

Welsh Government

M4 Corridor around Newport

Environmental Statement

Supplement

Land Contamination Assessment

Report Annex D

CL-27 Elver Pill Reen and Green
Moor Landfill Land Contamination
Assessment Report

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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-27) known as the 'Elver Pill Reen and Green Moor Landfill' and hereinafter referred to as the Site.
- 1.1.2** The Site is located between chainage 16,400 and 17,900 (See Figure 1) and covers an area of historical landfill and infilling of the Elver Pill Reen.

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) published in March 2016 and the Land Contamination Assessment Reports formed an annex to Appendix 11.1 of the chapter on Geology and Soils.
- 1.2.2** A subsequent phase of investigation has been undertaken since the publication of the March 2016 ES. The additional data, herein referred to as the 2016 Additional Ground Investigation, have been incorporated into the summary tables, risk assessment, conceptual site model and associated text of this report where relevant. The conclusions and recommendations have also been refined to reflect the improved understanding of status of the site and associated risk. Therefore this report replaces the original CL-27 report published in Appendix 11.1 of the March 2016 ES.
- 1.2.3** In 2014, a Preliminary Sources Study Report (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) and the 2016 Additional Ground Investigation. This report relates to the area defined on the Site Plan Figure 1.
- 1.2.4** 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 March 2016 ES).

1.3 Objectives

- 1.3.1** The key objectives of this report are as follows.
- 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 the information 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 – This section summarises the Site description.
- Section 3: The Scheme – This section details the alignment of the new section of motorway 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 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 contamination linkages and presents the human health and controlled waters screening assessments.
- Section 9: Refined Conceptual Site Model – This section presents the 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 contaminant 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

- 2.1.1** The Site is located to the east of the Llanwern Steel Works former lagoon areas (CL-26 report, Annex D of Appendix 11.1 of the March 2016 ES) and south of the steel works itself. It is centred at National Grid Reference ST386 854 and covers an area of approximately 1 km².
- 2.1.2** The Site is located within a low lying area comprising fields intersected by reens and drainage ditches. Corus Reed bed No. 2 is situated to the north of the Site. Much of the Site is generally used for agriculture.
- 2.1.3** It is understood parts of the Site have historically been used as a landfill for steel works waste comprising slag, clinker, stone and ash. The landfilling activities relate to three areas.
- An area of a historical landfill area called 'Llanwern Steelworks Land Adjacent to 1-3 Blast Furnace'; According to the Natural Resources Wales (NRW) records, this historical landfill covers the entire Site area.
 - Areas of known in-filling in the vicinity of the Elver Pill Reen (later referred to as the 'Elver Pill Reen site'), The Elver Pill Reen site is an area surrounding and to the west of the reen and was identified as a potential contaminant source due to the presence of slag fill used to create roadways. The Site includes two main tracks, the eastern track is 'L'-shaped and the western track traverses north-south parallel to the Elver Pill Reen on its eastern side as shown on Figure 1.
 - Green Moor Lane landfill (later referred to as the 'Green Moor Lane site'). The Green Moor Lane site comprises three small (750-1,600 m² each) locations of buried steel works waste of slag, clinker, stone and ash to the east of the Elver Pill Reen site.
- 2.1.4** A site walkover was planned to be undertaken in January 2014, however no access could be gained.
- 2.1.5** A walkover survey in 2015 identified that the Site comprises a number of fields, ditches and reens and is largely in agricultural use as semi-improved grassland and scrub. Photographs are provided in Appendix 7.
- 2.1.6** During the 2016 Additional Ground Investigation, it was noted that the majority of roads traversing the site raised above the level of the reens and ditches consisted of gravel of clinker and slag materials.

3 The Scheme

- 3.1.1** The proposed new section of motorway would cross the Site centrally from east to west. The approximate chainage is 16,400 to 17,900. Refer to Figure 1 for the Site location in relation to the Scheme.
- 3.1.2** The current design crosses the Site on an earth embankment some 2 m to 3 m high. A proposed new overbridge to accommodate North Row road also cuts through the eastern part of the Site.
- 3.1.3** The alignment would transect the western Elver Pill Reen track and encroach on the northern end of the existing eastern track. The road construction would also cross the Green Moor landfill areas.
- 3.1.4** An area of permanent land take is proposed in the north eastern corner of the Site which includes a water treatment area, an attenuation pond and associated landscaping.

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) 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 Welsh Government. Relevant extracts are presented in Appendix 8.
- 4.1.3** A summary of the Site's history is presented in Table 1 below.

Table 1: Site History Summary

1995 Feature ID / Date	Use / Observation	Source of Information
1843 - 1893	The Site comprises a number of fields traversed by reens and drainage ditches. Middle Road and Middle Road Reen run northeast-southwest through the centre of Site. The Elver Pill Reen runs north-south in the west of Site and Newcut Reen runs northwest-southeast through the centre of Site. A road runs along the southern and eastern boundary. Prides Bridge is located in the northwest corner.	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	A cattle shelter is present in the south.	1:10,560 Historical Mapping
1969	<u>A steelworks including settling ponds</u> beyond the Site to the north.	Aerial Photography
1970 - 1973	Two overhead wires and associated masts are located running northeast-southwest along the Site southern boundary. The cattle shelter is no longer present.	1: 10,000 Historical Mapping
1979	No significant change	Aerial Photography
1985 - 1996	A pond / area of <u>infilling</u> is located in the southwest corner of Site. A <u>pipeline</u> (assumed associated with the steelworks, above or below ground status unknown) runs along the western boundary of the Site.	1 : 10,000 Historical Mapping
1991	<u>Landfill activity observed</u> on the Site including <u>stockpiling of material / construction of a bund</u> along the southern and eastern boundary of the Site. Tracks observed in the western area of the Site. Area of <u>disturbed ground with ponding water</u> in the south western corner. Evidence of <u>stockpiling</u> adjacent to a track along the western boundary.	Aerial Photography

1995 Feature ID / Date	Use / Observation	Source of Information
1998	<u>Three settling ponds</u> are located in the north western area of the Site. A further <u>track</u> is located along the northern boundary. Areas of bare ground and <u>stockpiling</u> observed in discrete areas across the Site.	Aerial Photography
2006	One of the three settling ponds appears <u>infilled</u> and vegetated. Further <u>ponds / areas of disturbed ground</u> identified in the south western area of the Site. An area of bare ground with stockpiles is located along the northern boundary. Areas of bare ground with white material observed adjacent to track south of the settling ponds (described as a 'white spill' in the 1995 PSSR, however this is not captured in the 1998 image).	Aerial Photography
2009 - 2010	No significant change	Aerial Photography
2014	The northernmost settling pond appears infilled / covered by patchy vegetation. White material partially overgrown.	Aerial Photography

*Notes. Potential sources of contamination are underlined. Those within 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. Relevant extract of the photographs are presented in Appendix 8.
- 4.1.5** Consultation with Newport City Council and NRW has revealed that a large area encompassing Elver Pill Reen and Green Moor Lane sites was a licensed landfill (Reference: 6935/0026) and bounded to the north by Llanwern Works East, the A4810 and to the south by Rush Wall road.
- 4.1.6** The Site commenced to accept waste in 1981. The tip was licensed to accept 49 tonnes of sludge per day before the licence was revoked in 1984. It is understood that only the north west corner of the licensed area has been used for sludge disposal and this includes Reedbed No 2, part of the Llanwern Steelworks former lagoon site (CL- 26).
- 4.1.7** Evidence of large scale landfilling across the entire Site is not present from the historical maps and aerial photographs.
- 4.1.8** Historically, the Site was used as bombing decoy site during World War II which is described in detail within the 2014 PSSR (Ove Arup 2014) and the Explosive Ordnance Threat Assessment Report (Bactec, 2014). The risk from unexploded ordnance at the Site is categorised as medium risk (Bactec, 2014).

5 Environmental Setting

5.1 Geology

5.1.1 The British Geological Survey (BGS) geological maps show relatively impermeable Tidal Flat Deposits underlying the Site and bands of peat are likely to be present within these.

5.1.2 The BGS geological records show bedrock beneath the Site is that of the Mercia Mudstone Group comprising weathered mottled and often fractured mudstones.

5.2 Hydrology

5.2.1 A number of drainage ditches traverse the Site. Middle Road Reen runs northeast-southwest through the Site centre, Elver Pill Reen runs north-south in the west and a number of settling ponds are present in the west of Site as shown in Figure 1.

5.3 Hydrogeology

5.3.1 NRW classifies the Mercia Mudstone Group as a Secondary B Aquifer. The Tidal Flat Deposits are classified as non productive (negligibly permeable) strata.

5.3.2 The Site does not lie within a groundwater source protection zone.

5.3.3 Groundwater is anticipated to be present between the interface of the bedrock strata and Tidal Flat Deposits. Further, perched water may be encountered at shallow depth within any fill material above the Tidal Flat Deposits.

5.4 Environmental Information

5.4.1 NRW reports the following information within the study area.

- No pollutant incidents, abstraction licences or discharge consents within the Site or within 300 m of the Site.
- One historic landfill site has been recorded within the Site boundary.
- Three authorised landfills are recorded within 300 m of the Site.

Table 2: Historic Landfills within Site Boundary

Landfill Name	Location	Material Type	Date Waste First and Last Received
Llanwern Steelworks Land Adjacent to 1-3 Blast Furnace, Corus, Llanwern Works	Over whole Site	Industrial waste and liquid sludge	16/11/1981 20/06/1984

Table 3: Authorised Landfills within 300 m of Site

Landfill Name	Operator's Name	Location	Licence Type	Licence Status
Llanwern Landfill: South Side of Queensway	Corus Strip Products PPC	Adjacent to the west of the Site	Industrial Waste Landfill	Modified
South Side of Queensway Llanwern Landfill	Tata Steel UK Limited	Adjacent to the west of the Site	Waste landfilling; >10 T/D with capacity >25,000T excluding inert waste	Effective
Llanwern Works East	Corus Strip Products	Adjacent to the north eastern Site boundary	Industrial Waste Landfill	Issued

5.4.2 The Site lies within the Gwent Levels – Whitson and Redwick and Llandeenny Site of Special Scientific Interest.

5.4.3 Residual levels of potential contamination associated with the historical landfilling may be present.

6 Scope of Investigations

6.1 General

6.1.1 Six intrusive ground investigations have been undertaken at the Site since 1997 and these have been summarised in the following sections.

6.2 Scope of Works

6.2.1 The various intrusive ground investigations undertaken within the Site area are summarised in Table 4 and are shown on Figure 1.

Table 4: Ground Investigation Summary

Date	Contractor	Site Location	Boreholes	Trial Pits	Sampling
1997	Norwest Holst	South	BHK2, BHK3, BHK4, BHK5, BHL1, BHL2	-	Soil
2000	Exploration Associates	South	-	CH51, CH52, CH52A, CH53, CH53A, CH54, CH54A	Soil and leachate
2002	Enviros	Unknown	RBBH3, RBBH4, RBBH5	-	Soil & groundwater
2008	Norwest Holst	Central area	SBHK01CP, SBHK02CP, SBHK03CP, SBHK04CP, SBHL01CP, SBHL02CP, SBHL02RC	STPK01, STPK02, STPL01	Soil, leachate & groundwater
2015	Geotechnical Engineering	South	BH526, BH527, BH528, BH529, BH530	TP510, TP11, TP12, TP13	Soil
2016	RPS	Along/adjacent route alignment	WSM4CAN025, WSM4CAN026, WSM4CAN027, WSM4CAN028, WSM4CAN029, WSM4CAN030, WSM4CAN031, BHM4CAN044,	TPM4CAN019, TPM4CAN020, TPM4CAN021	Soil, leachate & groundwater

6.2.2 The 2016 Additional Ground Investigation undertaken by RPS specifically targeted some of the previously identified data gaps as well as enabling the

verification of the risk levels at the Site and need for any remedial measures. The scope of the 2016 Additional Ground Investigation included the following.

