.00				
				U20	8.20 - 8.65	(8)			
				D21	8.70	S7	S	8.70	
				D22	8.70			9.15	
---from 9.00m slightly gravelly. Gravel is subangular to rounded fine to coarse of limestone and sandstone				B23	9.00 - 9.50				
Dense reddish brown slightly clayey slightly sandy subangular to subrounded fine to coarse GRAVEL and		9.40	-2.77	W29	9.40				
				D24	9.50				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD01 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	328263.22 E
Project	New M4 - Second Preliminary Ground Investigation				183506.02 N
		Drilling Rig	Dando	Ground Level	6.63m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	PW	Orientation	Vertical
		Logged by	JAB	Date Started	11/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	13/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
subangular to subrounded COBBLES. Gravel is of limestone, sandstone and mudstone. Cobbles are of limestone and sandstone. (Fluvial Alluvium)				D25	10.00				
		10.20	-3.57	B26	10.20 - 10.50	C45	C	10.20 10.65	
Brown clayey slightly sandy SILT. (Fluvial Alluvium)									
		11.00	-4.37	D27	11.00				
Dense brown coarse SAND and subangular to rounded fine to coarse GRAVEL of limestone, sandstone, mudstone, quartz and quartzite. With high cobble content, cobbles are subangular to subrounded of limestone and sandstone. (Fluvial Alluvium)									
---from 12.00m reddish brown clayey				D28	12.00				
		12.90	-6.27						
Firm to stiff low strength reddish brown locally mottled greenish grey slightly sandy slightly gravelly CLAY. gravel is angular fine to medium of mudstone (Weathered Mudstone). (Probably Mercia Mudstone Group)				D30 U31	13.00 13.00	(130)			
---from 13.50m very stiff				D32 D33	13.50 13.50	S50/235mm	S	13.50 13.89	
---from 13.50m to 14.70m driller notes cobbles									
---from 14.00m to 14.70m gravelly				D34	14.00				
				D35	15.00				
				D36	15.50	S50/170mm	S	15.50 15.82	
				D37	16.40	S50/95mm	S	16.40 16.65	
		16.58	-9.95						
Cable Percussion boring complete at 16.58 m.									

NOTES: All depths in metres, all diameters in millimetres.
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD02 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	328447.74 E
Project	New M4 - Second Preliminary Ground Investigation				183480.70 N
		Drilling Rig	Dando 2000	Ground Level	5.48m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SJ	Orientation	Vertical
		Logged by	DH	Date Started	07/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	11/12/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
07/12/2007	1730	8.05	7.00	DRY	End of Shift
10/12/2007	0730	8.05	7.00	0.80	Start of Shift
10/12/2007	1730	13.50	12.60	0.80	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
8.30	8.60	1.00	Chiseling
13.30	13.50	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	13.50	200	13.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow

GENERAL NOTES

1. Cable Percussive boring complete at 13.50m.
2. Borehole grouted upon completion.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.80	S	N=1 (1,0,0,1,0,0)	0.00	DRY
3.60	S	N=1 (1,0,0,1,0,0)	3.00	DRY
5.60	S	N=0 (0,0,0,0,0,0)	5.00	DRY
7.60	S	N=36 (3,6,7,8,10,11)	7.00	DRY
9.00	S	N=48 (4,8,15,15,8,10)	7.50	0.80
11.00	S	N=4 (1,1,1,1,1,1)	11.00	0.80
12.75	S	N=45 (6,6,8,10,12,15)	12.60	0.80
13.50	S	50/245mm (2,4,10,15,15,10)	13.50	0.80

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	ARIAL CP HEADER
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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD02 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	328447.74 E
Project	New M4 - Second Preliminary Ground Investigation				183480.70 N
		Drilling Rig	Dando 2000	Ground Level	5.48m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SJ	Orientation	Vertical
		Logged by	DH	Date Started	07/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	11/12/2007

Description of Strata	Depth Below G.L.	Datum Level	Sampling	SPT N & (U blows)	SPT type & depth	Install-ation
Soft light brown TOPSOIL. (Driller's description)						
	0.30	5.18	D1 0.30 B3 0.30 - 1.20			
Firm to stiff greyish brown mottled orangish brown silty CLAY.			W22 0.80 D2 1.00 U4 1.20 - 1.65	(25)		
	1.65	3.83	D5 1.65 - 1.80 D6 1.80 - 2.25	S1	S 1.80	2.33
Firm greenish grey silty CLAY with rare rootlets. (Organic odour)						
	2.25	3.23	B7 2.25 - 3.00 D8 2.25 - 3.00			
Very soft extremely low strength grey very sandy organic CLAY. (Estuarine Alluvium)			U9 3.00 - 3.45	(40)		
			D10 3.45 - 3.60			
	3.65	1.83	D11 3.60 - 4.05	S1	S 3.60	4.13
Very soft brownish grey silty CLAY. (Estuarine Alluvium) ---from 3.60m to 5.45m with very closely spaced fine to medium gravel sized pockets of brown pseudofibrous peat			B12 4.05 - 5.00 D13 4.05 - 5.00			
			U14 5.00 - 5.45	(25)		
---from 5.26m with extremely closely spaced medium gravel sized pockets of brown fibrous peat			D15 5.45 - 6.00 D16 5.60 - 6.05	S0	S 5.60	6.20
			B17 6.05 - 7.00 D18 6.05 - 7.00			
	7.00	-1.52	U19 7.00 - 7.45	(25)		
Very soft grey slightly sandy slightly gravelly silty CLAY. Gravel is angular fine of mudstone and sandstone. (Estuarine Alluvium)			D20 7.45 - 7.60			
	7.60	-2.12	D21 7.60 - 8.05	S36	S 7.60	8.05
Firm friable reddish brown sandy CLAY. (Estuarine Alluvium)						
	8.05	-2.57	B23 8.05 - 9.00 D24 8.05 - 9.00			
Grey slightly sandy subrounded to rounded fine to coarse GRAVEL. Sand is coarse. Gravel is of sandstone, siltstone, limestone and mudstone. (Fluvial Alluvium)						
	9.00	-3.52	D25 9.00 - 9.45	S48	S 9.00	9.45
Dense grey slightly gravelly coarse SAND. Gravel is subrounded to rounded fine to coarse of sandstone, siltstone, limestone and mudstone. (Fluvial Alluvium)						

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD02 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	328447.74 E
Project	New M4 - Second Preliminary Ground Investigation				183480.70 N
		Drilling Rig	Dando 2000	Ground Level	5.48m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SJ	Orientation	Vertical
		Logged by	DH	Date Started	07/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	11/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Dense reddish brown coarse SAND and subrounded to rounded fine to coarse GRAVEL. Gravel is of sandstone, limestone, siltstone and mudstone. (Fluvial Alluvium)		10.00	-4.52	B26	10.00 - 11.00				
				D27	10.00 - 10.50				
				B28	10.50 - 11.00				
				D29	10.50 - 11.00				
				B30	11.00 - 11.45	S4	S	11.00 11.45	
				B31	11.50 - 12.60				
Stiff reddish brown slightly gravelly CLAY. Gravel is angular fine to medium (Weathered Mudstone). (Mercia Mudstone Group) ---from 12.75m becomes very stiff		12.60	-7.12	D32	12.60 - 12.75				
				D33	12.75 - 13.25	S45	S	12.75 13.20	
				B34	13.25 - 13.50				
				D35	13.25 - 13.50				
Cable Percussion boring complete at 13.50 m.		13.50	-8.02	D36	13.50 - 13.95	S50/245mm	S	13.50 13.90	

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Geotechnical Engineering Limited

BOREHOLE LOG

BH324

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 2

Start Date 6 January 2015 — Easting 327662.1 — Scale 1 : 50

End Date 12 January 2015 — Northing 183816.2 — Ground level 9.45mOD — Depth 15.00 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
06/01/15 1300hrs									MADE GROUND comprising black TARMACADAM. (MG)			
	1B	0.50	0.70							0.55	8.90	
	2D*	0.55	0.70		Vo 0.2				Dark brown slightly sandy silty subangular and rounded fine to coarse siliceous and sandstone GRAVEL with low cobble content. Cobbles are subrounded fine to coarse sandstone. (MG)	0.70	8.75	
06/01/15 1700hrs Dry	3B	0.70	1.20									
	4D*	1.00	1.20		Vo 0.2							
07/01/15 0915hrs Dry		1.20	1.65	1.20	C 38				Dense dark brown gravelly silty fine and medium SAND. Gravel is angular and subrounded fine to coarse sandstone and siliceous. (MG)	1.60	7.85	
	5B	1.60	2.00									
	6D*	1.60	2.00		Vo 0.4				Medium dense dark reddish brown silty sandy angular and rounded fine and medium sandstone GRAVEL. (RTD)			
	7D	2.00	2.45	2.00	S 22							
	8D	2.30										
	9D*	2.50	3.00							2.50	6.95	
	10B	2.50	3.00						Firm reddish brown rarely mottled light grey slightly sandy slightly gravelly CLAY with rare partings of black carbonaceous material. Gravel is angular and rounded fine and medium sandstone (RTD)			
	11D	3.00	3.45	3.00	S 15				2.50m: Rare rounded fine and medium sandstone gravel (possibly chased down hole).			
	12B	3.50	4.00							3.50	5.95	
	13D*	3.50	4.00						Stiff reddish brown slightly sandy CLAY with rare subangular fine to coarse gravel sized mudstone lithorelicts locally stained dark grey. (SMG)			
	14D	4.00	4.45	3.00	S 25							
										4.50	4.95	
	15B	4.50	5.00						Extremely weak and very weak reddish brown rarely mottled light grey MUDSTONE recovered as slightly sandy silty angular and subangular fine to coarse GRAVEL. (SMG)			
07/01/15 1630hrs 3.25m	16D	5.00	5.24	5.00	S*123							
08/01/15 0845hrs 2.10m												
										6.30	3.15	
08/01/15 1045hrs 2.10m	17D	6.50	6.71	6.50	S*125				Stiff reddish brown mottled light bluish grey slightly sandy silty CLAY. (SMG)	6.50	2.95	
	18D	6.70	6.75	6.50	S*333				Extremely weak and very weak reddish brown rarely mottled light grey MUDSTONE recovered as slightly sandy silty angular and subangular fine to coarse gravel. (SMG)			
09/01/15 1215hrs 2.46m	19X	6.90	7.50	6.50								
	20D	7.50	7.77	7.45	S*111							
	21C	7.50	9.00			87 0 0	NI			7.70	1.75	
									Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Cable percussion (200mm) 1.20-6.90m. Dynamic sampled (113mm) 6.90-7.50m. Waterflush rotary core drilled (116mm) 7.50-15.00m. CASING: 200mm diam to 6.50m and 140mm diam to 7.45m.

BACKFILL: On completion, a slotted standpipe (50mm) was installed to 15.00m, granular response zone with geosock 15.00-8.80m, bentonite seal 8.80-2.10m. A second slotted standpipe (50mm) was installed to 2.00m, granular response zone 2.10-1.00m, granular fill 1.00-0.80m, bentonite seal 0.80-0.40m, granular fill 0.40-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: Hole advanced by chiselling 5.60-6.10m (1hr), 6.10-6.50m (1hr), 6.50-6.70m (1hr) and 6.70 (1/2hr: No penetration achieved). Water added to assist boring 1.20-1.60m. Downhole magnetometry for UXO risk mitigation undertaken 0.00-5.20m. No anomalies encountered. Permeability test undertaken 3.00m-4.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
				Groundwater not encountered prior to use of water flush.

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH324

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 2 of 2

Start Date 6 January 2015 — Easting 327662.1 — Scale 1 : 50

End Date 12 January 2015 — Northing 183816.2 — Ground level 9.45mOD — Depth 15.00 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
									Extremely weak reddish brown rarely mottled light grey MUDSTONE. Fractures are randomly orientated very closely spaced locally extremely closely spaced planar rough. (SMG)			
	22C	9.00	9.38	7.45	C*67	93 0 0						
	22C	9.00	10.50									
	23C	10.50	10.79	7.45	C*107	93 0 0						
	23C	10.50	12.00									
										11.75	-2.30	
09/01/15 1650hrs 2.96m	24C	12.00	12.20	7.45	C*167	100 0 0	NI		Extremely weak reddish brown rarely mottled light grey MUDSTONE. Fractures are randomly orientated very closely and closely spaced locally extremely closely spaced planar rough. (SMG)			
12/01/15 0900hrs 2.33m	24C	12.00	13.50									
	25C	13.50	13.82	7.45	C*79	100 0 0						
	25C	13.50	15.00									
12/01/15 1640hrs 3.47m		15.00	15.22	7.45	C*143				Borehole completed at 15.00m.	15.00	-5.55	
										{18.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

Groundwater not encountered prior to use of water flush.

AGS

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BOREHOLE LOG

BH325

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 1

Start Date 7 January 2015 — Easting 328014.0 — Scale 1 : 50

End Date 7 January 2015 — Northing 183599.0 — Ground level 8.20mOD — Depth 2.10 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	instru -ment	description	depth (m)	reduced level (m)	legend
07/01/15 1200hrs	C	0.00	0.25					MADE GROUND comprising black TARMACADAM. (MG)	0.25	7.95	
	1B	0.30	1.20								
	2D*	0.30	1.20		Vo 0.9			Brownish grey clayey sandy subangular to rounded fine to coarse clinker, slag and limestone GRAVEL with a strong chemical odour. (MG)			
	3D	1.20	1.58	Nil	S*67						
	4B	1.20	1.65						1.20	7.00	
	5D*	1.20	1.65		Vo 2.4			Very dense grey and pinkish red very sandy angular to subrounded fine to coarse clinker, slag, limestone and sandstone GRAVEL. (MG)			
		1.65	1.89	1.65	C*100				1.65	6.55	
	6B	1.65	2.10								
07/01/15 1600hrs Dry	7D*	1.65	2.10		Vo 1.6			Very dense grey sandy angular and subangular fine and medium limestone GRAVEL. (MG)	2.10	6.10	
		2.10		2.00	C**			Borehole completed at 2.10m.	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig.

METHOD: Waterflush rotary core drilled (300mm) 0.00-0.25m. Hand dug inspection pit 0.25-1.20m. Cable percussion (200mm) 1.20-2.10m.

CASING: 200mm diam to 2.00m.

BACKFILL: On completion, hole backfilled with arisings and tarmacadam surfacing reinstated.

REMARKS: Water added to assist boring throughout borehole. Unable to advance casing beyond 2.00m. Chiselling attempted at 2.10m (1hr): No penetration achieved. Borehole reattempted as BH325A.

Survey and level data approximate only.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m) casing (m) rose to (m) time to rise (min) remarks

Groundwater not encountered.

AGS

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BOREHOLE LOG



BH325A

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 1

Start Date 8 January 2015 — Easting 328011.8 — Scale 1 : 50

End Date 8 January 2015 — Northing 183597.0 — Ground level 8.25mOD — Depth 0.80 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range		instru -ment	description	depth (m)	reduced level (m)	legend
08/01/15 0800hrs	1B	0.30	0.80						MADE GROUND comprising black TARMACADAM. (MG)	0.30	7.95	
	2D*	0.30	0.80		Vo 0.2				Grey sandy angular to subrounded fine to coarse clinker, slag and limestone GRAVEL. (MG)			
08/01/15 1100hrs Dry										0.80	7.45	
									Borehole completed at 0.80m.	{8.00}		

EQUIPMENT: Hand tools only.

METHOD: Surface hardstanding broken out with hydraulic breaker 0.00-0.30m. Hand dug inspection pit 0.30-0.80m.

CASING: Not used.

BACKFILL: On completion, hole backfilled with arisings and tarmacadam surfacing reinstated.

REMARKS: Hole terminated at 0.80m in the inspection pit due to fused slag obstruction. Borehole reattempted at BH325B.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
				Groundwater not encountered.

AGS

CONTRACT	CHECKED
30238	EC

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BOREHOLE LOG

BH325B

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT Sheet 1 of 1

Start Date 8 January 2015 Easting 328017.8 Scale 1 : 50

End Date 8 January 2015 Northing 183601.9 Ground level 8.05mOD Depth 1.50 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	instru -ment	description	depth (m)	reduced level (m)	legend
08/01/15 1100hrs								MADE GROUND comprising black TARMACADAM. (MG)	0.30	7.75	
	1D*	0.00	1.20		Vo 1.2			Brownish grey and black sandy subangular fine to coarse clinker and slag GRAVEL with a slight chemical odour. (MG)			
	2B	0.30	1.20								
		1.20	1.36	Nil	C*242				1.10	6.95	
08/01/15	3B	1.20	1.40								
1500hrs Dry	4D*	1.20	1.40		Vo 2.2			Very dense greyish brown slightly clayey sandy angular to subrounded fine to coarse limestone and clinker GRAVEL with a slight chemical odour. (MG)	1.50	6.55	
								Borehole completed at 1.50m.	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig.

METHOD: Surface hardstanding broken out with hydraulic breaker 0.00-0.30m. Hand dug inspection pit 0.30-1.20m. Cable percussion (200mm) 1.20-1.50m.

CASING: 200mm diam to 1.50m.

BACKFILL: On completion, hole backfilled with arisings and tarmacadam surface reinstated.

REMARKS: Unable to advance casing beyond 1.50m due to fused slag obstruction. Hole advanced by chiselling 1.20-1.30m (1hr) and 1.30-1.50m (1hr). Borehole reattempted as BH325C.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
				Groundwater not encountered.

AGS

CONTRACT	CHECKED
30238	EC

Geotechnical Engineering Limited

BOREHOLE LOG

BH325C

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 3

Start Date 8 January 2015 — Easting 328015.0 — Scale 1 : 50

End Date 13 January 2015 — Northing 183601.0 — Ground level 8.16mOD — Depth 21.00 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
08/01/15 1500hrs	1B	0.30	1.20						MADE GROUND comprising black TARMACADAM. (MG)	0.30	7.86	
08/01/15 1600hrs Dry	2D*	0.30	1.20		Vo 0.6				Light grey silty sandy subangular fine to coarse limestone GRAVEL. (MG)			
09/01/15 0800hrs Dry		1.20	1.31	1.20	C*484							
	3B	1.20	1.50									
	4D*	1.20	1.50		Vo 0.4				1.20 - 1.65m: Very dense.			
		1.50	1.74	1.50	C*167							
	5B	1.50	1.95							1.65	6.51	
	6D*	1.50	2.00		Vo 0.8				Very dense dark grey silty sandy angular and subrounded fine to coarse sandstone and limestone GRAVEL. (MG)			
		2.00	2.15	2.00	C*273					2.00	6.16	
	7B	2.00	2.50						Very dense dark grey silty slightly gravelly fine to coarse SAND. Gravel is subangular and subrounded fine and medium sandstone and limestone. (MG)			
	8D*	2.00										
		2.50	2.73	2.50	C*100					2.50	5.66	
	9B	2.50	3.00									
	10B	3.00	3.50						Very dense dark grey clayey sandy subangular and subrounded fine to coarse sandstone, limestone and tarmacadam GRAVEL. (MG)			
	11D	3.00	3.45	3.00	S 4					3.00	5.16	
	12D*	3.00							Soft reddish brown slightly gravelly silty CLAY. Gravel is rounded fine and medium sandstone. (TFD)			
	13B	3.50	4.10							3.50	4.66	
	14UT	3.50	3.95	3.50					Very soft bluish grey locally mottled brown silty organic CLAY with frequent wood fragments (up to 40mm). (TFD)			
	15D	3.95	4.10									
	16B	4.10	4.60									
	17D	4.10	4.55	4.10	S<1							
	18B	4.60	5.50							4.60	3.56	
	19UT	4.60	5.05	4.60					Soft brown silty organic CLAY with frequent decomposed wood fragments (up to 20mm). (TFD)			
										5.05	3.11	
09/01/15 1600hrs 4.80m	20D	5.05	5.20						Very soft greyish blue silty CLAY and organic matter. (TFD)			
	21B	5.50	7.00									
12/01/15 0800hrs Dry	22D	5.50	5.95	5.50	S 2							
	23B	7.00	7.50							7.00	1.16	
	24D	7.00	7.45	7.00	S 27				Medium dense grey slightly gravelly slightly sandy clayey SILT. Gravel is rounded and subrounded fine and medium sandstone. (TFD)			
		7.50	7.95	7.50	C 27							
	25B	7.50	8.00									
	26B	8.00	9.50							8.00	0.16	
									Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig.

METHOD: Surface hardstanding broken out with hydraulic breaker 0.00-0.30m. Hand dug inspection pit 0.30-1.20m. Cable percussion (200mm) 1.20-12.60m. Dynamic sampled (113mm) 12.60-13.50m. Waterflush rotary core drilled (116mm) 13.50-21.00m.

CASING: 200mm diam to 12.50m and 140mm diam to 13.10m.

BACKFILL: On completion, a slotted standpipe (50mm) was installed to 21.00m, granular response zone with geosock 21.00-12.00m, granular fill 12.00-11.80m, bentonite seal 11.80-5.70m and granular fill 5.70-5.50m. A second slotted standpipe (35mm) was installed to 5.50m, granular response zone 5.50-3.50m, granular fill 3.50-3.30m, bentonite seal 3.30-0.40m, granular fill 0.40-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: Hole advanced by chiselling 1.20-1.50m (1hr), 2.00-2.50mm (1hr) and 6.10-6.50m (1hr). Water added to assist boring throughout borehole (10 gallons). Permeability test undertaken at 7.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
4.00	4.00	3.20	20	Fast rate.

AGS

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BOREHOLE LOG

BH325C

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 2 of 3

Start Date 8 January 2015 — Easting 328015.0 — Scale 1 : 50

End Date 13 January 2015 — Northing 183601.0 — Ground level 8.16mOD — Depth 21.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	27D	8.00 - 8.45	8.00	S 18				Stiff reddish brown rarely mottled light grey silty CLAY. (MMG)			
	28B	9.50 - 11.00									
	29D	9.50 - 9.95	9.50	S 19							
	30B	11.00 - 12.50							11.00	-2.84	
	31D	11.00 - 11.45	11.00	S 50				Very stiff reddish brown silty CLAY. (MMG) (Grade IVb)			
									12.00	-3.84	
12/01/15 1200hrs 1.00m		12.60 - 12.98	12.50	C*67				Very stiff reddish brown slightly sandy gravelly CLAY. Gravel is subangular fine to coarse mudstone lithorelicts. Frequent gypsum crystals (up to 5mm). (MMG) (Grade III)			
13/01/15 1020hrs 2.94m	32X	12.60 - 13.50									
		13.50 - 13.88	13.10	C*67							
	33C	13.50 - 15.00			97 0 0	NA		13.50 - 13.65m: 20° fissure rough infilled (up to 2mm) with medium sand sized gypsum crystals.			
						NI			14.30	-6.14	
		15.00 - 15.31	13.10	C*91				Extremely weak thinly laminated to very thinly bedded reddish brown locally calcareous MUDSTONE. Fractures are subhorizontal to 20° and randomly orientated extremely closely and very closely spaced planar smooth rarely stained black and locally with veneer of clay. Fractures rarely infilled with gypsum. (MMG) (Grade II) 14.30 - 14.40m: 30° fissure rough infilled (up to 2mm) with medium sand sized gypsum crystals. 14.80 - 15.00m: 30° fissure rough infilled (up to 2mm) with medium sand sized gypsum crystals.			
	34C	15.00 - 16.50			100 0 0						
		16.50 - 16.84	13.10	C*81							
	35C	16.50 - 18.00			100 0 0						
		18.00 - 18.29	13.10	C*107							
								Continued Next Page	{18.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

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BOREHOLE LOG

BH325C

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 3 of 3

Start Date 8 January 2015 — Easting 328015.0 — Scale 1 : 50

End Date 13 January 2015 — Northing 183601.0 — Ground level 8.16mOD — Depth 21.00 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	36C	18.00	19.50			87 0 0						
		19.50	19.83	13.10	C*83							
	37C	19.50	21.00			100 0 0						
13/01/15 1650hrs 4.97m										21.00	-12.84	
		21.00	21.38	13.10	C*67				Borehole completed at 21.00m.			
										{28.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

AGS

CONTRACT **30238**

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BOREHOLE LOG

BH326

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 3

Start Date 6 January 2015 — Easting 328324.4 — Scale 1 : 50

End Date 9 January 2015 — Northing 183503.3 — Ground level 6.05mOD — Depth 20.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
06/01/15 1330hrs	C	0.00 - 0.30						MADE GROUND comprising black TARMACADAM. (MG)			
	1B	0.30 - 0.50							0.50	5.55	
	2B	0.50 - 0.80						Dark brown mottled dark grey silty angular and subangular fine to coarse mudstone GRAVEL. (MG)			
	3D*	0.60 - 0.75									
	4B	0.80 - 1.00									
	5D	1.20 - 1.65	Nil	S 5					1.20	4.85	
	6X	1.20 - 2.00						Soft fissured bluish grey mottled brown slightly sandy silty CLAY. (TFD)			
	UT	2.00 - 2.45	2.00					2.00 - 3.80m: Locally very soft.			
	7X	2.00 - 3.00									
	8D*	2.15 - 2.30									
	9D	2.50 - 2.95	2.00	S<1							
	10UT	3.00 - 3.45	2.00								
	11X	3.00 - 4.00									
	12D	3.45 - 3.50									
06/01/15 1640hrs 2.10m	13D	3.50 - 3.95	2.00	S 1							
	14D*	3.60 - 3.80						3.70 - 3.80m: Frequent wood fragments (up to 20mm).			
07/01/15 0815hrs 0.80m	UT	4.00 - 4.45	4.00					3.80 - 4.00m: Firm black fibrous peat with wood fragments.	4.00	2.05	
	15X	4.00 - 4.50									
	16D	4.50 - 4.95	4.00	S<1				Soft dark bluish grey locally mottled brown silty organic CLAY with frequent wood fragments (up to 20mm). (TFD)	4.40	1.65	
	17X	4.50 - 5.00						Very soft dark brownish grey slightly sandy silty CLAY with frequent wood fragments (up to 20mm). (TFD)			
	UT	5.00 - 5.45	4.00								
	18X	5.00 - 6.50									
	19D	5.50 - 5.95	4.00	S<1							
	20UT	6.50 - 6.95	6.50								
	21X	6.50 - 8.00									
	22D	6.95 - 7.00									
	23D	7.00 - 7.45	6.50	S 8				7.10 - 7.30m: Locally tending to fibrous peat.			
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Waterflush rotary core drilled (300mm) 0.00-0.30m. Hand dug inspection pit 0.30-1.20m. Dynamic sampled (113mm) 1.20-12.00m. Waterflush rotary core drilled (116mm) 12.00-20.50m.

CASING: 140mm diam to 12.00m.

BACKFILL: On completion, hole backfilled with bentonite pellets.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
				Groundwater not encountered prior to use of water flush.

AGS

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BOREHOLE LOG

BH326

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 2 of 3

Start Date 6 January 2015 — Easting 328324.4 — Scale 1 : 50

End Date 9 January 2015 — Northing 183503.3 — Ground level 6.05mOD — Depth 20.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	UT 24X	8.00 - 8.45 8.00 - 8.50	8.00						8.20	-2.15	
	25D 26X	8.50 - 8.85 8.50 - 9.50	8.00	S*61				Very stiff dark grey gravelly sandy CLAY. Gravel is subrounded and rounded fine and medium sandstone. (RTD)	8.80	-2.75	
		9.50 - 9.95	9.50	S 1				Dark grey silty very sandy subrounded and rounded fine and medium sandstone GRAVEL. (RTD)	9.40	-3.35	
	27X	9.50 - 10.70						Very loose (possibly drilling disturbed) dark grey silty fine and medium SAND. (RTD)	9.70	-3.65	
								Very loose (possibly drilling disturbed) dark grey slightly gravelly silty fine to coarse SAND. Gravel is subrounded and rounded fine and medium sandstone. (RTD)	10.20	-4.15	
		10.70 - 11.15	10.70	S 18				Firm dark reddish brown locally mottled grey slightly sandy gravelly silty CLAY. Gravel is subrounded and rounded fine and medium sandstone. (RTD)	10.50 10.70	-4.45 -4.65	
	28X	10.70 - 12.00						Reddish brown and grey slightly clayey sandy subrounded and rounded fine to coarse sandstone GRAVEL. (RTD)			
07/01/15 1640hrs 1.30m								Firm dark reddish brown slightly sandy slightly gravelly CLAY. Gravel is subrounded and rounded fine to coarse sandstone. Rare pockets (up to 20mm) of light greenish grey clay. (RTD)	11.70	-5.65	
08/01/15 0900hrs 1.50m	29D 30C	12.00 - 12.45 12.00 - 13.00	12.00	S 36	95	NA		Stiff becoming very stiff indistinctly fissured reddish brown slightly sandy gravelly CLAY. Gravel is subangular fine and medium gravel sized lithorelicts of mudstone and very stiff clay, surfaces locally stained dark grey. Frequent light greenish grey reduction spots (up to 50mm). Fissures rarely infilled (up to 5mm) with gypsum. (MMG) (Grade III)			
		13.00 - 13.33	12.00	C*86	86						
	31C	13.00 - 14.50						13.30 - 14.10m: Locally gravelly. Gravel is angular and subangular fine to coarse extremely weak mudstone lithorelicts. Subvertical undulating fractures frequently infilled with up to 5mm gypsum.			
		14.50 - 14.95	12.00	C 50	93						
	32C	14.50 - 16.00									
		16.00 - 16.36	12.00	C*73	100						
	33C	16.00 - 17.50						16.70 - 18.00m: 60-70° fissure planar rough infilled with up to 5mm gypsum.			
08/01/15 1700hrs 4.20m		17.50 - 17.77	12.00	C*103							
09/01/15 0820hrs 1.20m	34C	17.50 - 19.00			100						
								Continued Next Page	{18.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

Groundwater not encountered prior to use of water flush.

AGS

CONTRACT 30238

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Geotechnical Engineering Limited

BOREHOLE LOG

BH326

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 3 of 3

Start Date 6 January 2015 — Easting 328324.4 — Scale 1 : 50

End Date 9 January 2015 — Northing 183503.3 — Ground level 6.05mOD — Depth 20.50 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	35C	19.00	19.21 - 19.50	12.00	C*125	100						
09/01/15 1120hrs 4.00m		20.50	20.61	12.00	C*600				Hard reddish brown slightly sandy gravelly CLAY with frequent light greenish grey reduction spots (up to 20mm). Gravel is angular fine to coarse extremely weak mudstone lithorelicts. (MMG) (Grade III)	20.25	-14.20	
										20.50	-14.45	
									Borehole completed at 20.50m.	{28.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

Groundwater not encountered prior to use of water flush.

AGS

CONTRACT 30238

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Geotechnical Engineering Limited

TRIAL PIT LOG

TP315

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 1

Start Date 6 February 2015 — Easting 327629.6 — Scale 1 : 25

End Date 6 February 2015 — Northing 183861.9 — Ground level 9.50mOD — Depth 1.50 m

water record	sample/test no/type	sample/test result	sample/test depth (m)	description	depth (m)	level (m)	legend
				MADE GROUND comprising black TARMACADAM. (MG)			
					0.30	9.20	
				Light grey sandy angular and subangular fine to coarse crystalline GRAVEL. (MG)			
	1B	Vo 2.7	0.50				
	2D*		0.50				
					0.90	8.60	
				Dark brown mottled dark reddish brown very silty sandy angular to rounded fine to coarse GRAVEL of mudstone, brick and concrete. (MG)			
	3B		1.00				
	4D*	Vo 3.2	1.10 1.00				
Dry					1.50	8.00	
				Trial pit completed at 1.50m.			

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater not encountered.
Trial pit sides remained stable and vertical.
Trial pit dimensions 1.00x2.10x1.50m.
On completion, the trial pit was backfilled with materials arising.
Trial pit terminated at 1.50m due to the presence of buried service.

Sketch of Foundation - Not to scale. All dimensions in metres.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

AGS

CONTRACT	CHECKED
30238	EC

Geotechnical Engineering Ltd, Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 13:59:06 RDL SF

Geotechnical Engineering Limited

TRIAL PIT LOG

TP316

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 1

Start Date 6 February 2015 — Easting 327889.4 — Scale 1 : 25

End Date 6 February 2015 — Northing 183663.4 — Ground level 8.10mOD — Depth 1.35 m

water record	sample/test no/type	sample/test result	sample/test depth (m)	description	depth (m)	level (m)	legend
				MADE GROUND comprising black TARMACADAM. (MG)			
					0.30	7.80	
				Light grey sandy angular and subangular fine to coarse crystalline GRAVEL. (MG)			
	1B	Vo 2.0	0.50- 0.70				
	2D*		0.50- 0.70				
		Vo 4.2	1.00				
					1.10	7.00	
	3B		1.10- 1.30	Dark reddish brown sandy silty sandy angular and subangular fine to coarse mudstone GRAVEL with rare mudstone cobbles and rare coarse gravel sized pockets of clay. (MG)			
Dry	4D*		1.10- 1.30		1.35	6.75	
				Trial pit completed at 1.35m.			

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater not encountered.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.90x2.30x1.35m.
On completion, the trial pit was backfilled with materials arising.
Trial pit terminated at 1.35m due to no effective penetration.

Sketch of Foundation - Not to scale. All dimensions in metres.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

AGS

CONTRACT	CHECKED
30238	EC

Geotechnical Engineering Ltd, Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 13:59:07 RDL SF

Geotechnical Engineering Limited

TRIAL PIT LOG

TP317

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 1

Start Date 6 February 2015 — Easting 328146.7 — Scale 1 : 25

End Date 6 February 2015 — Northing 183549.0 — Ground level 7.85mOD — Depth 2.50 m

water record	sample/test no/type	sample/test result	sample/test depth (m)	description	depth (m)	level (m)	legend
				MADE GROUND comprising black TARMACADAM. (MG)			
					0.30	7.55	
				Light grey very sandy angular and subangular fine to coarse crystalline GRAVEL. (MG)			
	1D*		0.50				
	2B	Vo 3.6	1.00				
	3D*		1.00				
					1.50	6.35	
	4D*		1.50	1.50m: Plastic geogrid.			
				Dark grey silty very sandy angular and subangular fine to coarse limestone GRAVEL. (MG)			
	5B		2.00				
	6D*	Vo 3.4	2.00 2.00				
	7B		2.50				
	8D*		2.50		2.40	5.45	
				Dark reddish brown slightly clayey sandy angular and subangular fine to coarse mudstone GRAVEL with rare coarse gravel sized pockets of clay. (MG)	2.50	5.35	
Dry		Vo 2.4	2.50	Trial pit completed at 2.50m.			

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater not encountered.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.90x2.30x2.50m.
On completion, the trial pit was backfilled with materials arising.
Trial pit terminated at 2.50m due to no effective penetration.

Sketch of Foundation - Not to scale. All dimensions in metres.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

AGS

CONTRACT	CHECKED
30238	EC

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A2 Appendix 2

Gas and Groundwater Monitoring Data

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH324	26/02/15 12:30:00	1013	0								0.4	9		
BH324	26/02/15 12:31:00										0.0			
BH324	26/02/15 12:32:00										0.0			
BH324	26/02/15 12:33:00										0.0			
BH324	26/02/15 12:34:00										0.0			
BH324	26/02/15 12:35:00			0.6	0.0	15.9	0.0	0	10	5.2				
BH324	26/02/15 12:36:00			0.6	0.0	15.9	0.0	0	0	5.1				
BH324	26/02/15 12:37:00			0.6	0.0	15.9	0.0	0	0	5.0				
BH324	26/02/15 12:38:00			0.6	0.0	15.5	0.0	0	0	4.5				
BH324	26/02/15 12:39:00			0.7	0.0	14.4	0.0	0	0	3.6				
BH324	26/02/15 12:40:00			0.8	0.0	12.7	0.0	0	0	2.3				
BH324	26/02/15 12:41:00			0.9	0.0	11.3	0.0	0	0	1.2				
BH324	26/02/15 12:42:00													Upsurge at 7min 30sec. Gas monitoring stopped.
BH324	26/02/15 12:43:00													
BH324	26/02/15 12:44:00												1.10	
BH324	05/03/15 11:00:00	1041	0								0.4	7		5 litres purged, base depth 2.00m.
BH324	05/03/15 11:01:00										0.4			
BH324	05/03/15 11:02:00										0.0			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH324	05/03/15 11:03:00										0.0			
BH324	05/03/15 11:04:00										0.0			
BH324	05/03/15 11:05:00			0.1	0.0	19.6	82.5	0	0	3.7				
BH324	05/03/15 11:06:00			0.0	0.0	19.6	81.6	0	0	3.5				
BH324	05/03/15 11:07:00			0.0	0.0	19.7	81.0	0	0	3.5				
BH324	05/03/15 11:08:00			0.0	0.0	19.7	81.6	0	0	3.4				
BH324	05/03/15 11:09:00			0.0	0.0	19.7	83.0	0	0	3.3				
BH324	05/03/15 11:10:00			0.0	0.0	19.7	88.3	0	0	3.0				
BH324	05/03/15 11:11:00													Upsurge at 6min 10sec. Gas monitoring stopped.
BH324	05/03/15 11:12:00													
BH324	05/03/15 11:13:00													
BH324	05/03/15 11:14:00												1.15	
BH324	12/03/15 12:45:00	1023	0								0.0	13		5 litres purged, base depth 2.00m.
BH324	12/03/15 12:46:00										0.0			
BH324	12/03/15 12:47:00										0.0			
BH324	12/03/15 12:48:00										0.0			
BH324	12/03/15 12:49:00										0.0			
BH324	12/03/15 12:50:00			0.0	0.0	19.9	0.0	0	0	2.4				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH324	12/03/15 12:51:00			0.0	0.0	20.0	0.0	0	0	2.3				
BH324	12/03/15 12:52:00			0.0	0.0	20.0	0.0	0	0	2.3				
BH324	12/03/15 12:53:00			0.0	0.0	20.0	0.0	0	0	2.2				
BH324	12/03/15 12:54:00			0.0	0.0	19.7	0.0	0	0	2.1				
BH324	12/03/15 12:55:00			0.4	0.0	17.2	0.0	0	0	1.6				
BH324	12/03/15 12:56:00													Upsurge at 6min 10sec. Gas monitoring stopped.
BH324	12/03/15 12:57:00													
BH324	12/03/15 12:58:00													
BH324	12/03/15 12:59:00												1.20	
BH324	05/05/15 12:05:00	1002	0								0.4	12		
BH324	05/05/15 12:06:00										0.4			
BH324	05/05/15 12:07:00										0.4			
BH324	05/05/15 12:08:00										0.0			
BH324	05/05/15 12:09:00										0.0			
BH324	05/05/15 12:10:00			0.0	0.2	17.1	0.0	0	0	0.6				
BH324	05/05/15 12:11:00			0.0	0.2	17.1	0.0	0	0	0.6				
BH324	05/05/15 12:12:00			0.0	0.0	17.9	0.0	0	0	0.6				
BH324	05/05/15 12:13:00			0.0	0.0	18.0	0.0	0	0	0.5				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH324	05/05/15 12:14:00			0.0	0.0	18.3	0.0	0	0	0.4				
BH324	05/05/15 12:15:00			0.0	0.0	18.8	0.0	0	0	0.2				
BH324	05/05/15 12:16:00			0.0	0.0	19.4	0.0	0	0	0.0				
BH324	05/05/15 12:17:00			0.0	0.0	19.4	0.0	0	0	0.0				
BH324	05/05/15 12:18:00			0.0	0.0	19.4	0.0	0	0	0.0				
BH324	05/05/15 12:19:00			0.0	0.0	19.4	0.0	0	0	0.0				
BH324	05/05/15 12:20:00												1.26	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH324	26/02/15 12:44:00												2.17	
BH324	05/03/15 11:14:00												2.30	77 litres purged, base depth 15.00m.
BH324	12/03/15 12:59:00												2.38	75 litres purged, base depth 15.00m.

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH325C	27/02/15 09:00:00	1024	2								0.2	7		
BH325C	27/02/15 09:01:00										0.4			
BH325C	27/02/15 09:02:00										0.6			
BH325C	27/02/15 09:03:00										0.5			
BH325C	27/02/15 09:04:00										0.6			
BH325C	27/02/15 09:05:00			0.7	0.0	19.0	2.5	0	10	0.8				
BH325C	27/02/15 09:06:00			0.9	0.2	18.7	4.5	0	0	0.3				
BH325C	27/02/15 09:07:00			0.8	0.1	18.7	3.4	0	0	0.3				
BH325C	27/02/15 09:08:00			0.7	0.1	18.9	1.7	0	0	0.2				
BH325C	27/02/15 09:09:00			0.6	0.0	19.0	0.4	0	0	0.2				
BH325C	27/02/15 09:10:00			0.6	0.0	19.1	0.0	0	0	0.2				
BH325C	27/02/15 09:11:00			0.5	0.0	19.1	0.0	0	0	0.2				
BH325C	27/02/15 09:12:00			0.4	0.0	19.2	0.0	0	0	0.1				
BH325C	27/02/15 09:13:00			0.4	0.0	19.2	0.0	0	0	0.1				
BH325C	27/02/15 09:14:00			0.3	0.0	19.3	0.0	0	0	0.1			2.95	
BH325C	06/03/15 09:00:00	1037									-1.2	8		9 litres purged, base depth 5.50m.
BH325C	06/03/15 09:01:00		-4								-1.2			
BH325C	06/03/15 09:02:00										-1.6			

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH325C	06/03/15 09:03:00										-1.5			
BH325C	06/03/15 09:04:00										-1.2			
BH325C	06/03/15 09:05:00			0.2	0.1	19.9	0.0	0	0	1.0				
BH325C	06/03/15 09:06:00			0.0	0.0	20.0	0.0	0	0	0.8				
BH325C	06/03/15 09:07:00			0.0	0.0	19.9	0.0	0	0	0.7				
BH325C	06/03/15 09:08:00			0.0	0.0	19.9	0.0	0	0	0.7				
BH325C	06/03/15 09:09:00			0.0	0.0	19.9	0.0	0	0	0.6				
BH325C	06/03/15 09:10:00			0.0	0.0	19.9	0.0	0	0	0.5				
BH325C	06/03/15 09:11:00			0.0	0.0	20.0	0.0	0	0	0.5				
BH325C	06/03/15 09:12:00			0.0	0.0	20.0	0.0	0	0	0.4				
BH325C	06/03/15 09:13:00			0.0	0.0	20.0	0.0	0	0	0.4				
BH325C	06/03/15 09:14:00			0.0	0.0	20.0	0.0	0	0	0.3			3.54	
BH325C	13/03/15 10:30:00	1026									-2.6	5		10 litres purged, base depth 5.50m.
BH325C	13/03/15 10:31:00										3.0			
BH325C	13/03/15 10:32:00		-1								2.1			
BH325C	13/03/15 10:33:00										0.0			
BH325C	13/03/15 10:34:00										0.0			
BH325C	13/03/15 10:35:00			3.9	4.3	9.9	98.4	0	0	0.9				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH325C	13/03/15 10:36:00			3.6	4.3	10.2	96.1	0	0	0.8				
BH325C	13/03/15 10:37:00			3.7	4.1	10.5	93.4	0	0	0.8				
BH325C	13/03/15 10:38:00			3.5	3.9	10.9	89.4	0	0	0.6				
BH325C	13/03/15 10:39:00			3.4	3.8	11.3	86.4	0	0	0.5				
BH325C	13/03/15 10:40:00			3.1	3.6	11.8	79.0	0	0	0.4				
BH325C	13/03/15 10:41:00			2.8	3.4	12.3	77.3	0	0	0.4				
BH325C	13/03/15 10:42:00			2.6	3.1	12.9	69.6	0	0	0.3				
BH325C	13/03/15 10:43:00			2.4	2.9	13.4	64.9	0	0	0.2				
BH325C	13/03/15 10:44:00			2.2	2.6	13.9	59.5	0	0	0.1			3.30	
BH325C	05/05/15 12:29:00	1003	0								0.4	12		
BH325C	05/05/15 12:30:00										0.0			
BH325C	05/05/15 12:31:00										0.0			
BH325C	05/05/15 12:32:00										0.0			
BH325C	05/05/15 12:33:00										0.0			
BH325C	05/05/15 12:34:00			0.0	0.0	19.3	0.0	0	0	0.5				
BH325C	05/05/15 12:35:00			0.0	0.0	19.3	0.0	0	0	0.5				
BH325C	05/05/15 12:36:00			0.0	0.0	20.1	0.0	0	0	0.5				
BH325C	05/05/15 12:37:00			0.0	0.0	20.1	0.0	0	0	0.0				

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH325C	05/05/15 12:38:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH325C	05/05/15 12:39:00			0.0	0.0	20.6	0.0	0	0	0.0				
BH325C	05/05/15 12:40:00			0.0	0.0	20.9	0.0	0	0	0.0				
BH325C	05/05/15 12:41:00			0.0	0.0	21.5	0.0	0	0	0.0				
BH325C	05/05/15 12:42:00			0.0	0.0	21.7	0.0	0	0	0.0				
BH325C	05/05/15 12:43:00			0.0	0.0	22.0	0.0	0	0	0.0				
BH325C	05/05/15 12:44:00												3.20	

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH325C	27/02/15 09:14:00												3.10	
BH325C	06/03/15 09:14:00												3.43	105 litres purged, base depth 21.00m.
BH325C	13/03/15 10:44:00												3.59	105 litres purged, base depth 21.00m.

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		01

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		30/01/2008	09:50	2.45	25/02/2008	14:34	2.48	07/03/2008	14:25	2.60
SBHD03 CP	SPIE	10.00		30/01/2008	11:01	0.47	25/02/2008	14:52	0.43	07/03/2008	14:05	0.56
SBHD05 RC	SPIE	12.00		31/01/2008	09:00	1.02	25/02/2008	15:35	1.05	07/03/2008	13:50	1.77
SBHD06 RC	SP	15.00		30/01/2008	13:00	1.13	21/02/2008	10:30	1.39	07/03/2008	13:30	1.39
SBHD08 RC	SPIE	29.50		30/01/2008	13:50	1.20	25/02/2008	15:58	2.02	07/03/2008	13:35	1.40
SBHE02RD	SPIE	25.00		31/01/2008	09:25	2.18	25/02/2008	16:20	2.09	07/03/2008	13:10	2.48
SBHE04 RC	SPIE	17.20		31/01/2008	09:15	2.31	25/02/2008	16:11	2.51	07/03/2008	13:20	2.59
SBHF01 RC	SPIE	19.00		31/01/2008	09:40	5.69	25/02/2008	16:32	5.72	07/03/2008	12:50	5.43
SBHF02A CP	SPIE	17.00		01/02/2008	14:40	7.61	25/02/2008	17:13	7.57	07/03/2008	12:30	9.00
SBHF03 RC	SPIE	18.00		31/01/2008	10:35	6.97	26/02/2008	08:55	6.77	07/03/2008	12:15	7.22
SBHH01 RC	SPIE	25.00		31/01/2008	11:15	3.45	26/02/2008	09:39	3.42	07/03/2008	11:28	3.65
SBHH02 RC	SPIE	14.90		31/01/2008	11:10	3.42	26/02/2008	09:20	3.88	07/03/2008	11:35	3.64
SBHH05 RC	SPIE	21.50		31/01/2008	11:30	2.22	26/02/2008	10:01	2.13	07/03/2008	11:05	3.10
SBHH06 CP	SP	12.30		30/01/2008	15:30	3.75	21/02/2008	08:00	3.76	07/03/2008	11:10	3.87
SBHH07A RC	SPIE	24.85		30/01/2008	14:50	1.70	26/02/2008	10:40	1.34	07/03/2008	11:00	1.07
SBHJ01 CP	SP	7.50		01/02/2008	12:20	1.34	21/02/2008	11:45	5.98	06/03/2008	12:28	1.82
SBHJ03 CP	SP	5.20		01/02/2008	08:00	0.54	27/02/2008	16:15	0.70	07/03/2008	10:45	0.68
SBHJ04	SP	13.10		01/02/2008	11:55	6.61	22/02/2008	13::55	6.67	06/03/2008	11:46	6.75
SBHJ05	SP	11.50		01/02/2008	11:10	8.91	22/02/2008	09:00	9.07	06/03/2008	11:23	9.16
SBHJ06 CP	SP	4.10		01/02/2008	11:45	1.31	21/02/2008	15:30	1.32	06/03/2008	10:50	1.33
SBHJ07 CP	SP	10.40		01/02/2008	11:43	1.35	21/02/2008	14:40	1.40	06/03/2008	12:05	1.56
SBHJ08A CP	SP	7.40		01/02/2008	11:35	3.49	21/02/2008	13:05	2.31	06/03/2008	10:57	2.67
SBHJ09 CP	SP	2.20		01/02/2008	11:30	0.65	21/02/2008	12:25	0.85	06/03/2008	11:00	0.90
SBHJ10 CP	SP	10.00		01/02/2008	10:40	2.30	21/02/2008	13:45	2.24	06/03/2008	10:40	2.16
SBHK01 CP	SP	6.80		01/02/2008	10:55	0.70	25/02/2008	10:30	1.00	06/03/2008	14:24	1.06
SBHK02 CP	SP	11.20		01/02/2008	10:50	1.34	25/02/2008	11:20	1.33	06/03/2008	14:18	1.47
SBHK03 CP	SP	5.90		01/02/2008	10:45	0.87	25/02/2008	12:00	0.89	06/03/2008	14:15	1.00
SBHK04 CP	SP	12.20		01/02/2008	10:25	1.45	25/02/2008	12:30	1.60	06/03/2008	12:30	1.60
SBHL02 RC	SPIE	15.20		01/02/2008	10:35	2.27	25/02/2008	12:49	2.31	06/03/2008	14:00	2.42
SBHL03 RC	SPIE	15.00		31/01/2008	16:20	0.61	26/02/2008	11:15	0.51	07/03/2008	10:25	0.66
SBHM01 RC	SPIE	21.00		01/01/1900	08:20	-0.26	26/02/2008	11:30	-0.26	07/03/2008	10:17	0.05
SBHM02 RC	SPIE	20.00		01/02/2008	08:25	0.19	26/02/2008	11:41	0.49	07/03/2008	10:14	0.68
SBHN01A RC	SPIE	14.90		01/02/2008	15:20	8.49	27/02/2008	17:15	12.23	07/03/2008	14:45	13.18
SBHN02 RC	SPIE	20.40		31/01/2008	15:55	3.67	26/02/2008	11:57	4.19	07/03/2008	10:05	4.84
SBHN03 RC	SPIE	15.00		31/01/2008	15:45	1.07	26/02/2008	12:03	1.73	07/03/2008	09:55	2.34
SBHN04 RC	SPIE	10.00		31/01/2008	15:30	9.99	26/02/2008	14:42	DRY	07/03/2008	09:45	DRY

Recorded by:	S Davis	Checked by:	I Swain	Approved by:	I Swain
Date:	30/01/08-07/03/08	Date:	16/04/2008	Date:	17/04/2008
Form No.	SI GWR	Revision No.	2.03	Issue Date	07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		02

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		31/01/2008	14:50	DRY	26/02/2008	14:12	DRY	07/03/2008	09:35	DRY
SBHP02 RC	SPIE	9.80		31/01/2008	13:55	7.20	26/02/2008	13:59	8.09	07/03/2008	09:10	8.25
SBHP03 RC	SPIE	5.00		31/01/2008	13:40	4.09	26/02/2008	13:48	4.76	07/03/2008	09:05	4.78
SBHQ01 RC	SPIE	11.80		31/01/2008	14:20	5.76	26/02/2008	12:46	6.74	07/03/2008	09:30	7.20
SBHQ02 RC	SPIE	6.00		31/01/2008	14:15	4.98	26/02/2008	12:59	5.16	07/03/2008	09:25	5.98
SBHQ03 RC	SPIE	11.00		31/01/2008	13:20	6.04	26/02/2008	13:29	7.22	07/03/2008	08:38	7.59
SBHQ04 RC	SPIE	8.00		31/01/2008	13:05	4.35	26/02/2008	13:36	6.18	07/03/2008	08:55	6.94
SBHQ06 RC	SPIE	7.35		31/01/2008	13:00	3.89	26/02/2008	13:16	4.40	07/03/2008	08:25	4.63
SWSJ08	SP	3.30		01/02/2008	12:30	0.42	21/02/2008	11:45	0.37	06/03/2008	12:35	0.41
SWSJ13	SP	2.50		01/02/2008	12:00	DRY	22/02/2008	13:45	DRY	06/03/2008	11:50	DRY
SWSJ21	SP	6.00		01/02/2008	11:20	3.87	22/02/2008	09:30	5.72	06/03/2008	11:27	6.59
SWSJ23	SP	7.80		01/02/2008	11:22	5.92	22/02/2008	09:55	6.62	06/03/2008	11:30	6.97
SWSJ34	SP	6.00		01/02/2008	11:05	2.52	22/02/2008	10:55	3.33	06/03/2008	11:10	3.08
SWSJ37	SP	5.60		01/02/2008	11:25	0.46	22/02/2008	11:30	0.55	06/03/2008	11:15	0.61
LGBH02	SP	8.88					22/02/2008	14:35	7.50	06/03/2008	11:40	7.52
LGBH03	SP	8.90					22/02/2008	14:21	7.20	06/03/2008	11:44	7.28
LGBH04	SP	10.50					22/02/2008	10:30	8.87	06/03/2008	11:20	9.00
LGBH09	SP	7.00					22/02/2008	12:40	1.13	06/03/2008	10:48	1.56
LGBH10	SP	14.60					27/02/2008	14:30	8.15	06/03/2008	11:12	8.21
LGBH11	SP	11.20					27/02/2008	10:00	7.05	06/03/2008	11:03	7.07
LGBH12	SP	7.05					22/02/2008	13:10	1.40	06/03/2008	10:45	1.40
RBBH07	SP	6.25					27/02/2008	12.15	0.69	06/03/2008	12:20	0.71
RBBH09	SP	7.05					27/02/2008	13:40	1.25	06/03/2008	12:25	1.21
RBBH10	SP	6.85					27/02/2008	13:00	0.68	06/03/2008	12:30	0.82

Recorded by:	S Davis	Checked by:	I Swain	Approved by:	I Swain
Date:	30/01/08-07/03/08	Date:	16/04/2008	Date:	17/04/2008
Form No.	SI GWR	Revision No.	2.03	Issue Date	07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		03

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		20/03/2008	16:30	2.57	04/04/2008	08:00	2.59	18/04/2008	07:40	2.66
SBHD03 CP	SPIE	10.00		20/03/2008	16:45	0.58	04/04/2008	08:13	0.53	18/04/2008	08:00	0.60
SBHD05 RC	SPIE	12.00		20/03/2008	16:00	1.08	04/04/2008	09:15	1.22	18/04/2008	08:30	1.32
SBHD06 RC	SP	15.00		20/03/2008	17:55	1.20	04/04/2008	09:30	1.33	18/04/2008	08:40	1.44
SBHD08 RC	SPIE	29.50		19/03/2008	18:30	1.28	04/04/2008	10:00	1.39	18/04/2008	08:52	1.52
SBHE02RD	SPIE	25.00		20/03/2008	16:20	2.23	04/04/2008	08:50	2.46	18/04/2008	09:00	2.54
SBHE04 RC	SPIE	17.20		20/03/2008	15:45	2.20	04/04/2008	09:00	1.80	18/04/2008	08:15	1.80
SBHF01 RC	SPIE	19.00		20/03/2008	15:30	5.50	04/04/2008	08:40	5.55	18/04/2008	13:58	5.58
SBHF02A CP	SPIE	17.00		20/03/2008	15:10	5.60	04/04/2008	10:28	5.70	18/04/2008	13:45	5.77
SBHF03 RC	SPIE	18.00		20/03/2008	14:55	7.20	04/04/2008	10:36	7.38	18/04/2008	13:40	7.42
SBHH01 RC	SPIE	25.00		20/03/2008	14:25	3.60	04/04/2008	15:00	3.60	18/04/2008	13:10	3.62
SBHH02 RC	SPIE	14.90		20/03/2008	14:30	4.27	04/04/2008	15:05	3.64	18/04/2008	13:13	3.70
SBHH05 RC	SPIE	21.50		20/03/2008	17:30	2.17	04/04/2008	15:15	2.78	18/04/2008	11:34	2.90
SBHH06 CP	SP	12.30		17/03/2008	15:20	3.88	04/04/2008	15:20	3.89	17/04/2008	14:15	3.90
SBHH07A RC	SPIE	24.85		20/03/2008	13:55	1.33	04/04/2008	15:28	1.92	18/04/2008	11:43	0.88
SBHJ01 CP	SP	7.50		19/03/2008	14:15	1.81	03/04/2008	16:05	1.90	17/04/2008	12:40	1.80
SBHJ03 CP	SP	5.20		19/03/2008	16:40	0.78	03/04/2008	18:25	0.82	17/04/2008	15:55	0.80
SBHJ04	SP	13.10		17/03/2008	13:35	6.64	03/04/2008	18:10	6.74	17/04/2008	13:08	6.80
SBHJ05	SP	11.50		18/03/2008	13:50	9.02	03/04/2008	17:39	9.10	17/04/2008	13:31	9.11
SBHJ06 CP	SP	4.10		17/03/2008	12:55	1.29	03/04/2008	17:43	1.33	17/04/2008	15:05	1.20
SBHJ07 CP	SP	10.40		17/03/2008	10:25	1.59	03/04/2008	17:47	1.50	17/04/2008	13:58	1.47
SBHJ08A CP	SP	7.40		18/03/2008	10:00	2.50	03/04/2008	17:55	2.50	17/04/2008	15:33	2.50
SBHJ09 CP	SP	2.20		18/03/2008	10:25	0.69	03/04/2008	17:58	0.82	17/04/2008	15:22	0.90
SBHJ10 CP	SP	10.00		17/03/2008	09:15	2.10	03/04/2008	17:50	2.00	17/04/2008	13:55	2.00
SBHK01 CP	SP	6.80		19/03/2008	10:45	0.88	03/04/2008	16:40	1.00	17/04/2008	11:40	0.94
SBHK02 CP	SP	11.20		19/03/2008	11:15	1.46	03/04/2008	16:45	1.48	17/04/2008	11:43	1.46
SBHK03 CP	SP	5.90		19/03/2008	11:45	1.04	03/04/2008	16:48	1.07	17/04/2008	11::46	0.98
SBHK04 CP	SP	12.20		19/03/2008	12:15	1.64	03/04/2008	16:52	1.67	17/04/2008	12:05	1.60
SBHL02 RC	SPIE	15.20		19/03/2008	12:50	2.44	03/04/2008	17:00	2.45	17/04/2008	12:00	2.45
SBHL03 RC	SPIE	15.00		20/03/2008	13:25	0.76	08/04/2008	15:40	0.64	18/04/2008	09:50	0.62
SBHM01 RC	SPIE	21.00		20/03/2008	13:05	-0.21	08/04/2008	15:48	-0.45	18/04/2008	11:55	0.01
SBHM02 RC	SPIE	20.00		20/03/2008	13:10	0.61	08/04/2008	15:52	0.61	18/04/2008	11:50	0.61
SBHN01A RC	SPIE	14.90		20/03/2008	12:55	12.14	08/04/2008	16:05	12.58	18/04/2008	12:48	13.27
SBHN02 RC	SPIE	20.40		20/03/2008	12:45	4.26	08/04/2008	16:12	2.64	18/04/2008	12:45	4.85
SBHN03 RC	SPIE	15.00		20/03/2008	12:30	1.60	08/04/2008	16:17	2.07	18/04/2008	12:35	2.37
SBHN04 RC	SPIE	10.00		20/03/2008	12:10	DRY	08/04/2008	16:28	DRY	18/04/2008	10:55	DRY

Recorded by:	S Davis	Checked by:	I Swain	Approved by:	I Swain
Date:	17/03/08-17/04/08	Date:	21/04/2008	Date:	21/04/2008
Form No.	SI GWR	Revision No.	2.03	Issue Date	07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		04

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		20/03/2008	12:00	DRY	08/04/2008	16:40	DRY	18/04/2008	10:45	DRY
SBHP02 RC	SPIE	9.80		20/03/2008	11:45	5.59	08/04/2008	16:55	7.98	18/04/2008	10:30	8.20
SBHP03 RC	SPIE	5.00		20/03/2008	11:40	2.80	08/04/2008	16:50	DRY	18/04/2008	10:25	4.93
SBHQ01 RC	SPIE	11.80		20/03/2008	10:40	6.72	08/04/2008	17:13	7.24	18/04/2008	10:10	7.48
SBHQ02 RC	SPIE	6.00		20/03/2008	10:45	4.91	08/04/2008	17:10	DRY	18/04/2008	10:05	DRY
SBHQ03 RC	SPIE	11.00		20/03/2008	10:50	6.76	08/04/2008	17:05	7.69	18/04/2008	10:15	8.00
SBHQ04 RC	SPIE	8.00		20/03/2008	11:30	6.97	08/04/2008	17:02	DRY	18/04/2008	10:40	DRY
SBHQ06 RC	SPIE	7.35		20/03/2008	11:20	4.47	08/04/2008	17:20	6.63	18/04/2008	12:20	4.79
SWSJ08	SP	3.30		19/03/2008	15:10	0.44	03/04/2008	16:00	0.46	17/04/2008	12:35	0.42
SWSJ13	SP	2.50		17/03/2008	13:25	DRY	03/04/2008	18:12	DRY	17/04/2008	13:12	DRY
SWSJ21	SP	6.00		18/03/2008	14:30	4.42	03/04/2008	17:33	5.89	17/04/2008	13:32	6.50
SWSJ23	SP	7.80		18/03/2008	15:05	7.58	03/04/2008	17:35	7.20	17/04/2008	13:35	7.20
SWSJ34	SP	6.00		19/03/2008	08:55	2.36	03/04/2008	17:23	3.26	17/04/2008	13:46	DRY
SWSJ37	SP	5.60		18/03/2008	11:15	0.55	03/04/2008	17:25	0.67	17/04/2008	13:42	0.63
LGBH02	SP	8.88		17/03/2008	12:55	7.48	03/04/2008	18:05	7.46	17/04/2008	13:00	7.48
LGBH03	SP	8.90		17/03/2008	13:15	7.24	03/04/2008	18:08	7.32	17/04/2008	13:03	7.30
LGBH04	SP	10.50		18/03/2008	13:20	8.87	03/04/2008	17:40	8.90	17/04/2008	13:29	8.94
LGBH09	SP	7.00		17/03/2008	11:00	1.08	03/04/2008	17:45	1.15	17/04/2008	15:08	1.05
LGBH10	SP	14.60		18/03/2008	15:20	8.31	03/04/2008	17:27	8.20	17/04/2008	13:40	8.70
LGBH11	SP	11.20		18/03/2008	11:40	6.88	03/04/2008	17:18	7.00	17/04/2008	15:38	7.08
LGBH12	SP	7.05		17/03/2008	10:00	1.30	03/04/2008	17:49	1.47	17/04/2008	15:15	1.36
RBBH07	SP	6.25		19/03/2008	13:25	0.66	03/04/2008	15:50	0.68	17/04/2008	12:30	1.10
RBBH09	SP	7.05		19/03/2008	14:40	1.18	03/04/2008	16:07	1.21	17/04/2008	12:42	1.25
RBBH10	SP	6.85		19/03/2008	13:45	0.70	03/04/2008	16:03	0.75	17/04/2008	12:39	0.78

Recorded by:	S Davis	Checked by:	I Swain	Approved by:	I Swain
Date:	17/03/08-17/04/08	Date:	21/04/2008	Date:	21/04/2008
Form No.	SI GWR	Revision No.	2.03	Issue Date	07/01/2008

NORWEST HOLST SOIL ENGINEERING

A3 Appendix 3

Tabulated Soil Laboratory Data

M4CAN
Soil Analysis Results & Screening Assessment
CL-6
09/07/2015

Geological Formation Legend

MG	Made Ground
RTD	River Terrace Deposit
TFD	Tidal Flat Deposit

Screening Values and Assessment

	Exceeds S4ULs Criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
NAD No Asbestos Detected
Elemental Mercury criteria used
Chromium VI criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	SBHC01 CP	SBHC01 CP	SBHC02	BH324	BH325B	BH325C	BH325C	BH326	TP315	TP315	TP316	TP316	TP317	TP317	TP317	BH324	BH325C	BH326	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Specimen Depth (m)		1	2	1	0.55 - 0.7	0 - 1.2	0.3 - 1.2	2	0.6 - 0.75	0.5 - 0.7	1.1 - 1.3	0.5	1	0.5	1.5	2.5	1.6 - 2	3	2.15 - 2.3							
OD Level (m)					8.9	8.05	7.86	6.16	5.45	9	8.4	7.6	7.1	7.35	6.35	5.35	7.85	5.16	3.9							
Sample Type					ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES							
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	RTD	TFD	TFD							
Cluster Code		2007	2007	2007	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI							
Inorganics																										
Boron	mg/kg	<3.5	<3.5	<3.5	0.84	3.5	5.5	2	1.2	2.9	1.1	2.8	3	3.2	2.9	3.1	<0.4	<0.4	1.6	18	13	5.5	0.84	BH325C @ 0.3 - 1.2mbGL	46000	0
Antimony	mg/kg	2	1.9	<1.5																3	2	2	1.9	SBHC01 CP @ 1mbGL		
Arsenic	mg/kg	<3	<3	<3	24	38	28	30	18	8.1	13	9.1	19	8.7	9.6	22	8.5	9.4	9.6	18	15	38	8.1	BH325B @ 0 - 1.2mbGL	170	0
Barium	mg/kg	97	180	550																3	3	550	97	SBHC02 @ 1mbGL		
Cadmium	mg/kg	<0.3	<0.3	<0.3	0.2	0.18	0.27	0.22	0.1	0.13	0.1	<0.1	12	<0.1	<0.1	12	0.1	0.22	<0.1	18	11	12	0.1	TP316 @ 1 / TP317 @ 2.5mbGL	190	0
Chromium	mg/kg	12	20	9.8	26	13	7.7	11	37	11	34	7.9	11	11	5.5	11	23	57	33	18	18	57	5.5	BH325C @ 3mbGL	33	3
Copper	mg/kg	<6	13	<6	19	3.8	5.6	1.9	12	4.6	14	1.5	18	3.4	1.9	26	12	18	11	18	16	26	1.5	TP317 @ 2.5mbGL	44000	0
Lead	mg/kg	8	38	3	23	3.6	12	3.2	24	13	25	1.7	510	21	3.4	440	9.8	48	22	18	18	510	1.7	TP316 @ 1mbGL	1300	0
Mercury	mg/kg	<0.6	<0.6	<0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.13	<0.1	<0.1	0.13	<0.1	<0.1	<0.1	18	2	0.13	0.13	TP316 @ 1mbGL	30	0
Molybdenum	mg/kg	<0.6	<0.6																	2	0	None > LOD	None > LOD			
Nickel	mg/kg	16	29	8.6	43	31	24	26	31	12	40	6.6	9.5	6.1	5.9	13	31	41	28	18	18	43	5.9	BH324 @ 0.55 - 0.7mbGL	980	0
Selenium	mg/kg	<3	<3	<3	<0.2	<0.2	<0.2	<0.2	<0.2	0.84	0.52	1.3	1.3	1.9	1.5	1.5	<0.2	<0.2	<0.2	18	7	1.9	0.52	TP317 @ 0.5mbGL	1800	0
Zinc	mg/kg	50	86	37	91	34	34	34	53	45	100	19	470	58	20	600	71	93	51	18	18	600	19	TP317 @ 2.5mbGL	170000	0
Total Cyanide	mg/kg	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	18	0	None > LOD	None > LOD			
Cyanide Free	mg/kg				<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.6	15	0	None > LOD	None > LOD			
Asbestos Presence Screen	NONE	NFD	NFD	NFD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD					13	0	None > LOD	None > LOD			
pH Value	pH			9.2	8.7	11	11.6	11.1	8.4	10.5	8.8	11.4	10.5	11.6	11.4	10.9	7.3	7.4	8.4	16	16	11.6	7.3	BH325C @ 0.3 - 1.2 / TP317 @ 0.5mbGL	6-9	11
Phenols																										
Phenols	mg/kg					<0.3		<0.3		<0.3	<0.3	<0.3		<0.3	<0.3	<0.3		<0.3		9	0	None > LOD	None > LOD		440	0
BTEX																										
Benzene	mg/kg					<0.001		<0.001										<0.001		3	0	None > LOD	None > LOD		27	0
Toluene	mg/kg					<0.001		<0.001										<0.001		3	0	None > LOD	None > LOD		56000	0
Ethyl benzene	mg/kg					<0.001		<0.001										<0.001		3	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg					<0.001		<0.001										<0.001		3	0	None > LOD	None > LOD		5900	0
o Xylene	mg/kg					<0.001		<0.001										<0.001		3	0	None > LOD	None > LOD		6600	0
TPH																										
TPH >C6-C8.	mg/kg				<1		<1		<1	<1	<1	<1	<1	<1	<1	<1	<1			11	0	None > LOD	None > LOD		7800	0
TPH >C8-C10.	mg/kg				<1		<1		<1	<1	<1	<1	<1	<1	<1	<1	<1			11	0	None > LOD	None > LOD		2000	0
TPH >C10-C12.	mg/kg				<1		<1		<1	<1	<1	<1	<1	<1	<1	<1	<1			11	0	None > LOD	None > LOD		9200	0
TPH >C12-C16.	mg/kg				<1		<1		<1	<1	<1	<1	<1	<1	<1	<1	<1			11	0	None > LOD	None > LOD		10000	0
TPH >C16-C21.	mg/kg				<1		<1		<1	<1	<1	<1	<1	<1	<1	<1	<1			11	0	None > LOD	None > LOD		7600	0
TPH >C21-C35.	mg/kg				<1		<1		<1	64	<1	52	<1	8.4	19	<1	<1			11	4	64	8.4	TP315 @ 0.5 - 0.7mbGL	7800	0
Aliphatics C5-C6	mg/kg					<0.1		<0.1										<0.1		3	0	None > LOD	None > LOD		3200	0
Aliphatics >C6-C8	mg/kg					<0.1		<0.1										<0.1		3	0	None > LOD	None > LOD		7800	0
Aliphatics >C8-C10	mg/kg					<0.1		<0.1										<0.1		3	0	None > LOD	None > LOD		2000	0
Aliphatics >C10-C12	mg/kg					<1		<1										<1		3	0	None > LOD	None > LOD		9700	0
Aliphatics >C12-C16	mg/kg					<1		<1										<1		3	0	None > LOD	None > LOD		25000	0
Aliphatics >C16-C21	mg/kg					<1		<1										<1		3	0	None > LOD	None > LOD		450000	0
Aliphatics >C21-C35	mg/kg					23		12										<1		3	2	23	12	BH325B @ 0 - 1.2mbGL	450000	0
Aliphatics >C35-44	mg/kg					2.4		<1										<1		3	1	2.4	2.4	BH325B @ 0 - 1.2mbGL	450000	0
Aromatics >C5-C7	mg/kg					<0.1		<0.1										<0.1		3	0	None > LOD	None > LOD		26000	0
Aromatics >C7-C8	mg/kg					<0.1		<0.1										<0.1		3	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg					<0.1		<0.1										<0.1		3	0	None > LOD	None > LOD		3500	0
Aromatics >EC10-EC12	mg/kg					<1		<1										<1		3	0	None > LOD	None > LOD		9200	0
Aromatics >EC12-EC16	mg/kg					<1		<1										<1		3	0	None > LOD	None > LOD		10000	0
Aromatics >EC16-EC21	mg/kg					<1		<1										<1		3	0	None > LOD	None > LOD		7600	0
Aromatics >EC21-EC35	mg/kg					<1		2.6										<1		3	1	2.6	2.6	BH325C @ 2mbGL	7800	0
Aromatics >C35-44	mg/kg					<1		<1										<1		3	0	None > LOD	None > LOD		7800	0
Total Aliphatic TPH	mg/kg					25		12										<5		3	2	25	12	BH325B @ 0 - 1.2mbGL		
Total Aromatic TPH	mg/kg					<5		<5										<5		3	0	None > LOD	None > LOD			
Total petroleum hydrocarbons	mg/kg					25		14										<10		3	2	25	14	BH325B @ 0 - 1.2mbGL		
PAH																										
Acenaphthene	mg/kg				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	0	None > LOD	None > LOD		29000	0
Acenaphthylene	mg/kg				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	0	None > LOD	None > LOD		29000	0
Anthracene	mg/kg				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	0	None > LOD	None > LOD		150000	0
Benz(a)anthracene	mg/kg				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	0	None > LOD	None > LOD		49	0
Benzo(a)pyrene	mg/kg				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	0	None > LOD	None > LOD		11	0
Benzo(b)fluoranthene	mg/kg				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	0	None > LOD	None > LOD		13	0
Benzo(ghi)perylene	mg/kg				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	0	None > LOD	None > LOD		1400	0
Benzo(k)fluoranthene	mg/kg				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	0	None > LOD	None > LOD		370	0
Chrysene	mg/kg				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	0	None > LOD	None > LOD		93	0
Dibenzo(ah)anthracene	mg/kg				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	0	None > LOD	None > LOD		1.1	0
Fluoranthene	mg/kg				0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	1	0.2	0.2	BH324 @ 0.55 - 0.7mbGL	6300	0
Fluorene	mg/kg				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	0	None > LOD	None > LOD		20000	0
Indeno(123cd)pyrene	mg/kg				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	0	None > LOD	None > LOD		150	0
Naphthalene	mg/kg				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	0	None > LOD	None > LOD		190	0
Phenanthrene	mg/kg				<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	15	0	None > LOD	None > LOD		6200	0
Pyrene	mg/kg				0.14	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.91	<0.1	<0.1	<0.1	<0.1	<0.1	15	2	0.91	0.14	TP317 @ 0.5mbGL	15000	0
PAH 16 Total	mg/kg				<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	15	0	None > LOD	None > LOD			
VOCs																										
1,1,1,2-Tetrachloroethane	ug/kg					<2														1	0	None > LOD	None > LOD			
1,1,1-Trichloroethane	ug/kg					<1														1	0	None > LOD	None > LOD			
1,1,2-Trichloroethane	ug/kg					<10														1	0	None > LOD	None > LOD			
1,1-Dichloroethane	ug/kg					<1														1	0	None > LOD	None > LOD			
1,1-Dichloroethene	ug/kg					<1														1	0	None > LOD	None > LOD			
1,1-Dichloropropene	ug/kg					<1														1	0	None > LOD	None > LOD			
1,2,3-Trichlorobenzene	ug/kg					<2														1	0	None > LOD	None > LOD		102	0
1,2,3-Trichloropropane	ug/kg					<50														1	0	None > LOD	None > LOD			
1,2,4-Trichlorobenzene	ug/kg					<1														1	0	None > LOD	None > LOD		220	0
1,2,4-Trimethylbenzene	ug/kg					<1														1	0	None > LOD	None > LOD			
1,2-Dibromo-3-Chloropropane	ug/kg					<50														1	0	None > LOD	None > LOD			
1,2-Dibromoethane	ug/kg					<5														1	0	None > LOD	None > LOD			
1,2-Dichlorobenzene	ug/kg					<1														1	0	None > LOD	None > LOD			
1,2-Dichloroethane	ug/kg					<2														1	0	None > LOD	None > LOD			
1,2-Dichloropropane	ug/kg					<1														1	0	None > LOD	None > LOD			
1,3,5-Trimethylbenzene	ug/kg					<1														1	0	None > LOD	None > LOD			
1,3-Dichlorobenzene	ug/kg					<1														1	0	None > LOD	None > LOD			
1,3-Dichloropropane	ug/kg					<2														1	0	None > LOD	None > LOD			
1,4-Dichlorobenzene	ug/kg					<1														1	0	None > LOD	None > LOD			
2-Chlorotoluene	ug/kg					<1														1	0	None > LOD	None > LOD			
4-Chlorotoluene	ug/kg					<1														1	0	None > LOD	None > LOD			
4-Isopropyltoluene	ug/kg					<1														1	0	None > LOD	None > LOD			
Benzene	ug/kg					<1		<1										<1		3	0	None > LOD	None > LOD		27	0
Bromobenzene	ug/kg					<1														1	0	None > LOD	None > LOD			
Bromochloromethane	ug/kg					<5														1	0	None > LOD	None > LOD			
Bromodichloromethane	ug/kg					<5														1	0	None > LOD	None > LOD			
Bromomethane	ug/kg					<20														1	0	None > LOD	None > LOD			
Chlorobenzene	ug/kg					<1														1	0	None > LOD	None > LOD		56	0
Chloroethane	ug/kg					<2														1	0	None > LOD	None > LOD			
Chloroethene	ug/kg					<1														1	0	None > LOD	None > LOD		0.059	0
Chloroform	ug/kg					<1														1	0	None > LOD	None > LOD		99	0
Chloromethane	ug/kg					<1														1	0	None > LOD	None > LOD			
cis-1,2-Dichloroethene	ug/kg					<1														1	0	None > LOD	None > LOD			
cis-1,3-Dichloropropene	ug/kg					<10														1	0	None > LOD	None > LOD			
Dibromochloromethane	ug/kg					<10														1	0	None > LOD	None > LOD			
Dibromomethane	ug/kg					<1														1	0	None > LOD	None > LOD			
Dichlorodifluoromethane	ug/kg					<1														1	0	None > LOD	None > LOD			
Ethylbenzene	ug/kg					<1		<1										<1		3	0	None > LOD	None > LOD		5700	0
Hexachlorobutadiene (HCBD)	ug/kg					<1														1	0	None > LOD	None > LOD		31	0
Isopropylbenzene	ug/kg					<1														1	0	None > LOD	None > LOD			
m,p xylenes	ug/kg					<1		<1										<1		3	0	None > LOD	None > LOD		5900	0
Methyl tert-butyl ether (MTBE)	ug/kg					<1														1	0	None > LOD	None > LOD			
n-Butylbenzene	ug/kg					<1														1	0	None > LOD	None > LOD			
n-propylbenzene	ug/kg					<1														1	0	None > LOD	None > LOD			
O-Xylene	ug/kg					<1		<1										<1		3	0	None > LOD	None > LOD		6600	0
Sec-Butylbenzene	ug/kg					<1														1	0	None > LOD	None > LOD			
Styrene	ug/kg					<1														1	0	None > LOD	None > LOD			
Tert-Butylbenzene	ug/kg					<1														1	0	None > LOD	None > LOD			
Tetrachloroethene	ug/kg					<1														1	0	None > LOD	None > LOD		19	0
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg					<1														1	0	None > LOD	None > LOD		2.9	0
Toluene	ug/kg					<1		<1										<1		3	0	None > LOD	None > LOD		56000	0
trans-1,2-Dichloroethene	ug/kg					<1														1	0	None > LOD	None > LOD			
trans-1,3-Dichloropropene	ug/kg					<1														1	0	None > LOD	None > LOD			
Tribromomethane	ug/kg					<1														1	0	None > LOD	None > LOD			
Trichloroethene	ug/kg					<1														1	0	None > LOD	None > LOD		1.2	0
Trichlorofluoromethane	ug/kg					<1														1	0	None > LOD	None > LOD			
SVOCs																										
2,4,5-Trichlorophenol	mg/kg					<0.5														1	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	mg/kg					<0.5														1	0	None > LOD	None > LOD			
2,4-Dichlorophenol	mg/kg					<0.5														1	0	None > LOD	None > LOD			
2,4-Dimethylphenol	mg/kg					<0.5														1	0	None > LOD	None > LOD			
2,4-Dinitrotoluene	mg/kg					<0.5														1	0	None > LOD	None > LOD			
2,6-Dinitrotoluene	mg/kg					<0.5														1	0	None > LOD	None > LOD			
2-Chloronaphthalene	mg/kg					<0.5														1	0	None > LOD	None > LOD			
2-Chlorophenol	mg/kg					<0.5														1	0	None > LOD	None > LOD			
2-Methyl-4,6-Dinitrophenol	mg/kg					<0.5														1	0	None > LOD	None > LOD			
2-Methylnaphthalene	mg/kg					<0.5														1	0	None > LOD	None > LOD			
2-Methylphenol	mg/kg					<0.5														1	0	None > LOD	None > LOD			
2-Nitroaniline	mg/kg					<0.5														1	0	None > LOD	None > LOD			
2-Nitrophenol	mg/kg					<0.5														1	0	None > LOD	None > LOD			
3-Nitroaniline	mg/kg					<0.5														1	0	None > LOD	None > LOD			
4-Bromophenyl Phenyl Ether	mg/kg					<0.5														1	0	None > LOD	None > LOD			
4-Chloro-3-Methylphenol	mg/kg					<0.5														1	0	None > LOD	None > LOD			
4-Chloroaniline	mg/kg					<0.5														1	0	None > LOD	None > LOD			
4-Chlorophenyl Phenyl Ether	mg/kg					<0.5														1	0	None > LOD	None > LOD			
4-Methylphenol	mg/kg					<0.5														1	0	None > LOD	None > LOD			
4-Nitroaniline	mg/kg					<0.5														1	0	None > LOD	None > LOD			
4-Nitrophenol	mg/kg					<0.5														1	0	None > LOD	None > LOD			
Azobenzene	mg/kg					<0.5														1	0	None > LOD	None > LOD			
Bis(2-chloroethoxy)methane	mg/kg					<0.5														1	0	None > LOD	None > LOD			
Bis(2-chloroethyl)ether	mg/kg					<0.5														1	0	None > LOD	None > LOD			
Bis(2-chloroisopropyl)ether	mg/kg					<0.5														1	0	None > LOD	None > LOD			
Bis(2-ethylhexyl)phthalate	mg/kg					<0.5														1	0	None > LOD	None > LOD			
Butylbenzylphthalate	mg/kg					<0.5														1	0	None > LOD	None > LOD			
Carbazole	mg/kg					<0.5														1	0	None > LOD	None > LOD			
Dibenzofuran	mg/kg					<0.5														1	0	None > LOD	None > LOD			
Diethylphthalate	mg/kg					<0.5														1	0	None > LOD	None > LOD			
Dimethylphthalate	mg/kg					<0.5														1	0	None > LOD	None > LOD			
Di-N-Butyl Phthalate	mg/kg					<0.5														1	0	None > LOD	None > LOD			
Di-N-Octyl Phthalate	mg/kg					<0.5														1	0	None > LOD	None > LOD			
Hexachlorobenzene (HCB)	mg/kg					<0.5														1	0	None > LOD	None > LOD		30	0
Hexachlorocyclopentadiene	mg/kg					<0.5														1	0	None > LOD	None > LOD			
Hexachloroethane	mg/kg					<0.5														1	0	None > LOD	None > LOD			
Isophorone	mg/kg					<0.5														1	0	None > LOD	None > LOD			
Nitrobenzene	mg/kg					<0.5														1	0	None > LOD	None > LOD			
n-nitrosodimethylamine	mg/kg					<0.5														1	0	None > LOD	None > LOD			
N-Nitroso-Di-N-Propylamine	mg/kg					<0.5														1	0	None > LOD	None > LOD			
Pentachlorophenol (PCP)	mg/kg					<0.5														1	0	None > LOD	None > LOD		110	0
Phenol	mg/kg					<0.5														1	0	None > LOD	None > LOD		440	0

A4 Appendix 4

Tabulated Groundwater Laboratory Data

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-6
09/07/2015

Geological Formation Legend

MG	Made Ground	**RTD**	River Terrace Deposits
SMF	St Maughans Formation	**TFD**	Tidal Flat Deposits
MMG	Mercia Mudstone Group		

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Monitoring Round	Units	Screening Criteria		1	1	2	2	3	3	1	2	2	3	3
Location		EQS	DWS	BH324	BH324	BH324	BH324	BH324	BH324	BH325C	BH325C	BH325C	BH325C	BH325C
Location Type				CP BH						CP BH				
Response Zone (RZ) Details				1 - 2.1	8.8 - 15	1 - 2.1	8.8 - 15	1 - 2.1	8.8 - 15	3.5 - 5.5	3.5 - 5.5	12 - 21	3.5 - 5.5	12 - 21
Depth (m)				1.1	3.1	1.24	2.46	1.28	2.49	2.95	3.96	5.28	3.82	5.43
Installation Details				MG	SMF	MG	SMF	MG	SMF	TFD	TFD	MMG	TFD	MMG
Date sampled				26/02/2015	27/02/2015	05/03/2015		12/03/2015		27/02/2015	06/03/2015		13/03/2015	
Metals														
Arsenic	ug/l	50	10	<1	<1	1.7	1.6	1.5	1.2	2.4	3.3	1.4	17	2.4
Boron	ug/l	2000	1000	92	200	94	40	510	530	590	370	110	4100	950
Cadmium	ug/l	0.15	5	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Chromium	ug/l		50	<1	<1	<1	5.8	4.2	2.4	<1	3.8	1.4	110	16
Copper	ug/l	10	2000	<1	<1	<1	<1	11	9.7	<1	<1	<1	25	1.4
Lead	ug/l	1.2	10	<1	<1	<1	<1	1.2	<1	<1	<1	<1	<1	<1
Mercury	ug/l	0.07	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel	ug/l	4	20	1	<1	3.7	<1	3.4	<1	32	12	1.7	20	1.5
Selenium	ug/l		10	3.2	1.7	1.3	1.1	1.4	1	6.5	4.1	1	48	2.2
Zinc	ug/l	75		<1	<1	49	2	2.9	<1	<1	2.8	<1	25	1
Non-Metal Inorganics														
Total Alkalinity as CaCO3	mg/l					210	190	170	140	500	720	220	530	180
Chloride	mg/l	250	250			19000	15000	33000	18000	19000	21000	22000	20000	24000
Ammoniacal Nitrogen as N	mg/l	0.6				26	18	300	210	5400	4400	33	5000	30
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Free Cyanide	mg/l			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
pH Value	pH units	6-9	6.5-10	8	8.2	8.1	8.5	8.2	8.5	7.9	7.8	8.4	7.9	8.6
Sulphate	mg/l	400	250											
Phenols														
Phenol	ug/l	7.7												
Phenols	mg/l	0.0077				<0.03	<0.03	<0.03	<0.03	<0.03	40	<0.03	<0.03	<0.03
BTEX														
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethyl benzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
m & p Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
o Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
TPH														
Aliphatics C5-C6	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C6-C8	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C8-C10	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C10-C12	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C12-C16	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C16-C21	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C21-C35	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C35-44	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >C5-C7	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >C7-C8	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC8-EC10	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC10-EC12	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC12-EC16	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC16-EC21	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC21-EC35	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >C35-44	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Aliphatic TPH	ug/l			<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total Aromatic TPH	ug/l			<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total petroleum hydrocarbons	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
PAH														
Acenaphthene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	ug/l	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benz(a)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	ug/l	0.0063		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	ug/l	2		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAH 16 Total	ug/l			<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
PCBs														
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l					<0.01	<0.01			<0.01	<0.01	<0.01	<0.01	<0.01
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l					<0.01	<0.01			<0.01	<0.01	<0.01	<0.01	<0.01
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphe	ug/l					<0.01	<0.01			<0.01	<0.01	<0.01	<0.01	<0.01
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphe	ug/l					<0.01	<0.01			<0.01	<0.01	<0.01	<0.01	<0.01
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobip	ug/l					<0.01	<0.01			<0.01	<0.01	<0.01	<0.01	<0.01
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l					<0.01	<0.01			<0.01	<0.01	<0.01	<0.01	<0.01
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l					<0.01	<0.01			<0.01	<0.01	<0.01	<0.01	<0.01

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
11	9	17	1.2	BH325C @ 3.82	0	1
11	11	4100	40	BH325C @ 3.82	1	1
11	0	None > LOD	None > LOD		0	0
11	7	110	1.4	BH325C @ 3.82		1
11	4	25	1.4	BH325C @ 3.82	2	0
11	1	1.2	1.2	BH324 @ 1.28	0	0
11	0	None > LOD	None > LOD		0	0
11	8	32	1	BH325C @ 2.95	3	1
11	11	48	1	BH325C @ 3.82		1
11	6	49	1	BH324 @ 1.24	0	
9	9	720	140	BH325C @ 3.96		
9	9	33000	15000	BH324 @ 1.28	9	9
9	9	5400	18	BH325C @ 2.95	9	
11	0	None > LOD	None > LOD		0	0
11	0	None > LOD	None > LOD			
11	11	8.6	7.8	BH325C @ 5.43	0	0
0	0	None > LOD	None > LOD		0	0
0	0	None > LOD	None > LOD		0	
9	1	40	40	BH325C @ 3.96	1	
11	0	None > LOD	None > LOD		0	0
11	0	None > LOD	None > LOD		0	
11	0	None > LOD	None > LOD		0	
11	0	None > LOD	None > LOD		0	
11	0	None > LOD	None > LOD		0	
11	0	None > LOD	None > LOD			
11	0	None > LOD	None > LOD			
11	0	None > LOD	None > LOD

A5 Appendix 5

Tabulated Surface Water Data

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL6
14/07/2015

Notes
EQS calcium carbonate 100-150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
NDP - No determination possible

Screening Values and Assessment

EQS	Environmental Quality Standards
MRV	Minimum Reporting values
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory detection level higher than screening criterion
BOL/ITA	Exceeds CCW

Monitoring Round / Location	Units	Screening Criteria			E1 / R4	E2 / R4	E3 / R4	E4/ R4	E1 / R3	E2 / R3	E3 / R3	E4 / R3	Q1 / 6.1	Q1 / 5.1	Q1 / 4.4	Q1 / 4.3	Q1 / 4.2	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS	No. Data Exceeding CCW
Date Sampled					05/12/2007	19/03/2008	25/06/2008	25/09/2008	06/12/2007	18/03/2008	25/06/2008	25/09/2008	28/05/2015	28/05/2015	28/05/2015	05/06/2015	27/05/2015								
		EQS	DWS	CCW																					
Metals & Non-Metal Inorganics																									
Hardness Total	mg/l				130	160	194	190	120	163	199	200						8	8	200	120	E4 / R3			
Arsenic Dissolved	ug/l	50	10										1.22	0.743	0.91		0.522	4	4	1.22	0.522	Q1 / 6.1	0	0	
Calcium Dissolved	ug/l			300000	35	49	50	58	33	50	62	63	40.9	43.7	86.2	42.4	60.7	13	13	86.2	33	Q1 / 4.4			0
Cadmium Dissolved	ug/l	0.15	5	5									<0.1	<0.1	<0.1	<0.1	<0.1	5	0	None > LOD	None > LOD		0	0	0
Chromium Dissolved	ug/l		50		<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	1.04	1.15	14.8	1.42	1.4	13	5	14.8	1.04	Q1 / 4.4		0	
Copper Dissolved	ug/l	10	2000		<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	1.53	<0.85	1.37	1.27	<0.85	13	3	1.53	1.27	Q1 / 6.1	0	0	
Lead Dissolved	ug/l	1.2	10	250	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	0.341	0.185	0.493	0.101	0.782	13	5	0.782	0.101	Q1 / 4.2	0	0	0
Magnesium Dissolved	ug/l				8.5	11	14	13	7.6	11	11	12						8	8	14	7.6	E3 / R4			
Nickel Dissolved	ug/l	4	20	100	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	2.21	1.09	2.26	1.4	0.868	13	5	2.26	0.868	Q1 / 4.4	0	0	0
Selenium Dissolved	ug/l		10										<0.39	0.635	0.725	<0.39	<0.39	5	2	0.725	0.635	Q1 / 4.4		0	
Cadmium Total	ug/l	0.15	5	5	<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5						8	1	0.7	0.7	E2 / R3	1	0	0
Zinc Total	ug/l	75		1000	42	16	9	27	28	25	14	5						8	8	42	5	E1 / R4	0	0	0
BOD	mg/l	5		18	2	<1	1	<1	<1	<1	3	<1	<1	<1	<1	<1	<1	13	3	3	1	E3 / R3	0		0
Nitrate as N	mg/l		50	1	***2.4***	***2.2***	0.4	***2***	***2.5***	***3.3***	***1.2***	***3.1***						8	8	3.3	0.4	E2 / R3		0	7
Nitrate as NO3	mg/l		50	1	***10.6***	***9.74***	***1.8***	***8.86***	***11.1***	***14.61***	***5.3***	***13.733***	<0.3	***1.65***	***5.64***	***10.3***	***13.9***	13	12	14.61	1.65	E2 / R3		0	12
Nitrite as N	mg/l		0.15217391	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1						8	0	None > LOD	None > LOD			0	0
Nitrite as NO2	mg/l		0.5	1									<0.05	<0.05	<0.05	0.132	<0.05	5	1	0.132	0.132	Q1 / 4.3		0	0
Nitrogen, Total Oxidised as N	mg/l		50	2	***2.5***	***2.2***	0.4	***2.1***	***2.5***	***3.3***	1.3	***3.2***					<0.1	9	8	3.3	0.4	E2 / R3		0	6
Phosphate, Ortho as P	mg/l			1	<0.1	0.2	<0.1	0.2	<0.1	<0.1	<0.1	<0.1						8	2	0.2	0.2	E2 / R4			0
Phosphorus (tot.unfilt)	ug/l	120											122	273	225	195	100	5	5	273	100	Q1 / 5.1	4		0
Chloride	mg/l	250	250	300	20	18	17	17	19	19	22	17	13.7	18.2	23.9	27	16.3	13	13	27	13.7	Q1 / 4.3	0	0	0
Sulphide	mg/l																	0	0	None > LOD	None > LOD				
Ammoniacal Nitrogen as N	mg/l	0.6		1	0.11	<0.1	0.06	0.29	0.1	<0.1	0.04	<0.1	<0.1	0.26	0.269	0.261	0.556	13	9	0.556	0.04	Q1 / 4.2	0		0
Dissolved Oxygen (Saturation)	%	60			97.1	100.2	63.1	52.1	108.9	108.7	49.7	73.2						8	8	108.9	49.7	E1 / R3	6		
Dissolved Oxygen	mg/l				10.83	12.43	6.22	5.4	12.1	13.03	4.79	7.61						8	8	13.03	4.79	E2 / R3	0		
pH Value	pH units	6-9	6.5-10	6.8-8.5														0	0	None > LOD	None > LOD		0	0	0
Organics																									
GRO (C5-C12)	ug/l												<50	<50	<50	<50	<50	5	0	None > LOD	None > LOD				
MTBE	ug/l												<3	<3	<3	<3	<3	5	0	None > LOD	None > LOD				
Benzene	ug/l	10	1										<7	<7	<7	<7	<7	5	0	None > LOD	None > LOD		0	0	
Toluene	ug/l	50											<4	<4	<4	<4	<4	5	0	None > LOD	None > LOD		0		
Ethyl benzene	ug/l	20											<5	<5	<5	<5	<5	5	0	None > LOD	None > LOD		0		
m & p Xylene	ug/l	30											<8	<8	<8	<8	<8	5	0	None > LOD	None > LOD		0		
o Xylene	ug/l	30											<3	<3	<3	<3	<3	5	0	None > LOD	None > LOD		0		
TPH																									
Aliphatics C5-C6	ug/l												<10	<10	<10	<10	<10	5	0	None > LOD	None > LOD				0
Aliphatics >C6-C8	ug/l												<10	<10	<10	<10	<10	5	0	None > LOD	None > LOD				
Aliphatics >C8-C10	ug/l												<10	<10	<10	<10	<10	5	0	None > LOD	None > LOD				
Aliphatics >C10-C12	ug/l												<10	<10	<10	<10	<10	5	0	None > LOD	None > LOD				
Aliphatics >C12-C16 Aqueous	ug/l												<10	<10	<10	<10	<10	5	0	None > LOD	None > LOD				0
Aliphatics >C16-C21 Aqueous	ug/l												<10	<10	<10	<10	<10	5	0	None > LOD	None > LOD				0
Aliphatics >C21-C35 Aqueous	ug/l												<10	<10	<10	<10	<10	5	0	None > LOD	None > LOD				0
Total Aliphatics C12-C35 Aqueous	ug/l												<10	<10	<10	<10	<10	5	0	None > LOD	None > LOD				
Aromatics >C5-C7	ug/l												<10	<10	<10	<10	<10	5	0	None > LOD	None > LOD				
Aromatics >C7-C8	ug/l												<10	<10	<10	<10	<10	5	0	None > LOD	None > LOD				
Aromatics >EC8-EC10	ug/l												<10	<10	<10	<10	<10	5	0	None > LOD	None > LOD				
Aromatics >EC10-EC12	ug/l												<10	<10	<10	<10	<10	5	0	None > LOD	None > LOD				
Aromatics >EC12-EC16 Aqueous	ug/l												<10	<10	<10	<10	<10	5	0	None > LOD	None > LOD				0
Aromatics >EC16-EC21 Aqueous	ug/l												<10	<10	<10	<10	<10	5	0	None > LOD	None > LOD				0
Aromatics >EC21-EC35 Aqueous	ug/l												<10	<10	<10	<10	<10	5	0	None > LOD	None > LOD				0
Total Aromatics C12-C35 Aqueous	ug/l												<10	<10	<10	<10	<10	5	0	None > LOD	None > LOD				
TPH >C6-C8	ug/l				<10	<10	<10	<10	<10	<10	<10	<10						6	0	None > LOD	None > LOD				
TPH >C8-C10	ug/l				<10	<10	<10	<10	<10	<10	<10	<10						6	0	None > LOD	None > LOD				
TPH >C10-C16	ug/l				<20	<20	<20	<20	<20	<20	28	<20						6	1	28	28	E3 / R3			
TPH >C16-C24	ug/l				<20	<20	<20	<20	<20	<20	42	<20						6	1	42	42	E3 / R3			
TPH >C24-C40	ug/l				<50	<50	<50	<50	<50	<50	93	<50						6	1	93	93	E3 / R3			
TPH >C6-C40	ug/l				<50	<50	<50	<50	<50	<50	<50	<50						6	0	None > LOD	None > LOD				
PAHs																									
Acenaphthene	ug/l												<0.015	<0.015	<0.015	<0.015	<0.015	5	0	None > LOD	None > LOD				
Acenaphthylene	ug/l												<0.011	<0.011	<0.011	0.0176	<0.011	5	1	0.0176	0.0176	Q1 / 4.3			
Anthracene	ug/l	0.1											<0.015	<0.015	<0.015	<0.015	<0.015	5	0	None > LOD	None > LOD		0		
Benzo(a)anthracene	ug/l												<0.017	<0.017	<0.017	<0.017	<0.017	5	0	None > LOD	None > LOD				
Benzo(a)pyrene	ug/l	0.00017	0.01										<0.009	<0.009	<0.009	<0.009	<0.009	5	0	None > LOD	None > LOD		0	0	
Benzo(b)fluoranthene	ug/l	0.017	0.1										<0.023	<0.023	<0.023	<0.023	<0.023	5	0	None > LOD	None > LOD		0	0	
Benzo(k)fluoranthene	ug/l	0.017	0.1										<0.027	<0.027	<0.027	<0.027	<0.027	5	0	None > LOD	None > LOD		0	0	
Benzo(ghi)perylene	ug/l	0.0082	0.1										<0.016	<0.016	<0.016	<0.016	<0.016	5	0	None > LOD	None > LOD		0	0	
Indeno(1,2,3-cd)pyrene	ug/l		0.1										<0.014	<0.014	<0.014	<0.014	<0.014	5	0	None > LOD	None > LOD			0	0
Chrysene	ug/l												0.0141	<0.013	<0.013	<0.013	<0.013	5	1	0.0141	0.0141	Q1 / 6.1			
Dibenzo(a,h)anthracene	ug/l												<0.016	<0.016	<0.016	<0.016	<0.016	5	0	None > LOD	None > LOD				0
Fluoranthene	ug/l	0.0063											0.0318	<0.017	<0.017	<0.017	<0.017	5	1	0.0318	0.0318	Q1 / 6.1	1		
Fluorene	ug/l												<0.014	<0.014	<0.014	<0.014	<0.014	5	0	None > LOD	None > LOD				
Naphthalene	ug/l	2											<0.1	<0.1	<0.1	<0.1	<0.1	5	0	None > LOD	None > LOD		0		
Phenanthrene	ug/l												0.0235	<0.022	<0.022	<0.022	<0.022	5	1	0.0235	0.0235	Q1 / 6.1			
Pyrene	ug/l												0.0228	<0.015	<0.015	<0.015	<0.015	5	1	0.0228	0.0228	Q1 / 6.1			
Total PAHs (USEPA 16)	ug/l												<0.344	<0.344	<0.344	<0.344	<0.344	5	0	None > LOD	None > LOD				0
VOCs																									
Ethylbenzene	ug/l	20											<5	<5	<5	<5	<5	5	0	None > LOD	None > LOD		0		
m,p xylenes	ug/l	30											<8	<8	<8	<8	<8	5	0	None > LOD	None > LOD		0		
Methyl tert-butyl ether (MTBE)	ug/l												<3	<3	<3	<3	<3	5	0	None > LOD	None > LOD				
O-Xylene	ug/l	30											<3	<3	<3	<3	<3	5	0	None > LOD	None > LOD		0		
Toluene	ug/l	50											<4	<4	<4	<4	<4	5	0	None > LOD	None > LOD		0		

A6 Appendix 6

Tabulated Soil Leachate Data

M4CAN
Leachate Analysis Results & Screening Assessment
CL-6
09/07/2015

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Geological Formation Legend

MG	Made Ground

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		TP315	TP317	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Specimen Depth (m)		EQS	DWS	1.1 - 1.3	1.5							
OD Level (m)				8.4	6.35							
Sample type				ES	ES							
Geology code				MG	MG							
Cluster code				2015 GI	2015 GI							
Inorganics												
Arsenic	ug/l	50	10	2.1	1.3	2	2	2.1	1.3	TP315 @ 1.1 - 1.3mbGL	0	0
Boron	ug/l	2000	1000	74	25	2	2	74	25	TP315 @ 1.1 - 1.3mbGL	0	0
Cadmium	ug/l	0.15	5	<0.08	0.25	2	1	0.25	0.25	TP317 @ 1.5mbGL	1	0
Chromium	ug/l		50	<1	1.7	2	1	1.7	1.7	TP317 @ 1.5mbGL		0
Copper	ug/l	10	2000	3	<1	2	1	3	3	TP315 @ 1.1 - 1.3mbGL	0	0
Lead	ug/l	1.2	10	7.7	21	2	2	21	7.7	TP317 @ 1.5mbGL	2	1
Mercury	ug/l	0.07	1	<0.5	<0.5	2	0	None > LOD	None > LOD		0	0
Nickel	ug/l	4	20	<1	<1	2	0	None > LOD	None > LOD		0	0
Selenium	ug/l		10	4.5	13	2	2	13	4.5	TP317 @ 1.5mbGL		1
Zinc	ug/l	75		62	340	2	2	340	62	TP317 @ 1.5mbGL	1	
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	2	0	None > LOD	None > LOD		0	0
Cyanide Free	mg/l			<0.05	<0.05	2	0	None > LOD	None > LOD			
Total Diss Sulphur	ug/l					0	0	None > LOD	None > LOD			
pH	pH units	6-9	6.5-10	8.3	12	2	2	12	8.3	TP317 @ 1.5mbGL	1	1
Phenols												
Phenols	mg/l	0.0077		<0.03	<0.03	2	0	None > LOD	None > LOD		0	
BTEX												
Benzene	ug/l	10	1	<1	<1	2	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		<1	<1	2	0	None > LOD	None > LOD		0	
Ethylbenzene	ug/l	20		<1	<1	2	0	None > LOD	None > LOD		0	
m,p xylenes	ug/l	30		<1	<1	2	0	None > LOD	None > LOD		0	
O-Xylene	ug/l	30		1.9	<1	2	1	1.9	1.9	TP315 @ 1.1 - 1.3mbGL	0	
TPH												
Aliphatics >C5-C6	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Aliphatics >C12-C16	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Aliphatics >C16-C21	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Aliphatics >C21-C35	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Aliphatics >C35-44	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Aromatics >C8-C10	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Aromatics >C10-C12	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Aromatics >C12-C16	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Aromatics >C16-C21	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Aromatics >C21-C35	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Aromatics >C35-44	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l			<5	<5	2	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l			<5	<5	2	0	None > LOD	None > LOD			
Total petroleum hydrocarbons	ug/l			<10	<10	2	0	None > LOD	None > LOD			
PAH												
Acenaphthene	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		<0.1	<0.1	2	0	None > LOD	None > LOD		0	
Benz(a)anthracene	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.1	<0.1	2	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	2	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.1	<0.1	2	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.1	<0.1	2	0	None > LOD	None > LOD		0	0
Chrysene	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Dibenzo(ah)anthracene	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		<0.1	<0.1	2	0	None > LOD	None > LOD		0	
Fluorene	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.1	<0.1	2	0	None > LOD	None > LOD		0	0
Naphthalene	ug/l	2		<0.1	<0.1	2	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
Pyrene	ug/l			<0.1	<0.1	2	0	None > LOD	None > LOD			
PAH 16 Total	ug/l			<2	<2	2	0	None > LOD	None > LOD			

A7 Appendix 7

Site Walkover Photographs



Plate 01: CL6 – Quinn Radiator Warehouse (looking north)



Plate 02: CL6 – Temporary paint storage tanks (paint moved from main inside dipping tank to these during cleaning of the inside dipping tank)

Client:	Welsh Government			
Project:	M4CaN			
Job Ref:	JER6591	Checked By:	Date:	May 2015



Plate 03: CL6 – Paint stored in IBCs on pallets within warehouse



Plate 04: CL6 - empty IBC awaiting storage

Client:	Welsh Government			
Project:	M4CaN			
Job Ref:	JER6591	Checked By:	Date:	May 2015



Plate 05: CL6 – Empty Tanks Onsite (unknown original use)



Plate 06: CL6 – Tanker filling from liquid oxygen tank



Plate 07: CL6 – Empty oil drums & waste area



Plate 08: CL6 – HGV loading area

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: May 2015



Plate 09: CL6 – Stockpiles of demolition rubble on southern section of Site



Plate 10: CL6 – Drainage area on southern section of site (looking east)

Client:	Welsh Government			
Project:	M4CaN			
Job Ref:	JER6591	Checked By:	Date:	May 2015



Plate 11: CL6 – Pylons on southern section of site (looking west)



Plate 12: CL6 – Fly tipping in southern section of Site



Plate 13: CL6 – Fly tipping



Plate 14: CL6 – Fly tipping within Reen



Plate 15: CL6 – Reen



Plate 16: CL6 – Tanks outside Essentra (looking west)



Plate 17: CL6 – ALUK (looking west)

Plate :

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591
Checked By:	
Date:	May 2015

A8 Appendix 8

Relevant Extract of Additional Environmental Data



Plate 01: Extract of 1998 Aerial Photograph showing extensive earthworks in the southern area of the Site.



Plate 02: Extract of 2006 Aerial Photograph.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015



Plate 03: Extract of 2009/10 Aerial Photograph.



Plate 04: Extract of 2013/14 Aerial Photograph.

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

Welsh Government

M4 Corridor around Newport

Land Contamination Assessment Report Annex D CL-8 Former Railway Bridge

M4CaN-DJV-EGT-ZG_GEN-RP-EN-0009

At Issue | March 2016

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Appendix 2 Gas and Groundwater Monitoring
Appendix 3 Groundwater Laboratory Data
Appendix 4 Surface Water Data
Appendix 5 Relevant Extracts of Additional Environmental Data

1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-8) known as the 'Former Railway Bridge' hereafter referred to as the 'Site'.