- Investigation of one area of suspected tipping (Green Moor landfill).
- Construction of further groundwater and gas monitoring wells targeting the Made Ground and Mercia Mudstone.

6.2.3 Due to access constraints two of the three areas of suspected tipping were not investigated.

6.2.4 The construction details of all boreholes installed with monitoring wells on the Site are summarised in Table 5 below and shown on Figure 1.

Table 5: 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
SBHK01CP	50	13.5	4.8	6.8	Tidal Flat Deposits
SBHK02CP	50	13.7	7.2	11.2	Tidal Flat Deposits
SBHK03CP	50	11.5	4.9	5.9	Tidal Flat Deposits
SBHK04CP	50	12.2	10.2	12.2	TFD / Mercia Mudstone Group
SBHL02CP	19	20.3	14.8	15.4	Mercia Mudstone
BH527	35	19.1	4.9	9	Tidal Flat Deposits
	50		12.9	19	Mercia Mudstone
BH528	35	17	6	7	Peat / TFD
	50		11.8	17	Mercia Mudstone
BH530	35	21	5	8	Peat / TFD
	50		12	21	Mercia Mudstone

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
WSM4CAN026	50	5.0	0.5	1.5	Made Ground
WSM4CAN027	50	6.0	0.5	1.5	Made Ground
WSM4CAN028	50	6.0	4.0	6.0	TFD
WSM4CAN029	50	6.0	4.0	6.0	Peat / TFD
WSM4CAN030	50	6.0	1.0	6.0	Peat / TFD
WSM4CAN031	50	6.0	1.0	6.0	Peat / TFD
BHM4CAN044	50	13.0	2.0	8.0	Peat / TFD
			11.0	13.0	Mercia Mudstone

6.3 Surface Water Quality Monitoring

6.3.1 Surface water quality monitoring has been undertaken at a number of locations surrounding the Site which are shown in Figure 1. Sampling has also been undertaken during 2015 (Geotechnical Engineering, 2015) and by RPS (Appendix 16.2 of the March 2016 ES) as part of the supplementary works commissioned by Welsh Government.

6.3.2 Further sampling has previously been undertaken between 2007 and 2008 as part of the Titan surface water sampling regime (Titan, 2008).

6.3.3 These surface water monitoring locations are shown in Table 6.

Table 6: Surface water monitoring locations

Surface Water Location ID	Location Description	Comments
R14	Located Elver Pill Reen approximately 50 m south of the Site.	Flow was noted as slack to slow
R15	Located on Greenmoor Triangle approximately 50m north of the Site.	Flow was noted as slack to slow
R16	Located on Windmill Reen on the southern Site boundary.	Flow was noted as slack to slow
17.1	Located on 100 Perches Reen approximately 150 m north of the Site.	Slow flow noted, little vegetation

Surface Water Location ID	Location Description	Comments
17.2	Located on Middle Road Reen Diversion on the southern Site boundary.	Shallow with significant vegetation
17.3	Located Elver Pill Reen approximately 50m south of the Site.	Low to no flow, duck weed on surface of water
SW506	Located on field drain on the western boundary of the Site.	-
SW507	Located on Middle Road Reen Diversion on the eastern boundary of the Site.	-
SW508	Located on Middle Road Reen Diversion on the north eastern boundary of the Site.	-

6.4 Field Testing

6.4.1 Monitoring of Volatile Organic Compounds (VOCs) was undertaken on soil samples at locations STPK01, STPK02, SBHK02CP and SBHK04CP (Norwest Holst, 2008), and BH526, BH527, BH528, BH529, BH530, TP510, TP511, TP512 and TP513 (Geotechnical Engineering, 2015).

6.5 Groundwater Monitoring

6.5.1 The groundwater sampling, groundwater monitoring and ground gas monitoring rounds are shown in Table 7.

Table 7: Summary of Monitoring Rounds

Location Ref.	Number of Rounds (Date of Sampling)	Monitoring Details	Notes
RBBH003	6 no. 1st March 2002, 21st March 2002, 17th April 2002, 5th November 2002, 28th November 2002, 14th January 2003	Groundwater - sampling	
RBBH004	5 no. 21st March 2002, 17th April 2002, 5th November 2002, 28th November 2002, 14th January 2003	Groundwater - sampling	
RBBH005	0 no. recorded	Groundwater - sampling	
SBHK01CP	6 no. 1st February 2008, 25th February 2008, 6th March 2008, 19th March 2008, 3rd April 2008, 17th April 2008.	Groundwater - levels and sampling	
SBHK02CP	6 no. 1st February 2008, 25th February 2008, 6th March 2008, 19th March 2008, 3rd April 2008, 17th April 2008.	Groundwater - levels and sampling	
SBHK03CP	6 no. 1st February 2008, 25th February 2008, 6th March 2008, 19th March 2008, 3rd April 2008, 17th April 2008.	Groundwater - levels and sampling	

Location Ref.	Number of Rounds (Date of Sampling)	Monitoring Details	Notes
SBHK04CP	6 no. 1st February 2008, 25th February 2008, 6th March 2008, 19th March 2008, 3rd April 2008, 17th April 2008.	Groundwater - levels and sampling	
SBHL02CP	6 no. 1st February 2008, 25th February 2008, 6th March 2008, 19th March 2008, 3rd April 2008, 17th April 2008.	Groundwater -levels	
BH527 (35 mm)	4 no. 20th March 2015, 27th March 2015, 13th April 2015, 8th May 2015	Groundwater - levels and sampling Ground Gas	Dual installations. Gas monitoring in 35 mm shallow installations only.
BH527 (50 mm)			
BH528 (35 mm)	4 no. 20th March 2015, 27th March 2015, 13th April 2015, 8th May 2015	Groundwater - levels and sampling Ground Gas	
BH528 (50 mm)			
BH530 (35 mm)	4 no. 30th March 2015, 14th April 2015, 21st April 2015, 11th May 2015	Groundwater - levels and sampling Ground Gas	
BH530 (35 mm)			
WSM4CAN026 (50 mm)	1 no. 14 th June 2016	Groundwater levels & sampling Ground Gas	
WSM4CAN027 (50 mm)	1 no. 14 th June 2016	Groundwater levels & sampling Ground Gas	
WSM4CAN028 (50 mm)	1 no. 14 th June 2016	Groundwater levels & sampling Ground Gas	
WSM4CAN029 (50 mm)	1 no. 14 th June 2016	Groundwater levels & sampling Ground Gas	
WSM4CAN030 (50 mm)	1 no. 14 th June 2016	Groundwater levels & sampling Ground Gas	
WSM4CAN031 (50 mm)	1 no. 14 th June 2016	Groundwater levels & sampling Ground Gas	
BHM4CAN044 (50 mm)	3 no. 6 th May 2016, 19 th May 2016, 2 nd June 2016	Groundwater - levels and sampling ground gas	

6.6 Laboratory Chemical Testing

6.6.1 A summary of all laboratory analysis undertaken on soil, groundwater, leachate and surface water is summarised in Table 8 and Table 9 below.

Table 8: 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	4	0	0	Metals, pH, sulphate, cyanide, PAH screening, phenols, mineral oil
2000	6	2	0	Metals, pH, sulphate, cyanide, PAH screening, TPH, oil, phenol, PCBs
2002	3	0	9	Metals, pH, phenol, sulphate, cyanide, asbestos, TOC, TPH and PAH speciated, PCBs, BTEX, SVOCs
2008	10	6	8	Metals, pH, sulphate, asbestos, cyanide, phenol, MTBE, BTEX, TPH, PAH
2015	14	4	18	Metals, PAH, TPH, asbestos, pH, cyanide, organic matter, sulphate, sulphur, VOCs, SVOCs, nitrate, BTEX, phenols, PCBs
2016	10	3	10	Metals, asbestos, pH, PCBs, phenols, BTEX, TPH, PAH, VOCs, SVOCs

Table 9: Summary of Previous Investigation Sampling - Surface Water

Site Investigation date	No. of water sample locations / number of rounds	Suites of testing
2007/2008	3 locations / 4 rounds	Metals, inorganics, quality
2015	3 locations / 3 rounds	Inorganics, PAH, TPH, BTEX, VOCs, Phenols, quality
2015	3 locations / 1 round	Inorganics, PAH, TPH, BTEX, quality

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 3 with the supporting laboratory certificates available in the relevant original ground investigation reports (See Table 4).
- 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 (Tidal Flat Deposits specifically).
- 6.6.4** For the purpose of meeting the requirements of Volume 4, Section 1, Part 2 of the DMRB (HD22/08 – Managing Geotechnical Risk – 2008 (Highway Agency,

2008), the historical data used to support the PSSR, the additional 2015 information (Geotechnical Engineering, 2015) and 2016 information have been differentiated in the following sections.

6.6.5 The available information has been summarised in Table 10.

Table 10: Summary of Analytical Soil Data

Formation Unit	Number of Soil Analysis per Analytical Suite								
	Metals & Inorganics	Asbestos	PAH	TPH	Phenol	BTEX	VOCs	SVOCs	PCBs
Pre-2015 Data									
Made Ground	15	4	8	8	15	4	0	0	0
Natural Soils	8	6	8	8	8	6	0	0	0
2015 Data									
Made Ground	7	7	7	7	0	3	3	1	0
Natural Soils	7	1	7	4	0	3	3	1	0
2016 Data									
Made Ground	5	3	5	5	2	5	3	3	3
Natural Soils	5	2	5	3	1	3	2	2	2
Total Data									
Total	47	23	40	35	26	24	11	7	5

Soil Leaching Analysis

6.6.6 Similarly to the soils data, the soil leachate results have been considered for the Made Ground and natural soils separately. The available information is presented in Appendix 6 and summarised in Table 11.

Table 11: Summary of Soil Leaching Analytical Data

Formation Unit	Number of Soil Leachate Analysis per Analytical Suite							
	Metals & inorganics	PAH	TPH	Phenol	BTEX	VOCs	SVOCs	PCBs
Pre-2015 Data								
Made Ground	6	0	0	0	0	0	0	0
Natural Soils	2	0	0	0	0	0	0	0
2015 Data								
Made Ground	3	3	3	3	3	0	0	0
Natural Soils	1	1	1	1	1	1	1	1
2016 Data								
Made Ground	3	2	2	1	2	2	2	2
Total Data								
Total	15	6	6	5	6	3	3	3

Groundwater Analysis

6.6.7 The following section summarises 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.

6.6.8 The available data relate to groundwater samples taken from wells installed within the groundwater of the Tidal Flat Deposits and/or Mercia Mudstone and are summarised in Table 12.

Table 12: Summary of Analytical Groundwater Data

Groundwater Unit	Number of Groundwater Analysis per Analytical Suite (number of well locations)								
	Metals & Inorganics	PAH	TPH	PCB	BTEX	VOC	SVOC	Non Metal Inorganics	Phenols
Pre-2015 Data									
Perched (Made Ground)	7 (5)*	7 (5)*	7 (5)*	1 (2)*	4 (2)	0 (0)	0 (0)	7 (5)*	5 (5)*
Perched (Tidal Flat Deposits)	4 (2)	4 (2)	4 (2)	0 (0)	4 (2)	0 (0)	4 (2)	4 (2)	4 (2)
Undifferentiated	9 (3)	3 (3)	3 (3)	0 (0)	0 (0)	0 (0)	0 (0)	9 (3)	0 (0)
2015 Data									
Perched (Tidal Flat Deposits)	9 (3)	9 (3)	9 (3)	6 (2)	9 (3)	9 (3)	9 (3)	9 (3)	9 (3) /
Groundwater (Mercia Mudstone)	9 (3)	9 (3)	9 (3)	6 (2)	9 (3)	9 (3)	9 (3)	9 (3)	9 (3)
2016 Data									
Perched (Tidal Flat Deposits)	7 (5)	7 (5)	7 (5)	6 (5)	7 (5)	6 (5)	7 (5)	7 (5)	7 (5)
Groundwater (Mercia Mudstone)	3 (1)	3 (1)	3 (1)	2 (1)	3 (1)	2 (1)	3 (1)	3 (1)	3 (1)
Total Data									
Total	48 (22)	42 (22)	42 (22)	21 (12)	36 (16)	26 (12)	32 (14)	48 (22)	37 (19)

* Some samples relate to grab samples obtained within trial pits during 2000 ground investigation.

Surface Water Analysis

6.6.9 The following section summarises the laboratory analytical results for surface water samples collected during the various intrusive investigation phases. The available data set has been tabulated in a table format and is presented in Appendix 5 with supporting laboratory certificates available in the relevant original ground investigation reports.

Table 13: 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
Pre-2015 Data					
Elver Pill Reen	4 (1)	4 (1)	0 (1)	4 (1)	0 (1)
Greenmoor Triangle	4 (1)	4 (1)	0 (1)	4 (1)	0 (1)
Windmill Reen	4 (1)	4 (1)	0 (1)	4 (1)	0 (1)
Middle Road Reen Diversion	5 (2)	5 (2)	5 (2)	5 (2)	5 (2)
2015 Data					
Elver Pill Reen	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
Middle Road Reen Diversion	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
100 Perches Reen	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)

6.7 Review of Available Data

6.7.1 The investigation data available for the Site is considered reasonable as there has been sampling along the length of the new section of motorway. The 2016 Additional Ground Investigation included a single borehole located within one of the three areas of tipping comprising Green Moor landfill, the remaining two areas not being investigated due to access constraints. In addition the proposed link road and water treatment areas remain un-investigated due to access constraints. The latter are located adjacent to the Llanwern Works East Landfill and Llanwern Steelworks main operation areas.

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) and the 2016 Additional Ground Investigation has also been used.

Topsoil

7.1.2 Topsoil was encountered at fourteen locations across the Site. It was generally at ground level above the superficial deposits and ranged between 0.02 to 0.4 m thickness. One exception was in CH52A where the topsoil was encountered at 1.1 m bGL below the Made Ground.

Made Ground

7.1.3 Made Ground was encountered in twenty five exploratory locations at ground level at thicknesses ranging between 0.8 – 3.2 m. It is considered the majority of Made Ground relates to construction material for the existing access roads which cross the Site and is generally at 1 m above surrounding ground levels. Made Ground was also identified in the ponded area in the north west of Site. It commonly comprised a grey / black coarse material comprising slag, ash and occasionally bricks.

7.1.4 Made Ground was not identified in twenty two locations on the Site, the majority of which were located in the south and east.

7.1.5 The investigation data have not identified Made Ground which may be associated with landfilling, despite WSM4CAN026 targeting the area of the Greenmoor Landfill.

Superficial Deposits

7.1.6 Unconsolidated superficial deposits were encountered beneath the Made Ground or topsoil in all locations. These comprised Tidal Flat Deposits, generally firm bluish grey clays becoming soft or very soft with occasional gravel.

7.1.7 The deposits included one or two layers of peat beneath the Site with an upper layer encountered at typically 4.6 – 6.4 m bGL and a second layer at typically 5.25 – 8.8 m bGL. The horizontal continuity of these layers remains unproven. The thickness of the peat layers was variable between 0.1 - 2.8 m.

7.1.8 Sand and gravel material considered to represent Glaciofluvial Deposits was found to be generally absent beneath the Site, although some boreholes proved the base of the Tidal Flat Deposits to include a coarse fraction. Discrete areas of Glaciofluvial Deposits were found in SBHL01CP (identified as River Terrace Deposits in the borehole log) at a depth of 8.5 m bGL with a thickness of 1.9 m and BHM4CAN044 at a depth of 8.8 m bGL with a thickness of 2.3 m. Both boreholes are located in the east of the Site.

Solid Geology

7.1.9 Below the Superficial Deposits, the Mercia Mudstone Group was encountered at a depth of between 8.1 and 11.2 m bGL. The Mercia Mudstone Group was typically described as very stiff weathered reddish brown clay.

7.1.10 Borehole BHL2 in the Mercia Mudstone Group encountered siltstone formation below 10.5 m bGL to an unknown thickness (0.5 m proven).

Geological Sequence Summary

7.1.11 The general geological sequence identified during the previous ground investigations are summarised in Table 14 below.

Table 14: Summary of Geological Sequence

Unit	Description	Thickness Range (m)	Basal Depth m bGL)
Topsoil	-	0.02 - 0.4	0.02 - 0.4
Made Ground (associated with road construction)	Predominantly coarse to including ash, clinker, brick and slag.	0.5 - 3.2	0.5 - 3.2 (road generally 1m raised above surrounding ground level)
Superficial Deposits (Tidal Flat Deposits)	Silty clay, organic in places with at least one defined peat layer	7.0 - 11.2	8.1 - 11.2
Superficial Deposits (Glaciofluvial Deposits) – Discrete pockets	Gravel (SBHL01 and BHM4CAN044 only)	Generally absent – 1.9 m at SBHL01 and 2.3 m at BHM4CAN044	10.4 – 11.1
Mercia Mudstone Group (Mudstone)	Very stiff clays becoming weak completely fractured Mudstone	unproven (>0.5)	unproven

7.1.12 The conceptual ground model included within the 2014 PSSR report has been amended in light of the 2015 and 2016 information and is included within Figure 2.

7.2 Visual and Olfactory Evidence of Contamination

7.2.1 A summary of visual and olfactory evidence of potential contamination encountered during the previous ground investigations is summarised in Table 15.

Table 15: Visual and Olfactory Evidence of Contamination Summary

Location ID	Depth (m bGL)	Strata	Evidence of Potential Contamination
Most exploratory locations in the west	GL to 0.5 - 3.2	Made Ground	Ash, clinker, brick and slag.

7.2.2 No visual or olfactory evidence of hydrocarbon contamination was identified during any of the previous ground investigations. The PID meter recorded generally zero or low levels of VOCs with greatest concentrations recorded within BH529 within the Tidal Flat Deposits in which frequent rootlets were identified (15 to 24 ppm). In the absence of any significant source of contamination, the levels identified are considered to be naturally occurring.

7.3 Gas Monitoring

7.3.1 The ground gas monitoring dataset collected during each monitoring round is summarised on the summary field data sheets provided in Appendix 2. The maximum concentrations (minimum for oxygen) are presented in Table 16.

Table 16: Summary of Gas Monitoring Data

Location ID	Flow (l/hr)	VOCs (ppm)	CH ₄ (%/vol)	Peak LEL (%)	CO ₂ (%/ vol)	O ₂ (%/vol)	CO (ppm)	H ₂ S (ppm)
	Max	Max	Max	Max	Max	Min	Max	Max
BH527 35mm	1.3	3.2	3.4	61	0.0	19.6	0	0
BH528 35mm	0.4	0.4	31	>100	8.1	11.8	5	0
BH530 35mm	0.0	1.1	14.8	>100	5.3	15.0	10	0
WSM4CAN 026 (50 mm)	0	-	11	>>	0.3	21.6	0	0
WSM4CAN 027 (50 mm)	0.5	-	10	>>	0.3	21.5	0	0
WSM4CAN 028 (50 mm)	0.01	-	0	0	0.4	19.8	0	0
WSM4CAN 029 (50 mm)	0.01	-	12.5	>>	0.3	21.6	0	0
WSM4CAN 030 (50 mm)	0	-	0.4	0	0.2	21.7	0	0
WSM4CAN 031 (50 mm)	0.01	-	5.9	>>	0.3	21.2	2.3	0
BHM4CAN 044 Shallow (50 mm)	0.5	-	0.8	-	0.4	18.3	0	0
BHM4CAN 044 Deep (50 mm)	7.5	-	75.4	>>	0.06	3	1	0

7.4 Groundwater

Groundwater Encountered During Investigation

7.4.1 Groundwater strikes were encountered during the drilling of most boreholes and are detailed on the geological logs provided in Appendix 1. These are summarised in Table 17.

Table 17: Summary of Groundwater Level Data during Drilling

Location	Strike Depth (m bGL)	Geological Formation	Level after 20 Minutes (m bGL)
BHK2	6.8	Tidal Flat Deposits	6.8
	10.75	Mercia Mudstone	9.5
BHK3	10.8	Mercia Mudstone	7.1
BHK4	1.1	Made Ground	1
BHK5	9.2	Mercia Mudstone	5.4
BHL1	1.68	Tidal Flat Deposits	1.68
	6.1	Tidal Flat Deposits	5.8
	10.4	Mercia Mudstone	8.8
BHL2	10.4	Mercia Mudstone	9.05
CH51	0.8	Made Ground	not recorded
CH52A	0.8	Made Ground	not recorded
CH53	1.5	Tidal Flat Deposits	not recorded
CH54	1.6	Tidal Flat Deposits	not recorded
RBBH3	0.7	Made Ground	0.7
RBBH5	1.5	Made Ground	1.3
SBHK02CP	1	Made Ground	0.8
SBHL01CP	8.5	Tidal Flat Deposits	5.2
SBHL02CP	10.8	Mercia Mudstone	10.8
SBHL02RC	12	Mercia Mudstone	not recorded
STPK01	0.89	Tidal Flat Deposits	not recorded
STPK02	1.12	Made Ground	not recorded
STPL01	1.39	Tidal Flat Deposits	not recorded
BH526	2.5	Tidal Flat Deposits	2.1
BH528	0.25	Tidal Flat Deposits	0.20
BH529	0.9	Tidal Flat Deposits	0.52
TP510	1.05	Made Ground	not recorded
	3.8	Tidal Flat Deposits	not recorded
TP511	1.05	Made Ground	not recorded
TP512	1.5	Tidal Flat Deposits	not recorded
TP513	2.9	Tidal Flat Deposits	not recorded