1.1.2 The Site is located between chainage 6,400 and 6,600 (see Figure 1).

1.2 Reporting Context

1.2.1 The Site has been assessed as part of ground investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) hereafter referred to as the 'Scheme' and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) of which this document is an appendix to the chapter of Geology and Soils.

1.2.2 In 2014, a Preliminary Sources Study Report (2014 PSSR) was prepared as an initial land contamination appraisal (Ove Arup & Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. In addition, this report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015). This report relates to the area defined on the Site Location Plan Figure 1.

1.2.3 The overarching rationale and approach for the assessment of areas of land along the proposed new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the ES).

1.3 Objectives

1.3.1 The key objectives of this report are set out below:

- Undertake a risk assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.
- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.
- To provide information to support the Ground Investigation Report (GIR) and Geotechnical Design Report (GDR) required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The subsequent report structure is as follows:

- Section 2: Site Location and Description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and any relevant environmental information presented in the 2014 PSSR.
- Section 6: Scope of Ground Investigations Work – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions – This section describes the main findings of the intrusive site investigation including the ground conditions encountered and any visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessments.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations – This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and requirements for remediation/mitigation.

2 Site Location and Description

2.1.1 The Site is located approximately 1 km south of Duffryn and comprises two separate parcels of land. The main area of the Site is located to the north of the Great Western Railway and is centred on National Grid Reference ST292836. There is another smaller area forming part of the Site located to the south of the railway which contains one side of the former bridge approach embankment and is centred at ST292836. The Site is situated within the Wentlooge Levels. Refer to Figure 1 for the location of the Site.

2.1.2 Both areas of the Site are at an elevation of approximately 6 to 7 m Above Ordnance Datum (AOD). A Site walkover undertaken in 1995 by Ove Arup and Partners reported Made Ground within the main area of the Site. Also reported at the east of the Site were the remains of the approach embankments of a former railway bridge crossing. These remains consisted of the masonry abutments by the railway and a remaining mound of soil supporting the abutments. No detailed description of the Made Ground was made available.

2.1.3 Current aerial photography and Ordnance Survey (OS) mapping show that the parcel of land north of the railway comprises part of a wooded area known as Fox Covert and part agricultural land. The parcel of land to the south is shown to comprise agricultural land.

2.1.4 The Site could not be accessed in May 2015 for a walkover survey.

3 The Scheme

3.1.1 The Site is situated at approximate chainage 6,400 to 6,600. Refer to Figure 1 for the Site location in relation to the Scheme.

3.1.2 The proposed embankment for the new section of motorway crosses the southern part of the northern parcel of land and the majority of the southern parcel of land. A bridge would be placed over the existing railway line at the location of the Site. Both Site areas, to the north and south of the railway line, would be affected. The construction of an embankment up to 10 m high would be required with the possibility of part of the piled under-bridge spanning the Duffryn Railway being located within the Site.

3.1.3 Subject to the engineering properties of the encountered Made Ground materials, it is currently proposed that all material will remain *in situ*. This will be subject to the findings of a piling risk assessment and the materials being assessed as suitable for reuse.

4 Site History

4.1.1 The 2014 PSSR historical searches have been based on Ordnance Survey plans, literature reviews, information provided by Natural Resources Wales (NRW) (formally Environment Agency Wales) and Newport City Council and interpretation of aerial photography.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from the Welsh Government. Relevant extracts are presented in Appendix 5.

4.1.3 A summary of the Site's history is presented in Table 1 below.

Table 1: Summary of Site History

Date	Use	Source of information
1843 - 1893	The southern part of the Site comprises an agricultural field. The eastern area of the northern Site is wooded ('Fox Covert') whilst the western section is part of agricultural fields. Two drainage ditches cut the Site from north to south, one in the west and one in the centre. The Site is surrounded by agricultural fields and drainage ditches. The **Great Western Railway** runs between these areas of the Site. Fox Covert extends beyond part of the northern boundary of the Site to approximately 200 m north. The land to the south-west of the railway is marked as marshy.	1:10,560 Historical Mapping
1883	The plot currently labelled Fox Covert is shown as woodland.	Historical 1883 OS plan
1891 - 1912	A footbridge, and its associated **embankments**, crossing the Great Western Railway is now present on the eastern part of the northern part of the Site and the northern area of the southern part of the Site.	1:10,560 Historical Mapping
1901 - 1920	A bridge with approach embankments over the railway line existed at the time. The west side of the Site is covered by woodland labelled as Fox Covert and a portion of land in the middle is shown as marsh.	Historical 1901 and 1920 OS plans
1904 - 1939	No significant change.	1:10,560 Historical Mapping
1950 - 1969	The bridge and approach embankments existed during this period.	Aerial Photography
1964 - 1965	A spring is marked in the east of the northern part of the Site.	1:10,560 Historical Mapping
1970 - 1973	No significant change.	1:10,000 Historical Mapping

Date	Use	Source of information
1971	The bridge structure has been removed but the embankments are still in place.	Aerial Photography
1979	No significant change	Aerial Photography
1981	The south side bridge embankment had been partially flattened leaving the **abutment** and some supporting ground. The Fox Covert is shown covered in dense woodland.	Aerial Photography
1981 - 1989	No significant change.	1:10,000 Historical Mapping
1985 - 1996	No significant change.	1:10,000 Historical Mapping
1997	**Made Ground and remains of the embankments**	Walkover survey from 1995 PSSR Study
2006	Fox Covert has reduced in size to make way for agricultural fields. A small triangle of woodland is now present in the centre of the northern are of the Site. There is no longer a footbridge crossing the railway on either part of the Site, though embankments may still be in place.	Aerial Photography
2009 - 2010	No significant change.	Aerial Photography
2014	No significant change.	Aerial Photography

Notes: Potential sources of contamination are underlined. Those within the temporary and permanent land take are shown in **bold**.

4.1.4 The information presented above supplements the information provided in the 2014 PSSR. In particular, the 1971 and 1981 aerial photographs and the 1891-1912 historical map provide the location of the former embankment. Relevant extracts of the photographs are presented in Appendix 5.

4.1.5 Historically the Site is located in proximity to areas which may have been bombed during World War II which is discussed in the Explosive Ordnance Threat Assessment Report (Bactec, 2014). This categorises the site as low risk with respect to unexploded ordnance.

5 Environmental Setting

5.1 Geology

5.1.1 British Geological Survey (BGS) data indicates that the Site is underlain by Tidal Flat Deposits overlying bedrock of the Mercia Mudstone Group.

5.1.2 Furthermore, it is expected that Made Ground associated with the former railway bridge is likely to overlie part of the Site.

5.2 Hydrology

5.2.1 This Site is within surroundings of a flat low lying area (less than 10 m AOD) with a complex system of drainage channels and ditches running along plot boundaries.

5.2.2 There are reens and ditches intercepting the Site area and along the southern Site boundary.

5.3 Hydrogeology

5.3.1 NRW classifies the Mercia Mudstone Group as a Secondary B Aquifer. Tidal Flat Deposits in the local area have been classified as an unproductive stratum in terms of groundwater.

5.3.2 The Site does not lie within a groundwater source protection zone.

5.4 Environmental Information

5.4.1 No landfills have been recorded within the Site and no pollution incidents, abstraction licences or discharge points have been recorded at or within 300 m of the Site.

5.4.2 NRW records report a former landfill site adjacent to the Site across the railway line which operated until 1991 (see Land contamination Assessment Report for CL-9 Former Landfill Site in Annex D of Appendix 11.1 of the ES).

Table 2: Historic Landfills Within the Local Area

Landfill Name and Address	Location	Material Type	Date Waste First and Last Received
Wentlooge Landfill (also known as Green Lane Landfill), Newport, St Brides	Adjacent to the south	Inert waste	Unknown – Jan 1991

5.4.3 The Site lies within the Gwent Levels – St Brides Site of Special Scientific Interest (SSSI).

5.4.4 No further environmental information relevant to this Site has been identified.

5.4.5 Residual levels of potential contamination associated with the adjacent landfill are considered unlikely to be present on Site.

6 Scope of Investigations

6.1 General

6.1.1 One previous ground investigation has been undertaken within the Site. This has been summarised in Table 3.

6.1.2 Two phases of surface water sampling have also been undertaken and are summarised in Table 5.

6.2 Scope of Works

6.2.1 The intrusive investigation undertaken within the Site area is summarised in Table 3.

Table 3: Site Investigation Summary

Date	Contractor	Site Location	Boreholes	Window Sampler	Trial Pits	Sampling
2008	Norwest Holst	Northeast	SBHD07CP, SBHD07RC	-	-	None

6.2.2 No monitoring well was constructed within these boreholes.

6.2.3 For the purposes of a groundwater quality data set, four off site boreholes (SBHD05, SBHD06, SBHD08 and BH404) drilled during the 2008 and 2015 investigations have been considered. These are located within 10 m southwest, 80 m northeast and 50 m south of the Site for the 2008 boreholes and 50 m south for the 2015 borehole. The construction details of these boreholes are summarised in Table 4 below.

Table 4: Summary of Offsite Borehole Construction Details

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing /Gravel Pack (mbGL)	Base of Slotted Well Casing/Gravel Pack (mbGL)	Targeted Geology
SBHD05	19	30	11.5	12.2	Glaciofluvial Deposits
SBHD06	50	40.5	7.5	15	Glaciofluvial Deposits
SBHD08	19	30	29.1	29.7	Mercia Mudstone
BH404	35	24.5	1	4	Tidal Flat Deposits
	50		8	12.5	Glaciofluvial Deposits/Mercia Mudstone

6.3 Surface Water Quality Monitoring

6.3.1 Surface water monitoring in the vicinity of the Site has been undertaken during two investigations as summarised in Table 5. One sample location (R5) was included

within the Titan Surface Water Monitoring Network, of which three rounds were undertaken between 2007 and 2008. This sample was taken 250 m south-east of the Site on Morfa Gronw Reen.

6.3.2 An additional sample (7.1) was taken in 2015 within the same reen some 150 m north of the Site.

6.3.3 The results for these samples are reported within the Baseline Water Environment Report (Appendix 16.2 of this ES).

Table 5: Summary of Surface Water Monitoring Rounds

Surface Water Monitoring Point ID	Date of Sampling	Water Body	Position	Field Observation
R5	2007 - 2008	Morfa Gronw Reen	Approximately 250 m east of the Site.	Flow noted as slack, water slightly turbid and brown in colour.
7.1 / Q1	May 2015	Morfa Gronw Reen	Approximately 150 m north of the Site.	Very low flow, turbid water.

6.4 Field Testing

6.4.1 Photo Ionisation Detection (PID) monitoring for VOCs was not undertaken at the Site during the previous ground investigations.

6.5 Groundwater Monitoring

6.5.1 A summary of the groundwater sampling, groundwater/monitoring and ground gas monitoring undertaken at the off site boreholes are shown in Table 6.

Table 6: Summary of Monitoring Rounds

Location Ref.	Number of Rounds (Date of Sampling)	Monitoring Details	Notes
SBHD05 (off site)	6 no. (no sampling)	Groundwater level	-
SBHD06 (off site)	6 no. (21st February 2008, 20th March 2008)	Groundwater level & sampling	-
SBHD08 (off site)	6 no. (no sampling)	Groundwater levels	-
BH404 (off site)	3 no. (2nd March 2015, 9th March 2015, 16th March 2015)	Groundwater levels & sampling	Flooded

6.6 Laboratory Chemical Testing

6.6.1 A summary of all laboratory analysis undertaken on groundwater from the previous investigations on the Site is shown in Table 7.

Table 7: Summary of Previous Investigation Sampling

Site Investigation Date	Number of Soil Samples	Number of Leachate Samples	Number of Water Samples	Suites of Testing
2008	-	-	2*	Metals, phenols, pH, TPH, BTEX, MTBE, SVOCs, VOCs and PAHs
2015	N/A	N/A	6*	Metals, inorganics, pH, MTBE, BTEX, TPH, PAH, Phenols, PCBs

* Note: Water samples are from off site boreholes only.

Soil Analysis

6.6.2 No soil analysis has been undertaken for any on site exploratory locations during the previous investigations.

Soil Leachate Analysis

6.6.3 No soil leachate analysis was undertaken during the previous investigations.

Groundwater Analysis

6.6.4 The following sections summarise the laboratory analytical results for groundwater samples collected during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 3 with supporting laboratory certificates available in the relevant original reports.

6.6.5 Given that no analytical data is available from the Site, nearby groundwater data from off site well installations have also been considered. The nearest groundwater quality from the Site relates to boreholes SBHD06 and BH404 some 50 m south. These data are also presented within the CL-9 Former Landfill Site Land Contamination Assessment Report (Annex D of Appendix 11.1 of the ES), located 25 m south.

6.6.6 The available information is summarised in Table 8.

Table 8: Summary of Analytical Groundwater Data (Off Site)

Groundwater Unit	Number of Groundwater Analysis per Analytical Suite (Number of Well Locations) – 2015 data/All GI Data						
	Metals & Inorganics	PAH	TPH	Phenols	BTEX	PCBs	Phthalates
Tidal Flat Deposits	3(1)/3(1)	3(1)/3(1)	3(1)/3(1)	2(1)/2(1)	3(1)/3(1)	2(1)/2(1)	-
Groundwater (Glaciofluvial Deposits / Mercia Mudstone)	3(1)/5(2)	3(1)/5(2)	3(1)/5(2)	2(1)/4(2)	3(1)/5(2)	2(1)/2(1)	0(1)/2(2)

Note: PAH - Polycyclic Aromatic Hydrocarbons. TPH - Total Petroleum Hydrocarbon.

Surface Water Analysis

6.6.7 There are no surface water sample locations within the Site boundary. Table 9 summarises the surface water sampling that has been undertaken within the vicinity of the Site.

6.6.8 Sampling has been undertaken on Morfa Gronw Reen, a main reen within the Gwent Levels – St Brides SSSI. This reen is located approximately 200 m to the east of the Site.

Table 9: Summary of Analytical Surface Water Data

Surface Water System	Number of Water Analysis per Analytical Suite (number of locations) – 2015 data/All GI data				
	Metals & Inorganics	Water Quality Parameters	PAH	TPH	BTEX
Morfa Gronw Reen	1 (1)/ 4 (2)	1 (1)/ 4 (2)	1 (1) / 1 (1)	1 (1) / 4 (2)	1 (1) / 1 (1)

6.7 Gap Analysis of Available Data

6.7.1 There are no investigation data available within the former footprint of the embankment. One historical borehole is located within the Site north of the railway. No chemical soils data was available at this location.

6.7.2 There are no intrusive investigations available for the Site area south of the railway.

7 Ground Conditions

7.1 Geology

7.1.1 The geological log for the single exploratory hole excavated on the Site is provided in Appendix 1. The observed geological sequence is consistent with that discussed in the 2014 PSSR report and is summarised in the following sections. Information from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) has also been used.

Topsoil

7.1.2 Topsoil was encountered to 0.2 m below ground level (bGL) at one location. No Made Ground was encountered. It is noted the borehole is located outside the footprint of the former embankment.

Superficial Deposits

7.1.3 Unconsolidated superficial deposits were encountered beneath the topsoil. These comprised Tidal Flat Deposits (formerly referred to as Estuarine Alluvium), generally soft or very soft clay with gravel sized pockets of fibrous/pseudo-fibrous peat and gravel of mudstone and sandstone. A firm upper horizon was noted to 2.0 mbGL.

7.1.4 Sand and gravels comprising Glaciofluvial Deposits (formerly referred to as Fluvial Alluvium) were found to underlie the Tidal Flat Deposits. These consisted of medium dense sand and gravels of sandstone, siltstone, quartz and limestone, with a thickness of 6.2 m.

Solid Geology

7.1.5 Below the Glaciofluvial Deposits was encountered the Mercia Mudstone Group at a depth of 12.6 to 13 mbGL. The Mercia Mudstone was described as very stiff reddish brown gravelly clay.

Geological Sequence Summary

7.1.6 The geological sequence identified during the previous ground investigation is summarised in Table 10. This is based on information from a single borehole which was drilled on two separate occasions using different techniques.

Table 10: Summary of Geological Sequence

Unit	Description	Thickness Range (m)	Basal Depth (mbGL)
Topsoil	-	0.2	0.2
Superficial Deposits (Tidal Flat Deposits)	Very soft or soft clay – estuarine alluvium. Gravel sized pockets of fibrous/pseudo-fibrous peat	6.16 - 6.8	6.36 - 6.8
Superficial Deposits (Glaciofluvial Deposits)	Sand and gravel	6.2 - 6.24	12.6 - 13
Mercia Mudstone (Mudstone)	Very stiff reddish brown gravelly clay	> 3.5 - > 17	unproven

7.1.7 The conceptual site model included within the 2014 PSSR report has been revised in light of the 2015 information and is presented within Figure 2.

7.2 Visual and Olfactory Evidence of Contamination

7.2.1 No visual or olfactory evidence of hydrocarbon contamination was identified during the previous ground investigations.

7.3 Gas Monitoring

7.3.1 No gas monitoring was undertaken at any of the off site boreholes during the previous ground investigations.

7.4 Groundwater

Groundwater Encountered During Investigation

7.4.1 The ground model observed through borehole SBHD07 sunk within the Site is consistent with those proven by the selected nearby off site boreholes detailed below. As such these are considered to provide a reasonable overview of the groundwater condition to be anticipated beneath the Site. Individual borehole records for these selected off site boreholes are included in Appendix 1 for completeness.

7.4.2 Groundwater strikes were encountered during the advancement of the on-site and selected off site boreholes and are detailed on the geological logs provided in Appendix 1. These are summarised in Table 11.

Table 11: Summary of Groundwater Strike Data

Location	Strike Depth (mbGL)	Geological Formation	Level After 20 Minutes (mbGL)
SBHD07 CP	6.5	Glaciofluvial Deposits	3.5 (fast flow recorded)
			Water level recorded at 1.9 mbGL when borehole taken into the top of the Glaciofluvial Deposit (8.5 mbGL)
			Water level recorded at 1.3 mbGL when borehole taken into the Mercia Mudstone (13 mbGL)
SBHD07 RC	11.8	Glaciofluvial Deposits	-
	26.9	Mercia Mudstone	Water level recorded at 1.7 mbGL when borehole taken into the Mercia Mudstone (13 mbGL)

Groundwater Level During Monitoring Rounds

7.4.3 No groundwater level monitoring was been undertaken on site.

7.4.4 The entire groundwater level data set gathered at the off site boreholes is provided in Appendix 2 and summarised in Table 12.

Table 12: Summary of Groundwater Level Data

Location	Installation	Depth of Response Zone (mbGL) and Geological Formation	Number of Measurements	Minimum Depth (mbGL)	Maximum Depth (mbGL)	Comments
SBHD05	19 mm	11.5 - 12.2 Glaciofluvial Deposits	6	1.02	1.77	-
SBHD06	50 mm	7.5 - 15 Glaciofluvial Deposits	6	1.13	1.44	-
SBHD08	19 mm	29.1 -29.7 Mercia Mudstone	6	1.20	2.02	-
BH404	(S) 35 mm	1 - 4 Tidal Flat Deposits	2	-	-	Area flooded, no measurements
	(D) 50 mm	8 - 12.5 Glaciofluvial deposits / Mercia Mudstone	2	0	1.36	-

Notes: S denotes a shallow installation and D denotes deep installation.

Groundwater Summary

7.4.5 There are two main groundwater bodies anticipated to be present at the Site. The main body is within the Mercia Mudstone at depth which appears to be confined. A shallower body within the Glaciofluvial Deposits was struck during drilling with groundwater observations showing a rise to a resting level at 3.5 mbGL. This implies the groundwater within the Glaciofluvial Deposits is confined by the overlying lower permeability Tidal Flat Deposits. This demonstrates the latter to represent an aquitard to the groundwater flow.

7.4.6 Current data available from on site or nearby off site boreholes are insufficient to confirm whether the groundwater within the Glaciofluvial Deposits and within the Mercia Mudstone are in hydraulic continuity. Evidence from the wider hydrological setting suggests this to be the case.

7.4.7 Made Ground material was not encountered by the limited intrusive investigation but its presence is anticipated based on anecdotal evidence during an historical walkover survey. Its extent is considered to be limited, if at all present, with much associated with any relicts of the former bridge embankment (above ground feature). As such any perched groundwater within any Made Ground is not considered to represent a significant water body.

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The outline Conceptual Site Model presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the proposed Scheme. The main alteration to the 2014 PSSR model are summarised as follows:

- Consideration of a perched and deep groundwater bodies within the Tidal Flat Deposits and Glaciofluvial Deposits/Mercia Mudstone respectively.
- Proposed piling considered as a new pathway.
- Sub-artesian pressures within the Glaciofluvial Deposits and Mercia Mudstone.
- Update of the source-pathway-receptor linkages taking account of the above and more detailed assessments.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 Whilst current anecdotal information (historical walkover survey) has identified the presence of Made Ground, including the remains of the former bridge embankment, the Site coverage is anticipated to be limited.

8.2.2 In addition to the above sources, the quality of surface waters, perched groundwater and the deeper aquifer within the Glaciofluvial Deposits and Mercia Mudstone bodies may influence or impact the quality of the others, and therefore, are regarded as a source of possible contaminants as well as receptors.

Potential Receptors

8.2.3 Receptors during the construction and the operational stages of the Scheme have been considered:

During Construction

- Construction workers during Site development works.
- Groundwater within the Glaciofluvial Deposits and Mercia Mudstone.
- Nearby surface waters including the reens and existing surface water ditches within the Site and bordering the surrounding fields. This land drainage may be connected with the Gwent Levels SSSI wider network of reens and ditches, located south of the new section of motorway.

Operational

- General public end users.
- Maintenance workers (assuming area remains as soft landscaping adjacent to the motorway).

- Surface water, the drainage ditch adjacent to the Site will require removal or diversion. If a new drainage ditch is created through the existing Made Ground the pathway to surface waters could still exist. The potential source of contamination within the land take will be encapsulated by the embankment or hardstanding associated with the bridge, and therefore no viable pollution linkage will be present.
- Groundwater within the Glaciofluvial Deposits (secondary (undifferentiated) aquifer) and within the Mercia Mudstone (secondary B aquifer) as a result of potential for contamination migration along the piles.

Potential Pathways

8.2.4 Pathways during the construction and operational stages of the Scheme have been considered:

- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils possible during construction and maintenance works.
- Inhalation pathways possible for general public end users (the Made Ground is anticipated to be encapsulated within the new motorway embankment, reducing the likelihood of dermal contact and ingestion pathways).
- Contaminated surface water run-off into existing/new drainage system.
- Leaching of contaminants from the Made Ground to shallow groundwater and migration to land drainage (surface waters).
- Vertical migration of groundwater within Glaciofluvial Deposits and Mercia Mudstone possibly recharging perched groundwater and/or saturating the Made Ground due to pile installation.
- Vertical or lateral migration of ground gas associated with Made Ground.

8.3 Risk Evaluation

8.3.1 Source-pathway-receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the other data described herein, the following risk evaluation has been reconsidered and includes the following:

- The Site has been subject to the construction of a railway bridge embankment, now redundant and partially removed. Made Ground has historically been observed on site during a walkover survey.
- Much of the Made Ground from the former bridge embankment, if present, is likely to be removed or encapsulated as part of the new bridge construction. This would reduce exposure to motorway users.
- Limited on site investigation has occurred with no gas or groundwater monitoring undertaken.
- Tidal Flat Deposits are classified as non-productive and overlie an underlying secondary aquifer associated with the Glaciofluvial Deposits and Mercia Mudstone.
- Perched groundwater within the Tidal Flat Deposits is not considered a water resource due to its anticipated low vertical hydraulic continuity with the aquifer beneath, low permeability and low storage capacity.

- Cohesive Tidal Flat Deposits (of approximately 6 m thickness) separate the Made Ground (if present) and the aquifers.
- The proposed piling may create pathways from any potentially contaminated soils within or under the motorway embankment to the Secondary Aquifer.
- Hardstanding cover which is proposed in some areas of the motorway corridor is likely to limit infiltration, reducing leaching.
- Whilst piles may increase vertical pathways for ground gas migration from the Made Ground, gas flux is not anticipated given the limited extent of the material and the reuse/removal as part of the construction (subject to passing reuse criteria).
- Motorway users will be within open environment with no proposed structure or other confined spaces.

8.4 Human Health Risk Assessment

8.4.1 No sampling and analysis was undertaken at the on site boreholes during the previous ground investigation and therefore no screening assessment can be undertaken.

8.5 Controlled Waters Screening Assessment

8.5.1 The rationale and approach for the controlled waters (Tier 1) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the ES) and the groundwater chemical results are presented in Appendix 3 of this report. All exceedances of the relevant criteria are summarised in Tables 13 and 14 for groundwater and surface waters, respectively.

8.5.2 Where an Environmental Quality Standard (EQS) is dependent on water hardness (e.g. some heavy metals), the hardness of the surface water receptor should normally be used. The Baseline Water Environment Report (Appendix 16.2 of the ES) indicates surface water to be generally moderately hard with hardness concentrations within a range of 100 to 150 mg/l as calcium carbonate. Therefore, EQSs within this water hardness range have been used for screening purposes.

Soil Leachate Results

8.5.3 No soil samples were taken and analysed for leachability during the previous on site investigation.

Groundwater Results

8.5.4 Groundwater analysis results have been assessed from samples collected over two rounds of groundwater monitoring results from off site boreholes, SBHD066 and BH404, undertaken in 2008 and 2015, respectively. The groundwater samples were taken from the groundwater within the Glaciofluvial Deposits and Mercia Mudstone and the perched groundwater within the Tidal Flat Deposits.

8.5.5 It is noted that the reported data did not differentiate between the analytical results of the shallow (perched groundwater within the Tidal Flat Deposits) and deep installations (groundwater within the Glaciofluvial Deposits and Mercia Mudstone)

on two of the three rounds for borehole BH404. As such the information has been considered as 'undifferentiated' for these two rounds.

8.5.6 A summary of the exceedances of the screening criteria from all available ground results relating to the site is presented in Table 13 and discussed below.

Table 13: Groundwater Screening Exceedances (Off Site)

Determinant	Units	Range	EQS	DWS	Number Exceeded EQS (Total Number Results)	Location	Number of Exceeded DWS (Total Number Results)	Location
Perched Groundwater (Tidal Flat Deposits)								
Nickel	µg/l	<1 - 8.2	4	20	1 (3)	BH404	0 (3)	-
Phenols	mg/l	<0.03 - 0.08	0.0077[1]		1 (2)	BH404	0 (2)	-
Aquifer (Glaciofluvial Deposits/Mercia Mudstone)								
Manganese	µg/l	630 - 920	30	50	2 (5)	SBHD06	2 (5)	SBHD06
Zinc	µg/l	<1 - 150	75	-	1 (5)	SBHD06	0 (5)	-
Cadmium	ug/l	<0.08 - 0.6	0.15	5	1 (5)	SBHD06	0 (5)	-
Ammoniacal Nitrogen	mg/l	<0.01 - 4.1	0.6	-	1 (5)	SBHD06	0 (5)	-
Total Ammonium as NH_4	mg/l	0.6	-	0.5	0 (1)	-	1 (1)	SBHD06
Phenols	mg/l	<0.03 –0.03	0.0077[1]		1 (2)	BH404	0 (2)	-

Note: [1] based on phenol criteria. DWS - Drinking Water Standard.

8.5.7 The off site groundwater within the Glaciofluvial Deposits and Mercia Mudstone has marginally elevated levels of contamination from metals (manganese, cadmium and zinc) and inorganic contaminants (ammoniacal nitrogen and ammonium).

8.5.8 Exceedances of nickel and total phenols are reported within the perched groundwater of the Tidal Flat Deposits. The latter has been compared against the criterion for phenol which is considered a conservative approach and is not considered to pose a risk to controlled waters.

8.6 Surface Water

8.6.1 A summary of the surface water quality screening assessment undertaken for the Site is presented in Table 14. This includes the results for the two monitoring

locations identified in Table 3, both of which are situated on Morfa Gronw Reen, south east of the Site.

8.6.2 The results for all the sample locations are also presented in the Baseline Water Environment Report (Appendix 16.2 of the ES)

Table 14: Summary of Surface Water Screening Exceedances

Parameter	Unit	No. Analyses	Number of Analyses Above LOD	Minimum Concentration	Maximum Concentration	Location and Round with Maximum Concentration	EQS	Number of Analyses Exceeding EQS	DWS	Number of Analyses Exceeding DWS	CCW Trigger Levels	Number of Analyses Exceeding CCW Trigger Levels
Cadmium	µg/l	4	2	0.5	0.5	R5 / E2	0.15	2	5	0	5	0
Zinc	µg/l	3	3	23	260	R5 / E4	75	1	-	-	1000	0
BOD	mg/l	4	2	2	45	R5 / E4	5	1	-	-	18	1
Phosphorus	mg/l	1	1	126	126	7.1 / Q1	400	1	-	-	-	-
Ammoniacal Nitrogen	mg/l	4	4	0.06	2.48	R5 / E4	0.6	1	-	-	1	1
Nitrate as NO_3	mg/l	4	2	1.3	2.658	R5 / E4	-	-	50	0	1	2
Phosphate	mg/l	3	2	0.1	1.2	R5 / E4	-	-	-	-	1	1

8.6.3 The quality for Morfa Gronw Reen is generally good, with single occurrences each for ammoniacal nitrogen, phosphorus and Biological Oxygen Demand (BOD) exceeding their respective EQS. Exceedances were also recorded for zinc and cadmium.

8.6.4 Location R5 also recorded exceedances above Countryside Council of Wales (CCW) (now NRW) trigger levels for BOD, nitrate (NO_3) and phosphate during the September 2008 monitoring round (E4) and a single CCW exceedance for nitrate (NO_3) during the December 2007 monitoring round (E1).

8.6.5 TPH was analysed for in R5 and 7.1, with no occurrences above the laboratory Limit of Detection (LOD).

8.6.6 Polycyclic Aromatic Hydrocarbons (PAH) and Organics were also analysed for at location 7.1. The results were all below the Limit of Detection. These are therefore not considered to pose a risk to controlled waters.

8.6.7 Although the surface water quality of Morfa Gronw Reen is considered to be in keeping with the water quality expected in the reen system and of good quality, it is considered that a tortuous hydraulic linkage exists between the Site and the surface water sample locations, particularly at time of negligible flow during summer penning level.

8.7 Ground Gas Risk Assessment

8.7.1 There is no ground gas data available for the Site.

8.7.2 Risks associated with the adjacent former landfill are associated with CL-9 report (within Appendix 11.1 of the ES).

8.8 Summary

8.8.1 No analytical data for soils and groundwater are available for the Site. The groundwater (perched and main aquifer) as seen at the nearest off site locations has been identified to have marginally elevated levels of a limited number of metals and inorganics when compared to the Environmental Quality Standards and Drinking Water Standards.

8.8.2 The lack of soil quality data on site means that it is not possible to determine if a contaminant linkage is in existence at the Site. However, given the ground and groundwater conditions encountered at and off Site, the possible environmental effect of the Made Ground, if present at the Site, is unlikely to be notable.

8.8.3 Surface water sampling points nearest to the Site from Morfa Gronw Reen are of good quality although a tortuous hydraulic continuity is identified.

9 Refined Conceptual Site Model

9.1.1 The incorporation of data from the 2015 Supplementary Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. Relevant contaminant linkages (source-pathway-receptor) are considered within the refined CSM. The assessment is based on the Scheme during construction and operational phases.

9.1.2 A CSM representing general ground conditions, overall layout of the new section of motorway and relevant source-pathway-receptors (each of which has a specific alpha-numerical symbol attached) are presented in Figure 2 and is described in Table 15.

Table 15: Refined Conceptual Site Model

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
On Site Potentially contaminated soil or other contaminants within observed Made Ground and former embankments.	**Construction**					
	Construction workers (B)	Direct dermal (1)	Likely	Low	Low	Construction workers are likely to be exposed to Made Ground materials during construction works, however exposure duration will be short-term only. Prior to construction, a specific risk assessment will be required in line with CDM and other relevant health and safety guidance. This will enable safe methodology and appropriate levels of Personal Protective Equipment (PPE) to be put in place. As such, all risks will be duly considered and suitably mitigated to protect construction workers. No chemical analysis has been undertaken at the Site. No Made Ground has been encountered and no visual/olfactory evidence of contamination was identified. Construction to be within open space. Any earthworks within confined space would require specific risk assessment, control measures and PPE. Further investigation is required to establish whether any contamination exists and associated risks.
		Ingestion (2)	Likely	Low	Low	
		Inhalation of soil dust (3)	Likely	Low	Low	
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	Additional investigation and soil testing is required to confirm the presence of Made Ground and associated risks. Limited thickness of Made Ground is anticipated. Construction to be largely within open space. Any earthworks within confined space would require specific risk assessment, control measures and PPE.
	Surface waters (D)	Leaching/migration via saturated flow within perched groundwater (4)	Low	Low	Very low	Perched (shallow) groundwater is likely to be intercepted by the land drainage. The quality of perched groundwater may become affected by contamination during the construction works, particularly in the area of excavation (new drains).

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						Perched groundwater is likely to have low flow and may be absent seasonally. Groundwater quality status identified adjacent to former railway bridge shows elevated metals, inorganics and organics. Data based on limited information. Additional investigation and groundwater testing required to confirm risks.
		Contaminated surface water run-off (5)	Low	Low	Very low	During construction if the Made Ground is excavated some material might enter the adjacent drainage ditch or on site ditches that form part of the wider network of reens and ditches, part of the Gwent Levels SSSI. Additional investigation and soil testing required to confirm the presence of Made Ground and associated risks. Construction process to adopt surface water control and management.
	Deep Groundwater within Glaciofluvial Deposits (Cp) / Mercia Mudstone (Ca)	Leaching/contamination displacement through piling (4)	Low	Low	Very low	Displacement of Made Ground with potentially elevated contaminants is possible during piling and may potentially form a pathway to deep groundwater within the Mercia Mudstone, however this is subject to selected piling technique. Short-term only. A piling risk assessment is required to confirm low risk to controlled waters. Cohesive Tidal Flat Deposits (of approximately 6 m thickness) separate the Made Ground (if present) and the deep groundwater. Additional investigation required to confirm the presence of Made Ground and associated risks.
Groundwater – Aquifer from the Glaciofluvial Deposits and	Surface water (land drainage) (D)	Piles (4)	Likely	Low	Low	Groundwater quality status identified adjacent to former railway bridge shows elevated metals, inorganics and organics. Potentiometric surface of the aquifer potentially near base of land drainage.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Mercia Mudstone						Piles may create vertical pathways connecting aquifer with land drains. A piling risk assessment is required to confirm low risk to controlled waters. Presence of 6 m thick cohesive Tidal Flat Deposits. Perched groundwater within Tidal Flat Deposits and deep groundwater are of similar quality. Surface waters are of similar quality to the groundwater.
On Site Potentially contaminated soil or other contaminants within observed Made Ground and former embankments. .	**Operational**					
	Maintenance Workers (B)	Direct dermal (1)	Unlikely	Low	Very low	Made Ground to be largely encapsulated by the embankment and therefore the exposure to contamination will be limited outside the motorway embankment. Areas outside the motorway hardstanding are likely to receive topsoil cover and vegetation establishment, reducing potential of exposure. Exposure duration will be short-term only. Site specific risk assessment will be required in line with health and safety guidance. This will enable safe methods of work and appropriate levels of PPE to be put in place. As such, all risks will be duly considered and suitably mitigated to protect maintenance workers. No chemical analysis has been undertaken at the Site. No Made Ground has been encountered and no visual/olfactory evidence of contamination was identified. Additional investigation required to confirm the presence of Made Ground and associated risks.
		Ingestion of soil (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	Additional investigation and soil testing is required to confirm the presence of Made Ground and associated risks. Limited thickness of Made Ground is anticipated. Potential exposure duration will be short-term only. Maintenance workers will be in the open environment with no proposed structures or other confined spaces.
	Future motorway users (A)	Dermal contact with dust (1)	Unlikely	Low	Very low	Made Ground to be removed or encapsulated by the proposed embankment (subject to passing reuse criteria). Motorway to be built on raised embankment some 10 m above ground level providing a further barrier to migration gases. Areas outside the motorway hardstandings are likely to receive topsoil cover and vegetation establishment, reducing potential of exposure. Additional investigation and soil testing required to confirm the presence of Made Ground and associated risks.
		Ingestion of dust (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
		Inhalation of soil gas or vapours (2)	Unlikely	Low	Very low	
	Groundwater - aquifer (Ca) from the Glaciofluvial Deposits and Mercia Mudstone	Leaching/migration (4) of contamination in Made Ground	Unlikely	Low	Very low	Piles may potentially form a pathway to deep groundwater within the Mercia Mudstone, Hard/vegetative cover will provide infiltration and thus reduce the leaching potential. A piling risk assessment is required to confirm very low risk to controlled waters. Cohesive Tidal Flat Deposits (of approximately 6 m thickness) separate the Made Ground (if present) and the deep groundwater. Additional investigation required to confirm the presence of Made Ground and associated risks.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Surface water (land drainage) (D)	Leaching/migration via saturated flow within perched groundwater (4)	Unlikely	Low	Very low	Perched (shallow) groundwater is likely to be intercepted by the land drainage. Perched groundwater is likely to have low flow and may be absent seasonally. Groundwater quality status identified adjacent to former railway bridge shows elevated metals, inorganics and organics.
Groundwater - Aquifer from the Glaciofluvial Deposits and Mercia Mudstone	Surface water (land drainage) (D)	Piles (4)	Likely	Low	Low	Groundwater quality status identified adjacent to former railway bridge shows elevated metals, inorganics and organics. Potentiometric surface of the aquifer potentially near base of land drainage. Piles may create vertical pathways connecting aquifer with land drains. A piling risk assessment is required to confirm low risk to controlled waters. Presence of 6 m thick cohesive Tidal Flat Deposits. Perched groundwater within Tidal Flat Deposits and deep groundwater are of similar quality. Surface waters are of similar quality to the groundwater.

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 The review of the existing information indicates the presence of Made Ground materials within the proposed alignment of the new section of motorway, which may form part of the land take for the M4 Corridor around Newport. The nature and extent of the potential contamination has not been confirmed. However, it is unlikely to pose a risk to the Scheme.

10.1.2 In order to confirm the risks associated with the Site in relation to both construction and operational phases, and the suitability of materials for reuse within the Scheme, it is recommended that intrusive investigations are undertaken. The investigatory works should target the area of proposed works but should also consider the area within the confirmed land take for the Scheme.

10.1.3 The results of the investigations should be assessed in relation to identified receptors and inform the selection of appropriate health and safety and mitigation measures for the construction works and operational phase, if required.

10.1.4 Surface water sampling points nearest to the Site from Morfa Gronw Reen are of good quality although a tortuous hydraulic continuity is identified.

10.1.5 To confirm the risks associated with the construction of the deep piled foundations for the railway bridge a foundations works risk assessment is required.

10.2 Recommendations

10.2.1 Only limited ground investigation has been undertaken at the Site and although the likelihood of any contamination at the Site is relatively low, due to the potential presence of Made Ground, contamination may have occurred. As such it is recommended that a limited ground investigation is undertaken to verify risk levels described in the report. Should contamination be identified that could cause an unacceptable risk to the identified receptors, the remediation requirements shall be contained within the Remediation Strategy for the Scheme.

10.2.2 A Remediation Strategy for the Scheme should be developed for this Site that includes the following.

- Addressing potential human health and controlled waters risk identified by the proposed additional ground investigation.
- Risk assessment relating to the use of piles creating pathways enabling contaminants to enter surface watercourses.
- Monitoring and risk assessment of perched groundwater.
- Dealing with unexpected contamination.
- Verification sampling strategy to confirm suitability for soils for retention/reuse.
- Control measures to prevent risks to construction workers and the general public during construction.
- Verification of imported topsoils.

10.2.3 The Remediation Strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan.

10.2.4 The Remediation Strategy should be supported by a Scheme wide Materials Management Plan prepared in accordance with CL:AIRE Code of practice (CL:AIRE, 2011).

11 References

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Ove Arup & Partners (2014) M4 Corridor Around Newport, Preliminary Sources Study Report, 14/9197

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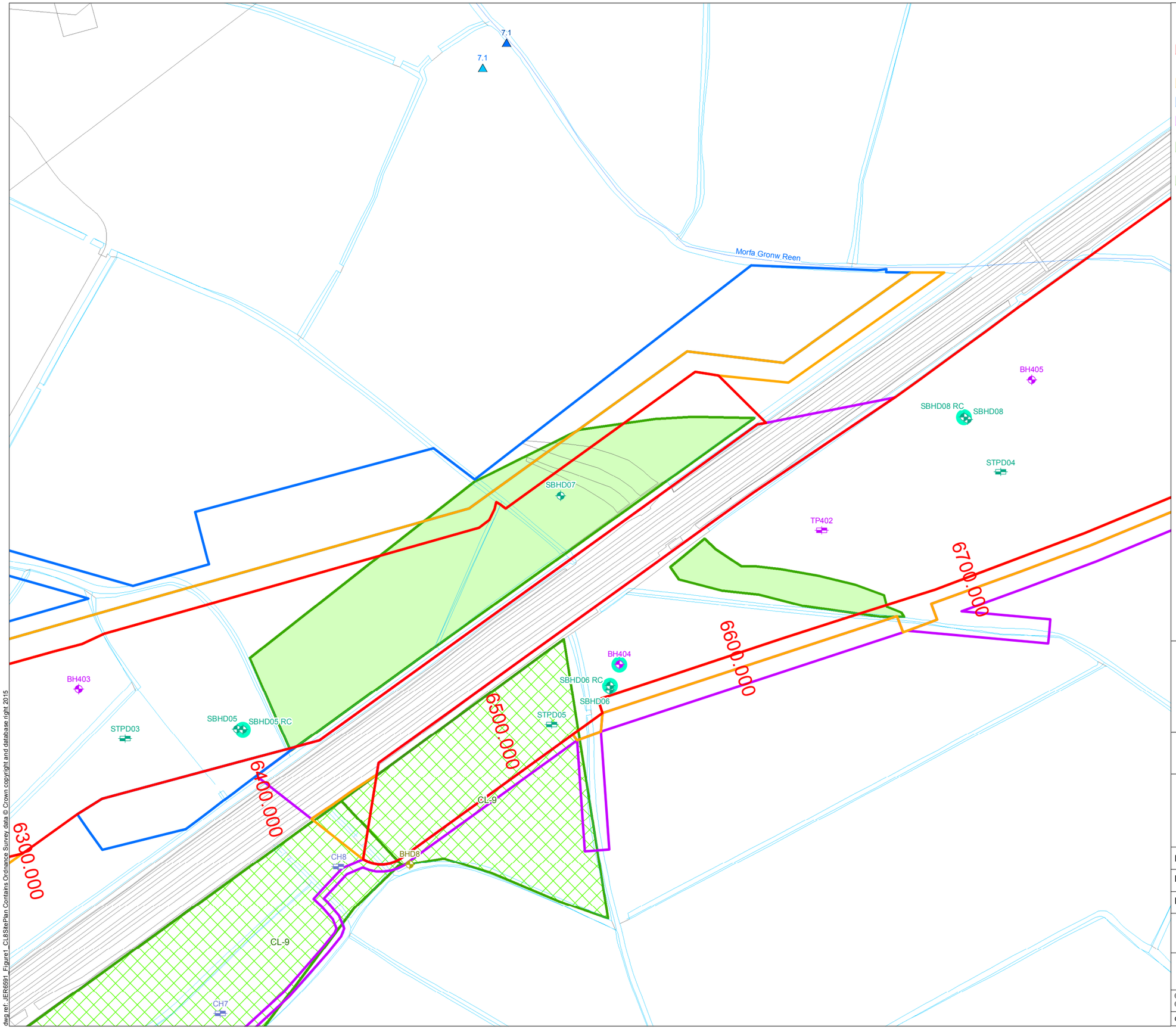
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12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GDR	Geotechnical Design Report
GIR	Ground Investigation Report
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum

mb	Millibars
mbGL	Metres below Ground Level
MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination

Investigation Locations

2015 (RPS)

- Surface Water Monitoring Location - Q2
- Surface Water Monitoring Location - Q1

2015 (Geotechnical Engineering)

- Borehole
- Trial Pit

2007 (Norwest Holst)

- Borehole
- Trial Pit

2000 (Exploration Associates)

- Trial Pit

1997 (Norwest Holst)

- Borehole
- Monitoring Well Installation



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Welsh Government

Appendix 11.1 Annex D CL-8

Site Plan for CL-8

Figure: 1	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Scale: A3 @ 1:1,500
0 25 50 m

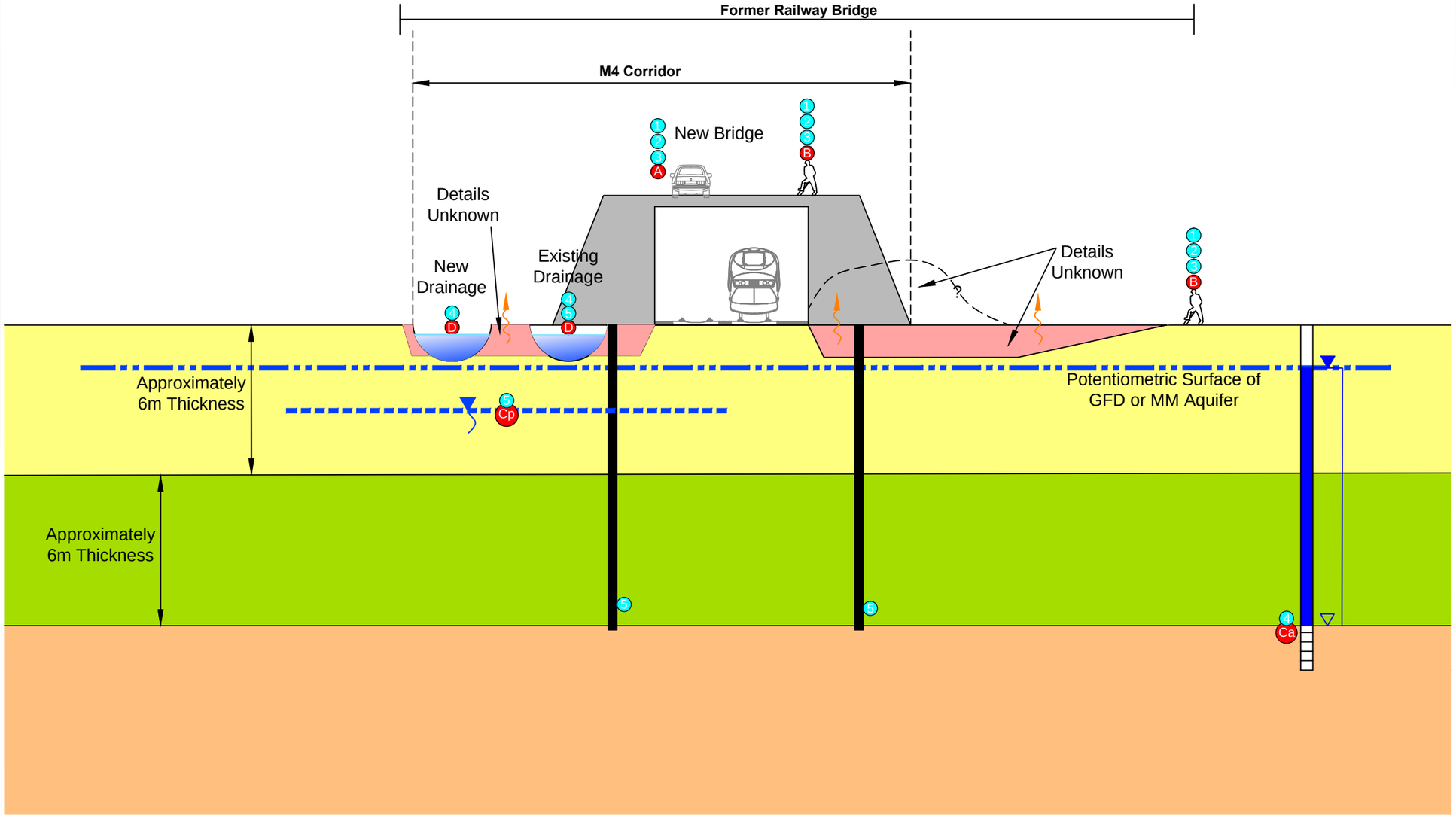
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CL-8 Former Railway Bridge



Ground conditions based on available information

Legend

- Made Ground - MG
- Tidal Flat Deposits - TFD
- Glaciofluvial Deposits - GFD
- Mercia Mudstone - MM
- Proposed Bridge
- Proposed Piling
- Perched Groundwater (TFD)
- Groundwater (FGD/MM)
- Water Strike
- Rest Water Level
- Gas Migration Pathway

Potential Receptors

- A Humans On-Site (M4 User)
- B Humans On-Site (Construction/Maintenance)
- Cp Groundwater (Perched)
- Ca Groundwater (Aquifer)
- D Surface Water

Potential Pathways

- Dermal Contact
- Inhalation
- Ingestion
- Leaching / Migration
- Surface Run Off

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Made Ground
- Groundwater

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0159 (March 2014)

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Appendix 11.1 Annex D CL-8

Conceptual Site Model for CL-8

Figure: 2	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL8ConceptualSiteModel

dwg ref: JER6591_Figure2_CL8ConceptualSiteModel

Appendices

A1 Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD07 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	329269.94 E
Project	New M4 - Second Preliminary Ground Investigation				183671.47 N
		Drilling Rig	Dando 2000	Ground Level	6.11m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SL/AL	Orientation	Vertical
		Logged by	DH	Date Started	15/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	26/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
15/11/2007	1730	5.00	5.00	DRY	End of Shift
24/11/2007	0730	5.00	5.00	3.60	Start of Shift
24/11/2007	1730	8.50	8.50	3.20	End of Shift
25/11/2007	0730	8.50	8.50	1.90	Start of Shift
25/11/2007	1730	13.80	13.00	2.20	End of Shift
26/11/2007	0730	13.80	13.00	1.30	Start of Shift
26/11/2007	1730	16.10	13.00	2.40	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
7.20	7.40	0.75	Chiselling
10.30	10.60	1.00	Chiselling
11.60	11.70	0.50	Chiselling
15.40	15.70	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	16.10	200	13.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
24/11/2007		6.50	3.50	20	Fast	6.50	NS

GENERAL NOTES

1. Cable Percussive boring complete at 16.10m.
2. Borehole grouted upon completion.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.50	S	N=7 (2,2,2,1,2,2)	0.00	DRY
2.50	S	N=4 (1,1,1,1,1,1)	0.00	DRY
3.50	S	N=4 (1,1,1,1,1,1)	3.00	DRY
4.50	S	N=4 (1,1,1,1,1,1)	4.00	NR
6.50	S	N=21 (2,2,4,5,5,7)	5.80	3.50
8.00	S	50/285mm (5,6,9,14,15,12)	7.90	3.90
10.00	S	50/95mm (3,7,18,32)	9.90	2.50
12.00	S	50/275mm (6,9,12,12,14,12)	11.50	2.00
13.30	S	50/230mm (8,10,13,15,16,6)	12.70	2.70
15.00	S	50/220mm (7,9,12,17,21)	13.00	1.80
15.70	S	50/190mm (8,9,13,20,17)	13.00	2.40

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	ARIAL CP HEADER
Version	3.05
Revised	17/12/2007

NORWEST HOLST

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD07 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	329269.94 E
Project	New M4 - Second Preliminary Ground Investigation				183671.47 N
		Drilling Rig	Dando 2000	Ground Level	6.11m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SL/AL	Orientation	Vertical
		Logged by	DH	Date Started	15/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	26/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
TOPSOIL.		0.20	5.91						
Firm locally soft Orangish brown mottled brownish grey mottled orangish grey slightly gravelly CLAY. Gravel is subangular to subrounded fine of mudstone and sandstone with occasional rootlets. (Estuarine Alluvium)				D1	0.30				
				U2	1.00 - 1.50				
				D3	1.50 - 1.95	S7	S	1.50	1.95
Very soft grey CLAY with closely spaced medium to coarse gravel sized pockets of silty fine sand. (Estuarine Alluvium)		2.00	4.11	B4 U5	2.00 2.00 - 2.50	(10)			
				D6	2.50 - 2.95	S4	S	2.50	2.95
---from 3.00m with closely spaced coarse gravel sized pockets of plastic black pseuofibrous peat				B7 U8	3.00 3.00 - 3.50	(10)			
				D9	3.50 - 3.95	S4	S	3.50	3.95
				D10 U11	4.00 4.00 - 4.50	(10)			
				D12	4.50 - 4.95	S4	S	4.50	4.95
Soft dark grey slightly sandy slightly gravelly CLAY with low cobble content, closely spaced fine to coarse gravel sized pockets of brown fiberous peat and rare coarse gravel sized pockets of black medium sand. Sand is fine to medium, gravel is subangular to rounded fine to coarse of sandstone. Cobbles are rounded of sandstone. (Estuarine Alluvium) ---from 5.00m with occasional organic material		5.00	1.11	D13	5.00				
				U14	6.00 - 6.45	(14)			
---from 6.30m to 6.50m very clayey		6.36	-0.25	D15 D16	6.50 6.50 - 6.95	S21	S	6.50	6.95
Medium dense grey coarse SAND and subangular to rounded fine to coarse GRAVEL of sandstone, siltstone, quartz and limestone. (Fluvial Alluvium) ---from 7.00m with high cobble content cobbles are subangular to subrounded of sandstone, limestone and siltstone				B17	7.00 - 7.50				
				D18	8.00 - 8.45	S50/285mm	S	8.00	8.44
---from 8.00m locally brown				B19	8.50 - 9.00				
				D20	9.50				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD07 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	329269.94 E
Project	New M4 - Second Preliminary Ground Investigation				183671.47 N
		Drilling Rig	Dando 2000	Ground Level	6.11m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SL/AL	Orientation	Vertical
		Logged by	DH	Date Started	15/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	26/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling	SPT N & (U blows)	SPT type & depth	Install-ation
Medium dense grey coarse SAND and subangular to rounded fine to coarse GRAVEL of sandstone, siltstone, quartz and limestone. (Fluvial Alluvium)				D21 10.00 - 10.30 B22 10.30 - 11.10 D23 11.50 D24 12.00 - 12.45	S50/95mm S50/275mm	S 10.00 10.25 S 12.00 12.43	
Very stiff reddish brown locally mottled greenish grey silty gravelly CLAY. Gravel sized fragments are angular fine to medium (Weathered Mudstone). (Mercia Mudstone Group)		12.60	-6.49	D25 12.70 U26 12.80 - 13.25 D27 13.30 D28 13.70 - 13.75 B29 13.80 - 14.30 D30 15.00 - 15.40 D31 15.70 - 16.10	(81) S50/230mm S50/220mm S50/190mm	S 13.30 13.68 S 15.00 15.37 S 15.70 16.04	
Cable Percussion boring complete at 16.10 m.		16.10	-9.99				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD07 RC
Header