Location	Strike Depth (m bGL)	Geological Formation	Level after 20 Minutes (m bGL)
BHM4CAN044	0.9	Made Ground	0.5
	7.9	Tidal Flat Deposits	3.9
	12.7	Mercia Mudstone	7.1
WSM4CAN026	1.1	Made Ground	not recorded
WSM4CAN028	3.5	Tidal Flat Deposits	not recorded
WSM4CAN029	3.5	Tidal Flat Deposits	not recorded
WSM4CAN030	3.2	Tidal Flat Deposits	not recorded
TPM4CAN019	1.7	Tidal Flat Deposits	steady ingress
TPM4CAN020	2.1	Tidal Flat Deposits	steady ingress

7.4.2 Groundwater was not recorded in any other boreholes and trial pits during the investigations.

Groundwater Levels During Monitoring Rounds

Table 18: Summary of Groundwater Level Data

Location	Installation #1	Depth of Response Zone (m bGL) and Geological Formation	No. Measurements	Min Depth (m bGL)	Max Depth (m bGL)
SBHK01C P	50 mm	4.8 - 6.8 TFD	6	0.70	1.06
SBHK02C P	50 mm	7.2 - 11.2 TFD	6	1.33	1.48
SBHK03C P	50 mm	4.9 - 5.9 TFD	6	0.87	1.07
SBHK04C P	50 mm	10.2 - 12.2 TFD / MMG	6	1.45	1.67
SBHL02R C	19 mm	14.8 - 15.4 MMG	6	2.27	2.45
BH527	35 mm (S)	4.9 - 9 TFD	4	0.67	2.74
	50 mm (D)	12.9 - 19 MMG	4	1.71	3.10
BH528	35 mm (S)	6 - 7 Peat / TFD	4	0.49	1.63
	50 mm (D)	11.8 - 17 MMG	4	1.28	2.90
BH530	35 mm (S)	5 - 8 Peat / TFD	4	1.52	2.62
	50 mm (D)	12 - 21 MMG	4	2.00	3.49
BHM4CA N044	50 mm (S)	2 - 8 Peat / TFD	3	0.89	1.13
	50 mm (D)	11 - 13 MMG	3	1.41	1.5
WSM4CA N026	35 mm	0.5 - 1.5 MG	1		0.77

Location	Installation #1	Depth of Response Zone (m bGL) and Geological Formation	No. Measurements	Min Depth (m bGL)	Max Depth (m bGL)
WSM4CA N027	35 mm	0.5 - 1.5 MG	1		Dry
WSM4CA N028	35 mm	4 - 6 TFD	1		0.63
WSM4CA N029	35 mm	4 - 6 TFD	1		0.64
WSM4CA N030	35 mm	1 - 6 TFD	1		0.87
WSM4CA N031	35 mm	1 - 6 TFD	1		0.39

^{#1} S denotes a shallow installation and D denotes deep installation;

Groundwater Summary

- 7.4.3** A perched water body was typically encountered within the Made Ground during the investigations between 0.5 and 1.3 m bGL.
- 7.4.4** The main groundwater body is within the granular Mercia Mudstone Group, which is confined by the intervening Tidal Flat Deposits representing an aquitard limiting vertical groundwater flow.
- 7.4.5** Perched groundwater is observed within the upper Tidal Flat Deposits associated with limited zones of permeability associated with more granular lithologies and peat. This 'groundwater' is regarded as 'pore water' which does not contribute to advective flow within these strata.
- 7.4.6** Perched water was also identified during the intrusive works and subsequent monitoring within the Made Ground. The water levels measured within the made Ground are greater than water levels within the underlying groundwater bearing units, most notably Glaciofluvial Deposits and Mercia Mudstone Group. This confirms the perched nature of groundwater in the Made Ground and demonstrates a perennial, downward vertical hydraulic gradient.
- 7.4.7** The groundwater conditions encountered on the Site are consistent with the hydrogeological conceptual model presented in the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES).

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 2016 Additional Ground Investigation. The main alteration to the 2014 PSSR model are summarised below.

- Addition of gas dataset from borehole monitoring wells on Site.
- Proposed use of band drains to accelerate surcharging of soft soils during construction. These are anticipated to be vertical drains installed in a close grid pattern through the Made Ground and underlying Tidal Flat Deposits and into the Glaciofluvial Deposits.
- Piled foundations proposed for the bridge / link road junction.
- Inclusion of a defined peat horizon.
- Update of the source/pathway/receptor linkages.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 The potential sources of contamination and associated contaminants which may be present within the Site are detailed below.

- Made Ground used for road construction across the Site.
- Waste material associated with landfill activity (Green Moor Landfill) – extent anticipated to be limited based on historical mapping and aerial photographs and a single borehole located within one of the three tipping areas did not identify the presence of waste materials.
- There is the possibility of ground gas generation from infilled ground and the presence of ground gas generated by natural organic rich soils beneath the Site.
- The quality of surface water drainage, perched water and the deep aquifer within the Glaciofluvial Deposits and Mercia Mudstone may influence or impact the quality of the others. Surface water, perched groundwater and aquifer could therefore be regarded as a source of possible contaminants as well as receptors. The waters associated with the Glaciofluvial deposits, Mercia Mudstone and Tidal Flat Deposits are brackish whereas the surface water is not.

8.2.2 The north west corner of the Site includes the Reedbed No.2 of the Llanwern Steelworks which receives all surface waters from the factory and lagoons prior to being discharged within the estuary.

8.2.3 The Site is also surrounded by three potential sources of contamination.

- To the north of the Site beyond the A4810 is Llanwern Steelworks.
- At the north eastern end of the Site is the Llanwern Works East Landfill which accepted industrial waste.
- To the west of the Site lies Llanwern Lagoon 26. The information related to the lagoon is discussed in more detail in the Land Contamination Assessment Report CL-26 Lagoons (Annex D of Appendix 11.1 of the March 2016 ES). Whilst Lagoon 26 is a permitted landfill, previous ground investigation proved minimal waste to be present, comprising mainly slag material with brick and concrete inclusions to typically 1-3 m in thickness. The soil contamination was associated with high pH and discrete areas of heavy metals (arsenic and nickel). Groundwater quality is considered to be similar to the overall baseline seen in this general area of the Gwent Levels as defined within the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES).

8.2.4 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 brackish 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

8.2.5 The following potential receptors have been identified.

Construction

- Construction workers during Site development works.
- General public and workers adjacent to construction works.
- Groundwater within the Glaciofluvial Deposits / Mercia Mudstone.
- Onsite and nearby surface waters including the reens and existing surface water ditches within the Site and bordering the surrounding fields. This land drainage is part of the Gwent Levels SSSI wider network of reens and ditches, which extends to the south of the Scheme.

Operational

- Maintenance workers.
- General public end users.
- Groundwater within the Glaciofluvial Deposits and/or Mercia Mudstone.
- The Gwent Levels SSSI surface water network of ditches and reens.

Potential Pathways

- Dermal contact, ingestion, inhalation pathways possible during development and maintenance works.
- Inhalation pathways for general public future end users.
- Contaminated surface water run-off into existing / new drainage system.

- Lateral migration of leachate and/or contaminated impacted perched water within the Made Ground directly into surrounding surface water bodies or via subsurface drainage.
- Downward vertical migration of impacted leachate and/or impacted perched water within the Made Ground into the main groundwater bodies.
- Downward vertical migration of impacted leachate and/or impacted perched water within the Made Ground into the main groundwater bodies and subsequent lateral migration to surface waters.
- Vertical or lateral migration of ground gas associated with Made Ground and peat and organic soils.
- Creation of new pathways for shallow contamination to migrate along piles and foundations from the Made Ground, through the Tidal Flat Deposits and into Glaciofluvial Deposits and/or Mercia Mudstone.

8.2.6 The groundwater level dataset suggests that upward, vertical migration from the Glaciofluvial Deposits/Mercia Mudstone Group into Made Ground is not an active pathway within the Site.

8.2.7 Although perched water contained within the Made Ground is unlikely to be laterally continuous across the Site, owing to the lithological and depth variability of this unit across the Site, it has been considered a possible generic pathway for this assessment.

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:

- Proposed 2–3 m motorway embankment and overlying hardstanding (carriage way) is to be constructed at the Site which is to cover most of the motorway corridor reducing pathways from any contamination in shallow soils left *in situ*.
- Tidal Flat Deposits are classified as non-productive and overlie an underlying secondary B aquifer associated with the Mercia Mudstone.
- The low permeability Tidal Flat Deposits (of over 10 m thickness) separates the various onsite and offsite Made Ground and deeper aquifer. Main groundwater body identified as being confined by the Tidal Flat Deposits.
- 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.
- Hardstanding cover which is proposed in some areas of the new motorway corridor is likely to limit infiltration thus reducing leaching.
- Creation of new drainage system may increase leaching of any contaminants from the Made Ground with associated increase in the risk for migration into surface waters.

- Piled and band drain foundations may create pathways to groundwater at depth. Pathways may allow increase in the influx of water within the Made Ground, given the recorded sub-artesian pressures.
- Motorway users will be within open environment with no proposed structures or other confined spaces.
- Risk of increased flux of gas emission due to induced consolidation of the Made Ground and peat from the proposed surcharge loading. However, potential receptors are limited, primarily associated to accumulation in confined spaces (such as underground services).
- Waters within the Tidal Flat Deposits and deeper aquifer of the Mercia Mudstone are brackish whereas surface water is not.

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 3. All exceedances to the relevant criteria are summarised in Table 19 below.

Table 19: Summary of Human Health Soil Screening Exceedances (Made Ground)

Determinant	Units	Range	Screening Criteria	No. Samples Exceeding Screening Criteria (Total Number of Results)	Locations of Exceedances
Chromium	mg/kg	36 - 1,200	33	27 (27)	BHK3 (x2), BHK4 (x2), CH51, CH52A), CH53A, CH54A, RBBH3, RBBH4, RBBH5, SBHK03CP, SBHK02CP, STPK01, STPK02, BH526 (x2), BH527 (x2), BH530, TP510, BHM4CAN044, WSM4CAN025, WSM4CAN026, WSM4CAN027, WSM4CAN029(x2)
pH	pH units	7.8 - 12.9	6 - 9	22 (27)	BHK4 (x2), CH51, CH53A, CH54A, RBBH3, RBBH4, RBBH5, SBHK03CP, SBHK02CP, STPK02, BH526 (x2), BH527 (x2), TP510 (x 2) BHM4CAN044, WSM4CAN025, WSM4CAN026, WSM4CAN027, WSM4CAN029(x2)
PAH (screening)	mg/kg	<10 - 82	3.5	3 (4)	CH51, CH52A CH53A

Table 20: Summary of Human Health Soil Screening Exceedances (Natural Ground)

Determinant	Units	Range	Screening Criteria	No. Samples Exceeding Screening Criteria (Total Number of Results)	Locations of Exceedances
Chromium	mg/kg	26.3 - 1,800	33	14 (20)	CH52A, CH53A, SBHK03CP, SBHK04CP (x2), STPK01, STPK02, BH526, BH528, BH530, TP510, TPM4CAN020, WSM4CAN030, WSM4CAN031
pH	pH units	7.1 - 12.3	6 - 9	3 (19)	CH52A, BH526, TP510
PAH (screening)	mg/kg	<10 - 12	3.5	1 (2)	CH52A

8.4.2 Elevated alkaline soil conditions have been identified in over half of the samples, mainly within the Made Ground material but also in three samples of the Tidal Flat Deposit material.

8.4.3 Although exceedances to chromium are widespread in both Made Ground and natural soils, the criterion relates to the hexavalent form. The majority of the results are considered to be within normal background data range (<95 mg/kg) and therefore are not considered to represent a contaminant of concern. However, 24 locations including a distinct cluster around TP510, STPK02, SBHK03 and WSM4CAN029, exceed this background range with maximum of up to 1,800 mg/kg (reported for a sample at the Made Ground/TFD interface). It is likely that the elevated chromium concentrations are related to the slag used to construct access roads. Two Made Ground samples with elevated chromium concentrations were analysed for the more toxic hexavalent form of chromium both of which were reported at below the limit of detection (LOD) indicating chromium to represent a low risk to human health. Further consideration of chromium is provided in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.4.4 Polycyclic Aromatic Hydrocarbons (PAHs) are identified in exceedances over half of the samples analysed without speciation. In this instance the criterion for total PAH has been taken considering the most stringent PAH compound (Dibenzo(ah)anthracene) and the elevated PAHs are mainly associated with Made Ground used for road construction.

8.4.5 All phenols, BTEX, VOCs and SVOCs were at levels below the laboratory LOD. Speciated PAHs and TPH were identified at low levels, however, this is considered unlikely to pose a risk to human health.

8.4.6 No other exceedances of the applied assessment criteria have been identified and no asbestos fibres were detected visually or in samples 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 Assessment Report (Appendix 11.1 of the March 2016 ES) and the groundwater chemical results are presented in Appendix 4. All exceedances to the relevant generic criteria are summarised in Table 20, 21 and 22 for soil leachate, groundwater and surface water, 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 Groundwater Baseline Report (Appendix 16.2 of the March 2016 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 Fifteen soil samples were subjected to leaching analysis. The majority of the soil leaching results were all below the applied screening criteria, with the exception of the contaminants in Table 21.

Table 21: Controlled Waters screening exceedances – soil leaching (Made Ground)

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location
Arsenic	µg/l	<1 - 27	50	10	0 (10)	-	3 (10)	SBHK03CP, BH526, TP510
Boron	µg/l	<10 - 1,200	2,000	1,000	0 (7)	-	1 (7)	SBHK03CP
Copper	µg/l	<1 - 14	10	2,000	2 (7)	STPK01, BH526	0 (7)	-
Nickel	µg/l	<1 - 16	4	20	5 (10)	SBHK03CP, STPK01, STPK02, BH526, WSM4CAN026	0 (10)	-
Lead	µg/l	<1 - 1,500	1.2	10	5 (10)	SBHK02CP, SBHK03CP, STPK01, STPK02 (WSM4CAN026)	2 (10)	SBHK02CP, SBHK03CP
Antimony	µg/l	<5 - 8		5	-	-	1 (4)	SBHK03CP

Determinant	Units	Range	EQS	DWS	No. Exceeded EQS Screening Criteria (Total Number of Results)	Location	No. Exceeded DWS Screening Criteria (Total Number of Results)	Location
pH	pH Units	10.9 - 11.8	6 - 9	6.5 - 10	2 (2)	CH51, CH53A	2 (2)	CH51, CH53A

Table 22: Controlled Waters screening exceedances – soil leaching (Natural Ground)

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)
Nickel	µg/l	<1 - 20	4	20	1 (3)	SBHK04CP (Tidal Flat Deposits)	0 (3)	-
Lead	µg/l	<1 - 14	1.2	10	1 (3)	SBHK04CP (Tidal Flat Deposits)	1 (3)	SBHK04CP

8.5.4 The leaching analysis in some samples of Made Ground indicates that arsenic, copper, nickel and lead are leachable such that concentrations would exceed EQSs and/or Drinking Water Standards (DWSs). Similarly pH in leachate is alkaline (10.9-11.8). The leachable concentrations are generally associated with slag materials in the Made Ground used to construct the roadways. However, it is notable that although potential leachate could be generated, surface water sampling has not identified similar concentrations or pH levels and the roadways constructed from slag do not appear to currently be impacting surface water quality. This indicates there is no currently active pathway from the Made Ground to surface waters.

8.5.5 The laboratory detection levels for cadmium, mercury, cyanide, some PAH, VOC and SVOC compounds are higher than applied screening criteria. This is considered unlikely to pose a risk to controlled waters.

Groundwater Results

8.5.6 The groundwater results assessment includes data from three grab samples taken from within the Made Ground during the 2000 investigation. Three monitoring rounds were undertaken at boreholes RBBH3, RBBH4 and RBBH5 in 2002, two monitoring rounds at boreholes SBHK01, SBHK02, SBHK03 and SBHK04 in 2008, three monitoring rounds from boreholes BH527, BH528 and BH530 in 2015, three monitoring rounds from BHM4CAN044 in May 2016 and one round at WSM4CAN26, WSM4CAN028, WSM4CAN029, WSM4CAN030 and WSM4CAN031 in June 2016. These groundwater samples were taken from the

aquifer body within the Mercia Mudstone and from perched groundwater within the Tidal Flat Deposits.

8.5.7 The summary of the exceedances of the applied assessment criteria is presented in Table 23 and discussed below.

Table 23: Groundwater screening exceedances

Determinant	Units	Range	EQS	DWS	No. exceeded Screening Criteria (Total Number of Results) against EQS	Location of Exceedances	No. Exceeded Screening Criteria (Total Number of Results) against DWS	Location of Exceedances
Perched Water (Made Ground)								
Nickel	µg/l	2 - 7	4	20	2 (6)	CH52, RBBH5	0 (6)	-
Cyanide	µg/l	<0.025 - 0.09	0.001	0.05	1 (6)	CH51	1 (6)	CH51
Lead	µg/l	<1 - 2	1.2	10	1 (6)	RBBH5	0 (6)	-
pH	pH Units	7.5 - 12.7	6-9	6.5-10	5 (6)	CH51, CH52A, RBBH5 (x3)	5 (6)	CH51, CH52A, RBBH5 (x3)
Ammoniacal Nitrogen as N	mg/l	3.6 - 7.2	0.6	-	3 (3)	RBBH5 (x3)	-	-
Benzo(a)pyrene	µg/l	<0.05 - 0.06	0.00017	0.01	1 (4)	CH52A	1 (4)	CH52A
Benzo(b)fluoranthene	µg/l	<0.05 - 0.07	0.017	0.1	1 (4)	CH52A	0 (4)	-
Fluoranthene	µg/l	<0.05 - 0.16	0.0063	-	1 (4)	CH52A	0 (4)	-
Groundwater (Tidal Flat Deposits)								
Arsenic	µg/l	<1 - 40	50	10	0 (30)	-	13 (30)	SBHK01, SBHK02, SBHK03, SBHK04, BH527, BH528, BH530
Boron	µg/l	<20 - 1,900	2,000	1,000	0 (9)	-	5 (9)	BH527, BH528, BH530

Determinant	Units	Range	EQS	DWS	No. exceeded Screening Criteria (Total Number of Results) against EQS	Location of Exceedances	No. Exceeded Screening Criteria (Total Number of Results) against DWS	Location of Exceedances
Chromium	µg/l	<1 - 110	-	50	-	-	4 (30)	BH527, BH528, BH530
Copper	µg/l	<1 - 41	10	2,000	7 (30)	SBHK04, BH527, BH528, BH530, WSM4CAN030	0 (30)	-
Iron	µg/l	<50 - 3,000	1,000	200	1 (14)	SBHK01	7 (14)	SBHK01 (x2), SBHK02, SBHK03, RBBH4 (x3)
Lead	µg/l	<1 - 14.6	1.2	10	9 (30)	SBHK01, SBHK02, SBHK04, RBBH4 (x2), WSM4CAN028, WSM4CAN029, WSM4CAN030, WSM4CAN031	2 (30)	WSM4CAN028, WSM4CAN030
Manganese	µg/l	560 - 1,800	30	50	8 (10)	SBHK01, SBHK02, SBHK03, SBHK04	8 (10)	SBHK01, SBHK02, SBHK03, SBHK04
Nickel	µg/l	<1 - 20.1	4	20	18 (30)	SBHK01, SBHK02, SBHK03, SBHK04, BH527, BH528, BH530, RBBH4 (x3), RBBH3, WSM4CAN030, WSM4CAN031, BHM4CAN044 (x2)	1 (30)	WSM4CAN031
Selenium	µg/l	<1 - 60	-	10	-	-	12 (30)	SBHK01, SBHK02, SBHK03, SBHK04, BH527, BH528, BH530, WSM4CAN028, WSM4CAN031

Determinant	Units	Range	EQS	DWS	No. exceeded Screening Criteria (Total Number of Results) against EQS	Location of Exceedances	No. Exceeded Screening Criteria (Total Number of Results) against DWS	Location of Exceedances
Cadmium	µg/l	<0.08 - 8.8	0.15	5	10 (30)	SBHK01, SBHK02, SBHK03, SBHK04, BH527, BH530, WSM4CAN028, WSM4CAN030	2 (30)	SBHK01
Mercury	µg/l	<0.5 - 1.2	0.07	1	5 (30)	BH527, BH528, BH530	1 (30)	BH527
Zinc	µg/l	<1 - 4,800	75	-	9 (30)	SBHK01, SBHK02, SBHK03, SBHK04, WSM4CAN028	-	-
BOD	mg/l	<1 - 12	5	-	3 (8)	SBHK01, SBHK03	-	-
Sodium	mg/l	590 - 3,500	-	200	-	-	10 (10)	SBHK01, SBHK02, SBHK03, SBHK04, RBBH3 (x2)
Sulphate	mg/l	71 - 550	400	250	3 (14)	SBHK03, SBHK04	8 (14)	SBHK02, SBHK03, SBHK04, RBBH3 (x3)
Chloride	mg/l	330 - 5,300	250	250	17 (25)	SBHK01, SBHK02, SBHK03, SBHK04, BH527, BH528, BH530, WSM4CAN028	17 (25)	SBHK01, SBHK02, SBHK03, SBHK04, BH527, BH528, BH530, WSM4CAN028

Determinant	Units	Range	EQS	DWS	No. exceeded Screening Criteria (Total Number of Results) against EQS	Location of Exceedances	No. Exceeded Screening Criteria (Total Number of Results) against DWS	Location of Exceedances
Ammoniacal Nitrogen	mg/l	<0.01 - 35	0.6	-	23 (30)	SBHK01, SBHK02, SBHK03, SBHK04, BH527, BH528, BH530, RBBH3 (x2), RBBH4 (x3), WSM4CAN028, WSM4CAN029, WSM4CAN030, WSM4CAN031, BHM4CAN044 (x3)	-	-
Total Ammonium	mg/l	6.8 - 35	-	0.5	-	-	4 (4)	SBHK01, SBHK02, SBHK03, SBHK04
Cyanide (Total)	mg/l	<0.05 - 0.4	0.001	0.05	3 (23)	RBBH4 (x3)	3 (23)	RBBH4 (x3)
pH	pH units	7.3 - 9.5	6 - 9	6.5 - 10	1 (30)	RBBH4	0 (30)	-
Bis(2-ethylhexyl)phthalate	µg/l	<0.5 - 5.29	1.3	-	4 (18)	BHM4CAN044 (x2), WSM4CAN030, WSM4CAN031	-	-
Aquifer (Mercia Mudstone)								
Arsenic	µg/l	15 - 216	50	10	6 (12)	BH528, BH530	12 (12)	BH527, BH528, BH530, BHM4CAN044 (x3)
Boron	µg/l	390 - 1,500	2,000	1,000	0 (9)	-	4 (9)	BH527, BH528
Chromium	µg/l	22 - 240	-	50	-	-	5 (12)	BH527, BH528, BH530
Copper	µg/l	9.9 - 110	10	2,000	8 (12)	BH527, BH528, BH530	0 (12)	-