Contract No.	F15056	Method	Rotary Coring	Coordinates	329271.07 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor		183672.02 N
		Driller	SL	Ground Level	6.08m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	27/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	29/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
27/11/2007	1730	13.70	13.70	12.80	End of Shift
28/11/2007	0730	13.70	13.70	8.00	Start of Shift
28/11/2007	1730	24.70	13.70	11.70	End of Shift
29/11/2007	0730	24.70	13.70	1.70	Start of shift
29/11/2007	1730	30.00	13.70	1.95	End of hole

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	13.70	Air/Mist	100%	0.00*
13.70	30.00	Air/Mist	100%	92.0

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
121	30.00	121	13.70

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
27/11/2007		11.80	NR	NR	NR	11.80	NS
29/11/2007		26.90	NR	NR	Seepage	13.70	NR

GENERAL NOTES

1. Rotary Openhole drilling from GL to 13.70m.
2. Rotary Coring complete at 30.00m.
3. Borehole grouted upon completion.
4. 0.00* indicates openhole drilling.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
14.70	S	N=73 (6,9,14,18,20,21)	13.70	NR
16.70	S	100/185mm (14,11,27,40,33)	13.70	NR
18.70	S	100/85mm (21,4,85,15)	13.70	NR

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD07 RC
Sheet 1 of 3

Contract No.	F15056	Method	Rotary Coring	Coordinates	329271.07 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor		183672.02 N
		Driller	SL	Ground Level	6.08m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	27/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	29/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Soft light brown CLAY. (Driller's description)										
		2.10	3.98							
Soft bluish grey silty CLAY. (Driller's description)										
		3.50	2.58							
Dark brown peaty CLAY. (Driller's description)										
		6.80	-0.72							
SAND and GRAVEL. (Driller's description)										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD07 RC
Sheet 2 of 3

Contract No.	F15056	Method	Rotary Coring	Coordinates	329271.07 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor		183672.02 N
		Driller	SL	Ground Level	6.08m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	27/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	29/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
COBBLES. (Driller's description)		10.00	-3.92							
MARL. (Driller's description) (Mercia Mudstone Group)		13.00	-6.92							
Very weak to extremely weak reddish brown locally mottled greenish grey MUDSTONE. Discontinuity 1) 0-10 deg closely to very closely spaced locally medium spaced undulating locally clay infilled. Discontinuity 2) 40-50 deg medium spaced locally very closely spaced undulating locally infilled with gypsum. (Mercia Mudstone Group)		13.70	-7.62	13.70 14.70	22	12	0	NI 30 50		
---from 13.84m to 13.94m recovered as non intact core (angular fine to coarse gravel sized fragments)									14.70 15.15 S73	
---from 14.70m to 14.74m recovered as non intact core (clay)				14.70 15.70	100	78	60	NI 120 250		
---from 14.74m to 14.85m 1 No discontinuity 60-70 deg undulating rough infilled with gypsum										
---from 14.85m to 14.87m recovered as non intact core (angular coarse gravel sized fragments)										
---from 14.90m to 14.95m strongly mottled greenish grey										
---from 15.78m to 15.98m recovered as non intact core (clayey angular fine to coarse gravel sized fragments)				15.70 16.70	100	97	0	NI 40 90		
---from 16.66m to 16.70m recovered as non intact core (angular fine to medium gravel sized fragments)									16.70 17.00 S100/185mm	
---from 16.70m to 17.40m recovered as non intact core (clayey angular fine to coarse gravel sized fragments)								NI NI NI		
---from 17.40m to 18.09m recovered as non intact core (angular fine to coarse gravel sized fragments and angular cobble sized fragments)				16.70 18.70	95	18	0			
---from 18.40m to 18.50m recovered as non intact core (angular fine to coarse gravel sized fragments)								NI 60 170		
---from 18.80m to 19.68m recovered as non intact core (soft gravelly clay. Gravel sized fragments are angular fine to coarse)									18.70 18.87 S100/85mm	
								NI NI NI		

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHD07 RC
Sheet 3 of 3

Contract No.	F15056	Method	Rotary Coring	Coordinates	329271.07 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando Tractor		183672.02 N
		Driller	SL	Ground Level	6.08m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	27/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	29/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Very weak to extremely weak reddish brown locally mottled greenish grey MUDSTONE. Discontinuity 1) 0-10 deg closely to very closely spaced locally medium spaced undulating locally clay infilled. Discontinuity 2) 40-50 deg medium spaced locally very closely spaced undulating locally infilled with gypsum. (Mercia Mudstone Group)				18.70 21.70	100	42	15	NI 90 140		
---from 20.13m to 20.30m recovered as non intact core (gravelly clay. Gravel sized fragments are subangular fine to medium)										
---from 20.30m to 20.56m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine to coarse)										
---from 20.84m to 21.62m recovered as non intact core (clayey angular fine to coarse gravel sized fragments)										
---from 21.70m to 21.92m recovered as non intact core (subangular medium to coarse gravel sized fragments)										
---from 22.03m to 22.10m recovered as non intact core (subangular fine to coarse gravel sized fragments)										
---from 22.15m to 22.19m recovered as non intact core (subangular fine to coarse gravel sized fragments)								NI NI 300		
---from 22.35m to 23.25m recovered as non intact core (clayey coarse sand sized fragments and angular fine to coarse gravel sized fragments)				21.70 24.70	71	62	20			
---from 23.30m to 23.70m recovered as non intact core (firm gravelly clay. Gravel sized fragments are angular fine to coarse)										
---23.70m to 24.35m assumed zone of core loss.										
---from 24.81m to 25.20m recovered as non intact core (angular fine to coarse gravel sized fragments)										
---from 25.25m to 25.53m recovered as non intact core (angular fine to coarse gravel sized fragments)								NI NI 80		
---from 25.76m to 25.84m recovered as non intact core (angular fine to coarse gravel sized fragments)				24.70 27.00	96	52	10			
---from 26.04m to 26.23m recovered as non intact core (firm gravelly clay. Gravel sized fragments are angular fine to coarse)										
---from 26.23m to 26.39m recovered as non intact core (clayey angular fine to coarse gravel sized fragments)										
---from 26.50m to 26.80m recovered as non intact core (angular fine to coarse gravel sized fragments)								NI 40 110		
---from 26.97m to 27.00m recovered as non intact core (angular medium to coarse gravel sized fragments)										
---from 27.00m to 27.08m recovered as non intact core (angular coarse gravel sized fragments)										
---from 27.13m to 27.20m recovered as non intact core (angular coarse gravel sized fragments)										
---from 27.20m to 27.40m recovered as non intact core (angular medium to coarse gravel sized fragments)										
---from 27.49m to 27.53m recovered as non intact core (angular fine to medium gravel sized fragments)				27.00 30.00	100	64	20			
---from 27.92m to 28.22m recovered as non intact core (angular fine to medium gravel)										
---from 29.18m to 29.40m recovered as non intact core (firm to stiff gravelly clay. Gravel sized fragments are angular fine to medium)								NI 100 250		

Rotary drilling complete at 30.00 m.

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD05 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	329137.11 E
Project	New M4 - Second Preliminary Ground Investigation				183575.49 N
		Drilling Rig	Dando	Ground Level	6.01m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SL	Orientation	Vertical
		Logged by	JAB	Date Started	06/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	13/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
06/11/2007	1630	0.50	0.00	DRY	End of Shift
07/11/2007	0730	0.50	0.00	DRY	Start of Shift
07/11/2007	1645	3.00	3.00	DRY	End of Shift
08/11/2007	1000	3.00	3.00	DRY	Start of Shift
08/11/2007	1645	8.45	8.00	NR	End of Shift
09/11/2007	0730	8.45	8.00	2.00	Start of Shift
09/11/2007	1645	15.50	15.00	NR	End of Shift
13/11/2007	0730	15.50	15.00	3.00	Start of Shift
13/11/2007	1700	19.00	16.50	NR	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
14.00	15.00	1.00	Slow progress

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	19.00	200	16.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
08/11/2007		6.50	5.80	20	Moderate	6.00	NS

GENERAL NOTES

1. Cable Percussive boring complete at 19.00m.
2. Borehole grouted upon completion.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.50	S	N=7 (2,2,2,2,2,1)	NR	NR
2.50	S	N=4 (1,1,1,1,1,1)	NR	NR
3.50	S	N=4 (1,1,1,1,1,1)	NR	NR
4.50	S	N=4 (1,1,1,1,1,1)	NR	NR
5.50	S	N=4 (1,1,1,1,1,1)	NR	NR
6.50	C	N=12 (2,3,2,3,4,3)	NR	NR
7.00	C	N=25 (4,5,5,8,7,5)	NR	NR
8.00	C	N=25 (5,5,7,7,6,5)	NR	NR
10.00	C	N=27 (5,5,7,8,7,5)	NR	NR
12.00	C	N=23 (4,4,5,5,7,6)	NR	NR
14.00	S	N=31 (8,8,7,8,8,8)	NR	NR
15.00	S	N=40 (9,9,11,9,10,10)	NR	NR
16.00	S	N=55 (10,10,10,10,15,20)	NR	NR
18.00	S	N=55 (8,10,10,10,15,20)	NR	NR

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

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NORWEST HOLST

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD05 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	329137.11 E
Project	New M4 - Second Preliminary Ground Investigation				183575.49 N
		Drilling Rig	Dando	Ground Level	6.01m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SL	Orientation	Vertical
		Logged by	JAB	Date Started	06/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	13/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
TOPSOIL.									
		0.30	5.71	ES1	0.30				
Soft to firm brown mottled grey silty slightly sandy CLAY. (Estuarine Alluvium)				D2	0.30 - 0.40				
				B3	0.50 - 1.00				
				U4	1.00 - 1.50	(20)			
				D5	1.50 - 1.95	S7	S	1.50	1.95
		2.00	4.01	D6	2.00	(20)			
Soft extremely low strength grey slightly sandy CLAY. (Estuarine Alluvium)				U7	2.00 - 2.50				
				D8	2.50 - 2.95	S4	S	2.50	2.95
				D9	3.00	(10)			
				U10	3.00 - 3.50				
				D11	3.50 - 3.95	S4	S	3.50	3.95
				U12	4.00 - 4.50	(10)			
				D13	4.50 - 4.95	S4	S	4.50	4.95
				B14	5.00	(25)			
		5.20	0.81	U15	5.00 - 5.50				
Firm dark brown locally brown fibrous PEAT. (Peat)				D16	5.50 - 5.95	S4	S	5.50	5.95
		6.00	0.01	UF	6.00 - 6.50	(20)			
Reddish brown locally grey slightly gravelly sandy SILT. Sand is fine. Gravel is subangular to subrounded fine to coarse of limestone and sandstone. (Estuarine Allvium)		6.10	-0.09	D17	6.00				
				B18	6.00				
				B19	6.50 - 7.00	C12	C	6.50	6.95
Medium dense greyish brown slightly clayey slightly sandy subangular to rounded fine to coarse GRAVEL and subangular to subrounded COBBLES. Gravel is of limestone, sandstone, siltstone, mudstone, quartz and quartzite. Cobbles are of limestone, siltstone and mudstone. (Fluvial Alluvium)				D20	7.00	C25	C	7.00	7.45
				B21	7.50 - 8.00				
						C25	C	8.00	8.45
				B22	9.80				
				D23	9.80				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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NORWEST HOLST

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD05 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	329137.11 E
Project	New M4 - Second Preliminary Ground Investigation				183575.49 N
		Drilling Rig	Dando	Ground Level	6.01m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	SL	Orientation	Vertical
		Logged by	JAB	Date Started	06/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	13/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth	Install-ation
Medium dense greyish brown slightly clayey slightly sandy subangular to rounded fine to coarse GRAVEL and subangular to subrounded COBBLES. Gravel is of limestone, sandstone, siltstone, mudstone, quartz and quartzite. Cobbles are of limestone, siltstone and mudstone. (Fluvial Alluvium)						C27	C 10.00 10.45	
				D24	11.00			
						C23	C 12.00 12.45	
Stiff to very stiff reddish brown slightly gravelly sandy CLAY. Gravel is angular fine to medium (Weathered Mudstone). (Mercia Mudstone Group)		12.50	-6.49	B25	12.50			
---from 13.00m locally mottled green				D26	13.00			
				UF D27	13.50 13.50	(10)		
				D28	14.00 - 14.45	S31	S 14.00 14.45	
				D29	14.50 - 15.00			
				D30	15.00 - 15.45	S40	S 15.00 15.45	
				D31 D32	15.50 15.60			
				D33	16.00 - 16.45	S55	S 16.00 16.45	
				D35	18.00 - 18.45	S55	S 18.00 18.45	
Cable Percussion boring complete at 19.00 m.		19.00	-12.99	D36	19.00			

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD05 RC
Header

Contract No.	F15056	Method	Rotary Coring	Coordinates	329139.52 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183575.29 N
		Driller	MM	Ground Level	6.05m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	16/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	20/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
15/11/2007	1730	7.00	7.00	DRY	End of Shift
16/11/2007	0730	7.00	7.00	6.00	Start of Shift
16/11/2007	1730	17.00	16.00	12.00	End of Shift
19/11/2007	0730	17.00	16.00	3.00	Start of Shift
19/11/2007	1730	23.00	16.00	9.00	End of Shift
20/11/2007	0730	23.00	10.00	3.10	Start of Shift
20/11/2007	1730	30.00	16.00	3.00	End of Hole

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	16.00	Air/Mist	100%	0.00*
16.00	30.00	Air/Mist	100%	92.0

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
121	30.00	121	16.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
16/11/2007		7.20	NR	20	Heavy	NR	NR

GENERAL NOTES

1. Service inspection pit hand excavated from GL to 1.20m.
2. Rotary Openhole from 1.20m to 16.00m.
3. Rotary Coring complete at 30.00m.
4. 19mm piezometer installed, tip at 12.00m, response zone from 11.50m to 12.20m.
5. 0.00* indicates openhole drilling.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
17.00	S	N=59 (7,8,12,14,15,18)	16.00	12.00
19.00	S	N=83 (4,5,14,18,22,29)	16.00	NR
21.00	S	N=89 (7,10,16,21,22,30)	16.00	NR
23.00	S	100/265mm (13,12,19,24,31,26)	16.00	9.00
25.00	S	N=49 (6,6,9,11,12,17)	16.00	18.40
27.00	S	100/20mm (25,100)	16.00	18.40
29.00	S	100/85mm (23,2,86,14)	16.00	19.00

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHD05 RC
Sheet 1 of 3

Contract No.	F15056	Method	Rotary Coring	Coordinates	329139.52 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183575.29 N
		Driller	MM	Ground Level	6.05m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	16/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	20/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
TOPSOIL. (Driller's description)		0.30	5.75							
Soft brown CLAY. (Driller's description)		2.50	3.55							
Stiff grey CLAY. (Driller's description)		3.20	2.85							
PEAT. (Driller's description)		3.60	2.45							
Clayey GRAVEL. (Driller's description)		7.50	-1.45							
SAND and GRAVELS. (Driller's description)										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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NORWEST HOLST

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD05 RC
Sheet 2 of 3

Contract No.	F15056	Method	Rotary Coring	Coordinates	329139.52 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183575.29 N
		Driller	MM	Ground Level	6.05m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	16/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	20/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
SAND and GRAVELS. (Driller's description)										
Weathered MARL. (Driller's description) (Mercia Mudstone Group)		15.00	-8.95							
Extremely weak to very weak reddish brown mottled grey MUDSTONE. Discontinuity: 1) 10-20 deg closely spaced undulating to planar rough locally clay infilled. Discontinuity 2) 70-90 deg medium spaced planar rough clay infilled. (Mercia Mudstone Group) ---from 16.00m to 16.30m recovered as non intact core (clayey angular fine to coarse gravel sized fragments) ---from 16.43m to 17.00m assumed zone of core loss ---from 17.00m to 17.50m recovered as non intact core (soft to firm slightly gravelly clay. Gravel sized fragments are angular fine to medium) ---from 17.77m to 18.00m assumed zone of core loss ---from 18.40m to 18.44m recovered as non intact core (fine to coarse sand sized fragments and angular fine to coarse gravel sized fragments) ---from 18.44m to 19.00m assumed zone of core loss ---from 19.00m to 19.47m recovered as non intact core (soft gravelly clay. Gravel sized fragments are angular to subrounded fine to coarse) ---from 19.50m to 20.00m assumed zone of core loss		16.00	-9.95	16.00 17.00 17.00 17.50 17.50 18.00 18.00 19.00 19.00 20.00	43 0 27 44 90	10 0 0 8 3	10 0 0 0 0	NI NI 80	17.00 17.45 S59 19.00 19.45 S83	

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHD05 RC
Sheet 3 of 3

Contract No.	F15056	Method	Rotary Coring	Coordinates	329139.52 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183575.29 N
		Driller	MM	Ground Level	6.05m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	16/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	20/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Extremely weak to very weak reddish brown mottled grey MUDSTONE. Discontinuity: 1) 10-20 deg closely spaced undulating to planar rough locally clay infilled. Discontinuity 2) 70-90 deg medium spaced planar rough clay infilled. (Mercia Mudstone Group) ---from 20.00m to 20.10m recovered as non intact core (angular coarse gravel sized fragments) ---from 20.30m to 20.40m recovered as non intact core (coarse sand sized fragments and angular to subrounded fine to coarse gravel sized fragments) ---from 20.40m to 20.50m assumed zone of core loss ---from 20.50m to 20.75m recovered as non intact core (angular to subrounded medium to coarse gravel sized fragments) ---from 21.00m to 21.07m recovered as non intact core (coarse sand sized fragments and angular fine to coarse gravel sized fragments) ---from 21.70m to 21.75m recovered as non intact core (angular fine to coarse gravel sized fragments and angular cobble sized fragments) ---from 21.75m to 22.00m assumed zone of core loss ---from 22.00m to 22.10m recovered as non intact core (clayey angular fine to coarse gravel sized fragments) ---from 22.40m to 22.88m reddish brown mottled grey ---from 22.55m to 22.86m recovered as non intact core (coarse sand sized fragments and angular fine to coarse gravel sized fragments) ---from 23.15m to 23.50m assumed zone of core loss ---from 23.50m to 23.95m recovered as non intact core (clayey angular fine to coarse gravel sized fragments) ---from 24.00m to 24.15m reddish brown mottled grey ---from 24.25m to 24.30m recovered as non intact core (coarse sand sized fragments and angular fine to coarse gravel sized fragments) ---from 24.48m to 24.50m recovered as non intact core (angular coarse gravel sized fragments) ---from 24.50m to 25.00m assumed zone of core loss				20.00 20.05	40	20	12			
				20.05 22.00	135	96	80	NI 80 190	21.00 21.45 S89	
				22.00 23.00	86	55	47	NI 40 200	23.00 23.36 S100/265mm	
				23.00 24.00	65	20	15	NI NI 90		
				24.00 25.00	50	15	10			
		25.00	-18.95						25.00 25.45 S49	
Zone of core loss. Marl. (Drillers description).				25.00 26.50	0	0	0			
Extremely weak to very weak reddish brown mottled grey MUDSTONE. Discontinuity: 1) 10-20 deg closely spaced, undulating to planar rough locally clay infilled. Discontinuity: 2) 70 - 90 deg medium spaced planar rough clay infilled. (Mercia Mudstone Group) ---from 26.50m to 26.66m recovered as non intact core (coarse sand sized fragments and subrounded coarse gravel sized fragments and subangular cobble sized fragments) ---from 26.78m to 27.00m assumed zone of core loss ---from 27.07m to 27.24m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 27.30m to 27.43m recovered as non intact core (angular cobble sized fragments) ---from 27.60m to 27.96m recovered as non intact core (angular medium to coarse gravel sized fragments) ---from 27.96m to 28.50m assumed zone of core loss ---from 28.50m to 28.72m recovered as non intact core (angular to subangular coarse gravel sized fragments and angular cobble sized fragments) ---from 28.75m to 28.80m recovered as non intact core (angular coarse gravel sized fragments)		26.50	-20.45	26.50 27.00	24	11	11			
				27.00 28.50	108	26	10	NI 30 100	27.00 27.04 S100/20mm	
				28.50 29.00	30	3	0			
				29.00 30.00	65	3	0		29.00 29.16 S100/85mm	

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD06 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	329290.22 E
Project	New M4 - Second Preliminary Ground Investigation				183591.47 N
		Drilling Rig	Dando	Ground Level	6.10m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	14/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	16/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
14/11/2007	1730	3.50	2.50	2.20	End of Shift
15/11/2007	0730	3.50	2.50	0.80	Start of Shift
15/11/2007	1730	10.00	9.70	2.50	End of Shift
16/11/2007	0730	10.00	9.70	0.50	Start of Shift
16/11/2007	1730	10.50	10.40	2.30	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
10.00	10.40	2.50	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	10.50	200	10.40

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
14/11/2007		2.40	2.10	20	Slow	1.50	NS
15/11/2007		7.80	3.50	20		NR	NR

GENERAL NOTES

1. Insitu permeability testing carried out from 8.70m to 9.30m.
2. Cable Percussive boring terminated at 10.50m.
3. Borehole grouted upon completion.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.50	S	N=12 (2,2,2,3,3,4)	1.30	DRY
3.00	S	N=3 (1,0,1,0,1,1)	2.40	2.20
4.50	S	N=1 (1,0,0,0,1,0)	3.80	1.80
6.50	S	N=3 (1,0,1,0,1,1)	5.90	4.70
8.00	S	N=39 (3,8,8,10,11,10)	7.90	3.50
9.50	S	50/170mm (7,12,15,18,17)	9.30	2.60
10.40	S	50/20mm (25,50)	10.40	2.30

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

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NORWEST HOLST

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD06 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	329290.22 E
Project	New M4 - Second Preliminary Ground Investigation				183591.47 N
		Drilling Rig	Dando	Ground Level	6.10m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	14/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	16/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
TOPSOIL. (Driller's description)		0.20	5.90						
Firm to stiff fissured orangish brown mottled grey slightly sandy CLAY. Sand is fine to medium. (Estuarine Alluvium)				ES1	0.30				
				B2	0.50 - 1.00				
				ES3	1.00	(11)			
				U4	1.00 - 1.45				
				D5	1.50	S12	S	1.50	
				D6	1.50 - 1.95			1.95	
Very soft grey silty CLAY. (Estuarine Alluvium)		2.30	3.80	D7	2.40				
				U8	2.50 - 2.95	(5)			
---from 2.95m with frequent organic material and rootlets		3.00	3.10	D9	3.00	S3	S	3.00	
				D10	3.00 - 3.45			3.53	
				B11	3.00 - 3.50				
Spongy brown fibrous PEAT with coarse gravel sized pockets of soft grey silty clay. (Peat)				W12	3.50				
		3.70	2.40	D13	3.80				
Very soft extremely low strength grey silty CLAY with rare organic material. Organic odour. (Estuarine Alluvium)				U14	4.00 - 4.45	(5)			
				D15	4.50	S1	S	4.50	
				D16	4.50 - 4.95			5.03	
				B17	4.50 - 5.00				
---from 5.50m with frequent organic material				D18	5.50				
				U19	6.00 - 6.45	(6)			
---from 6.50m becomes slightly sandy				D20	6.50	S3	S	6.50	
				D21	6.50 - 6.95			7.03	
				D22	7.50				
Dense brown and grey fine to coarse SAND and subangular to rounded fine to coarse GRAVEL of sandstone, mudstone, limestone and quartz. With low cobble content cobbles are subangular of limestone. (Fluvial Alluvium)		7.70	-1.60	D23	7.80				
				D24	8.00 - 8.45	S39	S	8.00	
				B25	8.50 - 9.00			8.45	
Very dense greyish brown slightly gravelly medium to coarse SAND with low cobble and boulder content. Gravel is subangular to rounded fine to medium of sandstone, mudstone, siltstone and quartz. Cobbles and boulders are subangular of limestone. (Fluvial Alluvium)		9.00	-2.90						
				D26	9.50	S50/170mm	S	9.50	
				D27	9.50 - 9.82			9.82	

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD06 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	329290.22 E
Project	New M4 - Second Preliminary Ground Investigation				183591.47 N
		Drilling Rig	Dando	Ground Level	6.10m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	14/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	16/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Very dense greyish brown slightly gravelly medium to coarse SAND with low cobble and boulder content. Gravel is subangular to rounded fine to medium of sandstone, mudstone, siltstone and quartz. Cobbles and boulders are subangular of limestone. (Fluvial Alluvium)				B28	10.20 - 10.40				
---from 10.20m High cobble content.				D29	10.40 - 10.50	S50/20mm	S	10.40 10.45	
		10.50	-4.40						
Cable Percussion boring complete at 10.50 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD06 RC
Header

Contract No.	F15056	Method	Rotary Coring	Coordinates	329290.36 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183593.26 N
		Driller	ME	Ground Level	6.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	24/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
21/11/2007	1730	18.00	15.10	8.60	End of Shift
22/11/2007	0730	18.00	15.10	1.80	Start of Shift
22/11/2007	1730	25.00	15.10	1.50	End of Shift
23/11/2008	0730	25.00	15.10	1.50	Start of Shift
23/11/2008	1730	37.60	15.10	1.70	End of Shift
24/11/2008	0730	37.60	15.10	1.70	Start of Shift
24/11/2008	1730	40.50	15.10	1.20	End of Hole

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	15.00	Air/Mist	100%	0.00*
15.00	16.00	Air/Mist	100%	92.0

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
121	40.50	121	15.10

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
21/11/2007	1115	3.20	NR	NR	Heavy	3.20	NR
22/11/2007	0930	19.20	NR	NR	Heavy	15.00	NS

GENERAL NOTES

1. Rotary Openhole drilling from GL to 15.00m.
2. Rotary Coring complete at 40.50m.
3. 50mm standpipe installed, slotted from 7.50m to 15.00m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
16.00	S	N=52 (4,6,12,11,14,15)	15.10	9.00
18.00	S	N=72 (9,12,14,19,18,21)	15.10	9.40
20.00	S	N=57 (8,9,14,14,13,16)	15.10	2.00
22.00	S	100/235mm (4,5,18,29,31,22)	15.00	1.70
24.00	S	100/240mm (6,10,17,31,33,19)	15.10	2.00
26.00	S	100/225mm (12,13,29,33,37,1)	15.00	1.50
28.00	S	125/15mm - Abandoned	15.00	1.80

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes.

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BOREHOLE LOG - ROTARY

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Contract No.	F15056	Method	Rotary Coring	Coordinates	329290.36 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183593.26 N
		Driller	ME	Ground Level	6.18m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	24/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
TOPSOIL. (Driller's description)		0.30	5.88							
Soft brown CLAY. (Driller's description)		2.50	3.68							
Stiff grey CLAY. (Driller's description)		3.20	2.98							
PEAT. (Driller's description)		3.60	2.58							
Clayey GRAVEL. (Driller's description)		7.50	-1.32							
SAND and GRAVELS. (Driller's description)										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - ROTARY

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Contract No.	F15056	Method	Rotary Coring	Coordinates	329290.36 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183593.26 N
		Driller	ME	Ground Level	6.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	24/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
SAND and GRAVELS. (Driller's description)										
		15.00	-8.82							
Zone of Core Loss. Extremely weak to very weak reddish brown locally mottled grey MUDSTONE. (Logged from SPT samples).				15.00 16.00	0	0	0			
				16.00 17.00	0	0	0	NA	16.00 16.45 S52	
				17.00 18.00	0	0	0			
		18.00	-11.82						18.00 18.45 S72	
Extremely weak to very weak reddish brown locally mottled grey MUDSTONE. Discontinuities 1) 0-10 very closely to medium spaced undulating rough locally infilled with clay. (Mercia Mudstone Group) ---from 18.00m to 18.17m recovered as non intact core (subangular medium to coarse gravel sized fragments) ---from 18.20m to 18.75m recovered as non intact core (clayey sand sized fragments and angular fine to coarse gravel sized fragments) ---from 18.75m to 19.00m assumed zone of core loss ---from 19.15m to 19.18m recovered as non intact core (angular fine to coarse gravel sized fragments)				18.00 19.00	75	3	0	NI NI 30		
				19.00 20.00	64	50	0	NI 20 90		

NOTES: All depths in metres, all diameters in millimetres.
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BOREHOLE LOG - ROTARY

Hole ID.
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Sheet 3 of 5

Contract No.	F15056	Method	Rotary Coring	Coordinates	329290.36 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183593.26 N
		Driller	ME	Ground Level	6.18m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	24/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling		TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Remaining Detail : 19.23m - 19.30m : ---from 19.23m to 19.30m recovered as non intact core (clayey angular fine to coarse gravel sized fragments) Detail 19.64m - 20.00m : ---from 19.64m to 20.00m assumed zone of core loss ---from 20.00m to 20.04m recovered as non intact core (subangular fine to coarse gravel sized fragments) ---from 20.10m to 20.30m 1 No (80-90 deg) discontinuity undulating clay infilled ---from 20.30m to 20.35m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 20.50m to 20.74m recovered as non intact core (clayey coarse sand sized fragments and angular fine to coarse gravel sized fragments) ---from 20.90m to 21.00m recovered as non intact core (clayey coarse sand sized fragments and angular fine to coarse gravel sized fragments) ---from 21.47m to 21.64m recovered as non intact core (clayey coarse sand sized fragments and angular fine to medium gravel sized fragments) ---from 21.64m to 22.00m assumed zone of core loss ---from 22.00m to 22.14m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 22.15m to 22.37m recovered as non intact core (clayey angular fine to coarse gravel sized fragments) ---from 22.37m to 23.00m assumed zone of core loss ---from 23.00m to 23.14m recovered as non intact core (clayey angular fine to medium gravel sized fragments) ---from 23.24m to 24.00m assumed zone of core loss ---from 24.00m to 24.07m recovered as non intact core (angular coarse gravel sized fragments) ---from 24.20m to 24.25m recovered as non intact core (angular coarse gravel sized fragments) ---from 24.32m to 24.44m recovered as non intact core (angular coarse gravel sized fragments) ---from 24.44m to 25.00m assumed zone of core loss				20.00	20.50	100	76	0		20.00 20.45 S57	
				20.50	22.00	76	35	7	NI NI NI		
				22.00	23.00	40	7	0		22.00 22.39 S100/235mm	
				23.00	24.00	24	9	0	NI 10 100		
				24.00	25.00	30	14	0		24.00 24.39 S100/240mm	
				25.00	26.00	100	96	91	NI 90 330		
---from 26.00m to 26.30m recovered as non intact core (clayey subangular to subrounded fine to coarse gravel sized fragments) ---from 26.40m to 26.50m assumed zone of core loss				26.00	26.50	80	20	20	NI 20 100	26.00 26.38 S100/225mm	
				26.50	27.50	84	84	29	20 80 170		
---from 27.13m to 27.32m recovered as non intact core (firm gravelly clay. Gravel sized fragments are angular fine to medium) ---from 27.32m to 27.50m assumed zone of core loss ---from 27.60m to 27.93m recovered as non intact core (firm gravelly clay. Gravel sized fragments are angular fine to medium) ---from 27.93m to 28.00m assumed zone of core loss ---from 28.00m to 28.14m recovered as non intact core (firm gravelly clay. Gravel sized fragments are angular fine to medium) ---from 28.17m to 28.39m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 28.44m to 28.55m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 28.71m to 28.73m recovered as non intact core (angular coarse gravel sized fragments)				27.50	28.00	82	76	38			
				28.00	29.00	81	52	34	NI 80 110	28.00 28.02 S125/15mm - Abandoned	
				29.00	29.50	60	16	0	NI NI 80		
				29.50	30.00	100	54	24			

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHD06 RC
Sheet 4 of 5

Contract No.	F15056	Method	Rotary Coring	Coordinates	329290.36 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183593.26 N
		Driller	ME	Ground Level	6.18m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	24/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Remaining Detail : 28.81m - 29.00m : ---from 28.81m to 29.00m assumed zone of core loss Detail 29.10m - 29.35m : ---from 29.10m to 29.35m recovered as non intact core (angular coarse gravel sized fragments) Detail 29.35m - 29.50m : ---from 29.35m to 29.50m assumed zone of core loss Detail 29.50m - 29.68m : ---from 29.50m to 29.68m recovered as non intact core (subangular coarse gravel sized fragments) Detail 29.80m - 29.87m : ---from 29.80m to 29.87m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 30.00m to 30.10m recovered as non intact core (angular medium to coarse gravel sized fragments) ---from 31.25m to 31.50m recovered as non intact core (angular coarse gravel sized fragments) ---from 31.89m to 31.94m recovered as non intact core (angular medium to coarse gravel sized fragments)				30.00 31.50	100	87	79	NI 190 360		
				31.50 33.00	92	82	65	NI 30 190 130 220 960		
				33.00 34.50	79	65	43	NI 80 140		
---from 33.85m to 34.05m recovered as non intact core (angular coarse gravel sized fragments and angular cobble sized fragments)		34.05	-27.87							
Weak to very weak reddish brown locally mottled grey MUDSTONE. Discontinuities 1) 0-10 very closely to medium spaced undulating rough locally infilled with clay. (Mercia Mudstone Group) ---from 34.30m to 34.50m assumed zone of core loss ---from 34.67m to 34.90m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 35.40m to 35.92m recovered as non intact core (angular fine to coarse gravel sized fragments)				34.50 36.00	88	57	29	NI 90 150 NI 90 200		
---from 35.92m to 36.00m assumed zone of core loss ---from 36.00m to 36.20m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 36.10m to 38.15m thin bed of greenish grey mudstone ---from 36.36m to 36.57m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 36.76m to 36.86m recovered as non intact core (angular fine to corse gravel sized fragments)				36.00 37.60	94	73	41	NI 90 200		
				37.60 39.00	93	90	60	NI 130 220		
				39.00 40.50	100	90	46			

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHD06 RC
Sheet 5 of 5

Contract No.	F15056	Method	Rotary Coring	Coordinates	329290.36 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183593.26 N
		Driller	ME	Ground Level	6.18m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	24/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Weak to very weak reddish brown locally mottled grey MUDSTONE. Discontinuities 1) 0-10 very closely to medium spaced undulating rough locally infilled with clay. (Mercia Mudstone Group)		40.50	-34.32							
Rotary drilling complete at 40.50 m.										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD08 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	329437.15 E
Project	New M4 - Second Preliminary Ground Investigation				183702.67 N
		Drilling Rig	Dando	Ground Level	6.10m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	JB/DH	Date Started	19/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	23/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
19/11/2007	1730	2.00	1.50	DRY	End of Shift
20/11/2007	0730	2.00	1.50	0.80	Start of Shift
20/11/2007	1730	10.30	10.30	1.90	End of Shift
21/11/2007	0730	10.30	10.30	1.50	Start of Shift
21/11/2007	1730	12.50	12.20	17.00	End of Shift
22/11/2007	0730	12.50	12.20	2.10	Start of Shift
22/11/2007	1730	14.40	13.00	2.30	End of Shift
23/11/2007	0730	14.40	13.00	1.20	Start of Shift
23/11/2007	1730	16.00	13.00	1.80	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
7.10	7.30	0.50	Chiselling
8.80	9.10	0.75	Chiselling
10.20	10.30	0.50	Chiselling
10.50	11.40	5.00	Chiselling
12.30	12.50	0.75	Chiselling
13.60	14.00	1.00	Chiselling
15.30	15.70	1.00	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	16.00	200	13.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
20/11/2007		6.40	4.20	20	Moderate	NR	NR

GENERAL NOTES

1. Service inspection pit hand excavated from GL to 1.20m.
2. Cable Percussive boring complete at 16.00m.
3. Borehole grouted upon completion.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.50	S	N=11 (1,2,2,3,3,3)	1.00	DRY
3.50	S	N=3 (1,0,1,0,1,1)	2.80	1.70
4.50	S	N=0 (0,0,0,0,0,0)	3.90	3.80
6.50	S	N=42 (3,5,5,8,14,15)	5.70	4.20
8.00	S	N=52 (4,8,11,11,12,18)	7.90	3.60
10.00	S	50/160mm (5,11,12,27,11)	9.80	2.20
12.00	S	50/160mm (14,12,16,19,15)	11.90	2.10
13.20	S	50/245mm (8,7,5,16,16,13)	13.00	2.30
14.00	S	50/245mm (7,10,11,13,19,7)	13.00	2.30
15.00	S	50/230mm (7,8,9,13,20,8)	13.00	1.90
15.70	S	49/225mm - Abandoned	13.00	1.60

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	ARIAL CP HEADER
Version	3.05
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD08 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	329437.15 E
Project	New M4 - Second Preliminary Ground Investigation				183702.67 N
		Drilling Rig	Dando	Ground Level	6.10m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	JB/DH	Date Started	19/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	23/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
TOPSOIL. (Driller's description)		0.20	5.90						
Firm grey mottled orangish brown slightly sandy CLAY with rare rootlets. (Estuarine Alluvium)				ES1	0.30				
				B2	0.50 - 1.00				
				ES3	1.00	(12)			
				U4	1.00 - 1.45				
				D5	1.50	S11	S	1.50	
				D6	1.50 - 1.95			1.95	
Soft very low strength grey fissured silty CLAY with silt partings and rare rootlets. (Estuarine Alluvium)		2.50	3.60	D7	2.50				
				U8	3.00 - 3.45	(7)			
				D9	3.50	S3	S	3.50	
				D10	3.50 - 3.95			4.03	
				B11	3.50 - 4.00				
Spongy black pseudofibrous PEAT. (Peat)		3.70	2.40	U12	4.00 - 4.45	(7)			
Grey locally mottled brown slightly sandy grey CLAY with frequent organic matter. (Estuarine Alluvium) ---from 4.50m with occasional medium gravel sized pockets of dark brown fibrous peat		4.25	1.85	B13	4.50	S0	S	4.50	
				D14	4.50 - 4.95			5.10	
				B15	5.00 - 5.50				
				D16	5.80				
---from 5.80m to 5.90m abundant organic matter		5.90	0.20	U17	6.00 - 6.45	(18)			
Brown PEAT. (Driller's description) (Peat)									
Dense grey silty fine to coarse SAND and subangular to rounded fine to coarse of sandstone, mudstone and siltstone. (Fluvial Alluvium) ---from 6.50m with high cobble content, cobbles are subangular to subrounded of siltstone and limestone		6.40	-0.31	D18	6.50	S42	S	6.50	
				D19	6.50 - 6.95			6.95	
				B20	7.00 - 7.50				
Very dense brown gravelly fine to coarse SAND with low cobble and boulder content. Gravel is subangular to rounded fine to coarse of siltstone, sandstone, limestone, mudstone, quartz and quartzite. Cobbles and boulders are subangular of limestone and sandstone. (Fluvial Alluvium)		8.00	-1.91	D21	8.00 - 8.45	S52	S	8.00	
								8.45	
				B22	8.50 - 9.00				
				D23	9.50				

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD08 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	329437.15 E
Project	New M4 - Second Preliminary Ground Investigation				183702.67 N
		Drilling Rig	Dando	Ground Level	6.10m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	JB/DH	Date Started	19/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	23/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (U blows)	SPT type & depth		Install-ation
Very dense brown gravelly fine to coarse SAND with low cobble and boulder content. Gravel is subangular to rounded fine to coarse of siltstone, sandstone, limestone, mudstone, quartz and quartzite. Cobbles and boulders are subangular of limestone and sandstone. (Fluvial Alluvium)				D24	10.00 - 10.31	S50/160mm	S	10.00 10.31	
				B25	10.40 - 11.00				
---from 10.50m to 11.00m slightly gravelly									
				B26	11.30 - 11.50				
---from 11.30m to 11.60m with frequent subangular cobbles and boulders of sandstone and limestone									
				D27	12.00 - 12.31	S50/160mm	S	12.00 12.31	
---from 12.00m greyish brown									
				B28	12.50 - 13.00				
		12.70	-6.61	U29	12.70 - 13.15	(76)			
Very stiff high strength reddish brown locally mottled greenish grey gravelly CLAY. Gravel is angular of mudstone (Weathered Mudstone). (Weathered Mudstone)				D30	13.20	S50/245mm	S	13.20	
				D31	13.20 - 13.58			13.60	
				W32	13.50				
				B33	13.60 - 14.00				
				D34	14.00 - 14.40	S50/245mm	S	14.00 14.40	
---from 14.50m to 15.00m grey									
						S50/230mm	S	15.00 15.38	
						S49/225mm - Abandoned		15.70 16.08	
		16.00	-9.91						
Cable Percussion boring complete at 16.00 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD08 RC
Header

Contract No.	F15056	Method	Rotary Coring	Coordinates	329435.63 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183703.73 N
		Driller	ME	Ground Level	6.17m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	25/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	27/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
25/11/2007	1730	16.00	15.00	1.00	End of Shift
26/11/2007	0730	16.00	15.00	1.00	Start of Shift
26/11/2007	1730	18.00	15.00	1.00	End of Shift
27/11/2007	0730	18.00	15.00	1.10	Start of Shift
27/11/2007	1730	30.00	15.00	1.00	End of Hole

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	15.00	Air/Mist	100%	0.00*
15.00	30.00	Air/Mist	100%	92.0

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
121	30.00	121	15.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
25/11/2007	1100	3.00	NR	NR	Heavy	3.00	NR
26/11/2007	1530	17.50	NR	NR	Heavy	15.00	NR
27/11/2007	1200	25.50	NR	NR	Heavy	15.00	NR

GENERAL NOTES

1. Rotary Openhole drilling from GL to 15.00m.
2. Rotary Coring complete at 30.00m.
3. 19mm piezometer installed, tip at 29.50m, response zone from 29.10m to 29.70m.
4. 0.00* indicates openhole drilling.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
16.00	S	100/235mm (9,10,19,27,38,16)	15.00	1.00
18.00	S	100/225mm (8,12,20,26,39,15)	15.00	1.00
20.00	S	100/160mm (10,12,36,44,20)	15.00	1.00
22.00	S	100/80mm (22,3,64,36)	15.00	1.00
26.60	S	100/265mm (7,10,15,23,32,30)	15.00	1.00

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes.

Form	ARIAL ROTARY HEADER
Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD08 RC
Sheet 1 of 3

Contract No.	F15056	Method	Rotary Coring	Coordinates	329435.63 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183703.73 N
		Driller	ME	Ground Level	6.17m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	25/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	27/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
TOPSOIL. (Driller's description)		0.40	5.77							
Grey CLAY. (Driller's description)										
PEAT. (Driller's description)		3.20	2.97							
Grey CLAY. (Driller's description)		3.40	2.77							
SAND and GRAVEL. (Driller's description)		5.80	0.37							

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD08 RC
Sheet 2 of 3

Contract No.	F15056	Method	Rotary Coring	Coordinates	329435.63 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183703.73 N
		Driller	ME	Ground Level	6.17m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	25/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	27/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
SAND and GRAVEL. (Driller's description)										
		11.40	-5.23							
Weathered MARL (Driller's description). (Mercia Mudstone Group)										
		15.00	-8.83							
Extremely weak to weak reddish brown mottled greenish grey MUDSTONE. Discontinuities: 1) 0-10 deg very closely to medium spaced undulating locally clay infilled. 2) 70-90 deg medium to widely spaced undulating clean. (Mercia Mudstone Group) ---from 15.50m to 15.60m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine) ---from 15.60m to 16.00m assumed zone of core loss ---from 16.00m to 16.07m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine) ---from 16.40m to 16.45m recovered as non intact core (gravelly clay. Gravel sized fragments are angular fine to medium) ---from 16.56m to 16.61m recovered as non intact core (slightly gravelly clay. Gravel sized fragments are angular fine) ---from 16.84m to 16.89m recovered as non intact core (angular coarse gravel sized fragments) ---from 16.89m to 17.50m assumed zone of core loss ---from 17.50m to 17.91m recovered as non intact (gravelly clay. Gravel sized fragments are angular to subangular fine to coarse) ---from 17.91m to 18.00m assumed zone of core loss ---from 18.00m to 18.06m recovered as non intact core (angular coarse gravel sized fragments) ---from 18.10m to 18.47m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 18.77m to 18.90m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 18.97m to 19.50m assumed zone of core loss ---from 19.50m to 19.92m recovered as non intact core (angular medium to coarse gravel sized fragments)				15.00 16.00 16.00 17.50 17.50 18.00 18.00 19.50 19.50 20.00	66 58 89 66 100	43 43 0 25 16	36 38 0 0 0	NI 140 320 NI NI 30	16.00 16.39 S100/235mm 18.00 18.38 S100/225mm	

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
Version	3.09
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD08 RC
Sheet 3 of 3

Contract No.	F15056	Method	Rotary Coring	Coordinates	329435.63 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183703.73 N
		Driller	ME	Ground Level	6.17m AOD
		Logged by	DH	Orientation	Vertical
Client	Transport Wales, Welsh Assembly Government	Core barrel	T6116	Date Started	25/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	27/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Extremely weak to weak reddish brown mottled greenish grey MUDSTONE. Discontinuities: 1) 0-10 deg very closely to medium spaced undulating locally clay infilled. 2) 70-90 deg medium to widely spaced undulating clean. (Mercia Mudstone Group) ---from 20.00m to 20.04m recovered as non intact core (angular coarse gravel sized fragments) ---from 20.04m to 20.22m strongly mottled greenish grey ---from 20.40m to 20.54m recovered as non intact core (angular fine to coarse sand sized fragments) ---from 20.75m to 20.79m recovered as non intact core (angular fine gravel sized fragments) ---from 20.86m to 21.00m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 21.00m to 21.46m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 21.65m to 21.87m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 21.87m to 22.00m assumed zone of core loss ---from 22.00m to 22.06m recovered as non intact core (clayey angular medium to coarse gravel sized fragments) ---from 22.33m to 22.35m recovered as non intact core (angular coarse gravel sized fragments) ---from 22.46m to 22.50m recovered as non intact core (coarse gravel sized fragments) ---from 22.50m to 22.60m recovered as non intact core (angular coarse gravel sized fragments) ---from 22.50m to 22.60m recovered as non intact core (angular coarse gravel sized fragments) ---from 23.02m to 23.04m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 23.11m to 23.14m recovered as non intact core (angular coarse gravel sized fragments) ---from 23.38m to 23.50m recovered as non intact core (angular coarse gravel sized fragments) ---from 23.55m to 23.60m recovered as non intact core (subangular coarse gravel sized fragments) ---from 23.66m to 23.99m recovered as non intact core (gravelly clay. Gravel sized fragments are subangular fine to coarse) ---from 24.02m to 24.96m recovered as non intact core (subangular fine to coarse gravel sized fragments) ---from 25.18m to 25.22m recovered as non intact core (angular fine to medium gravel sized fragments) ---from 25.30m to 25.41m recovered as non intact core (angular to subangular medium to coarse gravel sized fragments) ---from 25.41m to 25.45m assumed zone of core loss ---from 25.45m to 25.70m recovered as non intact core (clayey angular fine to coarse gravel sized fragments and angular cobble sized fragments) ---from 25.82m to 26.60m assumed zone of core loss ---from 26.99m to 27.16m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 27.16m to 27.60m assumed zone of core loss ---from 27.90m to 27.93m recovered as non intact core (slightly sandy clay) ---from 28.12m to 28.18m recovered as non intact core (slightly gravelly clay. Gravel sized fragments are angular fine to medium) ---from 28.18m to 28.60m recovered as non intact core (angular to subangular fine to coarse gravel sized fragments) ---from 28.60m to 28.80m assumed zone of core loss ---from 28.80m to 28.90m recovered as non intact core				20.00 21.00 21.00 22.00 22.00 22.50 22.50 23.60 23.60 25.10 25.10 26.60 26.60 27.60 27.60 28.80 28.80 30.00	100 85 100 100 91 47 57 83 83	68 20 72 48 6 17 30 26 54	30 0 30 14 0 9 13 0 26	NI 40 320 NI NI 70 NI 60 150 NI NI NI NI 30 120 NI NI 20 NI 40 160 NI NI 130 NI 60 310	20.00 20.31 S100/160mm 22.00 22.16 S100/80mm 26.60 27.02 S100/265mm	

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL ROTARY LOG
Version	3.09
Revised	17/12/2007

Geotechnical Engineering Limited

BOREHOLE LOG

BH404

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 3

Start Date 12 January 2015 — Easting 329294.1 — Scale 1 : 50

End Date 15 January 2015 — Northing 183602.1 — Ground level 6.10mOD — Depth 24.50 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
12/01/15 1230hrs	1B	0.20	0.50						Grass over very soft brownish grey organic silty CLAY with frequent plant fragments (up to 5mm). (TFD)			
	2D*	0.20	0.50		Vo 1.6							
	3D*	0.50	0.70		Vo 1.4							
	4B	0.50	0.70									
	5B	0.70	1.00									
	6D*	0.70	1.00		Vo 2.1							
	UT	1.00	1.45									
	7X	1.00	1.50							1.20	4.90	
	8D*	1.40	1.50	Nil	S 1				Very soft brownish grey organic silty sandy CLAY with frequent plant fragments (up to 5mm). (TFD)			
	9D	1.50	1.95									
	10X	1.50	2.00									
	11UT	2.00	2.45	Nil						2.00	4.10	
	12D	2.45	2.50						Very soft grey organic silty CLAY. (TFD)			
	13D	2.50	2.95	Nil	S 2							
	14D	2.00	3.00									
	14X	2.50	2.60									
	13D*									2.90	3.20	
	15D*	3.00	3.45	3.00					Spongy dark brown fibrous PEAT. (PEAT)	3.00	3.10	
	16UT	3.00	4.00						Very soft brownish grey organic silty CLAY with frequent plant fragments up to 5mm. (TFD)			
	19X	3.45	3.50									
	17D											
	18D	3.50	3.95	3.00	S<1				3.00 - 3.10m: Spongy clayey peat.			
	20UT	4.00	4.45	3.00					4.00 - 4.10m: Spongy clayey peat.			
	23X	4.00	5.00									
	21D	4.45	4.50									
	22D	4.50	4.95	3.00	S 1							
										5.00	1.10	
	24UT	5.00	5.45	5.00					Soft dark grey organic silty CLAY. (TFD)			
	26X	5.00	6.50									
	25D	5.50	5.95	5.00	S 1							
12/01/15 1620hrs 4.40m										6.15	-0.05	
									Spongy dark brown fibrous PEAT. (PEAT)	6.35	-0.25	
	27D	6.50	6.95	6.50	S 30				Soft dark grey slightly sandy organic clayey SILT. (TFD)			
13/01/15 0930hrs 1.20m	28X	6.50	8.00									
										7.20	-1.10	
									Dense brownish grey silty very sandy subrounded and subangular fine to coarse sandstone and crystalline GRAVEL. (RTD)			
	29D	8.00	8.45	8.00	S 35							
									Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Dynamic sampled (113mm) 1.00-11.00m and 12.00-12.50m. Waterflush rotary core drilled (116mm) 11.00-12.00m and 12.50-24.50m.

CASING: 140mm diam to 12.50m.

BACKFILL: On completion, borehole backfilled with bentonite 24.50-12.50m. A slotted standpipe (50mm) was installed to 12.50m, granular response zone 12.50-8.00m and bentonite seal 8.00-4.00m. A second slotted standpipe (35mm) was installed to 4.00m, granular response zone 4.00-1.00mm, bentonite seal 1.00-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001). Permeability test undertaken at 6.50m- 8.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
0.80	Nil	0.80	20	

AGS

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Ltd, Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 15:30:06 RM SF

Geotechnical Engineering Limited

BOREHOLE LOG

BH404

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 2 of 3

Start Date 12 January 2015 — Easting 329294.1 — Scale 1 : 50

End Date 15 January 2015 — Northing 183602.1 — Ground level 6.10mOD — Depth 24.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	30X	8.00 - 9.50									
	31D	9.50 - 9.95	9.50	S 46							
	32X	9.50 - 11.00									
	33D	11.00 - 11.33	11.00	S*86							
	34C	11.00 - 12.00			10			Limited recovery of subrounded grey sandstone COBBLES. (RTD)	11.00	-4.90	
	35X	12.00 - 12.50							12.00	-5.90	
13/01/15 1720hrs 4.00m	36D	12.50 - 12.95	12.50	S 47							
14/01/15 0915hrs 0.80m	37C	12.50 - 14.00			83	NA		Very stiff fissured reddish brown sandy gravelly CLAY. Gravel is subangular and subrounded fine and medium lithorelicts of very stiff clay to extremely weak mudstone. Localised relict fissures and randomly orientated closely spaced rarely infilled (up to 5mm) with fine to coarse sand sized selenite crystals. (MMG) (Grade III)			
		14.00 - 14.41	12.50	C*83							
	38C	14.00 - 15.50			100 77 77						
		15.50 - 15.73	12.50	C*120							
	39C	15.50 - 17.00			100 0 0	NI			15.75	-9.65	
						NA		Extremely weak and very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° and subvertical very closely and closely spaced planar rough with rare selenite crystals (up to 5mm). (MMG) (Grade II)	16.50	-10.40	
		17.00 - 17.17	12.50	C*167							
	40C	17.00 - 18.50			100 12 0			Very stiff fissured reddish brown slightly sandy gravelly to very gravelly CLAY. Gravel is subangular and subrounded fine and medium lithorelicts of very stiff clay to extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced locally stained black. (MMG) (Grade III)	17.50	-11.40	
						NI 60 90			17.90	-11.80	
								Continued Next Page	{18.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

AGS

CONTRACT **30238**

CHECKED **EC**

Geotechnical Engineering Ltd. Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 15:30:06 RM SF

Geotechnical Engineering Limited

BOREHOLE LOG

BH404

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 3 of 3

Start Date 12 January 2015 — Easting 329294.1 — Scale 1 : 50

End Date 15 January 2015 — Northing 183602.1 — Ground level 6.10mOD — Depth 24.50 m

progress date/time water depth	sample no & type	depth (m) from	depth (m) to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
							NA		Weak thinly laminated to very thinly bedded reddish brown MUDSTONE with frequent light greenish grey reduction spots (up to 30mm). Fractures are subhorizontal to 20° and subvertical very closely spaced planar rough. (MMG) (Grade I)			
	41C	18.50	18.67	12.50	C*214	100						
		18.50	20.00			20	NI			18.65	-12.55	
						0	40					
							90		Stiff fissured reddish brown slightly sandy gravelly CLAY with rare light greenish grey reduction spots (up to 20mm). Gravel is angular and subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal and randomly orientated planar rough. (MMG) (Grade III)	19.30	-13.20	
							NA					
		20.00	20.19	12.50	C*188	100			Extremely weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare light greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° and subvertical very closely and closely spaced planar rough with rare selenite crystals (up to 5mm). (MMG) (Grade II)			
	42C	20.00	21.50			97						
						40						
									Very stiff fissured reddish brown very gravelly CLAY with rare light greenish grey reduction spots (up to 20mm). Gravel is angular and subangular fine to coarse lithorelicts of extremely weak and very mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough. (MMG) (Grade III)			
		21.50	21.63	12.50	C*250				20.50 - 20.90m: Frequent 60-70° fissures planar smooth stained dark grey.			
	43C	21.50	23.00			100						
						93						
						20						
14/01/15 1700hrs 4.10m		23.00	23.10	12.50	C*341							
15/01/15 0900hrs 1.30m	44C	23.00	24.50			100	NA					
15/01/15 1020hrs 1.40m									24.00 - 24.50m: Locally tending to extremely weak mudstone.			
										24.50	-18.40	
		24.50	24.59	12.50	C*333				Borehole completed at 24.50m.			
										{28.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

AGS

CONTRACT **30238**

CHECKED **EC**

A2 Appendix 2

Gas and Groundwater Monitoring

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH404	09/03/15 11:00:00												0.00	Installation flooded. Unable to obtain gas readings. 0 litres purged, base depth 4.00m.
BH404	16/03/15 10:00:00												0.00	Installation flooded. Unable to obtain gas readings. 0 litres purged, base depth 4.00m.

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Shallow install.

CONTRACT	CHECKED
30238	**EC**

Geotechnical Engineering Limited

GAS AND GROUNDWATER LEVELS

CLIENT: WELSH GOVERNMENT

SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H_2O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH404	09/03/15 11:00:00												0.00	0 litres purged, base depth 12.50m.
BH404	16/03/15 10:00:00												1.36	66 litres purged, base depth 12.50m.

remarks
# denotes result exceeding capacity of gas monitoring equipment
VOC - Photoionisation Detector Mini RAE 2000 measures VOC vapours with 10.6eV lamp calibrated against isobutylene.
Deep install.

CONTRACT	CHECKED
30238	**EC**

A3 Appendix 3

Groundwater Laboratory Data

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-8
09/07/2015

Geological Formation Legend

TFD	Tidal Flat Deposits
GFD	Glaciofluvial Deposits
MM	Mercia Mudstone

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

	Offsite borehole location
N/A	Unknown detail

Monitoring Round	Units	Screening Criteria		2008 R1	2008 R2	1	1	2	2	3	3	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
Location		EQS	DWS	**SBHD06**	**SBHD06**	**BH404**	**BH404**	**BH404**	**BH404**	**BH404**	**BH404**							
Location Type				BH		BH												
Response Zone (RZ) Details				GFD		GFD / MM	TFD	N/A	N/A	N/A	N/A							
Depth				N/A		0	0	0	1.44	0	1.39							
Installation Details				N/A	N/A	Deep	Shallow	N/A	N/A	N/A	N/A							
Date Sampled				21/02/2008		02/03/2015		09/03/2015		16/03/2015								
Metals & Non-Metal Inorganics																		
Hardness Total	mg/l			350	340							2	2	350	340	SBHD06 @ N/A		
Arsenic Dissolved (ICP-MS)	ug/l	50	10	1	<0.75	<1	6.2	6.7	2.5	7.1	1.8	8	6	7.1	1	BH404 @ N/A	0	0
Boron	ug/l	2000	1000			480	610	300	160	830	210	6	6	830	160	BH404 @ N/A	0	0
Calcium Dissolved (ICP-MS)	ug/l			68000	65000							2	2	68000	65000	SBHD06 @ N/A		
Chromium Dissolved (ICP-MS)	ug/l		50	3	<1	<1	<1	<1	1.1	8.8	7.9	8	4	8.8	1.1	BH404 @ N/A		0
Copper Dissolved (ICP-MS)	ug/l	10	2000	3.1	1.7	<1	<1	<1	<1	3	1.5	8	4	3.1	1.5	SBHD06 @ N/A	0	0
Iron Dissolved (ICP-MS)	ug/l	1000	200	<50	<50							2	0	None > LOD	None > LOD		0	0
Lead Dissolved (ICP-MS)	ug/l	1.2	10	<0.5	<0.4	<1	<1	<1	<1	<1	<1	8	0	None > LOD	None > LOD		0	0
Magnesium Dissolved (ICP-MS)	ug/l			43000	42000							2	2	43000	42000	SBHD06 @ N/A		
Manganese Dissolved (ICP-MS)	ug/l	30	50	630	920							2	2	920	630	SBHD06 @ N/A	2	2
Nickel Dissolved (ICP-MS)	ug/l	4	20	3.3	<1.5	<1	<1	2.5	1.6	8.2	2	8	5	8.2	1.6	BH404 @ N/A	1	0
Selenium Dissolved (ICP-MS)	ug/l		10	4	<1	<1	2	2.4	1.5	2.3	2.4	8	6	4	1.5	SBHD06 @ N/A		0
Cadmium Dissolved	ug/l	0.15	5			<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	6	0	None > LOD	None > LOD		0	0
Zinc Dissolved	ug/l	75				<1	<1	<1	<1	<1	<1	6	0	None > LOD	None > LOD		0	
Mercury Dissolved	ug/l	0.07	1			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	6	0	None > LOD	None > LOD		0	0
Cadmium Total (HNO3 Digest)	ug/l	0.15	5	0.6	<0.4							2	1	0.6	0.6	SBHD06 @ N/A	1	0
Zinc Total (HNO3 Digest)	ug/l	75		150	67							2	2	150	67	SBHD06 @ N/A	1	
Mercury Total (Aqua Regia)	ug/l	0.07	1	0.05	0.01							2	2	0.05	0.01	SBHD06 @ N/A	0	0
Total Alkalinity as CaCO3	mg/l			380	340			760	570	480	330	6	6	760	330	BH404 @ N/A		
BOD	mg/l	5		<1	2							2	1	2	2	SBHD06 @ N/A	0	
COD	mg/l			40	25							2	2	40	25	SBHD06 @ N/A		
Potassium Dissolved	mg/l			9.6	7.8							2	2	9.6	7.8	SBHD06 @ N/A		
Sodium Dissolved	mg/l		200	110	110							2	2	110	110	SBHD06 @ N/A		0
Nitrate as NO3	mg/l		50	<0.3	0.3							2	1	0.3	0.3	SBHD06 @ N/A		0
Total Diss Sulphur	mg/l											0	0	None > LOD	None > LOD			
Sulphate (soluble)	mg/l	400	250	29	27							2	2	29	27	SBHD06 @ N/A	0	0
Chloride	mg/l	250	250	99	83			32	49	26	60	6	6	99	26	SBHD06 @ N/A	0	0
Sulphide	mg/l			<0.5	<0.5							2	0	None > LOD	None > LOD			
Ammoniacal Nitrogen as N	mg/l	0.6		0.5	4.1			0.03	0.017	<0.01	0.052	6	5	4.1	0.017	SBHD06 @ N/A	1	
Total Ammonium as NH4	mg/l		0.5	0.6								1	1	0.6	0.6	SBHD06 @ N/A		1
Hexavalent Chromium	mg/l		50									0	0	None > LOD	None > LOD			0
Phenols Monohydric	mg/l			<0.01	<0.01							2	0	None > LOD	None > LOD			
Thiocyanate	mg/l											0	0	None > LOD	None > LOD			
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	8	0	None > LOD	None > LOD		0	0
Free Cyanide	mg/l					<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	6	0	None > LOD	None > LOD			
Complex Cyanide	mg/l											0	0	None > LOD	None > LOD			
Carbon Dioxide Dissolved	ug/l			14								1	1	14	14	SBHD06 @ N/A		
pH Value	pH Units	6-9	6.5-10	7.84	7.55	8.2	8.2	7.5	8.4	8.4	8.5	8	8	8.5	7.5	BH404 @ N/A	0	0
Organics																		
GRO (C4-C12)	ug/l			<10	<10							2	0	None > LOD	None > LOD			
MTBE	ug/l			<10	<10							2	0	None > LOD	None > LOD			
Benzene	ug/l	10	1	<10	<10	<1	<1	<1	<1	<1	<1	8	0	None > LOD	None > LOD		0	0
Toluene	ug/l	50		<10	<10	<1	<1	<1	<1	<1	<1	8	0	None > LOD	None > LOD		0	
Ethyl benzene	ug/l	20		<10	<10	<1	<1	<1	<1	<1	<1	8	0	None > LOD	None > LOD		0	
m & p Xylene	ug/l	30		<10	<10	<1	<1	<1	<1	<1	<1	8	0	None > LOD	None > LOD		0	
o Xylene	ug/l	30		<10	<10	<1	<1	<1	<1	<1	<1	8	0	None > LOD	None > LOD		0	
TPH																		
Aliphatics C5-C6	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Aliphatics >C6-C8	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Aliphatics >C8-C10	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Aliphatics >C10-C12	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Aliphatics >C12-C16 Aqueous	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Aliphatics >C16-C21 Aqueous	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Aliphatics >C21-C35 Aqueous	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Total Aliphatics C5-C35 Aqueous	ug/l			<10	<10							2	0	None > LOD	None > LOD			
Aliphatics >C35-44	ug/l					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	6	0	None > LOD	None > LOD			
Aromatics >C5-C7	ug/l					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	6	0	None > LOD	None > LOD			
Aromatics C6-C7	ug/l			<10	<10							2	0	None > LOD	None > LOD			
Aromatics >C7-C8	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Aromatics >EC8-EC10	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Aromatics >EC10-EC12	ug/l			<10	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Aromatics >EC12-EC16 Aqueous	ug/l			10000	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	1	10000	10000	SBHD06 @ N/A		
Aromatics >EC16-EC21 Aqueous	ug/l			1400	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	1	1400	1400	SBHD06 @ N/A		
Aromatics >EC21-EC35 Aqueous	ug/l			240	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	1	240	240	SBHD06 @ N/A		
Total Aromatics C6-C35 Aqueous	ug/l			12000	<10							2	1	12000	12000	SBHD06 @ N/A		
C35 Aqueous	ug/l			12000	<10							2	1	12000	12000	SBHD06 @ N/A		
Aromatics >C35-44	ug/l					<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	6	0	None > LOD	None > LOD			
TPH FTIR	ug/l											0	0	None > LOD	None > LOD			
TPH GC	ug/l											0	0	None > LOD	None > LOD			
Total Aliphatic TPH	ug/l					<5	<5	<5	<5	<5	<5	6	0	None > LOD	None > LOD			
Total Aromatic TPH	ug/l					<5	<5	<5	<5	<5	<5	6	0	None > LOD	None > LOD			
Total petroleum hydrocarbons	ug/l					<10	<10	<10	<10	<10	<10	6	0	None > LOD	None > LOD			
SVOC by GCMS																		
Phenols																		
2-Chlorophenol	ug/l	50		<1	<1							2	0	None > LOD	None > LOD		0	
2-Methylphenol	ug/l	100		<1	<1							2	0	None > LOD	None > LOD		0	
2-Nitrophenol	ug/l			<1	<1							2	0	None > LOD	None > LOD			
2,4-Dichlorophenol	ug/l	20		<1	<1							2	0	None > LOD	None > LOD		0	
2,4-Dimethylphenol	ug/l			<1	<1							2	0	None > LOD	None > LOD			
2,4,5-Trichlorophenol	ug/l			<1	<1							2	0	None > LOD	None > LOD			
2,4,6-Trichlorophenol	ug/l			<1	<1							2	0	None > LOD	None > LOD			
4-Chloro-3-methylphenol	ug/l	40		<1	<1							2	0	None > LOD	None > LOD		0	
4-Methylphenol	ug/l	100		<1	<1							2	0	None > LOD	None > LOD		0	
4-Nitrophenol	ug/l			<1	<1							2	0	None > LOD	None > LOD			
Pentachlorophenol	ug/l	0.4		<1	<1							2	0	None > LOD	None > LOD		0	
Phenol	ug/l	7.7		<1	<1							2	0	None > LOD	None > LOD		0	
Phenols	mg/l	0.0077						0.08	0.03	<0.03	<0.03	4	2	0.08	0.03	BH404 @ N/A	2	
PAHs																		
2-Chloronaphthalene	ug/l			<1	<1							2	0	None > LOD	None > LOD			
2-Methylnaphthalene	ug/l			<1	<1							2	0	None > LOD	None > LOD			
Acenaphthene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Acenaphthylene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Anthracene	ug/l	0.1		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD		0	
Benzo(a)anthracene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Benzo(a)pyrene	ug/l	0.00017	0.01	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD		0	0
Benzo(b)fluoranthene	ug/l	0.017	0.1	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD		0	0
Benzo(k)fluoranthene	ug/l	0.017	0.1	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD		0	0
Benzo(ghi)perylene	ug/l	0.0082	0.1	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD		0	0
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			0
Chrysene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Dibenzo(a,h)anthracene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Fluoranthene	ug/l	0.0063		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD		0	
Fluorene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Naphthalene	ug/l	2		<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD		0	
Phenanthrene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Pyrene	ug/l			<1	<1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	8	0	None > LOD	None > LOD			
Total PAHs (USEPA 16)	ug/l					<2	<2	<2	<2	<2	<2	6	0	None > LOD	None > LOD			
Phthalates																		
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<2	<2							2	0	None > LOD	None > LOD		0	
Butylbenzyl phthalate	ug/l	20		<1	<1							2	0	None > LOD	None > LOD		0	
Di-n-butyl phthalate	ug/l	8		<1	<1							2	0	None > LOD	None > LOD		0	
Di-n-Octyl phthalate	ug/l	20		<5	<5							2	0	None > LOD	None > LOD		0	
Diethyl phthalate	ug/l	200		<1	<1							2	0	None > LOD	None > LOD		0	
Dimethyl phthalate	ug/l	800		<1	<1							2	0	None > LOD	None > LOD		0	
PCBs																		
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l							<0.01	<0.01	<0.01	<0.01	4	0	None > LOD	None > LOD			
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l							<0.01	<0.01	<0.01	<0.01	4	0	None > LOD	None > LOD			
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l							<0.01	<0.01	<0.01	<0.01	4	0	None > LOD	None > LOD			
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l							<0.01	<0.01	<0.01	<0.01	4	0	None > LOD	None > LOD			
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l							<0.01	<0.01	<0.01	<0.01	4	0	None > LOD	None > LOD			
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l							<0.01	<0.01	<0.01	<0.01	4	0	None > LOD	None > LOD			
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l							<0.01	<0.01	<0.01	<0.01	4	0	None > LOD	None > LOD			

A4 Appendix 4

Surface Water Laboratory Data

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL-8
14/07/2015

Notes

EQS calcium carbonate 200-250mg/l for heavy metals: chromium, copper, lead, nickel and zinc

NDP - No determination possible

Screening Values and Assessment

EQS	Environmental Quality Standards
MRV	Minimum Reporting values
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory detection level higher than screening criterion
BOL/ITA	Exceeds CCW

Monitoring Round / Location	Units	Screening Criteria			E1 / R5	E2 / R5	E4 / R5	Q1 / 7.1	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Round of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS	No. Data Exceeding CCW
Date Sampled					06/12/2007	18/03/2008	25/09/2008	29/05/2015								
Installation Details		EQS	DWS	CCW												
Metals & Non-Metal Inorganics																
Hardness Total	mg/l				154	125	276		3	3	276	125	E4 / R5			
Arsenic Dissolved	ug/l	50	10					1.71	1	1	1.71	1.71	Q1 / 7.1	0	0	
Calcium Dissolved	ug/l			300000	35	31	68	37.3	4	4	68	31	E4 / R5			0
Cadmium Dissolved	ug/l	0.15	5	5				<0.1	1	0	None > LOD	None > LOD		0	0	0
Chromium Dissolved	ug/l		50		<0.22	<0.22	<0.22	1.65	4	1	1.65	1.65	Q1 / 7.1		0	
Copper Dissolved	ug/l	10	2000		6	<0.85	<0.85	1.4	4	2	6	1.4	E1 / R5	0	0	
Lead Dissolved	ug/l	1.2	10	250	<0.22	<0.22	<0.22	0.185	4	1	0.185	0.185	Q1 / 7.1	0	0	0
Magnesium Dissolved	ug/l				10	9.1	20		3	3	20	9.1	E4 / R5			
Nickel Dissolved	ug/l	4	20	100	<0.15	<0.15	<0.15	2.59	4	1	2.59	2.59	Q1 / 7.1	0	0	0
Selenium Dissolved	ug/l		10					0.723	1	1	0.723	0.723	Q1 / 7.1		0	
Cadmium Total	ug/l	0.15	5	5	<0.5	0.5	0.5		3	2	0.5	0.5	E2 / R5	2	0	0
Zinc Total	ug/l	75		1000	26	23	260		3	3	260	23	E4 / R5	1		0
BOD	mg/l	5		18	<1	2	***45***	<1	4	2	45	2	E4 / R5	1		1
Nitrate as N	mg/l		50	1	<0.3	<0.3	0.6		3	1	0.6	0.6	E4 / R5		0	0
Nitrate as NO3	mg/l		50	1	***1.3***	<0.3	***2.658***	<0.3	4	2	2.658	1.3	E4 / R5		0	2
Nitrite as N	mg/l		0.152173913	1	<0.1	<0.1	<0.1		3	0	None > LOD	None > LOD			0	0
Nitrite as NO2	mg/l		0.5	1				<0.05	1	0	None > LOD	None > LOD			0	0
Nitrogen, Total Oxidised as N	mg/l		50	2	<0.1	<0.1	0.6	<0.1	4	1	0.6	0.6	E4 / R5		0	0
Phosphate, Ortho as P	mg/l			1	0.1	<0.1	***1.2***		3	2	1.2	0.1	E4 / R5			1
Phosphorus (tot.unfilt)	ug/l	120						126	1	1	126	126	Q1 / 7.1	1		
Chloride	mg/l	250	250	300	12	15	14	17.5	4	4	17.5	12	Q1 / 7.1	0	0	0
Sulphate	mg/l	400	250	300				5.4	1	1	5.4	5.4	Q1 / 7.1	0	0	0
Sulphate as SO4	mg/l	400	250	300	7	6	<5		3	2	7	6	E1 / R5	0	0	0
Sulphide	mg/l								0	0	None > LOD	None > LOD				
Ammoniacal Nitrogen as N	mg/l	0.6		1	0.19	0.06	***2.48***	0.218	4	4	2.48	0.06	E4 / R5	1		1
Dissolved Oxygen (Saturation)	%				2.31	6.15	0.57		3	3	6.15	0.57	E2 / R5		0	
Dissolved Oxygen	mg/l				18.5	48.1	5.1	11.7	4	4	48.1	5.1	E2 / R5		0	
pH Value	pH units	6-9	6.5-10		7.5	7.4	7.4		3	3	7.5	7.4	E1 / R5	0	0	
Organics																
GRO (C5-C12)	ug/l							<50	1	0	None > LOD	None > LOD				
MTBE	ug/l							<3	1	0	None > LOD	None > LOD				
Benzene	ug/l	10	1					<7	1	0	None > LOD	None > LOD		0	0	
Toluene	ug/l	50						<4	1	0	None > LOD	None > LOD		0		
Ethyl benzene	ug/l	20						<5	1	0	None > LOD	None > LOD		0		
m & p Xylene	ug/l	30						<8	1	0	None > LOD	None > LOD		0		
o Xylene	ug/l	30						<3	1	0	None > LOD	None > LOD		0		
TPH																
Aliphatics C5-C6	ug/l							<10	1	0	None > LOD	None > LOD				
Aliphatics >C6-C8	ug/l							<10	1	0	None > LOD	None > LOD				
Aliphatics >C8-C10	ug/l							<10	1	0	None > LOD	None > LOD				
Aliphatics >C10-C12	ug/l							<10	1	0	None > LOD	None > LOD				
Aliphatics >C12-C16 Aqueous	ug/l							<10	1	0	None > LOD	None > LOD				
Aliphatics >C16-C21 Aqueous	ug/l							<10	1	0	None > LOD	None > LOD				
Aliphatics >C21-C35 Aqueous	ug/l							<10	1	0	None > LOD	None > LOD				
Total Aliphatics C12-C35 Aqueous	ug/l							<10	1	0	None > LOD	None > LOD				
Aromatics >C5-C7	ug/l							<10	1	0	None > LOD	None > LOD				
Aromatics >C7-C8	ug/l							<10	1	0	None > LOD	None > LOD				
Aromatics >EC8-EC10	ug/l							<10	1	0	None > LOD	None > LOD				
Aromatics >EC10-EC12	ug/l							<10	1	0	None > LOD	None > LOD				
Aromatics >EC12-EC16 Aqueous	ug/l							<10	1	0	None > LOD	None > LOD				
Aromatics >EC16-EC21 Aqueous	ug/l							<10	1	0	None > LOD	None > LOD				
Aromatics >EC21-EC35 Aqueous	ug/l							<10	1	0	None > LOD	None > LOD				
Total Aromatics C12-C35 Aqueous	ug/l							<10	1	0	None > LOD	None > LOD				
TPH >C6-C8	ug/l				<10	<10	<10		1	0	None > LOD	None > LOD				
TPH >C8-C10	ug/l				<10	<10	<10		1	0	None > LOD	None > LOD				
TPH >C10-C16	ug/l				<20	<20	<20		1	0	None > LOD	None > LOD				
TPH >C16-C24	ug/l				<20	<20	<20		1	0	None > LOD	None > LOD				
TPH >C24-C40	ug/l				<50	<50	<50		1	0	None > LOD	None > LOD				
TPH >C6-C40	ug/l				<50	<50	<50		1	0	None > LOD	None > LOD				
PAHs																
Acenaphthene	ug/l							<0.015	1	0	None > LOD	None > LOD				
Acenaphthylene	ug/l							<0.011	1	0	None > LOD	None > LOD				
Anthracene	ug/l	0.1						<0.015	1	0	None > LOD	None > LOD		0		
Benzo(a)anthracene	ug/l							<0.017	1	0	None > LOD	None > LOD				
Benzo(a)pyrene	ug/l	0.00017	0.01					<0.009	1	0	None > LOD	None > LOD		0	0	
Benzo(b)fluoranthene	ug/l	0.017	0.1					<0.023	1	0	None > LOD	None > LOD		0	0	
Benzo(k)fluoranthene	ug/l	0.017	0.1					<0.027	1	0	None > LOD	None > LOD		0	0	
Benzo(ghi)perylene	ug/l	0.0082	0.1					<0.016	1	0	None > LOD	None > LOD		0	0	
Indeno(1,2,3-cd)pyrene	ug/l		0.1					<0.014	1	0	None > LOD	None > LOD			0	
Chrysene	ug/l							<0.013	1	0	None > LOD	None > LOD				
Dibenzo(a,h)anthracene	ug/l							<0.016	1	0	None > LOD	None > LOD				
Fluoranthene	ug/l	0.0063						<0.017	1	0	None > LOD	None > LOD		0		
Fluorene	ug/l							<0.014	1	0	None > LOD	None > LOD				
Naphthalene	ug/l	2						<0.1	1	0	None > LOD	None > LOD		0		
Phenanthrene	ug/l							<0.022	1	0	None > LOD	None > LOD				
Pyrene	ug/l							<0.015	1	0	None > LOD	None > LOD				
Total PAHs (USEPA 16)	ug/l							<0.344	1	0	None > LOD	None > LOD				
VOCs																
Ethylbenzene	ug/l	20						<5	1	0	None > LOD	None > LOD		0		
m,p xylenes	ug/l	30						<8	1	0	None > LOD	None > LOD		0		
Methyl tert-butyl ether (MTBE)	ug/l							<3	1	0	None > LOD	None > LOD				
O-Xylene	ug/l	30						<3	1	0	None > LOD	None > LOD		0		
Toluene	ug/l	50						<4	1	0	None > LOD	None > LOD		0		

A5 Appendix 5

Relevant Extracts of Additional Environmental Data

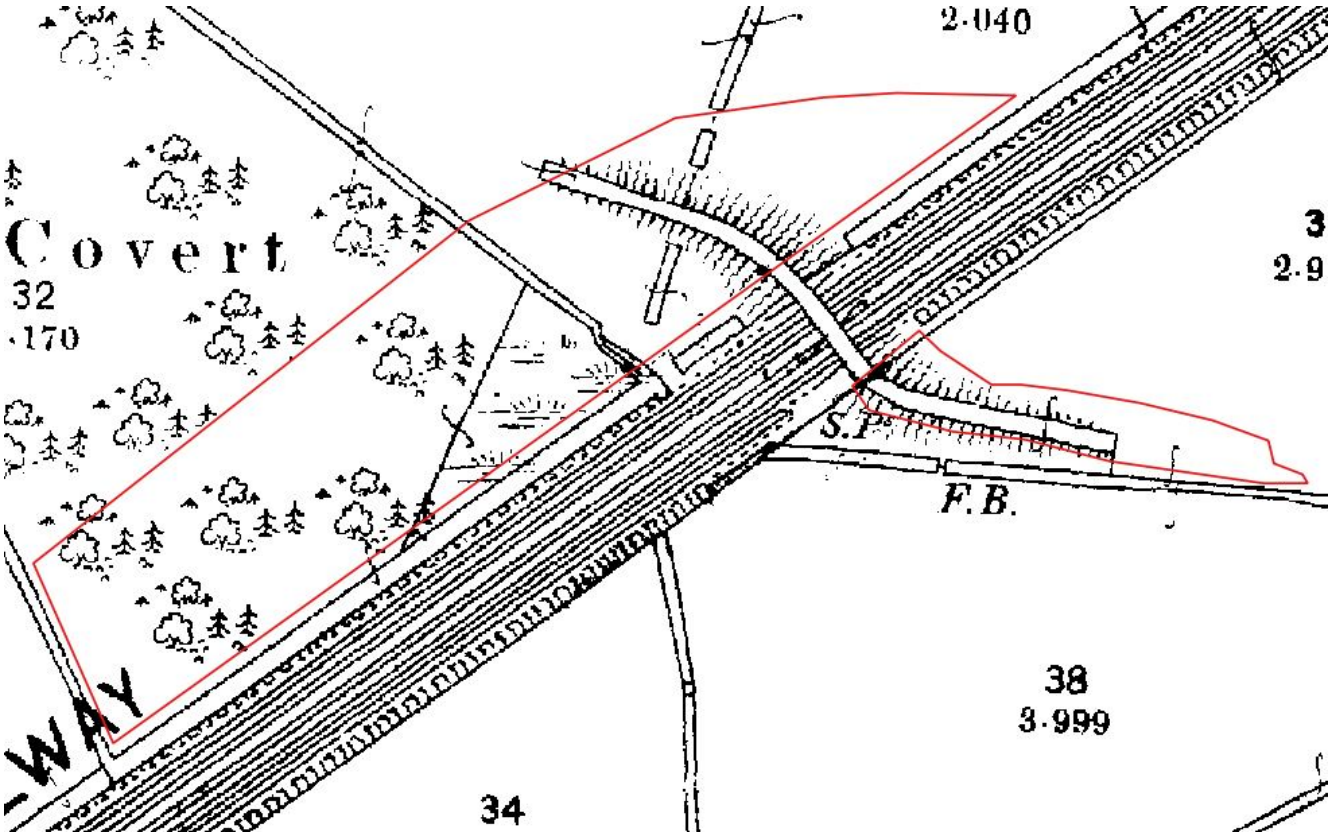


Plate 01: Extract of 1891-1912 Ordnance Survey map (1:2,500 scale)

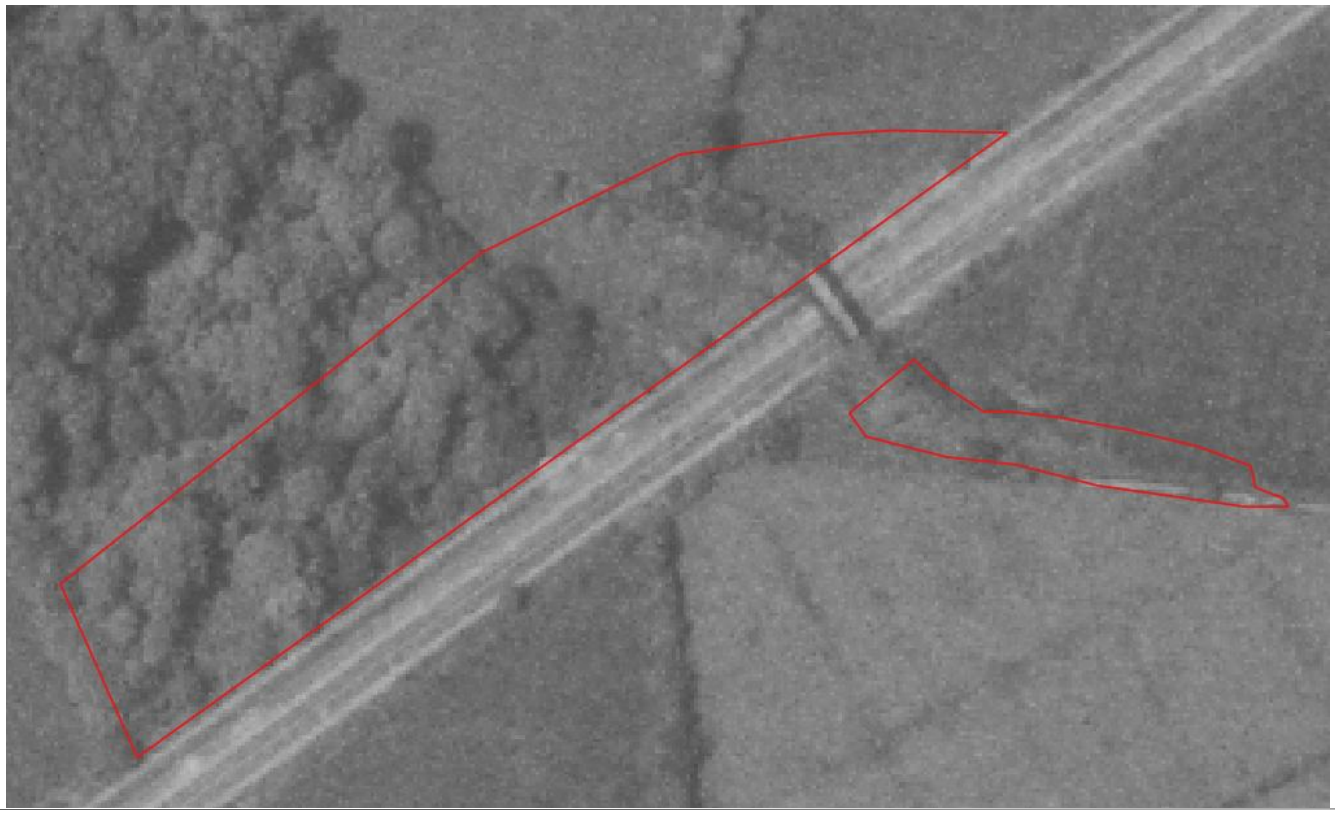


Plate 02: Extract of 1971 aerial photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

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Plate 03: Extract of 1981 aerial photograph (infra-red)

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Project:	M4CaN
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Welsh Government

M4 Corridor around Newport

Land Contamination Assessment Report Annex D CL-9, Green Lane Landfill Land Contamination Assessment Report

M4CaN-DJV-EGT-ZG_GEN-RP-EN-0010

At Issue | March 2016

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1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-9) known as the 'Green Lane Landfill' hereinafter referred to as the Site.

1.1.2 The Site is located between chainage 6,200 and 6,550 (See Figure 1), and was a licensed inert landfill previously used for refuse tipping. It now comprises roughly vegetated land.

1.2 Reporting Context

1.2.1 The Site has been assessed as part of investigations and monitoring associated with the wider works for the M4 Corridor around Newport (M4CaN) (hereafter referred to as the 'Scheme') and informs the baseline for the environmental impact assessment (EIA) for the Scheme. The EIA is reported in the M4CaN Environmental Statement (ES) of which this document is an appendix to the chapter on Geology and Soils.

1.2.2 In 2014, a Preliminary Sources Study Report (PSSR 2014) was undertaken as an initial land contamination appraisal (Ove Arup and Partners, 2014) as part of Design Manual for Roads and Bridges (DMRB) Stage 2 Assessments for a number of potential route options. This identified a number of individual areas that may have been affected by contamination as a result of historical activities at the Site. In addition, this report draws upon the 2015 Supplementary Ground Investigation report on behalf of the Welsh Government (Geotechnical Engineering, 2015). This report relates to the area defined in the Site Location Plan Figure 1.

1.2.3 The overarching rationale and approach for the assessment of areas of land along the new section of motorway with potential contamination is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the ES).

1.3 Objectives

1.3.1 The key objectives of this report are set out below:

- Undertake a risk assessment of the Site and determine whether potential risks to human health or controlled waters could exist based upon the Scheme.
- Identify the need for further assessment and investigation in order to refine potential land contamination risks and inform the need for remediation/mitigation.
- To provide information to support the Ground Investigation Report (GIR) and Geotechnical Design Report (GDR) required under DMRB HD22/08 (Highways Agency, 2008).

1.4 Report Structure

1.4.1 The remainder of this report is structured as follows:

- Section 2: Site Location and Description.
- Section 3: The Scheme – This section details the new section of motorway alignment and associated features at the Site.
- Section 4: Site History – This section summarises the history of the Site based on historical maps and historical land photographs.
- Section 5: Environmental Setting – This section summarises the Site description, published geology, hydrology and hydrogeology and relevant environmental information presented in the 2014 PSSR document.
- Section 6: Scope of Investigations – This section describes the previous and supplementary ground investigation data available for the Site.
- Section 7: Ground Conditions – This section describes the main findings of the intrusive site investigations including the ground conditions encountered and significant visual or olfactory evidence of contamination identified.
- Section 8: Contamination Assessment – This section describes the findings of the Tier 1 and Tier 2 contamination risk assessment based upon potential contamination sources, potential receptors and potential contaminant linkages and presents the human health and controlled waters assessment.
- Section 9: Refined Conceptual Site Model – This section presents the Conceptual Site Model (CSM) for the Site and identifies potential contaminant linkages, based upon the findings of the data presented within Sections 2 to 7.
- Section 10: Conclusions and Recommendations - This section provides conclusions concerning the likelihood of land contamination associated with the Site affecting the Scheme and requirements for remediation / mitigation.

2 Site Location and Description

2.1.1 The Site is located approximately 1 km south of Duffryn and is centred at National Grid Reference (NGR) ST292 834. It covers an area of approximately 2.2 ha. The Site is situated within a region referred to as the Wentlooge Levels. The layout and location of the Site is presented on Figure 1.

2.1.2 The surface of the Site comprises rough ground, with small bushes, brambles and long grass. The north eastern boundary, which is locally overgrown with brambles, is adjacent to the main London to West Wales (Great Western) railway line. The Site is at an elevation of approximately 6 to 7 m AOD and comprises an area of land which served as a licensed inert landfill, prior to which it had been used for refuse tipping.

2.1.3 A site walkover survey was undertaken in May 2015. The Site was partially accessible only (western area accessed via Green Lane). The eastern part of the Site, including the area of the new section of motorway was inaccessible due to dense vegetation. The western part of the Site is predominantly surfaced with hardcore material. Two stockpiles of hardcore were noted to be present on the northern boundary. The Site platform slopes steeply on its northern edge to the railway line located on an embankment which bounds the Site to the north. A larger heavily vegetated stockpile of material is present towards the centre of the Site. The material was noted to contain tarmac, brick and slag fragments. Photographs taken during the walkover survey are included in Appendix 7.

2.1.4 Aerial photography indicates land drains crossing through the Site.

3 The Scheme

3.1.1 The Site is situated at approximate chainage 6,200 to 6,550.

3.1.2 The section of highway impacting the Site is proposed to be on an embankment with a carriageway approximately 10 m above existing ground level. The lower section of the embankment encroaches onto the northern end of the Site.

3.1.3 Given the presence of soft compressible strata, the use of piles is being considered in order to manage potential settlements for the bridge and abutments.

3.1.4 The highway verges will be soft landscaped incorporating highway drainage predominantly as open swales / channels.

3.1.5 An access road may run along the southern boundary of the Site to form a junction onto Green Lane.

3.1.6 Subject to suitability of the encountered materials, it is currently proposed that all existing ground will be left in situ with the embankment constructed above.

4 Site History

4.1.1 The 2014 PSSR historical searches have been based on Ordnance Survey plans, literature reviews, information provided by Natural Resources Wales (NRW), Newport City Council and aerial photographic interpretation.

4.1.2 This is supplemented by a review of historical maps obtained in 2015 from Welsh Government. Relevant extracts are presented in Appendix 8.

4.1.3 A summary of the Site's history is presented in below.

Table 1: Site History

1995 Feature Id / Date	Use	Source of information
1843 - 1893	Agricultural fields with drainage ditches traversing the boundaries and across the fields running north-south and east-west. An area of marshland is present along the northern boundary in the western part of the Site. The Site is surrounded by agricultural fields and drainage ditches. The **Great Western Railway** bounds the Site to the north. Fox Covert is approximately 20 m to the north. Green Lane runs north-south along the western boundary and Pont-estyll Farm is located approximately 75 m to the northwest.	1:10,560 Historical Mapping
1891 - 1912	No significant change A road bridge has been constructed to enable Green Lane to cross the Great Western Railway along the western boundary. A footbridge has been constructed crossing the Great Western Railway approximately 50 m to the northeast. A spring is shown approximately 100 m to the northwest.	1:10,560 Historical Mapping
GF10/9 1901-1920	Railway siding along the southern boundary of the Site.	OS maps
1966	Marshy ground and **unknown waste types or quantities**	National Resources Wales (1995 PSSR)
1970 - 1973	The area of marshland is no longer marked. The Pont-estyll Farm buildings have been demolished.	1: 10,000 Historical Mapping
GF10/7, GF10/8 1981	Made ground, fill area for domestic refuse. Earthworks shown in southern part of site.	Aerial photography, walkover survey (1995 PSSR)
1989	**Licensed landfill accepting inert wastes**	Aerial photography
GF10/2 1995	Made Ground identified	Walkover survey (1995 PSSR)
1998	Southern part of Site where earthworks previously shown now appears vegetated.	Aerial Photography
2006	The eastern and central sections of the Site are now wooded. Fox covert has been reduced in size and an agricultural field is shown. The footbridge crossing the railway is no longer shown.	Aerial Photography

1995 Feature Id / Date	Use	Source of information
2009 - 2010	Tracks and spoil heaps now shown across the southern part of the Site.	Aerial Photography
2013 - 2014	The vegetation at the southern end of Site has been cleared.	Aerial Photography

Notes. Potential sources of contamination are underlined. Those within the temporary and permanent land take are shown in bold.

4.1.4 Newport City Council has confirmed the Site's previous use was a landfill, thought to have been operated by Sheringtons, a possible local farm. Information on the landfill gas monitoring was requested from the Council, however they do not hold any information on previous site investigations or ground gas data specifically relating to the Site.

4.1.5 NRW records indicate the current landfill status as 'in closure and aftercare'.

4.1.6 The sources of information presented above supplement those used in the 2014 PSSR. In particular, the 1981, 1998, 2009/10 and 20013/14 aerial photographs provided relevant information on the extent of works for these years. Relevant extracts of the photographs are presented in Appendix 8.

4.1.7 Historically the Site is located in proximity to areas which may have been bombed during World War II which is discussed in the Explosive Ordnance Threat Assessment Report (Bactec, 2014). This categorises the Site as low risk in respect to unexploded ordnance.

5 Environmental Setting

5.1 Geology

5.1.1 Fill associated with the former landfilling is likely over most of the Site. Based on ground elevations this is likely to be in the region of 1-2 m thick.

5.1.2 British Geological Survey (BGS) data indicates that the Site is underlain by Tidal Flat Deposits and Glaciofluvial Deposits, overlying bedrock of the Mercia Mudstone Group.

5.2 Hydrology

5.2.1 The Site lies within an area traversed by a complex system of drains and reens. Field drains run along the southern, western and eastern Site boundaries and two drains cut through the centre of the Site running from north to south and one cuts through from west to east. The Morfa Gronw Reen is located to the north west of the Site and the Wheel Lane Reen to the south. These named reens have been sampled during two phases of investigation.

5.3 Hydrogeology

5.3.1 NRW classifies the Mercia Mudstone Group as a Secondary B Aquifer. Tidal Flat Deposits in the locale have been classified as an unproductive stratum.

5.3.2 The Site does not lie within a groundwater source protection zone.

5.4 Environmental Information

5.4.1 NRW reports the following information within the study area which is set out in Table 2.

Table 2: Historic Landfills within Site Boundary

Landfill name and address	Location	Material type	Date waste first and last received
Wentloog Landfill, Newport, St Brides	Covering the whole Site	Inert waste	Unknown – Jan 1991

5.4.2 Previous site investigations found evidence of fill materials in the west of the Site.

5.4.3 No other landfills have been recorded within 300 m of the Site and no pollution incidents, abstraction licences or discharge points have been recorded within 300 m of the Site.

5.4.4 The Site lies within the Gwent levels – St Brides SSSI.

5.4.5 No further environmental information relevant to the Site has been identified.

6 Scope of Investigations

6.1 General

6.1.1 Three intrusive ground investigations include works that have been undertaken within the Site.

6.1.2 Two phases of surface water sampling have also been undertaken and are summarised below.

6.1.3 For the purpose of meeting the requirements of Volume 4, Section 1, Part 2 of the DMRB (HD22/08 – Managing Geotechnical Risk – 2008 (Highways Agency 2008), the historical data used to support the 2014 PSSR has been differentiated from additional 2015 Supplementary Ground Investigation data (Geotechnical Engineering, 2015).

6.2 Scope of Works

6.2.1 The various intrusive ground investigations undertaken within the Site area are summarised in Table 3:

Table 3: Site Investigation Summary

Date	Contractor	Site Location	Boreholes	Window Sampler	Trial Pits	Sampling
1997	Norwest Holst	Northwest and southwest	BHD7, BHD8	-	-	Soil
2000	Exploration Associates	Centrally across the Site	-	-	CH5, CH6, CH7, CH8	Soil and water
2008	Norwest Holst	Northeast	-	-	STPD05	Soil

6.2.2 No monitoring wells were constructed within any of these boreholes.

6.2.3 It is noted that the 2014 PSSR also considered findings of boreholes SBHD06CP and SBHD06RC from the 2008 investigation. Given these fall outside the boundary, approximately 16 m to the east, the findings relating to the soil data and ground conditions at these exploratory locations have been excluded within this report.

6.2.4 For the purposes of a groundwater quality dataset, two boreholes from off site, SBHD06 and BH404, advanced during the 2008 and 2015 investigations respectively and located within 20 m of the Site's eastern boundary, are considered. The construction details of these boreholes are summarised below.

Table 4: Summary of Off site Borehole Construction Details

Borehole ID	Diameter (mm)	Total Drilled Depth (m)	Top of Slotted Well Casing / Gravel Pack (m bGL)	Base of Slotted Well Casing / Gravel Pack (m bGL)	Targeted Geology
SBHD06 (off site)	50	40.5	7.5	15	Glaciofluvial Deposits
BH404 (off site)	35	24.5	1	4	Tidal Flat Deposits
	50		8	12.5	Glaciofluvial Deposits / Mercia Mudstone

6.3 Surface Water Quality Monitoring

6.3.1 Surface water monitoring in the vicinity of the Site has been undertaken during two investigations, as summarised in Table 5. One sample location (R5) was included within the Titan Surface Water Monitoring Network, of which three rounds were undertaken between 2007 – 2008 (Titan Environmental Surveys Ltd, 2008). This sample was taken 450 m southeast of the Site on Morfa Gronw Reen.

6.3.2 Additional samples were taken in 2015 from Morfa Gronw Reen and Wheel Lane Reen some 450 m to the south east and 200 m to the north west of the Site, respectively

6.3.3 The results for these samples are reported within the Baseline Water Environment Report (Appendix 16.2 of the ES).

Table 5: Surface Water Monitoring Locations

Surface Water Monitoring Point ID	Date of Sampling	Water Body	Position	Field Observation
R5	2007 - 2008	Morfa Gronw Reen	Approximately 350 m NE of the Site.	Flow noted as slack, water slightly turbid and brown in colour.
7.1 / Q1	May 2015	Morfa Gronw Reen	Approximately 200 m N of the Site.	Very low flow, turbid water.
7.3 / Q1	May 2015	Wheel Lane Reen	Approximately 300 m S of the Site.	Very low flow, turbid water.

6.4 Field Testing

6.4.1 Monitoring of Volatile Organic Compounds (VOCs) was undertaken on on soil samples at 0.3 m, 0.56 m, 1.3 m and 2.62 m at STPD05 within the Site.

6.5 Groundwater Monitoring

6.5.1 Grab samples of groundwater encountered during the investigations onsite were taken from CH5 and CH8 in 2000.

6.5.2 The dates of groundwater sampling and monitoring rounds are shown in Table 6.

Table 6: Summary of Monitoring Rounds

Location Ref.	Number of round (date of sampling)	Monitoring details	Notes
SBHD06 (off site)	**6 no.** (21st February 2008, 20th March 2008)	Groundwater level and Sampling	
BH404 (off site)	**3 no.** (2nd March 2015, 9th March 2015, 16th March 2015)	Groundwater level and sampling	Flooded

6.6 Laboratory Chemical Testing

6.6.1 A summary of all laboratory analysis undertaken on soils, groundwater, leachate and surface water from the previous site investigations is provided below.

Table 7: Summary of Previous Investigation Sampling

Site Investigation date	No. of soil samples	No. of leachate samples	No. of water samples	Suites of testing
1997	2	0	0	Metals, pH, mineral oil and phenols
2000	6	0	2	Metals, phenols, pH, TPH[1], PAH[2] and mineral oil
2008	2	1	2	Metals, phenols, pH, TPH, BTEX[3], MTBE[4], SVOCs[5], VOC[6s] and PAHs
2015	N/A	N/A	6*	Metals, inorganics, pH, MTBE, BTEX, TPH, PAH, Phenols, PCBs[7]

***** Note: Groundwater analysis from off site boreholes

[1] Total Petroleum Hydrocarbons
[2] Polycyclic Aromatic Hydrocarbons
[3] Benzene, Toluene, Ethylbenzene, and Xylenes
[4] Methyl tert-butyl ether
[5] Semivolatile Organic Compounds
[6] Volatile Organic Compounds
[7] Polychlorinated Biphenyls

Soil Analysis

6.6.2 The following sections summarise the laboratory analytical results for soil samples collected onsite during the various intrusive investigation phases. The available data set has been tabulated and is presented in Appendix 2 with the supporting laboratory certificates available in the relevant original reports.

6.6.3 To inform the conceptual ground model, the analytical data from the Made Ground has been segregated from those of the natural soils (namely the Tidal Flat Deposits).

6.6.4 The available information is summarised below:

Table 8: Summary of Analytical Soil Data

Formation Unit	Number of Soil Analysis per Analytical Suite - Historical data					
	Metals & inorganics	Asbestos	Polycyclic Aromatic Hydrocarbons	Total Petroleum Hydrocarbon	Phenol	BTEX
Made Ground	7	1	5	5	7	1
Natural Soils	3	1	3	1	3	1

Soil Leaching Analysis

6.6.5 The leachate results have also been considered separately for the Made Ground and natural soils. The available information is presented in Appendix 5 and summarised in Table 9.

Table 9: Summary of Soil Leaching Analytical Data

Formation Unit	Number of Soil Leachate Analysis per Analytical Suite - 2015 data / All GI data						
	Metals & inorganics	Polycyclic Aromatic Hydrocarbon	Total Petroleum Hydrocarbon	Phenol	BTEX	Volatile Organic Compounds	Semi Volatile Organic Compounds
Made Ground	0 / 1	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0

Groundwater Analysis

6.6.6 The following sections summarise the laboratory analytical results for groundwater samples collected during the various intrusive investigation phases. The available data has been tabulated and is presented in Appendix 3 with the supporting laboratory certificates available in the relevant original reports.

6.6.7 The available onsite data relates to two grab samples taken during trial pitting at CH05 and CH08. These relate to water samples taken in the Made Ground and within the Tidal Flat Deposits, respectively.

6.6.8 Given the gap in the data, groundwater data from nearby off site well installations has also been considered. Data relating to boreholes SBHD06 and BH404 some 20 m east of the Site have been utilised.

6.6.9 It is noted that the reported data did not differentiate between the analytical results of the shallow (perched groundwater within the Tidal Flat Deposits) and deep installations (groundwater within the Glaciofluvial Deposits and Mercia Mudstone) on two of the three rounds for borehole BH404. As such the information has been considered as 'undifferentiated' for these two rounds.

6.6.10 The available information is summarised in Table 10 and Table 11 below.

Table 10: Summary of Analytical Groundwater Data (On site)

Groundwater Unit	Number of Groundwater Analysis per Analytical Suite (number of grab locations) – Historical GI data						
	Metals & inorganics	PAH	TPH	Phenol	BTEX	PCBs	Phthalates
Perched (Made Ground)	1 (1)	1 (1)	1 (1)	1 (1)	0 (1)	0 (1)	0 (1)
Perched (Tidal Flat Deposits)	1 (1)	1 (1)	1 (1)	1 (1)	0 (1)	0 (1)	0 (1)

Note: PAH - Polycyclic Aromatic Hydrocarbon, TPH: Total Petroleum Hydrocarbon

Table 11: Summary of Analytical Groundwater Data (Off site)

Groundwater Unit	Number of Groundwater Analysis per Analytical Suite (number of well locations) – 2015 Data / All GI data						
	Metals & inorganics	PAH	TPH	Phenol	BTEX	PCBs	Phthalates
Tidal Flat Deposits	3 (1) / 3 (1)	3 (1) / 3 (1)	3 (1) / 3 (1)	2 (1) / 2 (1)	3 (1) / 3 (1)	2 (1) / 2 (1)	0 (1) / 0 (1)
Groundwater (Glaciofluvial Deposits / Mercia Mudstone)	3 (1) / 5 (2)	3 (1) / 5 (2)	3 (1) / 5 (2)	2 (1) / 4 (2)	3 (1) / 5 (2)	2 (1) / 2 (1)	0 (1) / 2 (2)

Note: PAH - Polycyclic Aromatic Hydrocarbon, TPH: Total Petroleum Hydrocarbon

Surface Water Analysis

6.6.11 There are no surface water samples taken within the Site boundary. Table 12 summarises the surface water sampling that has been undertaken within the vicinity of the Site.

6.6.12 Sampling has been undertaken on Morfa Gronw Reen and Wheel Lane Reen, located east and west of the Site respectively. There are a number of field drains that may offer connectivity between the Site and Morfa Gronw Reen.

6.6.13 Wheel Lane Reen is also potentially connected to the Site via field drains. Green Lane divides the Site however there is evidence of culverting beneath Green Lane, connecting Wheel Lane Reen and the associated field drains.

Table 12: Summary of Analytical Surface Water Data

Surface Water System	Number of Water Analysis per Analytical Suite (number of locations) – 2015 data / All GI data				
	Metals & inorganics	Water quality parameters	Polycyclic Aromatic Hydrocarbons	Total Petroleum Hydrocarbon	BTEX
Morfa Gronw Reen	1 (1) / 4 (2)	1 (1) / 4 (2)	1 (1) / 1 (1)	1 (1) / 4 (2)	1 (1) / 1 (1)
Wheel Lane Reen	1 (1) / 1 / (1)	1 (1) / 1 / (1)	1 (1) / 1 / (1)	1 (1) / 1 / (1)	1 (1) / 1 / (1)

6.7 Gap Analysis of Available Data

6.7.1 The investigation data available for the Site is considered relatively limited. A single trial pit is located within the northern part of the Site in the area of the proposed land take.