Determinant	Units	Range	EQS	DWS	No. exceeded Screening Criteria (Total Number of Results) against EQS	Location of Exceedances	No. Exceeded Screening Criteria (Total Number of Results) against DWS	Location of Exceedances
Nickel	µg/l	<1 - 5.9	4	20	4 (12)	BH528, BH530	0 (12)	--
Selenium	µg/l	7.8 - 180	-	10	-	-	10 (12)	BH527, BH528, BH530, BHM4CAN044 (x3)
Cadmium	µg/l	<0.1 - 0.228	0.15	0.5	1 (12)	BHM4CAN044	0 (12)	-
Mercury	µg/l	<0.5 - 1.3	0.07	1	4 (12)	BH527, BH528, BH530	2 (12)	BH527, BH528
Chloride	mg/l	1,100 - 4,800	250	250	12 (12)	BH527, BH528, BH530, BHM4CAN044 (x3)	12 (12)	BH527, BH528, BH530, BHM4CAN044 (x3)
Ammoniacal Nitrogen	mg/l	2.6 - 12	0.6	-	12 (12)	BH527, BH528, BH530, BHM4CAN044 (x3)	-	-
pH	pH units	7.3 - 9.1	6 - 9	6.5 - 10	1 (12)	BH527	0 (12)	-
Bis(2-ethylhexyl)phthalate	µg/l	<0.5 - 3.29	1.3	-	1 (6)	BHM4CAN044	-	-

- 8.5.8** The review of the water chemical testing results indicated that the perched water within the Made Ground at the Site has discrete areas of elevated levels of nickel, lead, cyanide and some PAH compounds including benzo[a]pyrene, benzo[b]fluoranthene and fluoranthene (all found at CH52A). In addition to these exceedances of the screening criteria, elevated levels of TPH were identified, with a maximum concentration of 5,700 µg/l found at location CH51. Both CH51 and CH52A are associated with high pH. These two locations are located about 150 m south of the new section of motorway and associated land take and are not expected to be disturbed during construction of the Scheme.
- 8.5.9** The groundwater within the Tidal Flat Deposits is identified to have elevated levels of metals (arsenic, boron, chromium, copper, iron, lead, manganese, nickel, selenium, cadmium, mercury and zinc) and inorganics above screening criteria. TPH was generally below the laboratory limit of detection, however four boreholes SBHK01, BH527, BH530, and WSM4CAN031 were identified to have concentrations of 270 µg/l, 1,900 µg/l, 23 µg/l and 118 µg/l, respectively. For all these boreholes, the results were associated with the first round (single round for WSM4CAN031), with subsequent monitoring rounds giving concentrations below laboratory limit of detection. TPH was identified in BHM4CAN044 in all three rounds with concentrations up to 103 µg/l in the third monitoring round.
- 8.5.10** Two PAHs were identified marginally above the LOD within WSM4CAN031. Phthalates were identified above the LOD within BHM4CAN044 (highest recorded in the first monitoring round), WSM4CAN030 and WSM4CAN031.
- 8.5.11** All VOCs, SVOCs, phenols and PCB results were found below limit of detection.
- 8.5.12** The groundwater within the Mercia Mudstone beneath the Site has elevated levels of metals (arsenic, boron, chromium, copper, nickel, selenium, cadmium and mercury) and inorganics.
- 8.5.13** All PAH, VOCs, SVOCs, and PCB results were found below the limit of detection. Total Petroleum Hydrocarbons (TPH) was also found below the limit of detection with the exception of BH530, BHM4CAN044 where the first round gave a concentration of 100 µg/l and 53 µg/l respectively (subsequent two gave non-detects). Bis(2-ethylhexyl)phthalate was also detected at 3.29 µg/l during the first monitoring round of BHM4CAN044.
- 8.5.14** Presence of high chloride concentrations indicates brackish conditions exist within the perched and deep aquifers.

Surface Water

- 8.5.15** A total of nine surface water samples have been collected from the reens surrounding the Site. These have been collected from between 2007 – 2008, and most recently in 2015 (Appendix 16.2 of the March 2016 ES and Geotechnical Engineering, 2015) as part of RPS sampling regime and included within the supplementary works commissioned by Welsh Government.
- 8.5.16** The full results are presented in the Baseline Water Quality Monitoring Report (Appendix 16.2 of the March 2016 ES).

Table 24: Summary Surface Water Screening Exceedances

Parameter	Unit	No. Analyses	No. Analyses Above LOD	Minimum Concentration	Maximum Concentration	Location & Round with Max. Concentration	EQS	No. Analyses Exceeding EQS	DWS	No. Analyses Exceeding DWS	CCW Trigger Level	No. Analyses Exceeding CCW Trigger Level
Lead	ug/l	23	6	0.049	7	R15 / E3	1.2	2	10	0	250	0
Nickel	ug/l	23	10	1	4.2	2 / SW506	4	2	20	0	100	0
Cadmium	ug/l	23	7	0	2.9	2 / SW506	0.15	5	5	0	5	0
Zinc	ug/l	12	12	6	310	R15 / E4	75	2	-	-	1,000	0
BOD	mg/l	15	10	1	15.7	17.3 / Q1	5	3	-	-	18	0
Phosphorus	mg/l	3	3	229	1200	17.2 / Q1	120	3	-	-	-	-
Chloride	mg/l	20	20	21	785	17.3 / Q1	250	2	250	2	300	2
Ammoniacal Nitrogen	mg/l	23	20	0.04	1.2	SW507 / 3	0.6	1	-	-	1	1
pH	pH units	20	20	7.3	8.9	SW506 / 2	6-9	0	6.5-10	0	6.8-8.5	7
Dissolved Oxygen	%	12	12	10.5	98.2	R15 / E3	60	7	-	-	-	-
Nitrate as N	mg/l	12	7	0.9	3.6	E1 / R15	-	-	50	0	1	6
Nitrate as NO3	mg/l	15	9	1.3	15.9	E1 / R15	-	-	50	0	1	9
Nitrite as N	mg/l	12	1	< LOD	0.2	E4 / R16	-	-	0.15	1	1	0
TON	mg/l	15	8	0.9	9.43	Q1 / 17.1	-	-	50	0	2	4
Phosphate	mg/l	12	10	0.1	1.2	E3 / R14	-	-	-	-	1	3

8.5.17 The water quality within Elver Pill Reen and Middle Road Reen Diversion are generally similar, both of which recorded exceedances above the EQS for phosphorous and single occurrences of heavy metal exceedances such as cadmium and nickel.

8.5.18 Nitrates and Total Oxidised Nitrogen exceeded their respective CCW trigger levels on a number of occasions primarily at Elver Pill Reen, 100 Perches Reen, Windmill Reen and Greenmoor Triangle.

8.5.19 TPH was recorded below its laboratory limit of detection throughout all sampling regimes, as were BTEX organics.

8.6 Ground Gas Risk Assessment

8.6.1 The ground gas data available relate to three boreholes, (BH527, BH528 and BH530), drilled during the 2015 investigation with response zones within the Tidal Flat Deposits including peat horizons and seven boreholes (WSM4CAN026, WSM4CAN027, WSM4CAN028, WSM4CAN029, WSM4CAN030, WSM4CAN031 and BHM4CAN044(S)(D)), drilled during the 2016 Additional Ground Investigation with response zones within the Made Ground, Tidal Flat Deposits including peat horizons and Mercia Mudstone. Of the 4 no monitoring rounds available for 2015 and between 1 and 3 monitoring rounds available for 2016, the below observations have been made.

- Monitoring of the window sample boreholes drilled during the 2016 Additional Ground Investigation was undertaken during low barometric pressure (less than 1000 mb), with the lowest conditions being 996 mb.
- Gas flow was generally recorded absent or with a low flow of 0.01 l/hr, with the exception of the first round in BH527 which recorded a peak flow of 1.3 l/hr, first round in BH528 which recorded a flow of 0.4 l/hr before rapidly stabilising to zero, the single monitoring round for WSM4CAN027 which recorded a flow of 0.5 l/hr, the third monitoring round for BHM4CAN044(S) and (D) which recorded flows of 0.5 l/hr and a peak of 7.5 l/h for BHM4CAN044(D) during the first monitoring round.
- Methane has been recorded up to 3.41% on the third round in BH527, up to 31% in the third round in BH528 and absent for the other three monitoring rounds in these boreholes. In BH530 methane was absent in the first round and recorded up to 14.8% in the other three monitoring rounds.
- When encountered, methane concentrations were seen to reduce through the first minute's reading intervals, indicating a limited amount of gas is present within the soils.
- Methane was recorded at 10% and 11% within WSM4CAN027 and WSM4CAN026 respectively. The response zone for these boreholes is within the Made Ground which is noted to comprise slag gravel.
- Methane was recorded at 5.9 % and 12.5% within WSM4CAN031 and WSM4CAN029 respectively. The response zone for these boreholes is within the Tidal Flat Deposits and 0.4 m thick peat horizon (base of peat unproven). The silts/clays were also noted to contain occasional decaying organic material.

- Methane was recorded at 75.4% reducing to 67.6 % during the first monitoring round of BHM4CAN044(D). The response zone for this borehole is within the Mercia Mudstone. Subsequent monitoring rounds recorded methane at 0.4%.
- Carbon dioxide above the screening criteria of 5 % was identified at up to 8.1% in BH528 and up to 5.3% in BH530.
- Trace of Volatile Organic Compounds of up to 3.2 ppm has been recorded within the 2015 boreholes.
- Hydrogen sulphide was not detected throughout the monitoring.
- Carbon monoxide was recorded at a maximum of 10 ppm in the second monitoring round at BH530 and an initial peak of 2.3 ppm in WSM4CAN031. These concentrations are below the screening criteria of 30 ppm.
- Oxygen has been recorded to be at ambient concentrations of between 18.3 - 21.7 %. In BH530 it is recorded at lower concentrations during the second round at concentrations of 15 - 15.6 % and within BH528 during the third round at concentrations of 11.8 and 12.1 %. In BHM4CAN044(D) a minimum concentration of 3% was recorded during the first monitoring round.

8.6.2 The available data identify elevated methane concentration and raised carbon dioxide that are higher than the screening criteria with ambient or depleted oxygen conditions for boreholes screened within the Tidal Flat Deposits. These concentrations are considered representative of peat deposits with low gas generation potential.

8.6.3 Elevated methane has also been identified for boreholes with response zones within the Made Ground which is considered to be associated with the slag materials.

8.6.4 Significantly elevated CH₄ was recorded during the first monitoring round within BHM4CAN044(D) together with a relatively high gas flow. This borehole is located within the east of the Site within the proposed water treatment area which is generally undeveloped, approximately 15 m south of an active industrial waste landfill (Llanwern Works East). The borehole well is screened within the Mercia Mudstone with a sub artesian groundwater level of approximately 1.5 m bGL. It is unclear as to the source of this ground gas however the Tidal Flat Deposits above are noted to contain two peat horizons (1.7 m and 0.6 m thickness).