6.7.2 No ground gas data is available in the vicinity of the Site and no groundwater available from on-site boreholes.

7 Ground Conditions

7.1 Geology

7.1.1 The geological logs for all available exploratory holes on the Site are provided in Appendix 1. The observed geological sequence is consistent with that discussed in the 2014 PSSR report and is summarised in the following sections. Information from the Supplementary Ground Investigation (Geotechnical engineering, 2015) has also been used.

7.1.2 The conceptual ground model included within the 2014 PSSR report has been amended in light of the 2015 information and is included within Figure 2.

Made Ground

7.1.3 Made Ground was encountered in the south and north of the Site at thicknesses ranging between 0.36 - 3.1 m, thinning to the northeast, as summarised in Table 13.

7.1.4 Made Ground was present as a sandy clayey gravel comprising concrete, brick, slag, ash, plastic, brick, wire and glass. The additional inclusion of a buried wooden sleeper at CH5 at 1 m bGL is also noted.

7.1.5 The main waste mass is generally 50-80 % above ground level if considering an overall baseline level of 6 m AOD. The Made Ground below ground level is therefore limited.

7.1.6 The new section of motorway encroaches the northern edge of the landfill where the thickness of the waste mass was encountered at 0.36 m, based on trial pit STPD05.

Superficial Deposits

7.1.7 Unconsolidated superficial deposits were encountered in all locations. These comprised Tidal Flat Deposits overlying Glaciofluvial deposits at depth.

7.1.8 Tidal Flat Deposits generally comprised soft to firm grey clays. Below 5.5 m bGL, laminations of peat were identified in borehole BHD7. At STPD05, a 0.14 m thick peat band was proven at 3.8 m bGL.

7.1.9 Siliceous gravel considered to represent Glaciofluvial deposits was found to underlie the predominantly fine and cohesive Tidal Flat Deposits at depths below 7.1 - 10.1 m bGL. These coarse deposits were only encountered within the deeper boreholes BHD7 and BHD8 at thicknesses of 4.6 and 5.4 m, respectively.

Solid Geology

7.1.10 Below the Glaciofluvial deposits the Mercia Mudstone formation was encountered (depth of 12.5 - 14.7 m bGL). The Mercia mudstone was typically described as very stiff reddish brown clay or weak mudstone.

Geological Sequence Summary

7.1.11 The general geological sequence identified during the previous ground investigations are summarised in Table 13.

Table 13: Summary of Geological Sequence

Unit	Description	Thickness Range (m)	Basal Depth (m bGL)
Made Ground	Predominantly coarse to includes concrete, brick, clag, ash, plastic, glass and wire.	0.36 - 3.1 Thickness of Made Ground increasing south westwards	0.36 - 3.1
Superficial Deposits (Tidal Flat Deposits)	Soft to firm grey silty clay with peat laminations at depth.	>0.5 - 7	>1.5 - 10.1
Superficial Deposits (Glaciofluvial Deposits)	Siliceous sandy Gravel	4.6 - 5.4	12.5 - 14.7
Mercia Mudstone (Mudstone)	Weak red brown Mudstone	>20.3	unproven

7.2 Visual and Olfactory Evidence of Contamination

7.2.1 A summary of visual and olfactory evidence of contamination encountered during the intrusive investigation is summarised in Table 14.

7.2.2 Full details and observations noted during the drilling and trial pitting are presented on the exploratory logs attached in Appendix 1.

Table 14: Visual and Olfactory Evidence of Contamination Summary

Location ID	Depth (m bGL)	Strata	Evidence of Potential Contamination
BHD7	0 - 3.1	Made ground	Concrete and rubble.
CH5	0 - 2.7	Made ground	Brick, concrete and wooden sleepers with a strong creosote odour at 0.8 – 1 m.
STPD05	0.08 - 0.36	Made ground	Brick, concrete, metal, wire, glass and plastic.

7.3 Gas Monitoring

7.3.1 No monitoring wells were installed onsite during the investigations and therefore no gas monitoring data is available.

7.3.2 No gas monitoring is available in the vicinity of the Site.

7.4 Groundwater

Groundwater Encountered During Investigation

7.4.1 No groundwater data is available for exploratory holes within the area impacted by the Scheme. However, the ground model observed within the Site is consistent with that proven by the selected nearby off site boreholes detailed below. As such these are considered to provide a reasonable overview of the groundwater condition to be anticipated beneath the Site. Individual borehole records for these selected off site boreholes are included in Appendix 1 for completeness.

7.4.2 Groundwater strikes were encountered during the advancement of all onsite exploratory locations and those selected off site boreholes are detailed on the geological logs provided in Appendix 1. These are summarised below:

Table 15: Summary of Groundwater Strike Data

Location	Strike Depth (m bGL)	Geological Formation	Level after 20 minutes (m bGL)	Comments
BHD7	9.1	Tidal Flat Deposits	8.8	
				Water level recorded at 4.1 m bGL when borehole taken into the top of the Glaciofluvial Deposit (10.5 m bGL)
				Water level recorded at 1.44 m bGL when borehole taken into the Mercia Mudstone (16 m bGL)
BHD8	7.9	Glaciofluvial Deposits	5.7	Water level recorded at 1.9 m bGL when borehole taken into the Glaciofluvial Deposit (10 m bGL).
CH5	2.7	Made Ground	-	
CH6	1.8	Made Ground	-	
CH7	1.5	Tidal Flat Deposits	-	
CH8	1.5	Tidal Flat Deposits	-	
STDP05	1.38	Tidal Flat Deposits	-	

Groundwater Level Dataset

7.4.3 The groundwater level data used to consider site conditions is provided in Appendix 6 and summarised in Table 16.

Table 16: Summary of Groundwater Level Data (Off site locations)

Location	Installation[#1]	Depth of response zone (m bGL) and Geological Formation	No. Measurements	Minimum Depth (m bGL)	Maximum Depth (m bGL)	Comments
SBHD06 (off site)	50 mm	7.5 - 15 Glaciofluvial Deposits	6	1.13	1.44	
BH404 (off site)	(S) 35 mm	1 - 4 Tidal Flat Deposits	2	-	-	Area flooded, no measurements
	(D) 50 mm	8 - 12.5 Glaciofluvial deposits / Mercia Mudstone	2	0	1.36	

Notes. #1: S denotes a shallow installation and D denotes deep installation;

Groundwater Summary

7.4.4 A continuous perched groundwater water body was encountered between 1.5 m and 2.7 m depth within the Made Ground in the southern part of the Site.

7.4.5 Perched groundwater is evident from strikes recorded within the Tidal Flat Deposits however no monitoring data is available to confirm standing levels. Based on knowledge of this area of the Scheme, it is anticipated that groundwater will be at relatively shallow depth and is likely to be in hydraulic continuity with the perched water body within the Made Ground.

7.4.6 Groundwater was encountered in the granular Superficial Deposits and in the underlying Mercia Mudstone at between 7.9 and 9.1 m below ground level. With a resting level of 1.13 - 1.13 m bGL this implies that the groundwater within the Glaciofluvial Deposits and/or Mercia Mudstone is confined by the overlying low permeability Tidal Flat Deposits.

8 Contamination Assessment

8.1 Introduction

8.1.1 The following sections provide details of the assessment of land contamination at the Site.

8.1.2 The outline Conceptual Site Model (CSM) presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015) and the Scheme. The main alterations to the 2014 PSSR model are summarised as follows:

- Addition of thin peat layers.
- Additional gas pollutant (methane and/or carbon dioxide) considered from peat.
- Sub-artesian pressures within the Glaciofluvial Deposits and Mercia Mudstone considered within the Scheme.
- New ditch considered as a new pathways.
- Update of the source/pathway/receptor linkages taking account of above and more detailed amendments.

8.2 Preliminary Risk Assessment

Potential Sources

8.2.1 The Made Ground was identified through the 2014 PSSR as a potential source of contamination associated with potential contamination arising from historical landfilling activity. The thickness of Made Ground within the corridor of the new section of motorway has been identified as minimal.

8.2.2 Given the limited thickness of Made Ground, a perched water body beneath the motorway corridor is not anticipated to be present. However, the perched groundwater within the Made Ground in the southern area may be in hydraulic continuity with the groundwater body of the Tidal Flat Deposits beneath the proposed embankment.

8.2.3 The Made Ground and peat horizons may represent potential sources of ground gas. The potential of the latter may increase as a result of consolidation associated with the surcharge loading and the use of piled foundations.

8.2.4 The quality of the surface waters, perched groundwater and the deeper aquifer within the Glaciofluvial Deposits and Mercia Mudstone may influence or impact the quality of the others. Surface water, perched groundwater and deeper aquifer are therefore regarded as a source of possible contaminants as well as receptors.

Potential Receptors

Construction

- Construction workers during site development works.
- Groundwater within the Glaciofluvial Deposits and Mercia Mudstone.
- Nearby surface waters including the reens and existing surface water ditches within the Site and bordering the surrounding fields. This land drainage may be connected with the Gwent Levels Site of Specific Scientific Interest (SSSI) wider network of reens and ditches, located south of the new section of motorway.

Operational

- General public end users.
- General public adjacent to permanent land take.
- Maintenance workers.
- Groundwater within the Glaciofluvial Deposits and Mercia Mudstone.
- Nearby surface waters including the reens and existing and/or proposed surface water ditches within the Site and bordering the surrounding fields.

Potential Pathways

- Dermal contact, ingestion, inhalation pathways possible during construction works.
- Dermal contact, ingestion, inhalation pathways possible for general public end users (from dust originating outside the embankment footprint).
- Leaching of contaminants from the Made Ground to shallow perched groundwater body.
- Surface water run-off into local reens and ditches.
- Vertical migration of leachate from the Made Ground into main groundwater bodies.
- Vertical migration of groundwater from within the Glaciofluvial Deposits and Mercia Mudstone possibly recharging perched groundwater and/or saturating the Made Ground due to pile installation.
- Vertical or lateral migration of ground gas associated with the Made Ground and peat.

8.3 Risk Evaluation

8.3.1 Source pathway receptor linkages were considered in the 2014 PSSR using the historical data available up to 2008. With review of the other data described herein, the following risk evaluation has been re-considered and included:

- The Site has been subject to potential contaminating uses through landfilling activity, however much of the waste mass is located at least 100 m from the new section of motorway.
- The proposed 10 m high embankment will provide significant cover and therefore reduce pathways for contamination in the shallow soils to motorway users.
- Tidal Flat Deposits are classified as non-productive and overlie a secondary aquifer associated with the Glaciofluvial Deposits and Mercia Mudstone.
- Perched groundwater within the Tidal Flat Deposits is not considered a water resource due to its anticipated low vertical hydraulic continuity with the aquifer beneath, low permeability and storage capacity.
- The low permeability Tidal Flat Deposits (of about 7 m thickness) separates the Made Ground and deeper aquifer. Ground water within the Mercia Mudstone is confined by the Tidal Flat Deposits.
- The proposed use of piles could create pathways from any potentially contaminated soils within or under the motorway embankment to the secondary aquifer.
- No soils ground gas data is available for the Site. Gas migration requires consideration in relation to proposed piling for the embankment foundations.
- Motorway users will be within an open environment with no proposed structures or other confined spaces.

8.4 Human Health Risk Assessment

8.4.1 The rationale and approach for the human health (Tier 2) screening assessment is detailed in the Land Contamination Preliminary Assessment Report (Appendix 11.1 of the ES). Soil chemical results and the findings of the generic tier 2 human health risk assessment are presented in Appendix 2. All exceedances to the relevant criteria are summarised in Table 17.

Table 17: Summary of Human Health Soil Screening Exceedances

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Locations of exceedances
Lead	mg/kg	24 - 1920	1300	2 (10)	CH5 (x2)
PAH	mg/kg	<0.01 - <201	1.1	2 (8)	CH6 (x2)

8.4.2 Exceedances of lead were identified on two samples from the same location, which may represent an area of discrete localised contamination as the remainder of the dataset for the same geological unit (Made Ground), are well below the screening criteria.

8.4.3 Chromium concentrations are considered to be within normal background data range and therefore are not considered to represent a contaminant of concern.

Further speciation is recommended during construction to confirm low risks (Appendix 11.1 of the ES).

8.4.4 Total PAH is identified with exceedances. In this instance the criteria for total PAH has been taken considering the most stringent PAH compound (Dibenzo(ah)anthracene). Whilst this is considered as a conservative initial approach, it is noted that both these exceedances relate to Made Ground material. This may represent a discrete area of contamination.

8.4.5 There were four instances where the laboratory limit of detection (LoD) was higher than the screening criterion used. This was for PAH at locations CH5, CH7 and CH8 where the LoD's were <75, <201 and <10 mg/kg.

8.4.6 No other exceedances of the applied assessment criteria have been identified.

8.4.7 No asbestos fibres were detected visually or in samples (2 no.) analysed in the laboratory.

8.5 Controlled Waters Screening Assessment

8.5.1 The rationale and approach for the controlled waters (Tier 1) screening assessment is detailed in the Land Contamination Preliminary Assessment Report (Appendix 11.1 of the ES) and the groundwater chemical results are presented in Appendix 3. All exceedances to the relevant criteria are summarised in Table 18, Table 19 and Table 20 for soil leachate, groundwater and surface waters, respectively.

8.5.2 Where Environmental Quality Standard (EQS) is dependent on water hardness i.e. some heavy metals, the hardness of the surface water receptor should normally be used. The Baseline Water Environment Report (Appendix 16.2 of the ES) indicates surface water to be generally moderately hard with hardness concentrations within a range of 100 to 150 mg/l as calcium carbonate. Therefore EQSs within this water hardness range have been used for screening purposes.

Soil Leaching Results

8.5.3 One soil sample was subjected to leachate analysis. The majority of the soil leachate results were below the applied screening criteria, with the exception of the following contaminants.

Table 18: Controlled Waters Screening Exceedances - Soil Leachate

Determinant	Units	Range	EQS	DWS	No. exceeded EQS (Total number of results)	Location	No. exceeded DWS (Total number of results)	Location
Copper	ug/l	31	10	2000	1 (1)	STPD05	0 (1)	-
Lead	ug/l	4	1.2	10	1 (1)	STPD05	0 (1)	-

8.5.4 Exceedances of lead were identified on two samples from the same location, which may represent an area of discrete localised contamination as the

remainder of the dataset for the same geological unit (Made Ground), are well below the screening criteria.

8.5.5 The leachability of copper and lead within the Made Ground is therefore deemed to be moderate and may pose a risk to controlled waters.

8.5.6 Certain laboratory detection levels in samples used in previous ground investigations for cadmium and cyanide are higher than the screening criterion.

8.5.7 The leachability of lead as seen in the samples from CH5 and of organics from the general Made Ground in not known.

Groundwater Results

8.5.8 The groundwater analysis results include two grab samples from the perched groundwater onsite taken during trial pitting and a number of rounds of groundwater monitoring results from off site boreholes, SBHD066 and BH404, undertaken in 2008 and 2015, respectively. The groundwater samples were taken from the Glaciofluvial Deposits / Mercia Mudstone and the perched groundwater within the Tidal Flat Deposits / Made Ground. The results of these samples should therefore be regarded as indicative in line with BS10175:2001.

8.5.9 The summary of the exceedances of the screening criteria is presented in Table 19 and Table 20 and are discussed below.

Table 19: Water Screening Exceedances (On site)

Determinant	Units	Range	EQS	DWS	No. exceeded EQS (Total number of results)	Location	No. exceeded DWS (Total number of results)	Location
Perched Water (Made Ground)								
Arsenic	µg/l	22	50	10	0 (1)	-	1 (1)	CH5
Nickel	µg/l	87	4	20	1 (1)	CH5	1 (1)	CH5
Pentachlorophenol	ug/l	0.6	0.4	-	1 (1)	CH5	0 (1)	-
Fluoranthene	ug/l	0.08	0.0063	-	1 (1)	CH5	0 (1)	-
Perched Groundwater (Tidal Flat Deposits)								
Nickel	µg/l	<1 - 8.2	4	20	2 (4)	CH8, BH404	0 (4)	-
Phenols	mg/l	<0.03 – 0.08	0.0077[1]		1 (3)	BH404	0 (3)	-

Table 20: Groundwater Screening Exceedances (Off site)

Determinant	Units	Range	EQS	DWS	No. exceeded EQS (Total number of results)	Location	No. exceeded DWS (Total number of results)	Location
Aquifer (Glaciofluvial Deposits / Mercia Mudstone)								
Manganese	µg/l	630 - 920	30	50	2 (2)	SBHD06	2 (2)	SBHD06
Zinc	µg/l	<1 - 150	75	-	1 (5)	SBHD06	0 (5)	-
Cadmium	ug/l	<0.08 - 0.6	0.15	5	1 (5)	SBHD06	0 (5)	-
Ammoniacal Nitrogen	mg/l	<0.01 - 4.1	0.6	-	1 (4)	SBHD06	0 (4)	-
Total Ammonium as NH_4	mg/l	0.6	-	0.5	0 (1)	-	1 (1)	SBHD06
Phenols	mg/l	<0.03 – 0.03	0.0077[1]		1 (4)	BH404	0 (4)	-

Note: [1] based on phenol criteria

8.5.10 Review of the groundwater chemical testing results indicate that the perched water within the Made Ground beneath the Site has elevated metals (arsenic and nickel) phenols and fluoranthene. In addition to the exceedances identified above, TPH was identified above LOD within one grab sample from CH05 at 600 ug/l.

8.5.11 The off site groundwater within the Glaciofluvial Deposits and Mercia Mudstone is identified with elevated metals (manganese, cadmium and zinc) and inorganic contaminants (ammoniacal nitrogen and ammonium) and total phenols. Aromatic TPH was identified above LOD within one sample from SBHD06 at a total of 12,000 µg/l.

8.5.12 The perched groundwater of the Tidal Flat Deposits monitored within BH404 recorded marginal exceedances of nickel and total phenols. The latter has been compared against the criterion for phenol which is considered a conservative initial approach.

8.5.13 All BTEX, MTBE, TPH, PAHs, phthalates and PCBs were at or below the laboratory limit of detection.

8.5.14 Although the contaminants within the Made Ground have leachable lead and copper, none of these contaminants are reported to be in exceedance to the screening criteria.

8.5.15 Given that chloride concentrations are below the DWS, the groundwater appears to be freshwater.

8.5.16 The water within the Made Ground is shown to be impacted by some contaminants however the off site groundwater (perched and aquifer) quality status is considered to be in general in keeping with the baseline quality seen within this area of Newport (Appendix 16.2 of the ES). The current information indicates no obvious impact to groundwater from the land use of the Site.

Surface Water

8.5.17 A summary of the surface water quality screening assessment undertaken for the Site is presented in Table 21. This includes the results for the three monitoring locations identified in Table 5, situated on Morfa Gronw Reen and Wheel Lane Reen.

8.5.18 The results for all the sample locations are also presented in the baseline environment report (Appendix 16.2 of the ES).

Table 21: Summary of Surface Water Screening Assessment

Parameter	Unit	No. Analyses	No. Analyses Above LOD	Min Conc	Max Conc	Location & Round with Max Conc	EQS	No. Analyses Exceeding EQS	DWS	No. Analyses Exceeding DWS	CCW Trigger Level	No. Analyses Exceeding CCW Trigger Level
Cadmium	ug/l	3	2	0.5	0.5	R5 / E2	0.15	2	5	0	5	0
Zinc	ug/l	3	3	23	260	R5 / E4	75	1	-	-	1,000	0
BOD	mg/l	5	2	2	45	R5 / E4	5	1	-	-	18	1
Nitrate as NO_3	mg/l	5	2	1.3	2.658	R5 / E4	-	-	50	0	1	2
Phosphate	mg/l	3	1	1.2	1.2	R5 / E4	-	-	-	-	1	1
Phosphorus	mg/l	2	2	126	669	7.3 / Q1	400	2	-	-	-	-
Ammoniacal Nitrogen	mg/l	5	5	0.06	2.48	R5 / E4	0.6	1	-	-	1	1

8.5.19 The quality for Morfa Gronw Reen is generally good, with single occurrences each for Ammoniacal Nitrogen and Phosphorus exceeding their respective EQS. Exceedances were also recorded for Zinc and Cadmium. TPH was analysed in R5 and 7.1, with no occurrences above the laboratory Limit of Detection. Given the chloride concentrations are below the DWS, the surface water appears to be freshwater.

8.5.20 Wheel Lane Reen records one exceedance which was for Phosphorous in May 2015. With the exception of this, all other parameters were recorded below their respective EQS.

8.5.21 BOD and Ammoniacal Nitrogen exceeded the relevant screening criteria. Location R5 also recorded exceedances above CCW trigger levels and consisted of BOD; Nitrate (NO_3), Ammoniacal Nitrogen and Orthophosphate. These exceedances were recorded during the autumn monitoring round (E4).

8.5.22 Although the surface water quality of Morfa Gronw Reen and Wheel Lane Reen is considered to be in keeping with the water quality expected in the reen system and of good quality, it is considered unlikely that a hydraulic linkage exists between the Site and the surface water sample locations, particularly at times of negligible groundwater recharge.

8.6 Ground Gas Risk Assessment

8.6.1 No monitoring wells were installed onsite during the investigations and therefore no gas monitoring data is available. No gas monitoring is available in the vicinity of the Site. However, the following initial comments may be made:

- The main waste mass is predominantly located some 80 m from the new section of motorway alignment. This is separated by predominantly Tidal Flat Deposits, likely to act as a geological gas barrier for lateral and vertical gas migration.
- The main waste mass is up to 3.1 m in thickness with about 50-80 % above ground level. Made Ground buried below ground level is therefore limited.
- The Made Ground was described to be predominantly of inert status for gas generation, although localised wood / sleepers have also been identified. The Made Ground is therefore considered to be of low gas generation potential.
- The thickness of Made Ground beneath the proposed embankment across the Site is negligible.
- Peat horizons are likely to be associated with high methane concentrations however only thin bands/laminations were encountered at the Site.

8.6.2 Potential ground gas from the Site is therefore considered to represent a low risk to the Scheme.

8.7 Summary

8.7.1 Discrete areas of elevated lead concentrations are identified within the Made Ground.

8.7.2 Elevated PAH has been identified within the Made Ground, although the lack of speciation within the analytical data requires the use of conservative screening criteria.

8.7.3 Moderate levels of leachability have been identified from the Made Ground material with exceedances of copper and lead.

8.7.4 Perched water within the Made Ground has been identified with a limited number of elevated metals and organic contaminants when compared to the Environment Quality Standards and Drinking Water Standards, although gross contamination is not evident. Presence of some TPH is also noted.

8.7.5 There is no obvious linkage between the contamination seen in the Made Ground soils, the leachability data to date and the contamination status seen in the perched water.

8.7.6 The off site perched groundwater and the deep groundwater quality some 20 m east of the former landfill are identified to be impacted by some metal, organic and inorganic contaminants.

9 Refined Conceptual Model

9.1.1 The results of the supplementary Ground Investigation have enabled the original CSM presented in the 2014 PSSR to be updated. All relevant Pollutant (Source-Pathway-Receptor) Linkages are considered within the refined CSM. The assessment is based on the new section of motorway and takes consideration of the design.

9.1.2 A CSM to represent general ground conditions, overall Scheme layout and relevant source – pathway - receptors (each of which having a specific alpha-numerical symbol attached) are presented in Figure 2.

Table 22: Conceptual Site Model

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
On Site Waste from historical landfilling.	**Construction**					
	Construction Workers (B)	Direct dermal (1)	Unlikely	Low	Very low	Construction workers will possibly be exposed to Made Ground materials during construction works; however exposure duration will be short term only. Prior to construction, a specific risk assessment will be required in line with CDM and H&S guidance. This will enable safe methodology and appropriate level of PPE to be put in place. As such all risks will be duly considered and suitably mitigated to protect construction workers. Current data set identifies Made Ground to be present at the surface within the motorway corridor and limited exceedances to the selected screening criteria are observed. Further investigation is required to establish whether any localised contamination exists and any associated risks. Dust suppression measures are recommended during construction works.
		Ingestion (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
		Inhalation of ground gas or vapours (2)	Unlikely	Low	Very low	Limited putrescible material identified within the Made Ground. Significant abnormal gas regime not anticipated. Low concentration of VOC and SVOC recorded. Very limited thickness of Made Ground present beneath new section of motorway. Area of Made Ground underlain by predominantly cohesive Tidal Flat Deposits which are likely to represent geological barrier thereby preventing lateral or vertical gas migration. Construction to be largely within open space. Any earthworks within confined space would require specific risk assessment, control measures and PPE.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Surface waters (D)	Leaching and saturated flow within perched groundwater (4)	Likely	Low	Low	Perched (shallow) groundwater is likely to be intercepted by the land drainage. The quality of perched groundwater may become impacted by contamination during the construction works, particularly in the area excavation (new drains).Low leaching potential identified from soil materials. Perched groundwater is likely to have low flow and may be absent seasonally. Perched water within the Made Ground has elevated metals and organics. This body is anticipated to be absent beneath the footprint of the new section of motorway. Linkages between perched water within the Made Ground and the footprint of the motorway may be through the possible hydraulic continuity with the shallow groundwater of the Tidal Flat Deposits. Groundwater quality status identified adjacent to landfill shows elevated metals, inorganics and organics. Data based on limited information and the provision and implementation of a suitable verification sampling inspection strategy during construction to confirm risks.
		Contaminated surface water run-off (5)	Likely	Low	Low	During construction if the Made Ground is excavated some material might enter the adjacent drainage ditch that forms part of the wider network of reens and ditches, part of the Gwent Levels SSSI. Surface water run-off may further deteriorate the quality of surface water. Construction process to adopt surface water control and management.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Deeper Groundwater within Granular Superficial Deposits (Ca)	Contamination displacement through piling (4)	Likely	Low	Low	Displacement of potentially impacted Made Ground possible during piling, however this is subject to selected piling technique. Short term only. A piling risk assessment is required to confirm low risk to controlled waters. Current data set identifies Made Ground to be present at the surface within the motorway corridor and limited exceedances to the selected screening criteria are observed. Data based on limited information and the provision and implementation of a suitable verification sampling inspection strategy during construction to confirm risks.
Groundwater – Aquifer from the Glaciofluvial Deposits and Mercia Mudstone	Surface water (land drainage) (D)	Piles (4)	Likely	Low	Low	Aquifer quality shown to be impacted by metal contaminants and ammoniacal nitrogen. Hydrostatic pressure of the Aquifer potentially near base of land drainage. Piles may create vertical pathways connecting aquifer with land drains. Presence of 7 m thick cohesive Tidal Flat Deposits. Perched groundwater within Tidal Flat Deposits and deep groundwater of similar quality. Surface waters are of similar quality to the groundwater. A piling risk assessment is required to confirm low risk to controlled waters.
Peat	Construction Workers (B)	Inhalation of ground gas / explosion (2)	Low	High	Moderate	No ground gas data available to characterise gas regime from peat horizons. Peat likely to be associated with high methane concentration but with low or absent flux. Peat identified as thin bands/laminations and overlain by low permeability cohesive soils. New pathways to be created with piles. Construction to be largely within open space.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						Any earthworks within confined space would require specific risk assessment, control measures and PPE.
On Site Waste from historical landfilling.	**Operational**					
	Maintenance Workers (B)	Direct dermal (1)	Unlikely	Low	Very low	Made Ground to be largely encapsulated by the embankment and therefore the exposure to contamination will be limited outside the motorway embankment. Areas outside the motorway hardstanding are likely to receive topsoil cover and vegetation establishment, reducing potential of exposure. Exposure duration will be short term only. Site specific risk assessment will be required in line with H&S guidance. This will enable safe methodology and appropriate level of PPE to be put in place. As such all risks will be duly considered and suitably mitigated. Current data set identify limited exceedances to the selected screening criteria. Data based on limited information and the provision and implementation of a suitable verification sampling inspection strategy during construction to confirm risks.
		Ingestion (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
		Inhalation of ground gas or vapours (2)	Unlikely	Low	Very low	As per during construction.
	Future Motorway users (A)	Dermal contact with soil dust (1)	Unlikely	Low	Very low	Made Ground to be largely encapsulated by the embankment and therefore the exposure to contamination will be limited outside the motorway corridor. Exposure duration will be short term only for Motorway users. Screening criteria considered conservative when considering exposure and pathway
		Ingestion of soil dust (3)	Unlikely	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of soil dust (2)	Unlikely	Low	Very low	mechanisms. Data based on limited information and the provision and implementation of a suitable verification sampling inspection strategy during construction to confirm risks.
		Inhalation of ground gas or vapours (2)	Unlikely	Low	Very low	Limited putrescible material identified within the Made Ground. Significant abnormal gas regime not anticipated. Low concentration of VOC and SVOC recorded. Very limited thickness of Made Ground present beneath the new section of motorway. Area of Made Ground underlain by predominantly cohesive Tidal Flat Deposits which are likely to represent geological barrier thereby preventing lateral or vertical gas migration. Receptor within open space and at least 1-2 m above ground level.
	Groundwater - Aquifer (Da) within the Glaciofluvial Deposits and Mercia Mudstone	Leaching/migration (4) if contamination in Made Ground	Likely	Low	Low	Piles may potentially form a pathway to deep groundwater within the Mercia Mudstone. A piling risk assessment is required to confirm low risk to controlled waters. Current data set identifies Made Ground to be present at the surface within the motorway corridor and limited exceedances to the selected screening criteria are observed. Hard/vegetative cover will reduce infiltration and thus leaching potential.
Waste from historical landfilling.	Surface water (land drainage) (D)	Saturated flow within perched groundwater (4)	Likely	Low	Low	Perched (shallow) groundwater is likely to be intercepted by the land drainage. Perched groundwater is likely to have low flow and may be absent seasonally. Groundwater quality status identified within and adjacent to landfill shows elevated metals, inorganics and organics.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Groundwater - Aquifer from the Glaciofluvial Deposits and Mercia Mudstone	Surface water (land drainage) (D)	Piles (4)	Likely	Low	Low	Aquifer quality shown to be impacted by metal contaminants and ammoniacal nitrogen. Hydrostatic pressure of the Aquifer potentially near base of land drainage. Piles may create vertical pathways connecting aquifer with land drains. Presence of 7 m thick cohesive Tidal Flat Deposits Perched groundwater within Tidal Flat Deposits and deep groundwater of similar quality. Surface waters are of similar quality to the groundwater. A piling risk assessment is required to confirm low risk to controlled waters.
Peat	Maintenance Workers (B)	Inhalation of ground gas / explosion (2)	Low	High	Moderate	No ground gas data available to characterise gas regime from peat horizons. Peat identified as thin bands/laminations and overlain by low permeability cohesive soils. New pathways to be created with piles. Maintenance workers to be largely within open space. Site specific risk assessment will be required in line with health and safety guidance. As such all risks will be duly considered and suitably mitigated to protect maintenance workers.
	Motorway users (A)	Inhalation of ground gas / explosion (2)	Unlikely	High	Moderate to low	Ground gas data – comments as above. Limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits to shallow depth. Motorway to be built on raised embankment providing a further barrier to migration gases.

10 Conclusions and Recommendations

10.1 Conclusions

10.1.1 Ground Investigations have been undertaken at the Site to assess risks from land contamination associated with the construction and operation of the Scheme including human health and controlled waters risks.

10.1.2 Gross contamination associated with the Site historical use has not been identified. The risk assessment has identified that generally low risks to human health and moderate risks to controlled waters could exist. Control measures will be required to facilitate the construction and ongoing operation of the Scheme.

10.1.3 The historical and 2015 laboratory testing results confirmed the onsite observations and field testing, and showed that the materials encountered within the Site contain contaminant concentrations that are at levels that indicate minimal risk to human health. However, due to elevated levels of some contaminants being detected above a conservative screening assessment in soils, verification sampling and further analysis is recommended to support construction.

10.1.4 Limited putrescible material has been identified within the Made Ground and only thin peat horizons/lamination identified within the Tidal Flat Deposits. A significant abnormal gas regime in not anticipated at the Site however site specific risk assessments would be undertaken in line with health and safety guidance.

10.1.5 During the construction phase, specific mitigation measures will be required to prevent inhalation pathways of dust to the general public off site and construction workers. A suitable water management strategy will also be required to prevent impact to surface waters from run-offs.

10.1.6 There is limited analytical data specific to CL-9 that falls within the footprint of the motorway corridor. This should be mitigated through the provision and implementation of a suitable verification sampling inspection strategy during construction to confirm conditions are as expected and clarify materials for appropriate re-use.

10.1.7 Materials are considered likely to be suitable for reuse subject to provision of reuse criteria under a Material Management Plan.

10.1.8 During the operational phase, the embankment will cover part of the Site which will limit the infiltration of rainwater through the soils and thus potential leaching of soil contaminants into the groundwater.

10.1.9 New drainage should be confirmed to provide no new contamination linkages when intersecting areas of Made Ground. This should be confirmed through the verification sampling inspection strategy.

10.1.10 Adoption of the use of piles may provide new pathways which may lead to groundwater within the Tidal Flat Deposits and possibly any water bodies within the Made Ground to enter the currently confined aquifer within the Glaciofluvial deposits and Mercia Mudstone. Further consideration and risk assessment should be given to the potential impact of the use of piles and whether specific

precautions or mitigation measures should be implemented prior to construction using the Environment Agency guidance (EA, 2002).

10.1.11 Post construction, the embankment and topsoil cover outside the motorway corridor will limit linkages of concern of the possible contamination sources to the end-users and maintenance workers. Placed topsoil materials will need to be verified as chemically suitable.

10.2 Recommendations

10.2.1 A remediation strategy for the Scheme should be developed for the Site that includes the following:

- Addressing uncertain human health and controlled waters risk.
- Detailed risk assessment relating to use of piles creating pathways enabling contaminants entering surface water courses.
- Dealing with unexpected contamination.
- Verification sampling to confirm suitability of soils for re-use / retention within the Scheme (beneath embankment and within new drainage).
- Control measures (over and above good practise construction management) to prevent risks to construction workers and the general public during construction.
- Verification of material used as topsoil.

10.2.2 The remediation strategy should include a remediation options appraisal, remediation implementation plan and remediation verification plan.

10.2.3 The remediation strategy should be supplemented with a Scheme wide Material Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

11 References

Environment Agency (2001) Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention. NC/99/73

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Geotechnical Engineering (2015) M4 Corridor Around Newport, Factual Report on Ground Investigation, 30238

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Ove Arup and Partners (2014) M4 Corridor Around Newport, Preliminary Sources Study Report, 14/9197

Titan Environmental Surveys Ltd (2008) New M4 Magor to Castleton Baseline Surface Water Quality Final Report for Arup, Report Number HS0442/F1/2

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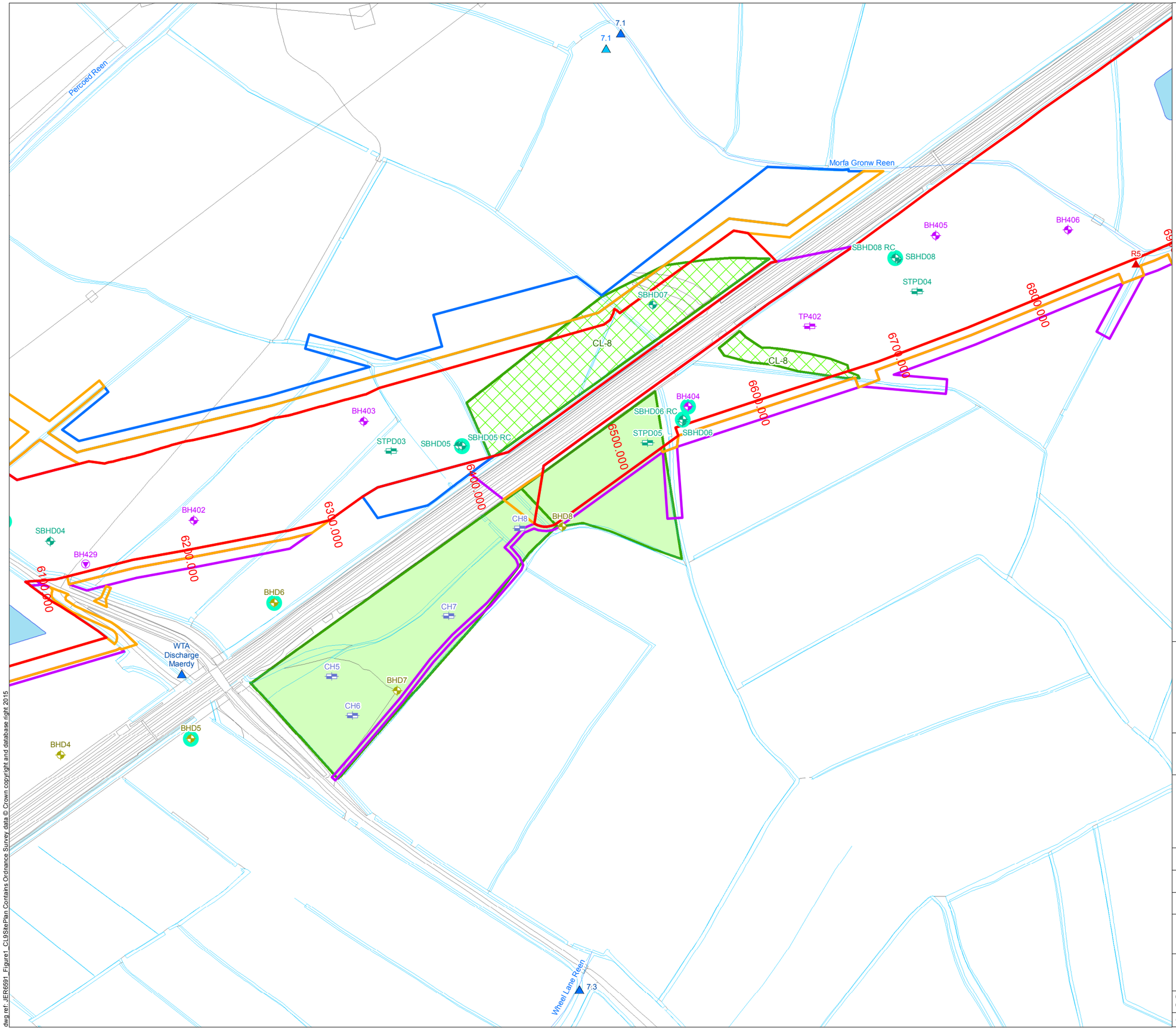
CL:AIRE (2011) Definition of Waste. Development Industry Code of Practice, Version 2, March 2011, ISBN 978-1-905046-23-2

12 Glossary

BF	Blast Furnace
BGS	British Geological Survey
BOD	Biochemical Oxygen Demand
BOS	Basic Oxygen Slag
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAT	Cable Avoidance Tool
CDM	Construction Design Management
CH_4	Methane
CLEA	Contaminated Land Exposure Assessment
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
CSM	Conceptual Site Model
DMRB	Design Manual for Roads and Bridges
DO	Dissolved Oxygen
DQRA	Detailed Quantitative Risk Assessment
DWS	Drinking Water Standard
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESG	Environmental Scientifics Group
EQS	Environmental Quality Standard
FTIR	Fourier Transform Infrared (spectroscopy)
GAC	Generic Assessment Criteria
GDR	Geotechnical Design Report
GIR	Ground Investigation Report
GRO	Gasoline Range Organics
LEL	Lower Explosive Limit
LOD	Limit of Detection
mAOD	Metres Above Ordnance Datum

mb	Millibars
mbGL	Metres below Ground Level
MTBE	Methyl Tert-butyl Ether
NRW	Natural Resources Wales
ORP	Oxidation Reduction Potential
O_2	Oxygen
OS	Ordnance Survey
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCSM	Preliminary Conceptual Site Model
PID	Photo Ionisation Detector
PPE	Personnel Protection Equipment
SGVs	Soil Guideline Values
SSAC	Site Specific Assessment Criteria
SSSI	Site of Special Scientific Interest
SVOCs	Semi-Volatile Organic Compounds
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbon
TPH CWG	Total Petroleum Hydrocarbon Criteria Working Group
UKAS	United Kingdom Accreditation Service
VOCs	Volatile Organic Compounds
WFD	Water Framework Directive
UXO	Unexploded Ordnance Survey

Figures



dwg ref: JER6591_Figure1_CL9SitePlan Contains Ordnance Survey data © Crown copyright and database right 2015

Legend

- Permanent Highway Land within Fenceline (including Water Treatment Areas)
- Other Permanent Land Take
- Temporary Construction Land
- Easement Only
- Proposed Water Treatment Area (WTA)
- Potential Area of Land Contamination based on 2014 PSSR
- Other Potential Area of Land Contamination

Investigation Locations

2015 (RPS)

- Surface Water Monitoring Location - Q2
- Surface Water Monitoring Location - Q1

2015 (Geotechnical Engineering)

- Borehole
- Dynamic Probe (Proposed Borehole)
- Trial Pit

2008-2009 (Titan Surveys)

- Surface Water Monitoring Location

2007 (Norwest Holst)

- Borehole
- Trial Pit

2000 (Exploration Associates)

- Trial Pit

1997 (Norwest Holst)

- Borehole
- Monitoring Well Installation



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Appendix 11.1 Annex D CL-9

Site Plan for CL-9

Figure: 1	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: FB

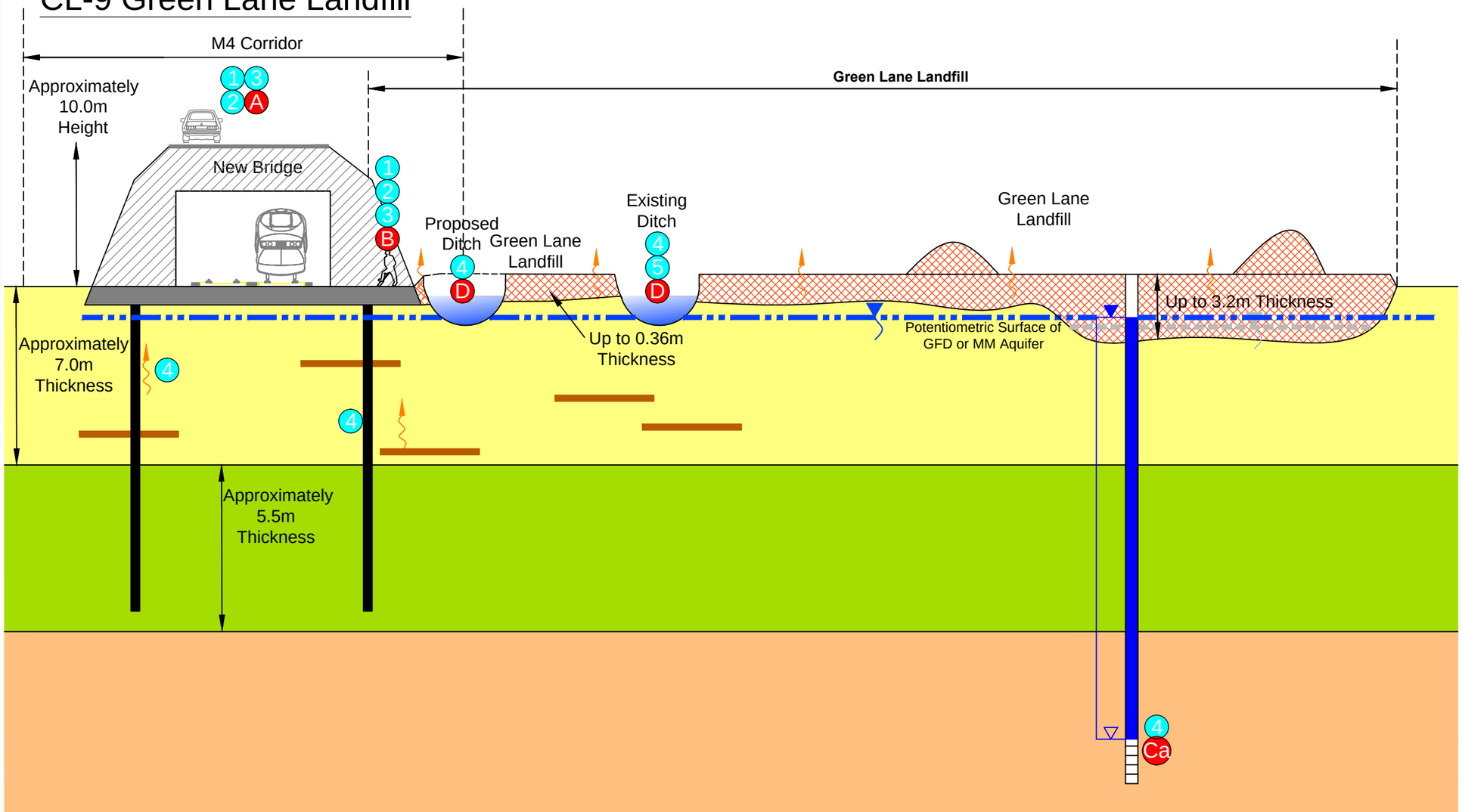
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dwg ref: JER6591_Figure1_CL9SitePlan

CL-9 Green Lane Landfill



Ground conditions based on available information

Legend

- Made Ground - MG
- Made Ground (Waste Material)
- Tidal Flat Deposits (Predominantly Clay) - TFD
- Glaciofluvial Deposits (Predominantly Sand & Gravel) - GFD
- Peat Bands
- Mercia Mudstone - MM
- Proposed Embankment
- Proposed Concrete Foundation
- Proposed Pile
- Perched Groundwater (Top of TFD)
- Groundwater (GFD and MM)
- Water Strike
- Rest Water Level
- Perched Water (MG)
- Gas Migration Pathway

Potential Receptors

- A: Humans On-Site (M4 User)
- B: Humans On-Site (Construction/Maintenance)
- Ca: Groundwater (Aquifer)
- D: Surface Water

Potential Pathways

- 1: Dermal Contact
- 2: Inhalation
- 3: Ingestion
- 4: Leaching / Migration
- 5: Surface Run Off

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Potential for contamination to be present on site associated with potential & known fill material
- Perched water within made ground
- Potential for ground gas
- Aquifer

NOTE
Drawing refined from PSSR Drawing Reference M4-OA-17-00DR-Z-XX-0124 (April 2014)

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Appendix 11.1 Annex D CL-9

Conceptual Site Model for CL-9

Figure: 2	Revision: -
Date: March 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

dwg ref:JER6591_Figure2_CL9ConceptualSiteModel

dwg ref: JER6591_Figure2_CL9ConceptualSiteModel

Appendices

A1 Appendix 1

Exploratory Records

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No.
BHD7
Header

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	329095.0 E
Project	M4 Relief Road Magor to Castleton Stage 2				183408.0 N
		Drilling Rig	Pilcon/Knebel 77	Ground Level	7.90m AOD
Client	Welsh Office	Drillers	C.A/E.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	11/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	14/11/1997
		Core bit	Saw Tooth		

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
11/11/1997	1800	1.00	0.00	Dry	
12/11/1997	0800	1.00	0.00	Dry	
12/11/1997	1800	10.50	10.50	9.30	
13/11/1997	0800	10.50	10.50	4.10	
13/11/1997	1800	16.30	16.00	Dry	
14/11/1997	1130	16.30	16.00	1.44	

CABLE PERCUSSION DETAILS

Hard strata from depth	Hard strata to depth	Hours	Remarks
0.30	0.50	0.75	
11.60	11.85	0.75	
15.80	16.00	0.75	
16.00	16.20	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	16.30	150	15.00

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
12/11/1900	0000	9.10	8.80	20	moderate	0.00	0.00

ROTARY DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
16.00	35.00	mist	100%	92

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
1.00	C	N=11 (3,2,3,4,2,2)
2.00	C	N=1 (1,0,0,1,0,0)
4.00	S	N=3 (1,0,1,1,0,1)
6.00	S	1/450mm
8.00	S	1/450mm
10.00	C	N=60 (7,8,12,15,15,18)
11.50	C	50/50mm (8,19,50)
13.00	C	50/168mm (9,15,18,21,11)
14.50	C	N=56 (18,10,10,12,15,19)
15.50	S	50/165mm (8,14,20,25,5)
16.20	S	50/70mm (17,20,50)

* Seating blows only.

GENERAL NOTES

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, hard strata time in hours

Form	COMBINED HEADER
Version	2.00
Revised	26/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No. **BHD7** Sheet 1 of 4

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	329095.0 E 183408.0 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Knebel 77	Ground Level	7.90 m AOD
Client	Welsh Office	Drillers	C.A/E.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	11/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	14/11/1997
		Core Bit	Saw Tooth		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	Blow count to drive U100	SPT N & depth	Install-ation
MADE GROUND: Soft brown silty sandy clay with occasional to some sub-angular gravel size fragments of concrete and rubble with occasional rootlets to 1.00m.				D 0.20 B 0.50 - 1.00 B 1.00 - 1.45 D 1.25 B 2.00 - 2.45 D 2.75 U 3.00 - 3.45	(10)	C11 1.00 1.45 C1 2.00 2.45	
		3.10	4.80				
Very soft grey occasionally thinly laminated very silty CLAY with very occasional gravel size pockets of plant remains. (Estuarine Alluvium)				D 3.50 D 3.75 B 4.00 - 4.45 D 4.00 D 4.75 U 5.00 - 5.45 D 5.50 D 5.75	(4)	S3 4.00 4.45	
---from 4.75m slightly sandy							
---from 5.75m organic		5.90	2.00	D 5.90 B 6.00 - 6.45 D 6.00		S1/450mm 6.00 6.45	
Very soft greyish blue thinly laminated CLAY with some to many extremely closely spaced thin laminations of blackish brown spongy and firm fibrous peat. (Estuarine Alluvium)				D 6.75 U 7.00 - 7.45 D 7.50 D 7.75	(4)		
---from 7.75m sandy with occasionally fine to medium gravel size pockets of blackish brown firm fibrous peat				B 8.00 - 8.45 D 8.00 D 9.00		S1/450mm 8.00 8.45	
		9.10	-1.20	D 9.10			
Very soft to soft reddish brown very silty sandy CLAY. (Estuarine Alluvium)		9.30	-1.40	U 9.20 - 9.65 D 9.70	(90)		
				B 10.00 - 10.45		C60 10.00	

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No. **BHD7** Sheet 2 of 4

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	329095.0 E 183408.0 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Knebel 77	Ground Level	7.90 m AOD
Client	Welsh Office	Drillers	C.A/E.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	11/11/1997
Consultant	Ove Arup and Partners	Core Barrel	P	Date Completed	14/11/1997
		Core Bit	Saw Tooth		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	Blow count to drive U100	SPT N & depth	Installation
Soft greyish brown very silty slightly sandy CLAY with occasional to some sub-rounded siliceous gravel and occasional cobbles. (Estuarine Alluvium)	10.10	-2.20	B 10.00 - 10.45		C60 10.00 - 10.45	
Very dense greyish brown sandy sub-rounded siliceous GRAVEL with occaisonal cobbles. (Fluvial Alluvium)			D 11.00			
			B 11.50 - 11.95		C50/50mm 11.50 - 11.70	
			D 12.50			
			B 13.00 - 13.45		C50/168mm 13.00 - 13.32	
			D 14.00			
			B 14.50 - 14.95		C56 14.50 - 14.95	
Reddish brown mottled greyish green occasionally thinly laminated highly to completely weathered MUDSTONE, very weak to weak. (Mercia Mudstone Group)	14.70	-6.80	D 15.00			
			B 15.50 - 15.95 D 15.50		S50/165mm 15.50 - 15.82	
---from 16.20m highly weathered weak to moderately weak	16.30	-8.40	D 16.20	TCR SCR RQD FI	S50/70mm 16.20 - 16.42	
Reddish brown occasionally mottled green medium to thickly bedded moderately weathered silty MUDSTONE, moderately weak to moderately strong locally very weak with medium to widely spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group)			16.00 - 17.60	97 66 49 4		
---from 17.10 to 17.80m moderately weathered weak completely fractured				NI		
---from 17.80 to 19.10m moderately to highly weathered weak			17.60 - 19.00	100 46 0 12		
---from 18.55 to 20.00m with medium spaced undulating thin laminations of calcite			19.00 - 20.50	97 59 59 5		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No. **BHD7** Sheet 3 of 4

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	329095.0 E 183408.0 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Knebel 77	Ground Level	7.90 m AOD
Client	Welsh Office	Driller	C.A/E.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	11/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	14/11/1997
		Core bit	Saw Tooth		

Description of Strata	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown occasionally mottled green medium to thickly bedded moderately weathered silty MUDSTONE, moderately weak to moderately strong locally very weak with medium to widely spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group)							NI		
							NI		
			20.50 - 22.00	100	70	60	2		
---from 22.00 to 22.25m moderately to highly weathered weak completely fractured							NI		
			22.00 - 23.50	100	97	80	3		
	23.50	-15.60							
Reddish brown thinly to medium bedded highly weathered silty MUDSTONE, very weak completely fractured. (Mercia Mudstone Group)			23.50 - 25.00	100	27	0	NI		
	25.00	-17.10							
Reddish brown occasionally mottled green medium bedded moderately weathered silty MUDSTONE, very weak with medium spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group)			25.00 - 26.50	100	73	63	7		
---from 26.00m very sandy	26.20	-18.30					NI		
Reddish brown mottled green thinly to medium bedded highly weathered silty sandy MUDSTONE, very weak to weak completely fractured. (Mercia Mudstone Group)			26.50 - 28.00	100	7	0	NI		
			28.00 - 29.00	100	0	0	NI		
---from 29.00 to 29.65m moderately weathered weak with very closely to closely spaced sub-horizontal to inclined fractures planar rough tight			29.00 - 29.80	100	25	0	8		
							NI		

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE & ROTARY

Borehole No. **BHD7** Sheet 4 of 4

Contract No.	F10895	Method	Cable Percussion & Rotary Coring	Coordinates	329095.0 E 183408.0 N
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon/Knebel 77	Ground Level	7.90 m AOD
Client	Welsh Office	Driller	C.A/E.D	Orientation	Vertical
		Logged by	C.D/T.R	Date Started	11/11/1997
Consultant	Ove Arup and Partners	Core barrel	P	Date Completed	14/11/1997
		Core bit	Saw Tooth		

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling & coring	TCR	SCR	RQD	FI	SPT N & depth	Install-ation
Reddish brown mottled green thinly to medium bedded highly weathered silty sandy MUDSTONE, very weak to weak completely fractured. (Mercia Mudstone Group)				29.80 - 30.90	100	0	0	NI		
		30.90	-23.00							
Reddish brown thinly to medium bedded moderately weathered silty MUDSTONE, weak to moderately strong with very closely to closely spaced sub-horizontal to inclined fractures planar rough tight. (Mercia Mudstone Group)				30.90 - 31.90	100	50	15	NI 6		
---from 30.90 to 31.30m moderately to highly weathered weak completely fractured										
---from 31.90 to 32.40m moderately to highly weathered weak completely fractured				31.90 - 33.40	100	17	0	NI 10		
---from 32.90 to 33.20m moderately to highly weathered weak completely fractured								NI 10		
---from 33.40m with closely spaced sub-horizontal to inclined fractures planar rough tight				33.40 - 35.00	100	76	38	12		
---from 34.80m weak		35.00	-27.10							
Borehole complete at 35.00 m.										