8.6.5 A gas risk assessment has been undertaken and is set out in the Land Contamination Assessment Report Appendix 11.1 of the March 2016 ES).

8.7 Summary

8.7.1 Made Ground and to a much lesser extent natural ground has been shown to have elevated chromium concentrations above background range with a maximum of up to 1,800 mg/kg. The elevated concentrations generally relate to the slag material used in the construction of roads at the Site. Analysis of three samples of Made Ground during the 2016 Additional Ground Investigation identified that the chromium is unlikely to be present in the more toxic hexavalent form.

- 8.7.2** Elevated alkaline soil conditions have been identified in over half of the samples, mainly within the Made Ground material but also in three samples of the Tidal Flat Deposit material. However, the pH in nearby surface water receptors is not noted to be elevated.
- 8.7.3** Made Ground tested at the Site was identified to have leachable contaminants with exceedances of arsenic, boron, copper, nickel, lead, antimony and pH. The natural soils were identified to have limited leachability with marginal exceedances of nickel and lead limited to one sample out of three. Similar elevated levels of these metals were not observed in surface water samples.
- 8.7.4** Perched water within the Made Ground has high levels of metals, pH and PAHs. Elevated TPH concentrations are also identified within the perched water. However, the area where perched groundwater within Made Ground has been identified is not going to be affected by the Scheme.
- 8.7.5** Both the perched groundwater within the Tidal Flat Deposits and the aquifer have been identified to have elevated metals and inorganics contaminants when compared to the Environment Quality Standards or the Drinking Water Standards. Localised and sporadic presence of TPH contamination is identified. The pore waters within the Tidal Flat Deposits and groundwater within the Mercia Mudstone is saline. These groundwater qualities are considered to be within the baseline of this area within the Gwent levels as defined within the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES).
- 8.7.6** Surface waters at the boundary of the Site are generally of good quality and are comparable to the baseline surface water quality (Appendix 16.2 of the March 2016 ES).
- 8.7.7** Elevated concentrations of methane along with occasional depleted oxygen levels and slightly elevated carbon dioxide within borehole wells screened within the Tidal Flat Deposits are likely attributed to the presence of organic material including peat and are consistent with the expected gas regime given the types of natural soils present beneath the Site.
- 8.7.8** Elevated methane has also been identified within the Made Ground which is attributed to the presence of slag materials.
- 8.7.9** Significantly elevated methane together with relatively high flow was identified within a borehole well screened within the Mercia Mudstone. This borehole is located within the proposed Water Treatment Area.

9 Refined Conceptual Site Model

- 9.1.1** The results of the Supplementary Ground Investigation (Geotechnical, 2015) and the 2016 Additional Ground Investigation have enabled the original CSM presented in the 2014 PSSR to be updated. The assessment is based on the Scheme during its construction and operation phases.
- 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) is presented in Figure 2.

Table 15: Conceptual Site Model

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
On Site Metals, inorganics and organic contaminants associated with slag and industrial rubble from the nearby steel works in particular. Sludge and industrial waste within the Green Moor Land Landfill. Road construction material (slag) in particular Off site Llanwern Lagoon 26 (CL-26); Llanwern Works East Landfill; Llanwern steelworks main operation	Construction Stage					
	Construction Workers (B)	Direct dermal (1)	Likely	Moderate	Moderate	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 H&S guidance. This will enable safe methods of work 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. 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. A construction mat will be placed over the length and width of the proposed embankment to enable piling and band drain installation as well as general construction. This will break dermal, ingestion and inhalation pathways once placed. Made Ground comprising ash and slag used to make up the existing access roads will require removal to facilitate construction. The materials may be appropriate for reuse within the Scheme subject to meeting suitability for re-use criteria. The slag materials on Site have been identified as a potential source of ground gas (elevated CH ₄). The known areas of tipping associated with Green Moor Lane Landfill may also be a source of elevated ground gases/vapours however this requires further investigation. It is currently unclear as to the source of an elevated concentration of CH ₄ identified for a single borehole located within the proposed Water Treatment Area. It is considered ground gas management will be required during construction and further gas monitoring and risk assessment is required in the proposed Water Treatment Area.
		Ingestion (3)	Likely	Moderate	Moderate	
		Inhalation of soil dust (2)	Likely	Moderate	Moderate	
		Inhalation of ground gas / VOCs / hydrocarbon vapours (2)	Unlikely	Moderate	Low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	General public/site neighbours during construction works (C)	Dermal contact with soil dust(1)	Unlikely	Moderate	Low	During construction period there is the possibility of inhalation/ ingestion of soil dust. Dust suppression measures will be required during construction works. Potential contamination sources extend well beyond the land take. A construction mat will be placed over the length and width of the proposed embankment to enable piling and band drain installation as well as general construction. This will break dermal, ingestion and inhalation pathways once placed. The slag materials on Site have been identified as a potential source of ground gas (elevated CH₄). The known areas of tipping associated with Green Moor Lane Landfill may also be a source of elevated ground gases/vapours however this requires further investigation. It is currently unclear as to the source of an elevated concentration of CH₄ identified for a single borehole located within the proposed Water Treatment Area. It is considered ground gas management will be required during construction and further gas monitoring and risk assessment is required in the proposed Water Treatment Area.
		Ingestion of soil dust (3)	Unlikely	Moderate	Low	
		Inhalation of soil dust (2)	Unlikely	Moderate	Low	
		Inhalation of soil gas or vapours (2)	Unlikely	Moderate	Low	
	Surface water (land drainage, reens), part of Gwent Levels SSSI (C)	Saturated flow of contaminated perched water (4)	Unlikely	Moderate	Low	Leachable organics and inorganics identified within the Made Ground. Surface waters at the boundary of the Site are generally of good quality. The quality of perched groundwater may become impacted by contamination during the construction works, particularly in the area where excavation is undertaken (new drains and piling). Made Ground comprising ash and slag used to make up the existing access roads will require removal to facilitate construction. The materials may be appropriate for re-use within the Scheme subject to meeting suitability for re-use criteria. Perched groundwater is likely to have very low flow and
		Contaminated surface water run-off (5)	Likely	Moderate	Moderate	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						may be absent seasonally. Perched water within the Made Ground has elevated metals and organics, albeit in an area not to be affected by the Scheme. Application of appropriate surface water run-off control measures will be required.
	Deep groundwater within Mercia Mudstone(Da)	Leaching and/or vertical migration along piles (4)	Unlikely	Moderate	Low	Displacement of potentially impacted Made Ground possible during piling, however this is subject to selected piling technique. Furthermore, Made Ground comprising ash and slag used to make up the existing access roads will require removal to facilitate construction. The materials may be appropriate for reuse within the Scheme subject to meeting suitability for re-use criteria. A thick mantle of predominantly very low permeability Tidal Flat Deposits overlie the Mercia Mudstone aquifer, reducing risk of downward migration. Groundwater (aquifer) quality identified to be impacted by metal and inorganic contaminants of concern are of same quality as the Tidal Flat Deposit perched groundwater. Groundwater is considered saline. Perched groundwater in Made Ground has been impacted with hydrocarbons in CH52A. This is anticipated to be discrete feature rather than widespread across the Site and is also not going to be affected by the Scheme. A piling risk assessment will be required to mitigate residual risks from piling and band drain installation to controlled waters.
Peat and organic soils	Construction Workers (B)	Inhalation of soil gas / explosion (2)	Low likelihood	High	Moderate	High methane concentrations associated with peat / organic clays but with low or absent flux. Gas flux likely to increase during surcharge loading.
	Off site users during construction works (C)	Inhalation of soil gas/ explosion (2)	Unlikely	High	Moderate to low	New pathways to be created with band drain. Construction to be largely within open space. Any earthworks within confined space would require specific risk assessment, control measures and PPE. Gas control measures would be needed during piling and band drain

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						installation. Risks to offsite general public during construction considered very low as no enclosed spaces or buildings within public access and low permeability of Tidal Flat Deposits will inhibit migration. Piling and band drain installations could result in explosive risks during operations and risk assessment and gas mitigation measures will be needed.
<u>On Site</u> Metals, inorganic and organic contaminants associated with slag and industrial rubble from the nearby steel works. Sludge and industrial waste within the Green Moor Landfill. Ground gas Off site Llanwern Lagoon 26 (CL-26); Llanwern Works East Landfill; Llanwern steelworks main operation	Operational					
	Maintenance Workers (B)	Direct dermal (1)	Low likelihood	Low	Very low	Made Ground to be largely encapsulated by the embankment or removed and therefore the exposure to contamination will be limited outside the motorway embankment along existing tracks albeit outside the permanent land take. Areas outside the motorway hardstanding will receive topsoil and / or subsoil cover for planting further reducing pathways. 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 required during maintenance. Current data set identifies limited exceedances above the selected generic screening criteria. Existing contamination levels are not foreseen to represent abnormal constraints to maintenance workers' health and safety over and above those typical of a brown field site redevelopment. Surcharge of superficial soils may temporary increase gas flux. Maintenance works to be largely within open space. Any works within confined space would require specific risk assessment, control measures and PPE to meet
		Ingestion (3)	Low likelihood	Low	Very low	
		Inhalation of soil dust (2)	Low likelihood	Low	Very low	
		Inhalation of soil gas or vapours (2)	Low likelihood	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						legislative requirements. Further investigations are required to delineate any potential contamination and confirm the risks associated with potential waste deposition in two areas of Green Moor Lane Landfill.
	Future Motorway users (A) and other off site users (C)	Dermal contact with soil dust (1)	Unlikely	Low	Very low	Potential contamination sources in soil are limited to the existing roadways constructed from ash and slag and the Made Ground is to be largely encapsulated by the embankment. Exposure duration will be short term only for Motorway users. The human health screening criteria is considered conservative when considering exposure and pathway mechanisms to future Site users. Limited potential for lateral gas migration given the presence of low permeability Tidal Flat Deposits to shallow depth. Off-site receptors adjacent to proposed earthworks at the link road but some 450 m from the main motorway section and this is not considered at risk. Further investigations are required to delineate any potential contamination and confirm the risks associated with potential waste deposition in two areas of Green Moor Lane Landfill.
		Ingestion of soil 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	
	Deep groundwater within Mercia Mudstone(Da)	Leaching and/or vertical migration along piles (4)	Unlikely	Moderate	Low	Leaching of contaminants from the Made Ground materials used to construct existing roadways could migrate via piling and band drains; however the impact on the aquifer quality is likely to be negligible. The Made Ground comprising ash and slag access roads will require removal to facilitate construction. The materials may be appropriate for reuse within the Scheme subject to meeting suitability for reuse criteria. Thick mantle of predominantly very low permeability Tidal Flat Deposits overlying aquifer, reducing risk of downward migration. Groundwater (aquifer) quality already identified to be impacted by metal and inorganic contaminants of same

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						quality than the perched groundwater. Groundwater characterised as saline. Water in Made Ground impacted with hydrocarbons (CH52A). This is anticipated to be discrete feature rather than widespread across the Site and is also not going to be affected by the Scheme. Piling risk assessment will be required to mitigate residual risks from piling and band drain installation to controlled waters. Further investigations are required to delineate any potential contamination and confirm the risks associated with potential waste deposition in two areas of Green Moor Lane Landfill.
	Surface water (land drainage) (E)	Leaching from Made Ground. Lateral saturated flow of contaminated perched water (4)	Unlikely	Moderate	Low	Leachable organics and inorganics identified within the Made Ground. Made Ground comprising ash and slag used to make up the existing access roads will require removal to facilitate construction. The materials may be appropriate for reuse within the Scheme subject to meeting suitability for re-use criteria. Perched groundwater is likely to have very low flow and may be absent seasonally. Perched water within the Made Ground has elevated metals and organics, albeit in an area not to be affected by the Scheme. Application of appropriate surface water run-off control measures will be required.
Peat and organic soils	Maintenance Workers (B)	Inhalation of soil gas / explosion (2)	Unlikely	High	Moderate to Low	Although elevated methane concentrations are known within the natural soils of the Tidal Flat Deposits, the low permeability soils will result in limited gas generation post construction. Risks to maintenance workers low but entry into any confined spaces will need to adhere to health and safety legislation requirements. Pathways along piles likely to "heal" with increase in soil contact along pile shaft preventing gas migration.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						However band drains could still allow localised gas migration.
	Future motorway users (A) and off-site users (C)	Inhalation of soil gas / explosion (2)	Unlikely	High	Moderate to Low	Ground gas data from the peat horizons within the superficial deposits identify concentrations of methane, carbon dioxide and trace VOCs. New pathways to be created with piles and band drains. 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. Pathways along piles likely to “heal” with increase in soil contact along pile shaft preventing gas migration. However band drains could still allow localised gas migration.