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH COMBINED LOG
Version	1.00
Revised	20/09/96

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.
BHD8
Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	329208.0 E
Project	M4 Relief Road Magor to Castleton Stage 2				183520.0 N
		Drilling Rig	Pilcon	Ground Level	5.87m AOD
Client	Welsh Office	Driller	C.A	Orientation	Vertical
		Logged by	C.D	Date Started	14/11/1997
Consultant	Ove Arup and Partners			Date Completed	15/11/1997

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
14/11/1997	1800	10.00	7.70	5.70	
15/11/1997	0800	10.00	0.00	1.90	
15/11/1997	1800	14.30	13.50	Dry	

DRILLING DETAILS

Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
8.20	8.40	0.75	
9.70	9.80	0.50	
13.90	14.25	1.00	

CASING

Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
150	14.30	150	13.50

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
14/11/1997	0000	7.90	5.70	20.0	fast	7.70	0.00

GENERAL NOTES

SPT DETAILS

Depth	Type	Incremental blow count/penetration in mm
2.00	C	N=1 (1,0,0,1,0,0)
4.50	S	1/450mm
6.50	S	1/450mm
7.80	C	N=57 (5,7,8,12,16,21)
9.30	C	50/165mm (7,18,21,25,4)
10.80	C	N=85 (8,17,18,21,22,24)
12.20	C	N=58 (7,8,12,14,15,17)
13.80	S	N=67 (8,8,14,14,18,21)

* Seating blows only.

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

Form	CP HEADER
Version	2.00
Revised	25/06/1997

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No. **BHD8** Sheet 1 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	329208.0 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		183520.0 N
		Driller	C.A	Ground Level	5.87m AOD
Client	Welsh Office	Logged by	C.D	Orientation	Vertical
				Date Started	14/11/1997
Consultant	Ove Arup and Partners			Date Completed	15/11/1997

Description of Strata	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install-ation
TOPSOIL	0.10	5.77	U 0.20			
Soft to firm brown mottled very silty CLAY. (Estuarine Alluvium)			B 0.50 - 1.00			
---at 0.20m with occasional rootlets			U 1.00 - 1.45	(6)		
			D 1.50			
			D 1.75			
Very soft dark grey CLAY. (Estuarine Alluvium)	2.00	3.87	B 2.00 - 2.45 D 2.00	C1	C 2.00 2.45	
			D 2.75			
---at 2.75m soft			B 3.00 - 3.45 U 3.00 - 3.45	(4)		
			U 3.50 - 3.95	(4)		
			D 4.00			
			D 4.25			
			B 4.50 - 4.95 D 4.50	S1/450mm	S 4.50 4.95	
			D 5.25			
---at 5.50m very silty			U 5.50 - 5.95	(3)		
			D 6.00			
			D 6.25			
			B 6.50 - 6.95 D 6.50	S1/450mm	S 6.50 6.95	
	7.10	-1.23	D 7.10			
Very dense greyish brown sandy sub-rounded and occasional sub-angular siliceous GRAVEL with some cobbles. (Fluvial Alluvium)			U 7.20 - 7.65	(150)		
			D 7.70			
			B 7.80 - 8.25 W 7.90	C57	C 7.80 8.25	
			D 8.50			
			B 9.30 - 9.75	C50/165mm	C 9.30 9.62	

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No. **BHD8** Sheet 2 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	329208.0 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		183520.0 N
		Driller	C.A	Ground Level	5.87m AOD
Client	Welsh Office	Logged by	C.D	Orientation	Vertical
				Date Started	14/11/1997
Consultant	Ove Arup and Partners			Date Completed	15/11/1997

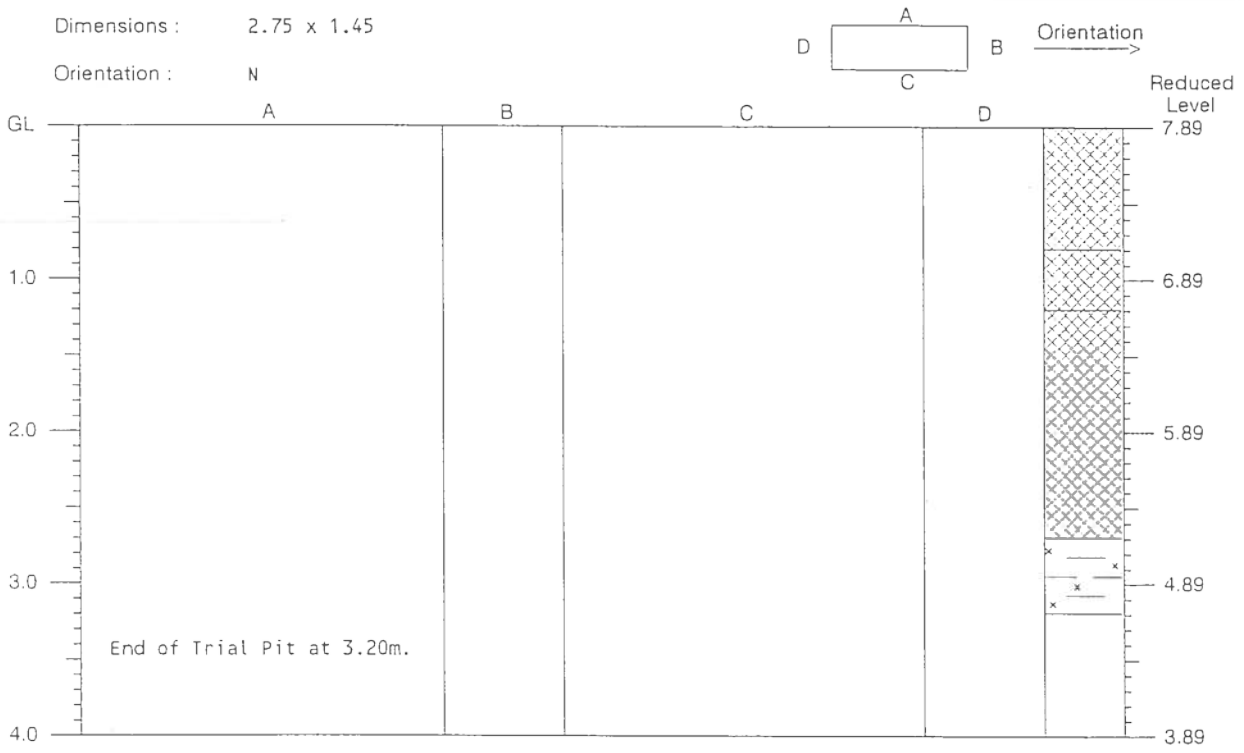
Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install-ation
Very dense greyish brown sandy sub-rounded and occasional sub-angular siliceous GRAVEL with some cobbles. (Fluvial Alluvium)				D 10.50 B 10.80 - 11.25 D 11.80 B 12.20 - 12.75	C85 C58	C 10.80 - 11.25 C 12.20 - 12.65	
		12.50	-6.63				
Reddish brown occasionally mottled greyish green highly to moderately weathered MUDSTONE, weak to moderately weak. (Mercia Mudstone Group) ---from 13.80m moderately weathered moderately weak				D 13.30 B 13.80 - 14.25 D 13.80	S67	S 13.80 - 14.25	
		14.30	-8.43				
Cable Percussion boring complete at 14.30 m.							

NB All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

Form	NH CP LOG
Version	2.00
Revised	19/12/1996

Dimensions : 2.75 x 1.45

Orientation : N



Strata

Depth (m)	No.	Description
0.00-0.80	1	MADE GROUND: Loose red brown sandy very silty clayey angular to sub-angular fine to coarse gravel and cobbles of concrete, brick, sandstone and limestone with some refuse of plastic 5%.
0.80-1.20	2	MADE GROUND: Loose grey sandy very silty clayey angular to sub-angular fine to coarse gravel and cobbles of brick, concrete, slag, ash and sandstone with some boulders (<550mm) of reinforced concrete (strong creosote odour) from wooden sleepers at 1.00m).
1.20-2.70	3	MADE GROUND: Soft to firm red brown and grey sandy very silty clay with some angular to sub-angular fine to coarse gravel of slag, brick, ash, sandstone and mudstone with occasional cobbles of brick and concrete and many wooden sleepers encountered at 1.90m with some refuse of plastic 5%.
2.70-3.20	4	Firm grey mottled brown very silty organic CLAY.

Samples and Tests

Depth (m)	Type	Results
0.00-0.80	BTO	
0.80-1.20	BTO	
1.20-1.70	BTO	
2.70-3.20	BTO	
2.70	W	

Date of Excavation 31/01/00
Equipment JCB 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
1	2.70	medium flow

Ground Level 7.89 m OD
Coordinates 329050.29 mE
183417.98 mN

Logged by DC
Checked by AF

Remarks

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

Project

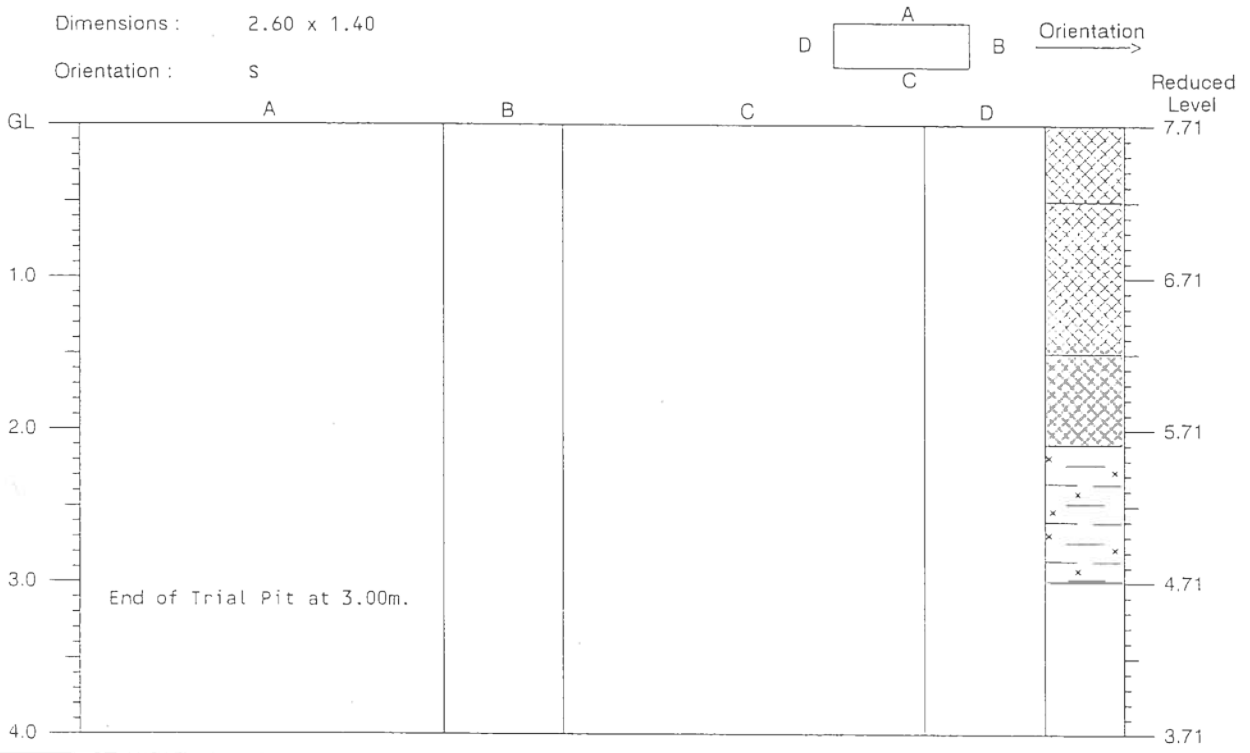
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Trial Pit CH5

Dimensions : 2.60 x 1.40

Orientation : S



Strata

Depth (m)	No.	Description
0.00-0.50	1	MADE GROUND: Firm reddish brown sandy very silty clay with much sub-angular to sub-rounded fine to coarse gravel and cobbles of brick, slag, ash, sandstone, siltstone and limestone.
0.50-1.50	2	MADE GROUND: Moderately compact grey very sandy slightly silty slightly clayey sub-angular to sub-rounded fine to coarse gravel and cobbles of concrete, brick, sandstone, slate, slag, ash and siltstone with some sub-angular boulder (<500mm) of reinforced concrete with occasional pockets of red brown very silty sandy clayey marl and some refuse of pipe 1%, plastic 1% and wood 10%.
1.50-2.10	3	MADE GROUND: Firm red brown sandy very silty clay with some angular to sub-angular fine to coarse gravel of brick, sandstone and concrete with much wood.
2.10-3.00	4	Firm grey mottled blue grey and brown slightly sandy very silty organic CLAY.

Samples and Tests

Depth (m)	Type	Results
0.00-0.50	BTO	
0.50-1.00	BTO	
1.50-2.00	BTO	
2.10-2.70	BTO	
	W	

Date of Excavation 31/01/00
Equipment JCB 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
1	1.80	slight seepage

Ground Level 7.71 m OD
Coordinates 329064.57 mE
183391.17 mN

Logged by DC
Checked by AF

Remarks Slight water seepage at 1.80m (insufficient amount for water sampling). Water sample taken in rear adjacent to CH6 (known as "Site No. 2" rear sample)

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

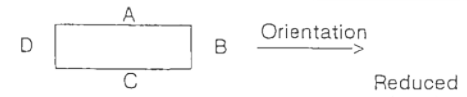
Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

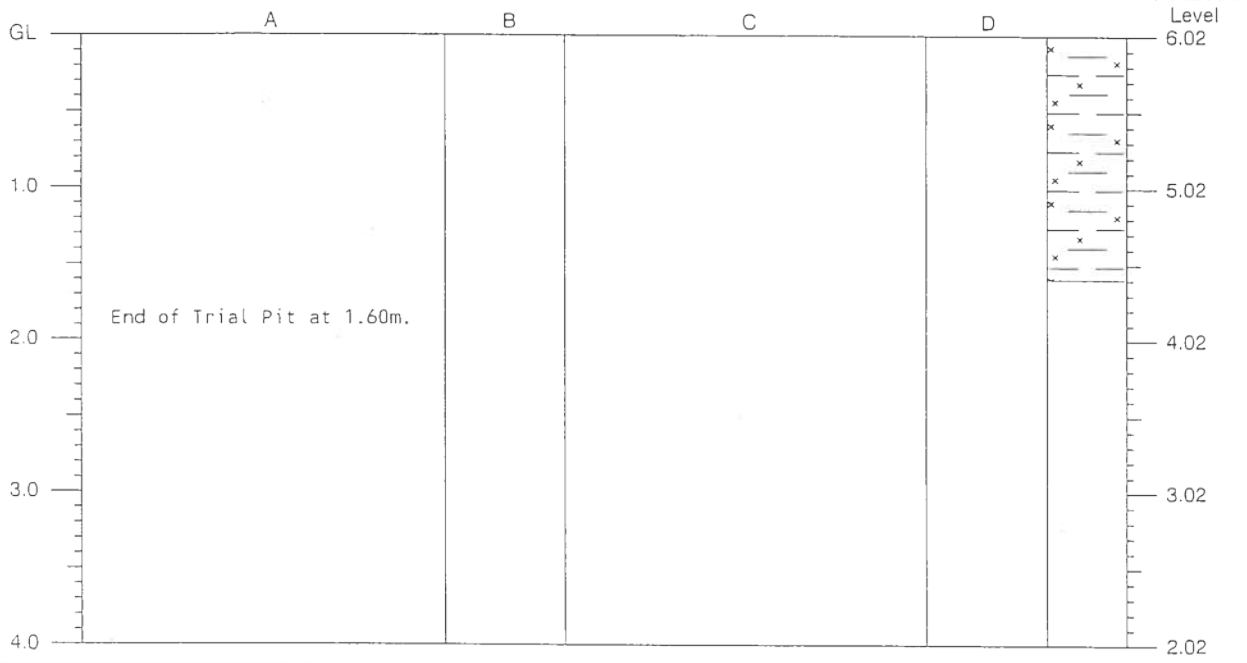
Contract 150006

Trial Pit CH6

Dimensions : 2.10 x 1.20

Orientation : N





Strata

Depth (m)	No.	Description
0.00-1.60	1	Soft to firm grey mottled brown very slightly organic CLAY.

Samples and Tests

Depth (m)	Type	Results
0.00-0.50	BTO	
1.00-1.60	B	

Date of Excavation 31/01/00
Equipment JCb 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
1	1.50	slight seepage

Ground Level 6.02 m OD
Coordinates 329130.33 mE
183458.91 mN

Logged by DC
Checked by AF

Remarks Slight seepage at 1.50m (insufficient amount for water sampling).

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

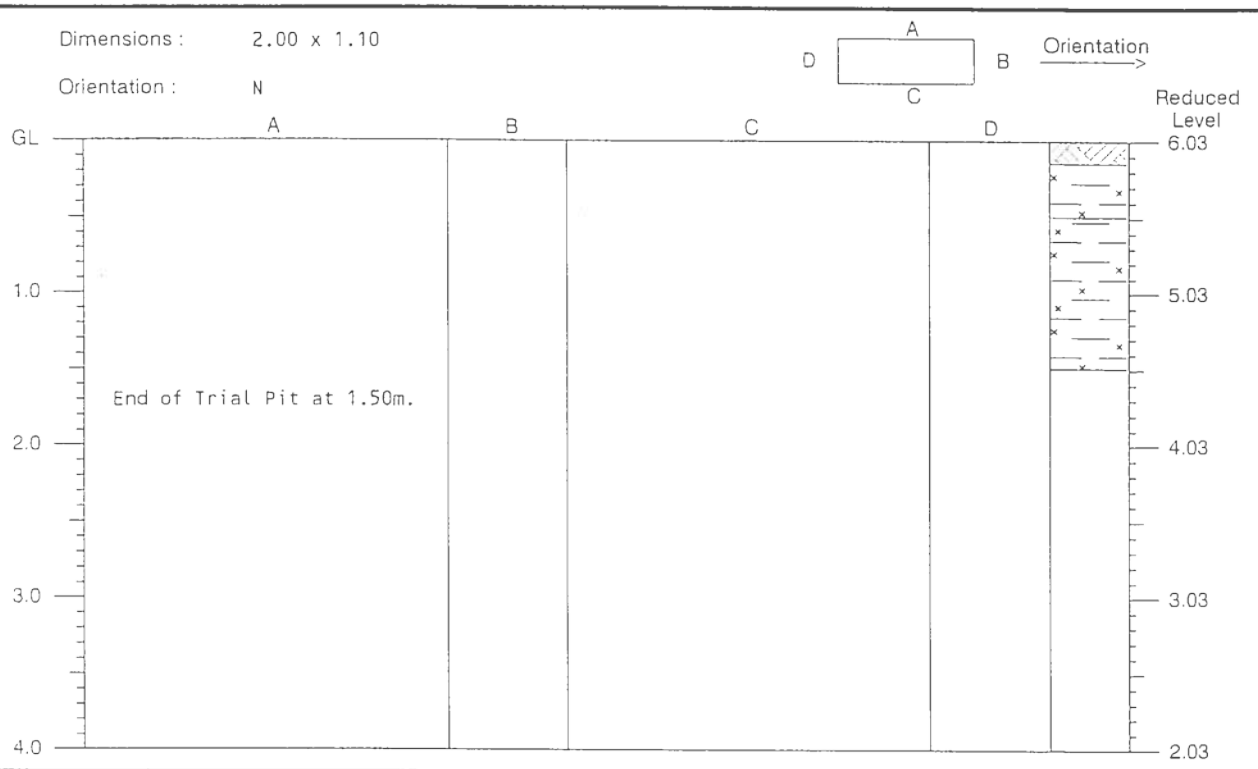
Project
M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Trial Pit CH7

Dimensions : 2.00 x 1.10

Orientation : N



Strata

Depth (m)	No.	Description
0.00-0.15	1	Brown sandy clayey TOPSOIL.
0.15-0.50	2	Grey mottled brown very silty organic CLAY.
0.50-1.50	3	Blue grey mottled brown very silty CLAY.

Samples and Tests

Depth (m)	Type	Results
0.15	B	
1.00-1.50	BTO	
1.50	W	

Date of Excavation 31/01/00
Equipment JCB 3CX
Stability Stable

Groundwater

No.	Struck	Behaviour
1	1.50	medium flow

Ground Level 6.03 m OD
Coordinates 329178.75 mE
183519.18 mN

Logged by DC
Checked by AF

Remarks

See key sheet and appendices for explanations.

Form 2/0

Trial Pit Record

Exploration Associates

Project

M4 Relief Road - Stage 2. Preliminary Chemical Investigation
Ove Arup & Partners

Contract 150006

Trial Pit CH8

Norwest Holst Soil Engineering Ltd.

TRIAL PIT LOG

Hole ID.
STPD05
Sheet 1 of 1

Contract No.	F15056	Method	Machine Excavated	Coordinates	329266.30 E
Project	New M4 • Second Preliminary Ground Investigation	Equipment	JCB 3CX		183577.46 N
				Ground Level	6.21m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	GS	Date Started	12/12/2007
				Date Completed	12/12/2007
Consultant	Ove Arup & Partners Ltd				

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
MADEGROUND: Topsoil		0.08	6.13			
MADE GROUND: Grey angular to subangular fine to coarse gravel and cobble sized fragments of brick, concrete, metal, wire, glass and plastic. With rare angular boulder sized fragments of concrete.		0.36	5.85	ES1 B2 D3 ES4	0.30 0.36 • 0.50 0.50 0.56	
Soft light grey mottled brown locally reddish brown silty slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of shell fragments. With occasional rootlets. (Estuarine Alluvium)				B5 ES6 D7	1.00 • 1.36 1.30 1.30	
Soft grey slightly sandy CLAY. With occasional rootlets. (Estuarine Alluvium)		2.35	3.86	B8 ES9 D10	2.40 • 2.62 2.62 2.62	
Firm light brown and black fibrous PEAT. (Peat)		3.86	2.35	D11 B12	3.80 3.82 • 3.86	
Soft light grey slightly sandy CLAY. (Estuarine Alluvium)		4.02	2.19	B13	4.02 • 4.16	
Trial pit complete at 4.16 m.		4.16	2.05	D14	4.10	

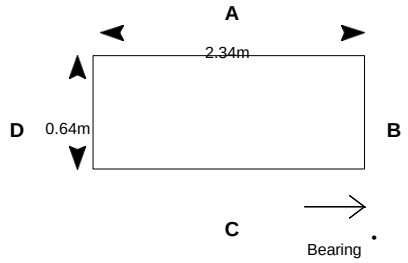
Stability: From 2.40m faces A and B unstable

Shoring: None used

Groundwater: Water strike at 1.38m on all faces • seepage

Remarks: 1.Trial pit complete at 4.16m

Sketch Plan of Trial Pit



NOTES: All depths in metres, all soil strengths in kPa.
See legend sheet for key to symbols and abbreviations.
All bearings given relate to magnetic North

Form	ARIAL TP LOG
Version	3.06
Revised	17/12/2007

Norwest Holst Soil Engineering Ltd.

HAND VANE AND HAND PENETROMETER TESTS

Hole ID.

STPD05
Data Sheet

Contract No.	F15056	Method	Machine Excavated	Coordinates	329266.30E
Project	New M4 • Second Preliminary Ground Investigation				183577.46 N
		Equipment	JCB 3CX	Ground Level	6.21m AOD
Client	Transport Wales, Welsh Assembly Government			Orientation	Vertical
		Logged by	GS	Date Started	12/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	12/12/2007

Hand Vane				Hand Penetrometer		
Depth	Test No	Peak	Remoulded	Depth	Test No	Result
1.35	01	18.0	4.0			
1.35	02	20.0	10.0			
1.35	03	18.0	6.0			
2.35	04	20.0	12.0			
2.35	05	20.0	10.0			
2.35	06	16.0	7.0			

NOTES: All depths in metres, all diameters in millimetres, test results in kPa.

Form	ARIAL HANDVANE/PEN
Version	3.03
Revised	18/01/2007

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD06 CP
Header

Contract No.	F15056	Method	Cable Percussion	Coordinates	329290.22 E
Project	New M4 - Second Preliminary Ground Investigation				183591.47 N
		Drilling Rig	Dando	Ground Level	6.10m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	14/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	16/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
14/11/2007	1730	3.50	2.50	2.20	End of Shift
15/11/2007	0730	3.50	2.50	0.80	Start of Shift
15/11/2007	1730	10.00	9.70	2.50	End of Shift
16/11/2007	0730	10.00	9.70	0.50	Start of Shift
16/11/2007	1730	10.50	10.40	2.30	End of Hole

BORING DETAILS

Hard Strata from depth	Hard Strata to depth	Chiselling hours	Remarks
10.00	10.40	2.50	Chiselling

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
200	10.50	200	10.40

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
14/11/2007		2.40	2.10	20	Slow	1.50	NS
15/11/2007		7.80	3.50	20		NR	NR

GENERAL NOTES

1. Insitu permeability testing carried out from 8.70m to 9.30m.
2. Cable Percussive boring terminated at 10.50m.
3. Borehole grouted upon completion.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
1.50	S	N=12 (2,2,2,3,3,4)	1.30	DRY
3.00	S	N=3 (1,0,1,0,1,1)	2.40	2.20
4.50	S	N=1 (1,0,0,0,1,0)	3.80	1.80
6.50	S	N=3 (1,0,1,0,1,1)	5.90	4.70
8.00	S	N=39 (3,8,8,10,11,10)	7.90	3.50
9.50	S	50/170mm (7,12,15,18,17)	9.30	2.60
10.40	S	50/20mm (25,50)	10.40	2.30

* Seating blows only.

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes, chiselling time in hours.

Form	ARIAL CP HEADER
Version	3.05
Revised	17/12/2007

NORWEST HOLST

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD06 CP
Sheet 1 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	329290.22 E
Project	New M4 - Second Preliminary Ground Investigation				183591.47 N
		Drilling Rig	Dando	Ground Level	6.10m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	14/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	16/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (Ublows)	SPT type	& depth	Install-ation
TOPSOIL. (Driller's description)		0.20	5.90						
Firm to stiff fissured orangish brown mottled grey slightly sandy CLAY. Sand is fine to medium. (Estuarine Alluvium)				ES1	0.30				
				B2	0.50 - 1.00				
				ES3	1.00	(11)			
				U4	1.00 - 1.45				
				D5	1.50	S12	S	1.50	
				D6	1.50 - 1.95				1.95
Very soft grey silty CLAY. (Estuarine Alluvium)		2.30	3.80	D7	2.40				
				U8	2.50 - 2.95	(5)			
---from 2.95m with frequent organic material and rootlets		3.00	3.10	D9	3.00	S3	S	3.00	
				D10	3.00 - 3.45				3.53
				B11	3.00 - 3.50				
Spongy brown fibrous PEAT with coarse gravel sized pockets of soft grey silty clay. (Peat)				W12	3.50				
		3.70	2.40	D13	3.80				
Very soft extremely low strength grey silty CLAY with rare organic material. Organic odour. (Estuarine Alluvium)				U14	4.00 - 4.45	(5)			
				D15	4.50	S1	S	4.50	
				D16	4.50 - 4.95				5.03
				B17	4.50 - 5.00				
---from 5.50m with frequent organic material				D18	5.50				
				U19	6.00 - 6.45	(6)			
---from 6.50m becomes slightly sandy				D20	6.50	S3	S	6.50	
				D21	6.50 - 6.95				7.03
				D22	7.50				
Dense brown and grey fine to coarse SAND and subangular to rounded fine to coarse GRAVEL of sandstone, mudstone, limestone and quartz. With low cobble content cobbles are subangular of limestone. (Fluvial Alluvium)		7.70	-1.60	D23	7.80				
				D24	8.00 - 8.45	S39	S	8.00	
				B25	8.50 - 9.00				8.45
Very dense greyish brown slightly gravelly medium to coarse SAND with low cobble and boulder content. Gravel is subangular to rounded fine to medium of sandstone, mudstone, siltstone and quartz. Cobbles and boulders are subangular of limestone. (Fluvial Alluvium)		9.00	-2.90	D26	9.50	S50/170mm	S	9.50	
				D27	9.50 - 9.82				9.82

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

Form	ARIAL CP LOG
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Revised	17/12/2007

NORWEST HOLST

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Hole ID.
SBHD06 CP
Sheet 2 of 2

Contract No.	F15056	Method	Cable Percussion	Coordinates	329290.22 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Dando		183591.47 N
				Ground Level	6.10m AOD
Client	Transport Wales, Welsh Assembly Government	Driller	AL	Orientation	Vertical
		Logged by	DH	Date Started	14/11/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	16/11/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		SPT N & (Ublows)	SPT type & depth		Install-ation
Very dense greyish brown slightly gravelly medium to coarse SAND with low cobble and boulder content. Gravel is subangular to rounded fine to medium of sandstone, mudstone, siltstone and quartz. Cobbles and boulders are subangular of limestone. (Fluvial Alluvium) ---from 10.20m High cobble content.				B28	10.20 - 10.40				
				D29	10.40 - 10.50	S50/20mm	S	10.40 10.45	
		10.50	-4.40						
Cable Percussion boring complete at 10.50 m.									

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of boring, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD06 RC
Header

Contract No.	F15056	Method	Rotary Coring	Coordinates	329290.36 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183593.26 N
		Driller	ME	Ground Level	6.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	24/11/2007

PROGRESS

Date	Time	Hole depth	Casing depth	Water depth	Remarks
21/11/2007	1730	18.00	15.10	8.60	End of Shift
22/11/2007	0730	18.00	15.10	1.80	Start of Shift
22/11/2007	1730	25.00	15.10	1.50	End of Shift
23/11/2008	0730	25.00	15.10	1.50	Start of Shift
23/11/2008	1730	37.60	15.10	1.70	End of Shift
24/11/2008	0730	37.60	15.10	1.70	Start of Shift
24/11/2008	1730	40.50	15.10	1.20	End of Hole

DRILLING DETAILS

From depth	To depth	Flush type	Flush return	Core diameter
0.00	15.00	Air/Mist	100%	0.00*
15.00	16.00	Air/Mist	100%	92.0

CASING

Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.
121	40.50	121	15.10

WATER STRIKES

Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
21/11/2007	1115	3.20	NR	NR	Heavy	3.20	NR
22/11/2007	0930	19.20	NR	NR	Heavy	15.00	NS

GENERAL NOTES

1. Rotary Openhole drilling from GL to 15.00m.
2. Rotary Coring complete at 40.50m.
3. 50mm standpipe installed, slotted from 7.50m to 15.00m.

SPT DETAILS

Depth	Type	Incremental blow count/penetration	Casing	Water Depth
16.00	S	N=52 (4,6,12,11,14,15)	15.10	9.00
18.00	S	N=72 (9,12,14,19,18,21)	15.10	9.40
20.00	S	N=57 (8,9,14,14,13,16)	15.10	2.00
22.00	S	100/235mm (4,5,18,29,31,22)	15.00	1.70
24.00	S	100/240mm (6,10,17,31,33,19)	15.10	2.00
26.00	S	100/225mm (12,13,29,33,37,1)	15.00	1.50
28.00	S	125/15mm - Abandoned	15.00	1.80

NOTES: All depths in metres, all diameters in millimetres, water strike rise time in minutes.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD06 RC
Sheet 1 of 5

Contract No.	F15056	Method	Rotary Coring	Coordinates	329290.36 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Hands England Tractor		183593.26 N
		Driller	ME	Ground Level	6.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	24/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
TOPSOIL. (Driller's description)		0.30	5.88							
Soft brown CLAY. (Driller's description)		2.50	3.68							
Stiff grey CLAY. (Driller's description)		3.20	2.98							
PEAT. (Driller's description)		3.60	2.58							
Clayey GRAVEL. (Driller's description)		7.50	-1.32							
SAND and GRAVELS. (Driller's description)										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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BOREHOLE LOG - ROTARY

Hole ID.
SBHD06 RC
Sheet 2 of 5

Contract No.	F15056	Method	Rotary Coring	Coordinates	329290.36 E
Project	New M4 - Second Preliminary Groun	Drilling Rig	Hands England Tractor		183593.26 N
	Investigation	Driller	ME	Ground Level	6.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	24/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
SAND and GRAVELS. (Driller's description)										
Zone of Core Loss. Extremely weak to very weak reddish brown locally mottled grey MUDSTONE. (Logged from SPT samples).		15.00	-8.82	15.00 16.00	0	0	0		16.00 16.45 S52	
				16.00 17.00	0	0	0	NA		
				17.00 18.00	0	0	0			
Extremely weak to very weak reddish brown locally mottled grey MUDSTONE. Discontinuities 1) 0-10 very closely to medium spaced undulating rough locally infilled with clay. (Mercia Mudstone Group) ---from 18.00m to 18.17m recovered as non intact core (subangular medium to coarse gravel sized fragments) ---from 18.20m to 18.75m recovered as non intact core (clayey sand sized fragments and angular fine to coarse gravel sized fragments) ---from 18.75m to 19.00m assumed zone of core loss ---from 19.15m to 19.18m recovered as non intact core (angular fine to coarse gravel sized fragments)		18.00	-11.82	18.00 19.00	75	3	0	NI NI 30	18.00 18.45 S72	
				19.00 20.00	64	50	0	NI 20 90		

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD06 RC
Sheet 3 of 5

Contract No.	F15056	Method	Rotary Coring	Coordinates	329290.36 E
Project	New M4 - Second Preliminary Groun	Drilling Rig	Hands England Tractor		183593.26 N
	Investigation	Driller	ME	Ground Level	6.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	24/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling		TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Remaining Detail : 19.23m - 19.30m : ---from 19.23m to 19.30m recovered as non intact core (clayey angular fine to coarse gravel sized fragments)				20.00	20.50	100	76	0		20.00 20.45 S57	
Detail 19.64m - 20.00m : ---from 19.64m to 20.00m assumed zone of core loss ---from 20.00m to 20.04m recovered as non intact core (subangular fine to coarse gravel sized fragments)				20.50	22.00	76	35	7	NI NI NI		
---from 20.10m to 20.30m 1 No (80-90 deg) discontinuity undulating clay infilled ---from 20.30m to 20.35m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 20.50m to 20.74m recovered as non intact core (clayey coarse sand sized fragments and angular fine to coarse gravel sized fragments) ---from 20.90m to 21.00m recovered as non intact core (clayey coarse sand sized fragments and angular fine to coarse gravel sized fragments) ---from 21.47m to 21.64m recovered as non intact core (clayey coarse sand sized fragments and angular fine to medium gravel sized fragments)				22.00	23.00	40	7	0		22.00 22.39 S100/235mm	
---from 21.64m to 22.00m assumed zone of core loss ---from 22.00m to 22.14m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 22.15m to 22.37m recovered as non intact core (clayey angular fine to coarse gravel sized fragments) ---from 22.37m to 23.00m assumed zone of core loss ---from 23.00m to 23.14m recovered as non intact core (clayey angular fine to medium gravel sized fragments) ---from 23.24m to 24.00m assumed zone of core loss				23.00	24.00	24	9	0	NI 10 100		
---from 24.00m to 24.07m recovered as non intact core (angular coarse gravel sized fragments) ---from 24.20m to 24.25m recovered as non intact core (angular coarse gravel sized fragments) ---from 24.32m to 24.44m recovered as non intact core (angular coarse gravel sized fragments) ---from 24.44m to 25.00m assumed zone of core loss				24.00	25.00	30	14	0		24.00 24.39 S100/240mm	
				25.00	26.00	100	96	91	NI 90 330		
---from 26.00m to 26.30m recovered as non intact core (clayey subangular to subrounded fine to coarse gravel sized fragments) ---from 26.40m to 26.50m assumed zone of core loss				26.00	26.50	80	20	20	NI 20 100	26.00 26.38 S100/225mm	
				26.50	27.50	84	84	29	20 80 170		
---from 27.13m to 27.32m recovered as non intact core (firm gravelly clay. Gravel sized fragments are angular fine to medium) ---from 27.32m to 27.50m assumed zone of core loss				27.50	28.00	82	76	38			
---from 27.60m to 27.93m recovered as non intact core (firm gravelly clay. Gravel sized fragments are angular fine to medium) ---from 27.93m to 28.00m assumed zone of core loss ---from 28.00m to 28.14m recovered as non intact core (firm gravelly clay. Gravel sized fragments are angular fine to medium) ---from 28.17m to 28.39m recovered as non intact core (angular fine to coarse gravel sized fragments)				28.00	29.00	81	52	34	NI 80 110	28.00 28.02 S125/15mm - Abandoned	
---from 28.44m to 28.55m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 28.71m to 28.73m recovered as non intact core (angular coarse gravel sized fragments)				29.00	29.50	60	16	0	NI NI 80		
				29.50	30.00	100	54	24			

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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NORWEST HOLST

Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD06 RC
Sheet 4 of 5

Contract No.	F15056	Method	Rotary Coring	Coordinates	329290.36 E
Project	New M4 - Second Preliminary Groun	Drilling Rig	Hands England Tractor		183593.26 N
	Investigation	Driller	ME	Ground Level	6.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	24/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Remaining Detail : 28.81m - 29.00m : ---from 28.81m to 29.00m assumed zone of core loss Detail 29.10m - 29.35m : ---from 29.10m to 29.35m recovered as non intact core (angular coarse gravel sized fragments) Detail 29.35m - 29.50m : ---from 29.35m to 29.50m assumed zone of core loss Detail 29.50m - 29.68m : ---from 29.50m to 29.68m recovered as non intact core (subangular coarse gravel sized fragments) Detail 29.80m - 29.87m : ---from 29.80m to 29.87m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 30.00m to 30.10m recovered as non intact core (angular medium to coarse gravel sized fragments) ---from 31.25m to 31.50m recovered as non intact core (angular coarse gravel sized fragments) ---from 31.89m to 31.94m recovered as non intact core (angular medium to coarse gravel sized fragments)				30.00 31.50	100	87	79	NI 190 360		
				31.50 33.00	92	82	65	NI 30 190 130 220 960		
				33.00 34.50	79	65	43	NI 80 140		
---from 33.85m to 34.05m recovered as non intact core (angular coarse gravel sized fragments and angular cobble sized fragments)		34.05	-27.87							
Weak to very weak reddish brown locally mottled grey MUDSTONE. Discontinuities 1) 0-10 very closely to medium spaced undulating rough locally infilled with clay. (Mercia Mudstone Group) ---from 34.30m to 34.50m assumed zone of core loss ---from 34.67m to 34.90m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 35.40m to 35.92m recovered as non intact core (angular fine to coarse gravel sized fragments)				34.50 36.00	88	57	29	NI 90 150		
---from 35.92m to 36.00m assumed zone of core loss ---from 36.00m to 36.20m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 36.10m to 38.15m thin bed of greenish grey mudstone ---from 36.36m to 36.57m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 36.76m to 36.86m recovered as non intact core (angular fine to corse gravel sized fragments)				36.00 37.60	94	73	41	NI 90 200 NI 90 200		
				37.60 39.00	93	90	60	NI 130 220		
				39.00 40.50	100	90	46			

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Hole ID.
SBHD06 RC
Sheet 5 of 5

Contract No.	F15056	Method	Rotary Coring	Coordinates	329290.36 E
Project	New M4 - Second Preliminary Groun	Drilling Rig	Hands England Tractor		183593.26 N
	Investigation	Driller	ME	Ground Level	6.18m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	T6116	Date Started	21/11/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	24/11/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	RQD	IF	SPT N & depth	Install-ation
Weak to very weak reddish brown locally mottled grey MUDSTONE. Discontinuities 1) 0-10 very closely to medium spaced undulating rough locally infilled with clay. (Mercia Mudstone Group)		40.50	-34.32							
Rotary drilling complete at 40.50 m.										

NOTES: All depths in metres, all diameters in millimetres.
See header sheet for details of drilling, progress and water strikes. See legend sheet for key to symbols.

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Geotechnical Engineering Limited

BOREHOLE LOG

BH404

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 1 of 3

Start Date 12 January 2015 — Easting 329294.1 — Scale 1 : 50

End Date 15 January 2015 — Northing 183602.1 — Ground level 6.10mOD — Depth 24.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
12/01/15 1230hrs	1B	0.20 - 0.50						Grass over very soft brownish grey organic silty CLAY with frequent plant fragments (up to 5mm).			
	2D*	0.20 - 0.50		Vo 1.6							
	3D*	0.50 - 0.70		Vo 1.4							
	4B	0.50 - 0.70									
	5B	0.70 - 1.00									
	6D*	0.70 - 1.00		Vo 2.1							
	UT	1.00 - 1.45							1.20	4.90	
	7X	1.00 - 1.50						Very soft brownish grey organic silty sandy CLAY with frequent plant fragments (up to 5mm).			
	8D*	1.40 - 1.50	Nil	S 1							
	9D	1.50 - 1.95									
	10X	1.50 - 2.00							2.00	4.10	
	11UT	2.00 - 2.45	Nil					Very soft grey organic silty CLAY.			
	12D	2.45 - 2.50									
	13D	2.50 - 2.95	Nil	S 2							
	14X	2.00 - 3.00									
	15D*	2.50 - 2.60							2.90	3.20	
								Spongy dark brown fibrous PEAT.	3.00	3.10	
	16UT	3.00 - 3.45	3.00					Very soft brownish grey organic silty CLAY with frequent plant fragments up to 5mm.			
	19X	3.00 - 4.00									
	17D	3.45 - 3.50									
	18D	3.50 - 3.95	3.00	S<1				3.00 - 3.10m: Spongy clayey peat.			
	20UT	4.00 - 4.45	3.00					4.00 - 4.10m: Spongy clayey peat.			
	23X	4.00 - 5.00									
	21D	4.45 - 4.50									
	22D	4.50 - 4.95	3.00	S 1							
	24UT	5.00 - 5.45	5.00					Soft dark grey organic silty CLAY	5.00	1.10	
	26X	5.00 - 6.50									
	25D	5.50 - 5.95	5.00	S 1							
12/01/15 1620hrs 4.40m									6.15	-0.05	
								Spongy dark brown fibrous PEAT.	6.35	-0.25	
	27D	6.50 - 6.95	6.50	S 30				Soft dark grey slightly sandy organic clayey SILT.			
13/01/15 0930hrs 1.20m	28X	6.50 - 8.00									
									7.20	-1.10	
								Dense brownish grey silty very sandy subrounded and subangular fine to coarse sandstone and crystalline GRAVEL.			
	29D	8.00 - 8.45	8.00	S 35							
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Dynamic sampled (113mm) 1.00-11.00m and 12.00-12.50m. Waterflush rotary core drilled (116mm) 11.00-12.00m and 12.50-24.50m.

CASING: 140mm diam to 12.50m.

BACKFILL: On completion, borehole backfilled with bentonite 24.50-12.50m. A slotted standpipe (50mm) was installed to 12.50m, granular response zone 12.50-8.00m and bentonite seal 8.00-4.00m. A second slotted standpipe (35mm) was installed to 4.00m, granular response zone 4.00-1.00mm, bentonite seal 1.00-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001). Permeability test undertaken at 6.50m- 8.00m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
0.80	Nil	0.80	20	

AGS

CONTRACT **30238**

CHECKED

DRAFT

Geotechnical Engineering Limited

BOREHOLE LOG

BH404

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 2 of 3

Start Date 12 January 2015 — Easting 329294.1 — Scale 1 : 50

End Date 15 January 2015 — Northing 183602.1 — Ground level 6.10mOD — Depth 24.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
	30X	8.00 - 9.50									
	31D	9.50 - 9.95	9.50	S 46							
	32X	9.50 - 11.00									
	33D	11.00 - 11.33	11.00	S*86					11.00	-4.90	
	34C	11.00 - 12.00			10			Limited recovery of subrounded grey sandstone COBBLES.			
	35X	12.00 - 12.50							12.00	-5.90	
13/01/15 1720hrs 4.00m								Very stiff fissured reddish brown sandy gravelly CLAY. Gravel is subangular and subrounded fine and medium lithorelicts of very stiff clay to extremely weak mudstone. Localised relict fissures and randomly orientated closely spaced rarely infilled (up to 5mm) with fine to coarse sand sized selenite crystals. (MMG. Weathering Grade III)			
	36D	12.50 - 12.95	12.50	S 47							
14/01/15 0915hrs 0.80m	37C	12.50 - 14.00			83	NA					
	38C	14.00 - 14.41	12.50	C*83	100						
		14.00 - 15.50			77 77						
		15.50 - 15.73	12.50	C*120							
	39C	15.50 - 17.00			100 0 0	NI			15.75	-9.65	
						NA		Extremely weak and very weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° and subvertical very closely and closely spaced planar rough with rare selenite crystals (up to 5mm). (MMG. Weathering Grade II)	16.50	-10.40	
		17.00 - 17.17	12.50	C*167							
	40C	17.00 - 18.50			100 12 0			Very stiff fissured reddish brown slightly sandy gravelly to very gravelly CLAY. Gravel is subangular and subrounded fine and medium lithorelicts of very stiff clay to extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced locally stained black. (MMG. Weathering GradeIII)	17.50	-11.40	
						NI 60 90			17.90	-11.80	
								Continued Next Page	{18.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

AGS

CONTRACT **30238**

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Geotechnical Engineering Limited

BOREHOLE LOG

BH404

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT — Sheet 3 of 3

Start Date 12 January 2015 — Easting 329294.1 — Scale 1 : 50

End Date 15 January 2015 — Northing 183602.1 — Ground level 6.10mOD — Depth 24.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	I_f	instru -ment	description	depth (m)	reduced level (m)	legend
						NA		Weak thinly laminated to very thinly bedded reddish brown MUDSTONE with frequent light greenish grey reduction spots (up to 30mm). Fractures are subhorizontal to 20° and subvertical very closely spaced planar rough. (MMG. Weathering Grade I)			
	41C	18.50 - 18.67 18.50 - 20.00	12.50	C*214	100 20 0	NI 40 90			18.65	-12.55	
						NA		Stiff fissured reddish brown slightly sandy gravelly CLAY with rare light greenish grey reduction spots (up to 20mm). Gravel is angular and subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal and randomly orientated planar rough. (MMG. Weathering Grade III)	19.30	-13.20	
	42C	20.00 - 20.19 20.00 - 21.50	12.50	C*188	100 97 40			Extremely weak thinly laminated to very thinly bedded reddish brown MUDSTONE with rare light greenish grey reduction spots (up to 10mm). Fractures are subhorizontal to 20° and subvertical very closely and closely spaced planar rough with rare selenite crystals (up to 5mm). (MMG. Weathering Grade II)			
	43C	21.50 - 21.63 21.50 - 23.00	12.50	C*250	100 93 20			Very stiff fissured reddish brown very gravelly CLAY with rare light greenish grey reduction spots (up to 20mm). Gravel is angular and subangular fine to coarse lithorelicts of extremely weak and very mudstone. Fissures are subhorizontal to 20° and subvertical very closely spaced planar rough. (MMG. Weathering Grade III) 20.50 - 20.90m: Frequent 60-70° fissures planar smooth stained dark grey.			
14/01/15 1700hrs 4.10m											
15/01/15 0900hrs 1.30m	44C	23.00 - 23.10 23.00 - 24.50	12.50	C*341	100	NA					
15/01/15 1020hrs 1.40m								24.00 - 24.50m: Locally tending to extremely weak mudstone.			
		24.50 - 24.59	12.50	C*333				Borehole completed at 24.50m.	24.50	-18.40	
									{28.00}		

water strike (m) casing (m) rose to (m) time to rise (m) remarks

AGS

CONTRACT **30238**

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A2 Appendix 2

Tabulated Soil Laboratory Data

M4CAN
Soil Analysis Results & Screening Assessment
CL-9
30/06/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposit

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD No Fibres Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	BHD7	BHD7	CH5	CH5	CH6	CH6	STPD05	CH7	CH8	STPD05	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location and Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
Location Type																		
Specimen Depth		0.2	2.75	0	0.8	0	1.5	0.3	0	1	0.56							
Geology Code		MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD							
Cluster Code		1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2007 GI	2000 GI	2000 GI	2007 GI							
Metals & Inorganics																		
Antimony	mg/kg							4.8			3.8	2	2	4.8	3.8	STPD05 @ 0.3mbGL		
Arsenic	mg/kg	13.5	10.8	9.9	13	7.7	6.6	5	18	13	<3	10	9	18	5	CH7 @ 0mbGL	170	0
Barium	mg/kg							1300			69	2	2	1300	69	STPD05 @ 0.3mbGL		
Boron	mg/kg	0.3	1.2	0.6	1.3	0.5	<1		1.3	1.3		8	7	1.3	0.3	CH5 @ 0.8 / CH7 @ 0 / CH8 @ 1mbGL	46000	0
Boron Water Soluble	mg/kg							<3.5			<3.5	2	0	None > LOD	None > LOD			
Cadmium	mg/kg	0.8	0.6	1.1	1.32	0.51	0.27	3.8	0.08	0.11	<0.3	10	9	3.8	0.08	STPD05 @ 0.3mbGL	190	0
Chromium	mg/kg	41.9	44.1	25	29	16	16	16	38	45	47	10	10	47	16	STPD05 @ 0.56mbGL	33	5
Copper	mg/kg	32.3	27.8	74	178	27	31	2600	10	12	27	10	10	2600	10	STPD05 @ 0.3mbGL	44000	0
Lead	mg/kg	91.3	97.6	1610	1920	500	545	130	43	51	24	10	10	1920	24	CH5 @ 0.8mbGL	1300	2
Mercury	mg/kg	0.2	<0.1	0.42	0.41	<0.15	<0.12	<0.6	0.08	0.04	<0.6	10	5	0.42	0.04	CH5 @ 0mbGL	30	0
Molybdenum	mg/kg							1			<0.6	2	1	1	1	STPD05 @ 0.3mbGL		
Nickel	mg/kg	29.6	27.2	23	27	16	17	12	38	38	36	10	10	38	12	CH7 @ 0 / CH8 @ 1mbGL	980	0
Selenium	mg/kg	0.3	0.5	0.83	0.72	0.61	<0.58	<3			<3	8	5	0.83	0.3	CH5 @ 0mbGL	1800	0
Zinc	mg/kg	135.7	124.7	186	280	119	130	950	99	112	130	10	10	950	99	STPD05 @ 0.3mbGL	170000	0
Iron	mg/kg							22000			37000	2	2	37000	22000	STPD05 @ 0.56mbGL		
Cyanide (total)	mg/kg	0.2	<0.1	<1	<1	<1	<1	<1	<1	<1	<1	10	1	0.2	0.2	BHD7 @ 0.2mbGL		
Cyanide (free)	mg/kg	<0.1	<0.1									2	0	None > LOD	None > LOD			
Thiocyanate	mg/kg	<1	<1									2	0	None > LOD	None > LOD			
Ferro/ferricyanide	mg/kg	<10	<10									2	0	None > LOD	None > LOD			
Acid Soluble Sulphate	mg/kg			1110	1300	868	798		152	283		6	6	1300	152	CH5 @ 0.8mbGL		
Sulphate (soluble)	g/l							0.2			0.14	2	2	0.2	0.14	STPD05 @ 0.3mbGL		
Sulphate (total)	mg/kg	2022	1113									2	2	2022	1113	BHD7 @ 0.2mbGL		
Other																		
Asbestos Presence Screen	None							NFD			NFD	2	0	None > LOD	None > LOD			
Loss on Ignition	%							5.7				1	1	5.7	5.7	STPD05 @ 0.3mbGL		
Total Organic Carbon	%							1.6				1	1	1.6	1.6	STPD05 @ 0.3mbGL		
Organic Matter	%											0	0	None > LOD	None > LOD			
pH Value	pH Units	8	8.3	8.3	8	8.4	8.9	7.84	8	7.9	7.28	10	10	8.9	7.28	CH6 @ 1.5mbGL	6-9	0
Organics																		
PAH (Screening)	mg/kg			<75	<201	79	72		<10	<10		6	2	79	72	CH6 @ 0mbGL	1.1	2
Mineral Oil	mg/kg	351	22									6	2	351	22	BHD7 @ 0.2mbGL		
TPH FTIR (AR)	mg/kg			1590	973	496	108					4	4	1590	108	CH5 @ 0mbGL	3200	0
OIL FTIR	mg/kg			641	1946	338	183					6	4	1946	183	CH5 @ 0.8mbGL		
Phenols																		
Phenol Index	mg/kg			<0.5	<0.6	<0.5	<0.5		<0.5	<0.5		6	0	None > LOD	None > LOD		440	0
Phenols Monohydric	mg/kg	<1	<1									2	0	None > LOD	None > LOD		440	0
Phenols (total)	mg/kg	<1	<1					<0.15			230	4	1	230	230	STPD05 @ 0.56mbGL	440	0
BTEX																		
GRO (C4-C12)	mg/kg							<0.01			<0.01	2	0	None > LOD	None > LOD			
MTBE	mg/kg							<0.01			<0.01	2	0	None > LOD	None > LOD			
Benzene	mg/kg							<0.01			<0.01	2	0	None > LOD	None > LOD		27	0
Toluene	mg/kg							<0.01			<0.01	2	0	None > LOD	None > LOD		56000	0
Ethyl benzene	mg/kg							<0.01			<0.01	2	0	None > LOD	None > LOD		5700	0
m & p Xylene	mg/kg							<0.01			<0.01	2	0	None > LOD	None > LOD		5900	0
o Xylene	mg/kg							<0.01			<0.01	2	0	None > LOD	None > LOD		6600	0
TPH																		
Aliphatics C5-C6	mg/kg							<0.01			<0.01	2	0	None > LOD	None > LOD		3200	0
Aliphatics >C6-C8	mg/kg							<0.01			<0.01	2	0	None > LOD	None > LOD		7800	0
Aliphatics >C8-C10	mg/kg							<0.01			<0.01	2	0	None > LOD	None > LOD		2000	0
Aliphatics >C10-C12	mg/kg							<0.01			<0.01	2	0	None > LOD	None > LOD		9700	0
Aliphatics >C12-C16	mg/kg							16			5.2	2	2	16	5.2	STPD05 @ 0.3mbGL	25000	0
Aliphatics >C16-C21	mg/kg							32			4.7	2	2	32	4.7	STPD05 @ 0.3mbGL	450000	0
Aliphatics >C21-C35	mg/kg							58			2.8	2	2	58	2.8	STPD05 @ 0.3mbGL	450000	0
Total Aliphatics C5-C35	mg/kg							110			13	2	2	110	13	STPD05 @ 0.3mbGL		
Aromatics C6-C7	mg/kg							<0.01			<0.01	2	0	None > LOD	None > LOD		7800	0
Aromatics >C7-C8	mg/kg							<0.01			<0.01	2	0	None > LOD	None > LOD		56000	0
Aromatics >EC8-EC10	mg/kg							<0.01			<0.01	2	0	None > LOD	None > LOD		3500	0
Aromatics >EC10-EC12	mg/kg							<0.01			<0.01	2	0	None > LOD	None > LOD		9200	0
Aromatics >EC12-EC16	mg/kg							5.2			2	2	2	5.2	2	STPD05 @ 0.3mbGL	10000	0
Aromatics >EC16-EC21	mg/kg							10			1.1	2	2	10	1.1	STPD05 @ 0.3mbGL	7600	0
Aromatics >EC21-EC35	mg/kg							43			9.6	2	2	43	9.6	STPD05 @ 0.3mbGL	7800	0
Total Aromatics C6-C35	mg/kg							59			13	2	2	59	13	STPD05 @ 0.3mbGL		
TPH (Aliphatics and Aromatics C5-C35)	mg/kg							160			25	2	2	160	25	STPD05 @ 0.3mbGL		
PAH																		
Acenaphthene	mg/kg							0.021			<0.014	2	1	0.021	0.021	STPD05 @ 0.3mbGL	29000	0
Acenaphthylene	mg/kg							0.007			<0.005	2	1	0.007	0.007	STPD05 @ 0.3mbGL	29000	0
Anthracene	mg/kg							0.022			<0.009	2	1	0.022	0.022	STPD05 @ 0.3mbGL	150000	0
Benz(a)anthracene	mg/kg							0.075			<0.012	2	1	0.075	0.075	STPD05 @ 0.3mbGL	49	0
Benzo(a)pyrene	mg/kg							0.06			<0.012	2	1	0.06	0.06	STPD05 @ 0.3mbGL	11	0
Benzo(b)fluoranthene	mg/kg							0.12			<0.016	2	1	0.12	0.12	STPD05 @ 0.3mbGL	13	0
Benzo(ghi)perylene	mg/kg							0.072			<0.010	2	1	0.072	0.072	STPD05 @ 0.3mbGL	1400	0
Benzo(k)fluoranthene	mg/kg							0.048			<0.025	2	1	0.048	0.048	STPD05 @ 0.3mbGL	370	0
Chrysene	mg/kg							0.099			<0.010	2	1	0.099	0.099	STPD05 @ 0.3mbGL	93	0
Dibenzo(ah)anthracene	mg/kg							0.022			<0.008	2	1	0.022	0.022	STPD05 @ 0.3mbGL	1.1	0
Fluoranthene	mg/kg							0.1			<0.025	2	1	0.1	0.1	STPD05 @ 0.3mbGL	6300	0
Fluorene	mg/kg							0.044			<0.012	2	1	0.044	0.044	STPD05 @ 0.3mbGL	20000	0
Indeno(123cd)pyrene	mg/kg							0.049			<0.011	2	1	0.049	0.049	STPD05 @ 0.3mbGL	150	0
Naphthalene	mg/kg							0.066			<0.010	2	1	0.066	0.066	STPD05 @ 0.3mbGL	190	0
Phenanthrene	mg/kg							0.15			<0.021	2	1	0.15	0.15	STPD05 @ 0.3mbGL	6200	0
Pyrene	mg/kg							0.088			<0.022	2	1	0.088	0.088	STPD05 @ 0.3mbGL	15000	0
PAH 16 Total	mg/kg							1			<0.025	2	1	1	1	STPD05 @ 0.3mbGL		

A3 Appendix 3

Tabulated Groundwater Laboratory Data

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-9
01/07/2015

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits
FGD	Fluvio Glacial Deposits
MM	Mercia Mudstone

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Notes

	Offsite borehole loctaion
N/A	Detail Unknown

Monitoring Round	Units	Screening Criteria		2008 R1	2008 R2	2000	2000	1	1	2	2	3	3
Location		EQS	DWS	SBHD06	SBHD06	CH 05	CH 08	BH404	BH404	BH404	BH404	BH404	BH404
Location Type								BH					
Response Zone (RZ) Details				FGD		MG	TFD	FGD / MM	TFD	N/A	N/A	N/A	N/A
Depth				N/A		2.7m	1.5m	0	0	0	1.44	0	1.39
Installation Details				N/A	N/A	grab sample	grab sample	Deep	Shallow	N/A	N/A	N/A	N/A
Date Sampled				21/02/2008				02/03/2015		09/03/2015		16/03/2015	
Metals & Non-Metal Inorganics													
Hardness Total	mg/l			350	340								
Arsenic Dissolved (ICP-MS)	ug/l	50	10	1	<0.75	22	2	<1	6.2	6.7	2.5	7.1	1.8
Boron	ug/l	2000	1000					480	610	300	160	830	210
Calcium Dissolved (ICP-MS)	ug/l			68000	65000								
Chromium Dissolved (ICP-MS)	ug/l		50	3	<1	<1	<1	<1	<1	<1	1.1	8.8	7.9
Copper Dissolved (ICP-MS)	ug/l	10	2000	3.1	1.7	6	3	<1	<1	<1	<1	3	1.5
Iron Dissolved (ICP-MS)	ug/l	1000	200	<50	<50								
Lead Dissolved (ICP-MS)	ug/l	1.2	10	<0.5	<0.4	<1	<1	<1	<1	<1	<1	<1	<1
Magnesium Dissolved (ICP-MS)	ug/l			43000	42000								
Manganese Dissolved (ICP-MS)	ug/l	30	50	630	920								
Nickel Dissolved (ICP-MS)	ug/l	4	20	3.3	<1.5	87	7	<1	<1	2.5	1.6	8.2	2
Selenium Dissolved (ICP-MS)	ug/l		10	4	<1	7	<1	<1	2	2.4	1.5	2.3	2.4
Cadmium Dissolved	ug/l	0.15	5			<0.1	<0.1	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Zinc Dissolved	ug/l	75				75	43	<1	<1	<1	<1	<1	<1
Mercury Dissolved	ug/l	0.07	1			<0.1	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cadmium Total (HNO3 Digest)	ug/l	0.15	5	0.6	<0.4								
Zinc Total (HNO3 Digest)	ug/l	75		150	67								
Mercury Total (Aqua Regia)	ug/l	0.07	1	0.05	0.01								
Total Alkalinity as CaCO3	mg/l			380	340					760	570	480	330
BOD	mg/l	5		<1	2								
COD	mg/l			40	25								
Potassium Dissolved	mg/l			9.6	7.8								
Sodium Dissolved	mg/l		200	110	110								
Nitrate as NO3	mg/l		50	<0.3	0.3								
Total Diss Sulphur	mg/l					18.6	24						
Sulphate (soluble)	mg/l	400	250	29	27								
Chloride	mg/l	250	250	99	83					32	49	26	60
Sulphide	mg/l			<0.5	<0.5								
Ammoniacal Nitrogen as N	mg/l	0.6		0.5	4.1					0.03	0.017	<0.01	0.052
Total Ammonium as NH4	mg/l		0.5	0.6									
Hexavalent Chromium	mg/l		50										
Phenols Monohydric	mg/l			<0.01	<0.01	<0.05	<0.05						
Thiocyanate	mg/l												
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.025	<0.025	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Free Cyanide	mg/l							<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Complex Cyanide	mg/l												
Carbon Dioxide Dissolved	ug/l			14									
pH Value	pH Units	6-9	6.5-10	7.84	7.55	7	7	8.2	8.2	7.5	8.4	8.4	8.5
Organics													
GRO (C4-C12)	ug/l			<10	<10								
MTBE	ug/l			<10	<10								
Benzene	ug/l	10	1	<10	<10			<1	<1	<1	<1	<1	<1
Toluene	ug/l	50		<10	<10			<1	<1	<1	<1	<1	<1
Ethyl benzene	ug/l	20		<10	<10			<1	<1	<1	<1	<1	<1
m & p Xylene	ug/l	30		<10	<10			<1	<1	<1	<1	<1	<1
o Xylene	ug/l	30		<10	<10			<1	<1	<1	<1	<1	<1
TPH													
Aliphatics C5-C6	ug/l			<10	<10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C6-C8	ug/l			<10	<10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C8-C10	ug/l			<10	<10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C10-C12	ug/l			<10	<10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C12-C16 Aqueous	ug/l			<10	<10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C16-C21 Aqueous	ug/l			<10	<10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C21-C35 Aqueous	ug/l			<10	<10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Aliphatics C5-C35 Aqueous	ug/l			<10	<10								
Aliphatics >C35-44	ug/l							<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >C5-C7	ug/l							<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics C6-C7	ug/l			<10	<10								
Aromatics >C7-C8	ug/l			<10	<10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC8-EC10	ug/l			<10	<10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC10-EC12	ug/l			<10	<10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC12-EC16 Aqueous	ug/l			10000	<10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC16-EC21 Aqueous	ug/l			1400	<10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC21-EC35 Aqueous	ug/l			240	<10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Aromatics C6-C35 Aqueous	ug/l			12000	<10								
C35 Aqueous	ug/l												
Aromatics >C35-44	ug/l							<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
TPH FTIR	ug/l												
TPH GC	ug/l					600	<100						
Total Aliphatic TPH	ug/l							<5	<5	<5	<5	<5	<5
Total Aromatic TPH	ug/l							<5	<5	<5	<5	<5	<5
Total petroleum hydrocarbons	ug/l			12000	<10			<10	<10	<10	<10	<10	<10
SVOC by GCMS													
Phenols													
2-Chlorophenol	ug/l	50		<1	<1								
2-Methylphenol	ug/l	100		<1	<1								
2-Nitrophenol	ug/l			<1	<1								
2,4-Dichlorophenol	ug/l	20		<1	<1								
2,4-Dimethylphenol	ug/l			<1	<1								
2,4,5-Trichlorophenol	ug/l			<1	<1								
2,4,6-Trichlorophenol	ug/l			<1	<1								
4-Chloro-3-methylphenol	ug/l	40		<1	<1								
4-Methylphenol	ug/l	100		<1	<1								
4-Nitrophenol	ug/l			<1	<1								
Pentachlorophenol	ug/l	0.4		<1	<1	0.6	0.1						
Phenol	ug/l	7.7		<1	<1								
Phenols	mg/l	0.0077								0.08	0.03	<0.03	<0.03
PAHs													
2-Chloronaphthalene	ug/l			<1	<1								
2-Methylnaphthalene	ug/l			<1	<1								
Acenaphthene	ug/l			<1	<1	0.16	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	ug/l			<1	<1	<1.00	<1.00	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	ug/l	0.1		<1	<1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	ug/l			<1	<1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	ug/l	0.00017	0.01	<1	<1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	ug/l	0.017	0.1	<1	<1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	ug/l	0.017	0.1	<1	<1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)perylene	ug/l	0.0082	0.1	<1	<1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<1	<1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	ug/l			<1	<1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	ug/l			<1	<1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	ug/l	0.0063		<1	<1	0.08	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	ug/l			<1	<1	0.11	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	ug/l	2		<1	<1	1.19	<0.50	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	ug/l			<1	<1	0.15	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	ug/l			<1	<1	<0.05	<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total PAHs (USEPA 16)	ug/l					<3.18	<2.20	<2	<2	<2	<2	<2	<2
Phthalates													
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<2	<2								
Butylbenzyl phthalate	ug/l	20		<1	<1								
Di-n-butyl phthalate	ug/l	8		<1	<1								
Di-n-Octyl phthalate	ug/l	20		<5	<5								
Diethyl phthalate	ug/l	200		<1	<1								
Dimethyl phthalate	ug/l	800		<1	<1								
PCBs													
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l									<0.01	<0.01	<0.01	<0.01
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l									<0.01	<0.01	<0.01	<0.01
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l									<0.01	<0.01	<0.01	<0.01
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l									<0.01	<0.01	<0.01	<0.01
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l									<0.01	<0.01	<0.01	<0.01
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l									<0.01	<0.01	<0.01	<0.01
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l									<0.01	<0.01	<0.01	<0.01

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
2	2	350	340	SBHD06 @ N/A		
10	8	22	1	CH 05 @ grab sample	0	1
6	6	830	160	BH404 @ N/A	0	0
2	2	68000	65000	SBHD06 @ N/A		
10	4	8.8	1.1	BH404 @ N/A		0
10	6	6	1.5	CH 05 @ grab sample	0	0
2	0	None > LOD	None > LOD		0	0
10	0	None > LOD	None > LOD		0	0
2	2	43000	42000	SBHD06 @ N/A		
2	2	920	630	SBHD06 @ N/A	2	2
10	7	87	1.6	CH 05 @ grab sample	3	1
10	7	7	1.5	CH 05 @ grab sample		0
8	0	None > LOD	None > LOD		0	0
8	2	75	43	CH 05 @ grab sample	0	
8	0	None > LOD	None > LOD		0	0
2	1	0.6	0.6	SBHD06 @ N/A	1	0
2	2	150	67	SBHD06 @ N/A	1	
2	2	0.05	0.01	SBHD06 @ N/A	0	0
6	6	760	330	BH404 @ N/A		
2	1	2	2	SBHD06 @ N/A	0	
2	2	40	25	SBHD06 @ N/A		
2	2	9.6	7.8	SBHD06 @ N/A		
2	2	110	110	SBHD06 @ N/A		0
2	1	0.3	0.3	SBHD06 @ N/A		0
2	2	24	18.6	CH 08 @ grab sample		
2	2	29	27	SBHD06 @ N/A	0	0
6	6	99	26	SBHD06 @ N/A	0	0
2	0	None > LOD	None > LOD			
6	5	4.1	0.017	SBHD06 @ N/A	1	
1	1	0.6	0.6	SBHD06 @ N/A		1
0	0	None > LOD	None > LOD			0
4	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
10	0	None > LOD	None > LOD		0	0
6	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
1	1	14	14	SBHD06 @ N/A		
10	10	8.5	7	BH404 @ N/A	0	0
2	0	None > LOD	None > LOD			
2	0	None > LOD	None > LOD			
8	0	None > LOD	None > LOD		0	0
8	0	None > LOD	None > LOD		0	
8	0	None > LOD	None > LOD		0	
8	0	None > LOD	None > LOD		0	
8	0	None > LOD	None > LOD		0	
8	0	None > LOD	None > LOD		0	
8	0	None > LOD	None > LOD		0	
8	1	10000	10000	SBHD06 @ N/A		
8	1	1400	1400	SBHD06 @ N/A		
8	1	240	240	SBHD06 @ N/A		
2	1	12000	12000	SBHD06 @ N/A		
0	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
2	1	600	600	CH 05 @ grab sample		
6	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD			
8	1	12000	12000	SBHD06 @ N/A		
2	0	None > LOD	None > LOD		0	
2	0	None > LOD	None > LOD		0	
2	0	None > LOD	None > LOD			
2	0	None > LOD	None > LOD		0	
2	0	None > LOD	None > LOD			
2	0	None > LOD	None > LOD			
2	0	None > LOD	None > LOD			
2	0	None > LOD	None > LOD		0	
2	0	None > LOD	None > LOD		0	
2	0	None > LOD	None > LOD		1	
2	0	None > LOD	None > LOD		0	
4	2	0.08	0.03	BH404 @ N/A	2	
2	0	None > LOD	None > LOD			
2	0	None > LOD	None > LOD			
10	1	0.16	0.16	CH 05 @ grab sample		
10	0	None > LOD	None > LOD			
10	0	None > LOD	None > LOD		0	
10	0	None > LOD	None > LOD			
10	0	None > LOD	None > LOD		0	0
10	0	None > LOD	None > LOD		0	0
10	0	None > LOD	None > LOD		0	0
10	0	None > LOD	None > LOD		0	0
10	0	None > LOD	None > LOD			0
10	0	None > LOD	None > LOD			
10	0	None > LOD	None > LOD			
10	1	0.08	0.08	CH 05 @ grab sample	1	
10	1	0.11	0.11	CH 05 @ grab sample		
10	1	1.19	1.19	CH 05 @ grab sample	0	
10	1	0.15	0.15	CH 05 @ grab sample		
10	0	None > LOD	None > LOD			
8	0	None > LOD	None > LOD			
2	0	None > LOD	None > LOD		0	
2	0	None > LOD	None > LOD		0	
2	0	None > LOD	None > LOD		0	
2	0	None > LOD	None > LOD		0	
2	0	None > LOD	None > LOD		0	
2	0	None > LOD	None > LOD		0	
4	0	None > LOD	None > LOD			
4	0	None > LOD	None > LOD			
4	0	None > LOD	None > LOD			
4	0	None > LOD	None > LOD			
4	0	None > LOD	None > LOD			
4	0	None > LOD	None > LOD			
4	0	None > LOD	None > LOD			

A4 Appendix 4

Tabulated Surface Water Laboratory Data

M4CAN
Surface Water Sample Analysis & Screening Assessment
CL-9
14/07/2015

Notes

EQS calcium carbonate 200-250mg/l for heavy metals: chromium, copper, lead, nickel and zinc

NDP - No determination possible

Screening Values and Assessment

EQS	Environmental Quality Standards
MRV	Minimum Reporting values
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory detection level higher than screening criterion
BOL/ITA	Exceeds CCW

Monitoring Round / Location	Units	Screening Criteria			E1 / R5	E2 / R5	E4 / R5	Q1 / 7.3	Q1 / 7.1	No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Round of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS	No. Data Exceeding CCW
Date Sampled					06/12/2007	18/03/2008	25/09/2008	29/05/2015	29/05/2015								
Installation Details		EQS	DWS	CCW													
Metals & Non-Metal Inorganics																	
Hardness Total	mg/l				154	125	276			3	3	276	125	E4 / R5			
Arsenic Dissolved	ug/l	50	10					2.99	1.71	2	2	2.99	1.71	Q1 / 7.3	0	0	
Calcium Dissolved	ug/l			300000	35	31	68	46.1	37.3	5	5	68	31	E4 / R5			0
Cadmium Dissolved	ug/l	0.15	5	5				<0.1	<0.1	2	0	None > LOD	None > LOD		0	0	0
Chromium Dissolved	ug/l		50		<0.22	<0.22	<0.22	1.9	1.65	5	2	1.9	1.65	Q1 / 7.3		0	
Copper Dissolved	ug/l	10	2000		6	<0.85	<0.85	2.74	1.4	5	3	6	1.4	E1 / R5	0	0	
Lead Dissolved	ug/l	1.2	10	250	<0.22	<0.22	<0.22	1.03	0.185	5	2	1.03	0.185	Q1 / 7.3	0	0	0
Magnesium Dissolved	ug/l				10	9.1	20			3	3	20	9.1	E4 / R5			
Nickel Dissolved	ug/l	4	20	100	<0.15	<0.15	<0.15	2.29	2.59	5	2	2.59	2.29	Q1 / 7.1	0	0	0
Selenium Dissolved	ug/l		10					0.902	0.723	2	2	0.902	0.723	Q1 / 7.3		0	
Cadmium Total	ug/l	0.15	5	5	<0.5	0.5	0.5			3	2	0.5	0.5	E2 / R5	2	0	0
Zinc Total	ug/l	75		1000	26	23	260			3	3	260	23	E4 / R5	1		0
BOD	mg/l	5		18	<1	2	***45***	<1	<1	5	2	45	2	E4 / R5	1		1
Nitrate as N	mg/l		50	1	<0.3	<0.3	0.6			3	1	0.6	0.6	E4 / R5		0	0
Nitrate as NO3	mg/l		50	1	***1.3***	<0.3	***2.658***	<0.3	<0.3	5	2	2.658	1.3	E4 / R5		0	2
Nitrite as N	mg/l		0.1521739	1	<0.1	<0.1	<0.1			3	0	None > LOD	None > LOD			0	0
Nitrite as NO2	mg/l		0.5	1				<0.05	<0.05	2	0	None > LOD	None > LOD			0	0
Nitrogen, Total Oxidised as N	mg/l		50	2	<0.1	<0.1	0.6	<0.1	<0.1	5	1	0.6	0.6	E4 / R5		0	0
Phosphate, Ortho as P	mg/l			1	0.1	<0.1	***1.2***			3	2	1.2	0.1	E4 / R5			1
Phosphorus (tot.unfilt)	ug/l	120						669	126	2	2	669	126	Q1 / 7.3	2		
Chloride	mg/l	250	250	300	12	15	14	38.4	17.5	5	5	38.4	12	Q1 / 7.3	0	0	0
Sulphate	mg/l	400	250	300				37.7	5.4	2	2	37.7	5.4	Q1 / 7.3	0	0	
Sulphate as SO4	mg/l	400	250	300	7	6	<5			3	2	7	6	E1 / R5	0	0	0
Ammoniacal Nitrogen as N	mg/l	0.6		1	0.19	0.06	***2.48***	0.567	0.218	5	5	2.48	0.06	E4 / R5	1		1
Dissolved Oxygen (Saturation)	%				2.31	6.15	0.57			3	3	6.15	0.57	E2 / R5		0	
Dissolved Oxygen	mg/l				18.5	48.1	5.1	3.74	11.7	5	5	48.1	3.74	E2 / R5		0	
pH Value	pH units	6-9	6.5-10	6.8-8.5	7.5	7.4	7.4			3	3	7.5	7.4	E1 / R5	0	0	0
Organics																	
GRO (C5-C12)	ug/l							<50	<50	2	0	None > LOD	None > LOD				
MTBE	ug/l							<3	<3	2	0	None > LOD	None > LOD				
Benzene	ug/l	10	1					<7	<7	2	0	None > LOD	None > LOD		0	0	
Toluene	ug/l	50						<4	<4	2	0	None > LOD	None > LOD		0		
Ethyl benzene	ug/l	20						<5	<5	2	0	None > LOD	None > LOD		0		
m & p Xylene	ug/l	30						<8	<8	2	0	None > LOD	None > LOD		0		
o Xylene	ug/l	30						<3	<3	2	0	None > LOD	None > LOD		0		
TPH																	
Aliphatics C5-C6	ug/l							<10	<10	2	0	None > LOD	None > LOD				
Aliphatics >C6-C8	ug/l							<10	<10	2	0	None > LOD	None > LOD				
Aliphatics >C8-C10	ug/l							<10	<10	2	0	None > LOD	None > LOD				
Aliphatics >C10-C12	ug/l							<10	<10	2	0	None > LOD	None > LOD				
Aliphatics >C12-C16 Aqueous	ug/l							<10	<10	2	0	None > LOD	None > LOD				
Aliphatics >C16-C21 Aqueous	ug/l							<10	<10	2	0	None > LOD	None > LOD				
Aliphatics >C21-C35 Aqueous	ug/l							<10	<10	2	0	None > LOD	None > LOD				
Total Aliphatics C12-C35 Aqueous	ug/l							<10	<10	2	0	None > LOD	None > LOD				
Aromatics >C5-C7	ug/l							<10	<10	2	0	None > LOD	None > LOD				
Aromatics >C7-C8	ug/l							<10	<10	2	0	None > LOD	None > LOD				
Aromatics >EC8-EC10	ug/l							<10	<10	2	0	None > LOD	None > LOD				
Aromatics >EC10-EC12	ug/l							<10	<10	2	0	None > LOD	None > LOD				
Aromatics >EC12-EC16 Aqueous	ug/l							<10	<10	2	0	None > LOD	None > LOD				
Aromatics >EC16-EC21 Aqueous	ug/l							<10	<10	2	0	None > LOD	None > LOD				
Aromatics >EC21-EC35 Aqueous	ug/l							<10	<10	2	0	None > LOD	None > LOD				
Total Aromatics C12-C35 Aqueous	ug/l							<10	<10	2	0	None > LOD	None > LOD				
TPH >C6-C8	ug/l				<10	<10	<10			3	0	None > LOD	None > LOD				
TPH >C8-C10	ug/l				<10	<10	<10			3	0	None > LOD	None > LOD				
TPH >C10-C16	ug/l				<20	<20	<20			3	0	None > LOD	None > LOD				
TPH >C16-C24	ug/l				<20	<20	<20			3	0	None > LOD	None > LOD				
TPH >C24-C40	ug/l				<50	<50	<50			3	0	None > LOD	None > LOD				
TPH >C6-C40	ug/l				<50	<50	<50			3	0	None > LOD	None > LOD				
PAHs																	
Acenaphthene	ug/l							<0.015	<0.015	2	0	None > LOD	None > LOD				
Acenaphthylene	ug/l							<0.011	<0.011	2	0	None > LOD	None > LOD				
Anthracene	ug/l	0.1						<0.015	<0.015	2	0	None > LOD	None > LOD		0		
Benzo(a)anthracene	ug/l							<0.017	<0.017	2	0	None > LOD	None > LOD				
Benzo(a)pyrene	ug/l	0.00017	0.01					<0.009	<0.009	2	0	None > LOD	None > LOD		0	0	
Benzo(b)fluoranthene	ug/l	0.017	0.1					<0.023	<0.023	2	0	None > LOD	None > LOD		0	0	
Benzo(k)fluoranthene	ug/l	0.017	0.1					<0.027	<0.027	2	0	None > LOD	None > LOD		0	0	
Benzo(ghi)perylene	ug/l	0.0082	0.1					<0.016	<0.016	2	0	None > LOD	None > LOD		0	0	
Indeno(1,2,3-cd)pyrene	ug/l		0.1					<0.014	<0.014	2	0	None > LOD	None > LOD			0	
Chrysene	ug/l							<0.013	<0.013	2	0	None > LOD	None > LOD				
Dibenzo(a,h)anthracene	ug/l							<0.016	<0.016	2	0	None > LOD	None > LOD				
Fluoranthene	ug/l	0.0063						<0.017	<0.017	2	0	None > LOD	None > LOD		0		
Fluorene	ug/l							<0.014	<0.014	2	0	None > LOD	None > LOD				
Naphthalene	ug/l	2						<0.1	<0.1	2	0	None > LOD	None > LOD		0		
Phenanthrene	ug/l							<0.022	<0.022	2	0	None > LOD	None > LOD				
Pyrene	ug/l							<0.015	<0.015	2	0	None > LOD	None > LOD				
Total PAHs (USEPA 16)	ug/l							<0.344	<0.344	2	0	None > LOD	None > LOD				
VOCs																	
Benzene	ug/l	10	1					<7	<7	2	0	None > LOD	None > LOD		0	0	
Ethylbenzene	ug/l	20						<5	<5	2	0	None > LOD	None > LOD		0		
m,p xylenes	ug/l	30						<8	<8	2	0	None > LOD	None > LOD		0		
Methyl tert-butyl ether (MTBE)	ug/l							<3	<3	2	0	None > LOD	None > LOD				
O-Xylene	ug/l	30						<3	<3	2	0	None > LOD	None > LOD		0		
Toluene	ug/l	50						<4	<4	2	0	None > LOD	None > LOD		0		

A5 Appendix 5

Tabulated Soil Leachate Laboratory Data

M4CAN
Leachate Samples Analysis & Screening Assessment
CL-9
01/07/2015

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Geological Formation Legend

MG	Made Ground

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		STPD05
Specimen depth (m)		EQS	DWS	0.3
OD Level (m)				5.91
Sample type				ES
Geology code				MG
Cluster code				2007 GI
2:1 Results				
Arsenic Dissolved	ug/l	50	10	4
Boron Dissolved	ug/l	2000	1000	100
Barium Dissolved	ug/l			87
Cadmium Dissolved	ug/l	0.15	5	<0.4
Chromium Dissolved	ug/l		50	<1
Copper Dissolved	ug/l	10	2000	31
Molybdenum Dissolved	ug/l			3
Nickel Dissolved	ug/l	4	20	2
Lead Dissolved	ug/l	1.2	10	4
Antimony Dissolved	ug/l		5	<5
Selenium Dissolved	ug/l		10	<1
Zinc Dissolved	ug/l	75		64
Total Cyanide	mg/l	0.001	0.05	<0.05

No. Data Exceeding EQS	No. Data Exceeding DWS
0	0
0	0
0	0
	0
1	0
0	0
1	0
	0
	0
0	
0	0

A6 Appendix 6

Groundwater Level Data

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		01

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		30/01/2008	09:50	2.45	25/02/2008	14:34	2.48	07/03/2008	14:25	2.60
SBHD03 CP	SPIE	10.00		30/01/2008	11:01	0.47	25/02/2008	14:52	0.43	07/03/2008	14:05	0.56
SBHD05 RC	SPIE	12.00		31/01/2008	09:00	1.02	25/02/2008	15:35	1.05	07/03/2008	13:50	1.77
SBHD06 RC	SP	15.00		30/01/2008	13:00	1.13	21/02/2008	10:30	1.39	07/03/2008	13:30	1.39
SBHD08 RC	SPIE	29.50		30/01/2008	13:50	1.20	25/02/2008	15:58	2.02	07/03/2008	13:35	1.40
SBHE02RD	SPIE	25.00		31/01/2008	09:25	2.18	25/02/2008	16:20	2.09	07/03/2008	13:10	2.48
SBHE04 RC	SPIE	17.20		31/01/2008	09:15	2.31	25/02/2008	16:11	2.51	07/03/2008	13:20	2.59
SBHF01 RC	SPIE	19.00		31/01/2008	09:40	5.69	25/02/2008	16:32	5.72	07/03/2008	12:50	5.43
SBHF02A CP	SPIE	17.00		01/02/2008	14:40	7.61	25/02/2008	17:13	7.57	07/03/2008	12:30	9.00
SBHF03 RC	SPIE	18.00		31/01/2008	10:35	6.97	26/02/2008	08:55	6.77	07/03/2008	12:15	7.22
SBHH01 RC	SPIE	25.00		31/01/2008	11:15	3.45	26/02/2008	09:39	3.42	07/03/2008	11:28	3.65
SBHH02 RC	SPIE	14.90		31/01/2008	11:10	3.42	26/02/2008	09:20	3.88	07/03/2008	11:35	3.64
SBHH05 RC	SPIE	21.50		31/01/2008	11:30	2.22	26/02/2008	10:01	2.13	07/03/2008	11:05	3.10
SBHH06 CP	SP	12.30		30/01/2008	15:30	3.75	21/02/2008	08:00	3.76	07/03/2008	11:10	3.87
SBHH07A RC	SPIE	24.85		30/01/2008	14:50	1.70	26/02/2008	10:40	1.34	07/03/2008	11:00	1.07
SBHJ01 CP	SP	7.50		01/02/2008	12:20	1.34	21/02/2008	11:45	5.98	06/03/2008	12:28	1.82
SBHJ03 CP	SP	5.20		01/02/2008	08:00	0.54	27/02/2008	16:15	0.70	07/03/2008	10:45	0.68
SBHJ04	SP	13.10		01/02/2008	11:55	6.61	22/02/2008	13::55	6.67	06/03/2008	11:46	6.75
SBHJ05	SP	11.50		01/02/2008	11:10	8.91	22/02/2008	09:00	9.07	06/03/2008	11:23	9.16
SBHJ06 CP	SP	4.10		01/02/2008	11:45	1.31	21/02/2008	15:30	1.32	06/03/2008	10:50	1.33
SBHJ07 CP	SP	10.40		01/02/2008	11:43	1.35	21/02/2008	14:40	1.40	06/03/2008	12:05	1.56
SBHJ08A CP	SP	7.40		01/02/2008	11:35	3.49	21/02/2008	13:05	2.31	06/03/2008	10:57	2.67
SBHJ09 CP	SP	2.20		01/02/2008	11:30	0.65	21/02/2008	12:25	0.85	06/03/2008	11:00	0.90
SBHJ10 CP	SP	10.00		01/02/2008	10:40	2.30	21/02/2008	13:45	2.24	06/03/2008	10:40	2.16
SBHK01 CP	SP	6.80		01/02/2008	10:55	0.70	25/02/2008	10:30	1.00	06/03/2008	14:24	1.06
SBHK02 CP	SP	11.20		01/02/2008	10:50	1.34	25/02/2008	11:20	1.33	06/03/2008	14:18	1.47
SBHK03 CP	SP	5.90		01/02/2008	10:45	0.87	25/02/2008	12:00	0.89	06/03/2008	14:15	1.00
SBHK04 CP	SP	12.20		01/02/2008	10:25	1.45	25/02/2008	12:30	1.60	06/03/2008	12:30	1.60
SBHL02 RC	SPIE	15.20		01/02/2008	10:35	2.27	25/02/2008	12:49	2.31	06/03/2008	14:00	2.42
SBHL03 RC	SPIE	15.00		31/01/2008	16:20	0.61	26/02/2008	11:15	0.51	07/03/2008	10:25	0.66
SBHM01 RC	SPIE	21.00		01/01/1900	08:20	-0.26	26/02/2008	11:30	-0.26	07/03/2008	10:17	0.05
SBHM02 RC	SPIE	20.00		01/02/2008	08:25	0.19	26/02/2008	11:41	0.49	07/03/2008	10:14	0.68
SBHN01A RC	SPIE	14.90		01/02/2008	15:20	8.49	27/02/2008	17:15	12.23	07/03/2008	14:45	13.18
SBHN02 RC	SPIE	20.40		31/01/2008	15:55	3.67	26/02/2008	11:57	4.19	07/03/2008	10:05	4.84
SBHN03 RC	SPIE	15.00		31/01/2008	15:45	1.07	26/02/2008	12:03	1.73	07/03/2008	09:55	2.34
SBHN04 RC	SPIE	10.00		31/01/2008	15:30	9.99	26/02/2008	14:42	DRY	07/03/2008	09:45	DRY

Recorded by:	S Davis	Checked by:	I Swain	Approved by:	I Swain
Date:	30/01/08-07/03/08	Date:	16/04/2008	Date:	17/04/2008
Form No.	SI GWR	Revision No.	2.03	Issue Date	07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		02

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		31/01/2008	14:50	DRY	26/02/2008	14:12	DRY	07/03/2008	09:35	DRY
SBHP02 RC	SPIE	9.80		31/01/2008	13:55	7.20	26/02/2008	13:59	8.09	07/03/2008	09:10	8.25
SBHP03 RC	SPIE	5.00		31/01/2008	13:40	4.09	26/02/2008	13:48	4.76	07/03/2008	09:05	4.78
SBHQ01 RC	SPIE	11.80		31/01/2008	14:20	5.76	26/02/2008	12:46	6.74	07/03/2008	09:30	7.20
SBHQ02 RC	SPIE	6.00		31/01/2008	14:15	4.98	26/02/2008	12:59	5.16	07/03/2008	09:25	5.98
SBHQ03 RC	SPIE	11.00		31/01/2008	13:20	6.04	26/02/2008	13:29	7.22	07/03/2008	08:38	7.59
SBHQ04 RC	SPIE	8.00		31/01/2008	13:05	4.35	26/02/2008	13:36	6.18	07/03/2008	08:55	6.94
SBHQ06 RC	SPIE	7.35		31/01/2008	13:00	3.89	26/02/2008	13:16	4.40	07/03/2008	08:25	4.63
SWSJ08	SP	3.30		01/02/2008	12:30	0.42	21/02/2008	11:45	0.37	06/03/2008	12:35	0.41
SWSJ13	SP	2.50		01/02/2008	12:00	DRY	22/02/2008	13:45	DRY	06/03/2008	11:50	DRY
SWSJ21	SP	6.00		01/02/2008	11:20	3.87	22/02/2008	09:30	5.72	06/03/2008	11:27	6.59
SWSJ23	SP	7.80		01/02/2008	11:22	5.92	22/02/2008	09:55	6.62	06/03/2008	11:30	6.97
SWSJ34	SP	6.00		01/02/2008	11:05	2.52	22/02/2008	10:55	3.33	06/03/2008	11:10	3.08
SWSJ37	SP	5.60		01/02/2008	11:25	0.46	22/02/2008	11:30	0.55	06/03/2008	11:15	0.61
LGBH02	SP	8.88					22/02/2008	14:35	7.50	06/03/2008	11:40	7.52
LGBH03	SP	8.90					22/02/2008	14:21	7.20	06/03/2008	11:44	7.28
LGBH04	SP	10.50					22/02/2008	10:30	8.87	06/03/2008	11:20	9.00
LGBH09	SP	7.00					22/02/2008	12:40	1.13	06/03/2008	10:48	1.56
LGBH10	SP	14.60					27/02/2008	14:30	8.15	06/03/2008	11:12	8.21
LGBH11	SP	11.20					27/02/2008	10:00	7.05	06/03/2008	11:03	7.07
LGBH12	SP	7.05					22/02/2008	13:10	1.40	06/03/2008	10:45	1.40
RBBH07	SP	6.25					27/02/2008	12.15	0.69	06/03/2008	12:20	0.71
RBBH09	SP	7.05					27/02/2008	13:40	1.25	06/03/2008	12:25	1.21
RBBH10	SP	6.85					27/02/2008	13:00	0.68	06/03/2008	12:30	0.82

Recorded by:	S Davis	Checked by:	I Swain	Approved by:	I Swain
Date:	30/01/08-07/03/08	Date:	16/04/2008	Date:	17/04/2008
Form No.	SI GWR	Revision No.	2.03	Issue Date	07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		03

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS SBHM01 RC installation extends 0.50m above ground level. - symbol indicates water level is above GL

All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHC01 RC	SPIE	8.05		20/03/2008	16:30	2.57	04/04/2008	08:00	2.59	18/04/2008	07:40	2.66
SBHD03 CP	SPIE	10.00		20/03/2008	16:45	0.58	04/04/2008	08:13	0.53	18/04/2008	08:00	0.60
SBHD05 RC	SPIE	12.00		20/03/2008	16:00	1.08	04/04/2008	09:15	1.22	18/04/2008	08:30	1.32
SBHD06 RC	SP	15.00		20/03/2008	17:55	1.20	04/04/2008	09:30	1.33	18/04/2008	08:40	1.44
SBHD08 RC	SPIE	29.50		19/03/2008	18:30	1.28	04/04/2008	10:00	1.39	18/04/2008	08:52	1.52
SBHE02RD	SPIE	25.00		20/03/2008	16:20	2.23	04/04/2008	08:50	2.46	18/04/2008	09:00	2.54
SBHE04 RC	SPIE	17.20		20/03/2008	15:45	2.20	04/04/2008	09:00	1.80	18/04/2008	08:15	1.80
SBHF01 RC	SPIE	19.00		20/03/2008	15:30	5.50	04/04/2008	08:40	5.55	18/04/2008	13:58	5.58
SBHF02A CP	SPIE	17.00		20/03/2008	15:10	5.60	04/04/2008	10:28	5.70	18/04/2008	13:45	5.77
SBHF03 RC	SPIE	18.00		20/03/2008	14:55	7.20	04/04/2008	10:36	7.38	18/04/2008	13:40	7.42
SBHH01 RC	SPIE	25.00		20/03/2008	14:25	3.60	04/04/2008	15:00	3.60	18/04/2008	13:10	3.62
SBHH02 RC	SPIE	14.90		20/03/2008	14:30	4.27	04/04/2008	15:05	3.64	18/04/2008	13:13	3.70
SBHH05 RC	SPIE	21.50		20/03/2008	17:30	2.17	04/04/2008	15:15	2.78	18/04/2008	11:34	2.90
SBHH06 CP	SP	12.30		17/03/2008	15:20	3.88	04/04/2008	15:20	3.89	17/04/2008	14:15	3.90
SBHH07A RC	SPIE	24.85		20/03/2008	13:55	1.33	04/04/2008	15:28	1.92	18/04/2008	11:43	0.88
SBHJ01 CP	SP	7.50		19/03/2008	14:15	1.81	03/04/2008	16:05	1.90	17/04/2008	12:40	1.80
SBHJ03 CP	SP	5.20		19/03/2008	16:40	0.78	03/04/2008	18:25	0.82	17/04/2008	15:55	0.80
SBHJ04	SP	13.10		17/03/2008	13:35	6.64	03/04/2008	18:10	6.74	17/04/2008	13:08	6.80
SBHJ05	SP	11.50		18/03/2008	13:50	9.02	03/04/2008	17:39	9.10	17/04/2008	13:31	9.11
SBHJ06 CP	SP	4.10		17/03/2008	12:55	1.29	03/04/2008	17:43	1.33	17/04/2008	15:05	1.20
SBHJ07 CP	SP	10.40		17/03/2008	10:25	1.59	03/04/2008	17:47	1.50	17/04/2008	13:58	1.47
SBHJ08A CP	SP	7.40		18/03/2008	10:00	2.50	03/04/2008	17:55	2.50	17/04/2008	15:33	2.50
SBHJ09 CP	SP	2.20		18/03/2008	10:25	0.69	03/04/2008	17:58	0.82	17/04/2008	15:22	0.90
SBHJ10 CP	SP	10.00		17/03/2008	09:15	2.10	03/04/2008	17:50	2.00	17/04/2008	13:55	2.00
SBHK01 CP	SP	6.80		19/03/2008	10:45	0.88	03/04/2008	16:40	1.00	17/04/2008	11:40	0.94
SBHK02 CP	SP	11.20		19/03/2008	11:15	1.46	03/04/2008	16:45	1.48	17/04/2008	11:43	1.46
SBHK03 CP	SP	5.90		19/03/2008	11:45	1.04	03/04/2008	16:48	1.07	17/04/2008	11::46	0.98
SBHK04 CP	SP	12.20		19/03/2008	12:15	1.64	03/04/2008	16:52	1.67	17/04/2008	12:05	1.60
SBHL02 RC	SPIE	15.20		19/03/2008	12:50	2.44	03/04/2008	17:00	2.45	17/04/2008	12:00	2.45
SBHL03 RC	SPIE	15.00		20/03/2008	13:25	0.76	08/04/2008	15:40	0.64	18/04/2008	09:50	0.62
SBHM01 RC	SPIE	21.00		20/03/2008	13:05	-0.21	08/04/2008	15:48	-0.45	18/04/2008	11:55	0.01
SBHM02 RC	SPIE	20.00		20/03/2008	13:10	0.61	08/04/2008	15:52	0.61	18/04/2008	11:50	0.61
SBHN01A RC	SPIE	14.90		20/03/2008	12:55	12.14	08/04/2008	16:05	12.58	18/04/2008	12:48	13.27
SBHN02 RC	SPIE	20.40		20/03/2008	12:45	4.26	08/04/2008	16:12	2.64	18/04/2008	12:45	4.85
SBHN03 RC	SPIE	15.00		20/03/2008	12:30	1.60	08/04/2008	16:17	2.07	18/04/2008	12:35	2.37
SBHN04 RC	SPIE	10.00		20/03/2008	12:10	DRY	08/04/2008	16:28	DRY	18/04/2008	10:55	DRY

Recorded by:	S Davis	Checked by:	I Swain	Approved by:	I Swain
Date:	17/03/08-17/04/08	Date:	21/04/2008	Date:	21/04/2008
Form No.	SI GWR	Revision No.	2.03	Issue Date	07/01/2008

NORWEST HOLST SOIL ENGINEERING

Project Name	New M4 Preliminary Ground Investigation	**Groundwater Readings For Installations**	
Project No.	F15056		
Engineer	Ove Arup & Partners Ltd		Fig no.
Client	Transport Wales, Welsh Assembly Government		04

NOTES: SPIE=Piezometer, SP=Standpipe
For multiple installations, use different Installation IDs.
For piezometers installation depth = tip depth. For standpipes = base of pipe

COMMENTS
Unable to locate LGBH05 and RBBH08. LGBH06 was blocked
All groundwater levels are recorded from ground level

Exploratory Hole ID	Installation Details			Recorded Water Level								
	Type	Depth m	ID	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m	Date dd/mm/yyyy	Time hh:mm	Reading m
SBHP01 RC	SPIE	8.00		20/03/2008	12:00	DRY	08/04/2008	16:40	DRY	18/04/2008	10:45	DRY
SBHP02 RC	SPIE	9.80		20/03/2008	11:45	5.59	08/04/2008	16:55	7.98	18/04/2008	10:30	8.20
SBHP03 RC	SPIE	5.00		20/03/2008	11:40	2.80	08/04/2008	16:50	DRY	18/04/2008	10:25	4.93
SBHQ01 RC	SPIE	11.80		20/03/2008	10:40	6.72	08/04/2008	17:13	7.24	18/04/2008	10:10	7.48
SBHQ02 RC	SPIE	6.00		20/03/2008	10:45	4.91	08/04/2008	17:10	DRY	18/04/2008	10:05	DRY
SBHQ03 RC	SPIE	11.00		20/03/2008	10:50	6.76	08/04/2008	17:05	7.69	18/04/2008	10:15	8.00
SBHQ04 RC	SPIE	8.00		20/03/2008	11:30	6.97	08/04/2008	17:02	DRY	18/04/2008	10:40	DRY
SBHQ06 RC	SPIE	7.35		20/03/2008	11:20	4.47	08/04/2008	17:20	6.63	18/04/2008	12:20	4.79
SWSJ08	SP	3.30		19/03/2008	15:10	0.44	03/04/2008	16:00	0.46	17/04/2008	12:35	0.42
SWSJ13	SP	2.50		17/03/2008	13:25	DRY	03/04/2008	18:12	DRY	17/04/2008	13:12	DRY
SWSJ21	SP	6.00		18/03/2008	14:30	4.42	03/04/2008	17:33	5.89	17/04/2008	13:32	6.50
SWSJ23	SP	7.80		18/03/2008	15:05	7.58	03/04/2008	17:35	7.20	17/04/2008	13:35	7.20
SWSJ34	SP	6.00		19/03/2008	08:55	2.36	03/04/2008	17:23	3.26	17/04/2008	13:46	DRY
SWSJ37	SP	5.60		18/03/2008	11:15	0.55	03/04/2008	17:25	0.67	17/04/2008	13:42	0.63
LGBH02	SP	8.88		17/03/2008	12:55	7.48	03/04/2008	18:05	7.46	17/04/2008	13:00	7.48
LGBH03	SP	8.90		17/03/2008	13:15	7.24	03/04/2008	18:08	7.32	17/04/2008	13:03	7.30
LGBH04	SP	10.50		18/03/2008	13:20	8.87	03/04/2008	17:40	8.90	17/04/2008	13:29	8.94
LGBH09	SP	7.00		17/03/2008	11:00	1.08	03/04/2008	17:45	1.15	17/04/2008	15:08	1.05
LGBH10	SP	14.60		18/03/2008	15:20	8.31	03/04/2008	17:27	8.20	17/04/2008	13:40	8.70
LGBH11	SP	11.20		18/03/2008	11:40	6.88	03/04/2008	17:18	7.00	17/04/2008	15:38	7.08
LGBH12	SP	7.05		17/03/2008	10:00	1.30	03/04/2008	17:49	1.47	17/04/2008	15:15	1.36
RBBH07	SP	6.25		19/03/2008	13:25	0.66	03/04/2008	15:50	0.68	17/04/2008	12:30	1.10
RBBH09	SP	7.05		19/03/2008	14:40	1.18	03/04/2008	16:07	1.21	17/04/2008	12:42	1.25
RBBH10	SP	6.85		19/03/2008	13:45	0.70	03/04/2008	16:03	0.75	17/04/2008	12:39	0.78

Recorded by:	S Davis	Checked by:	I Swain	Approved by:	I Swain
Date:	17/03/08-17/04/08	Date:	21/04/2008	Date:	21/04/2008
Form No.	SI GWR	Revision No.	2.03	Issue Date	07/01/2008

NORWEST HOLST SOIL ENGINEERING

A7 Appendix 7

Site Walkover Photographs



Plate 01: Western part of site – view looking northwest



Plate 02: Hard core materials in northwestern corner of site

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015



Plate 03: Northwestern boundary



Plate 04: Spoil heap central part of site

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015



Plate 05: Spoil heap central part of site



Plate 06: Northwestern corner of site

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015



Plate 07: Man made materials within vegetated mound – central part of site

Plate 08:

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015

A8 Appendix 8

Relevant Extract of Additional Environmental Data

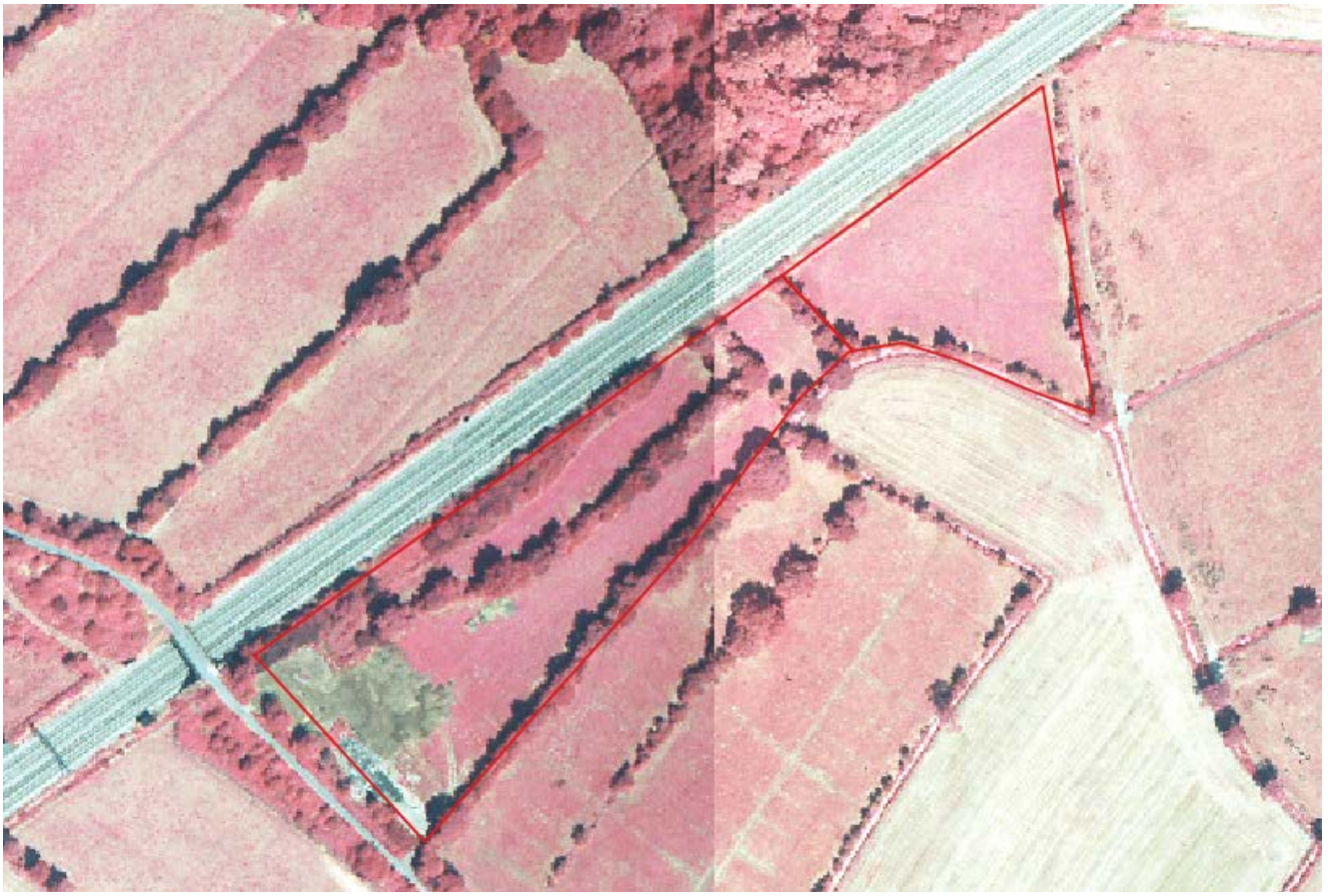


Plate 01: Extract of 1981 aerial photograph (infra-red)



Plate 02: Extract of 1998 aerial photograph

Client:	Welsh Government
Project:	M4CaN
Job Ref:	JER6591 Checked By: Date: Oct 2015



Plate 03: Extract of 2009/10 aerial photograph



Plate 04: Extract of 2013/14 aerial photograph

Client:	Welsh Government			
Project:	M4CaN			
Job Ref:	JER6591	Checked By:	Date:	Oct 2015