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** Widespread gross contamination associated with the Site's historical use has not been identified. The risk assessment has identified that some residual risks to human health and controlled waters could exist and control measures are required to facilitate the construction and ongoing operation of the Scheme.
- 10.1.3** The laboratory testing results from previous ground investigations confirm the on site observations and field testing, and indicate that the materials encountered within the Site are at tolerable levels of risk to human health both during construction and operational phases. Materials are also likely to be suitable for reuse subject to provision of reuse criteria under a Material Management Plan.
- 10.1.4** Contaminated materials appear to be confined to existing tracks that cross the Site that have been constructed from slag and ash materials. One of the three areas of suspected tipping representing Green Moor landfill was investigated during the recent 2016 Additional Ground Investigation. No evidence of landfilling was identified, the Made Ground encountered being similar in nature to elsewhere on site. The remaining two areas of suspected tipping have not been intrusively investigated and will therefore require additional assessment.
- 10.1.5** The Made Ground and Tidal Flat Deposits encountered at the site are considered to represent low generation gas sources typified by elevated methane concentrations with low or absent flows. The source of the ground gas within the Made Ground is attributed to the slag materials.
- 10.1.6** Significantly elevated ground gas was identified within a single borehole drilled within the area of proposed water treatment. The source if this is unclear and this area will require further investigation during the construction phase.
- 10.1.7** During the construction phase, specific mitigation measures will be required to prevent inhalation pathways of dust to off site and work force receptors, although such measures would be no more than typically expected on a construction site.
- 10.1.8** Impacted perched groundwaters likely to be in continuity with land drainage will require suitable water management strategy to prevent potential impact to surface waters from contaminant run-offs.
- 10.1.9** During the operational phase, the embankment will cover part of the Site which will significantly limit the infiltration of rainwater through the soils and potentially leaching any soil contaminants into the groundwater. However, perched groundwater may be within the Made Ground materials and could remain beneath the embankment.
- 10.1.10** Surface waters at the boundary of the Site are generally of good quality with limited evidence of impact on quality that can be associated with the Site. The surface water quality appears similar to that seen elsewhere across the Gwent Levels.

10.1.11 Adoption of band drain and 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. However, the likelihood and impact of any such risk is considered low.

10.1.12 Post construction, the embankment itself and topsoil and subsoil cover along the motorway corridor will break potential human health pathways to end-users and maintenance workers. However, topsoil materials placed at the surface will need to be checked for contamination.

10.2 Recommendations

10.2.1 The ground investigation data have indicated that potential contamination is present that could cause an unacceptable risk to the identified receptors. This will require appropriate remedial mitigation measures to be implemented. These measures would be identified within a remediation strategy for the Scheme. The remediation strategy is anticipated to include but is not limited to the following.

- A programme for ground gas monitoring to ensure construction is undertaken safely.
- Foundation works and piling risk assessment to mitigate residual risk to controlled waters.
- 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 for suitability of use.

10.2.2 The remediation strategy 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

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

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. April 2008.

Norwest Holst (2008) Report on a Ground Investigation at New M4 Project - Magor to Castleton - Second Preliminary Ground and Chemical Investigation. F15056

Ove Arup & Partners (2014), M4 Corridor Around Newport, Preliminary Sources Study Report, July 2014, 14/9197

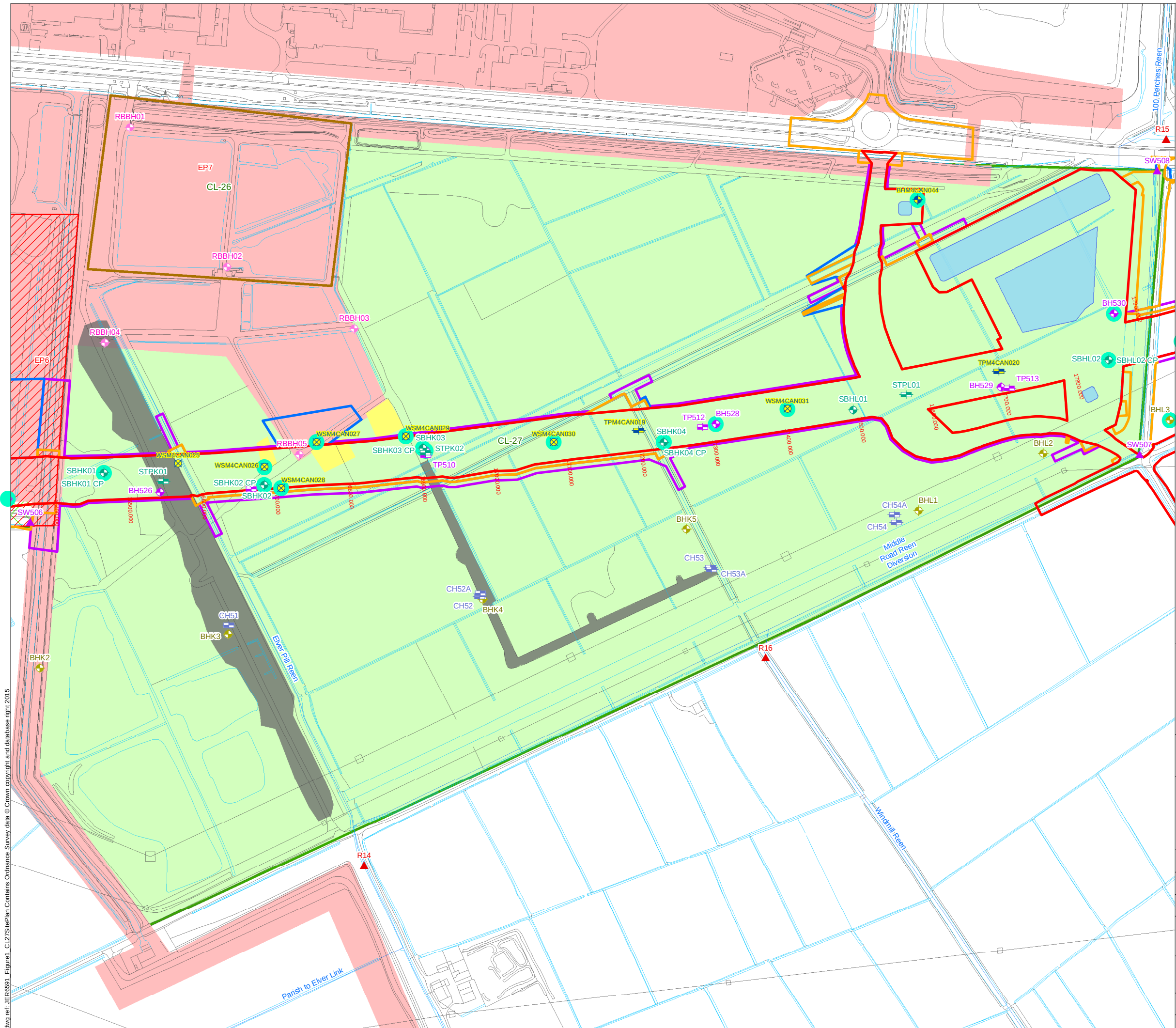
Titan Environmental Surveys Ltd (2008) New M4 Magor to Castleton Baseline Surface Water Quality Final Report for Arup, Report Number HS0442/F1/2

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
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
PSSR	Preliminary Sources Study Report
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



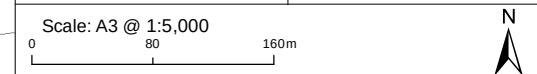
- Legend**
- Permanent Highway Land within Fenceline (including Water Treatment Areas)
 - Other Permanent Land Take
 - Temporary Construction Land
 - Easement Only
 - Proposed Water Treatment Area (WTA)
 - Potential Area of Land Contamination based on 2014 PSSR
 - Other Potential Area of Land Contamination
 - Reedbed No. 2
 - Green Moor Landfill
 - Elver Pill Reen Infill
 - Permit Boundaries**
 - Main Installation
 - Non-Hazardous Landfill
 - Investigation Locations**
 - 2015-2016 (RPS)**
 - Borehole
 - Window Sample
 - Trial Pit
 - 2015 (Geotechnical Engineering)**
 - Borehole
 - Trial Pit
 - Surface Water Monitoring Location
 - 2008-2009 (Titan Surveys)**
 - Surface Water Monitoring Location
 - 2007 (Norwest Holst)**
 - Borehole
 - Trial Pit
 - 2002 (Exploration Associates)**
 - Borehole
 - 2000 (Exploration Associates)**
 - Trial Pit
 - 1997 (Norwest Holst)**
 - Borehole
 - Monitoring Well Installation



Appendix R11.1 Annex D CL-27

Site Plan for CL-27

Figure: 1	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB



**CL-26: Llanwern
Steelworks
(Lagoon 26)**



	Topsoil
	Waste Material (Green Moor Landfill)
	Made Ground - MG
	Tidal Flat Deposits - TFD
	Organic Matter within TFD
	Peat
	Glaciofluvial Deposits - GFD
	Mercia Mudstone - MM
	Proposed Embankment
	Proposed Cutting
	Proposed Band Drain
	No Information Available
	Perched Water (MG)
	Perched Groundwater (TFD)
	Groundwater (GFD and MM)
	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)
- 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

- Green Moor landfill comprising sludge & industrial waste
- Fill material from adjacent steel works
- Ground gas originating from the natural organic rich soils / infill material

Off-Site

- Llanwern Steelworks (Lagoon 26)
- Llanwern Steelworks (Main Operation)
- Llanwern Works East Landfill

NOTE

Drawing refined from PSSR Drawing Reference
M4-OA-17-00DR-Z-XX-0149 (February 2014)



Llywodraeth Cymru
Welsh Government

Appendix R11.1 Annex D CL-27

Conceptual Site Model for CL-27

Figure: 2

Revision: -

Date: September 2016

Status: At Issue

Drawn: RJJ

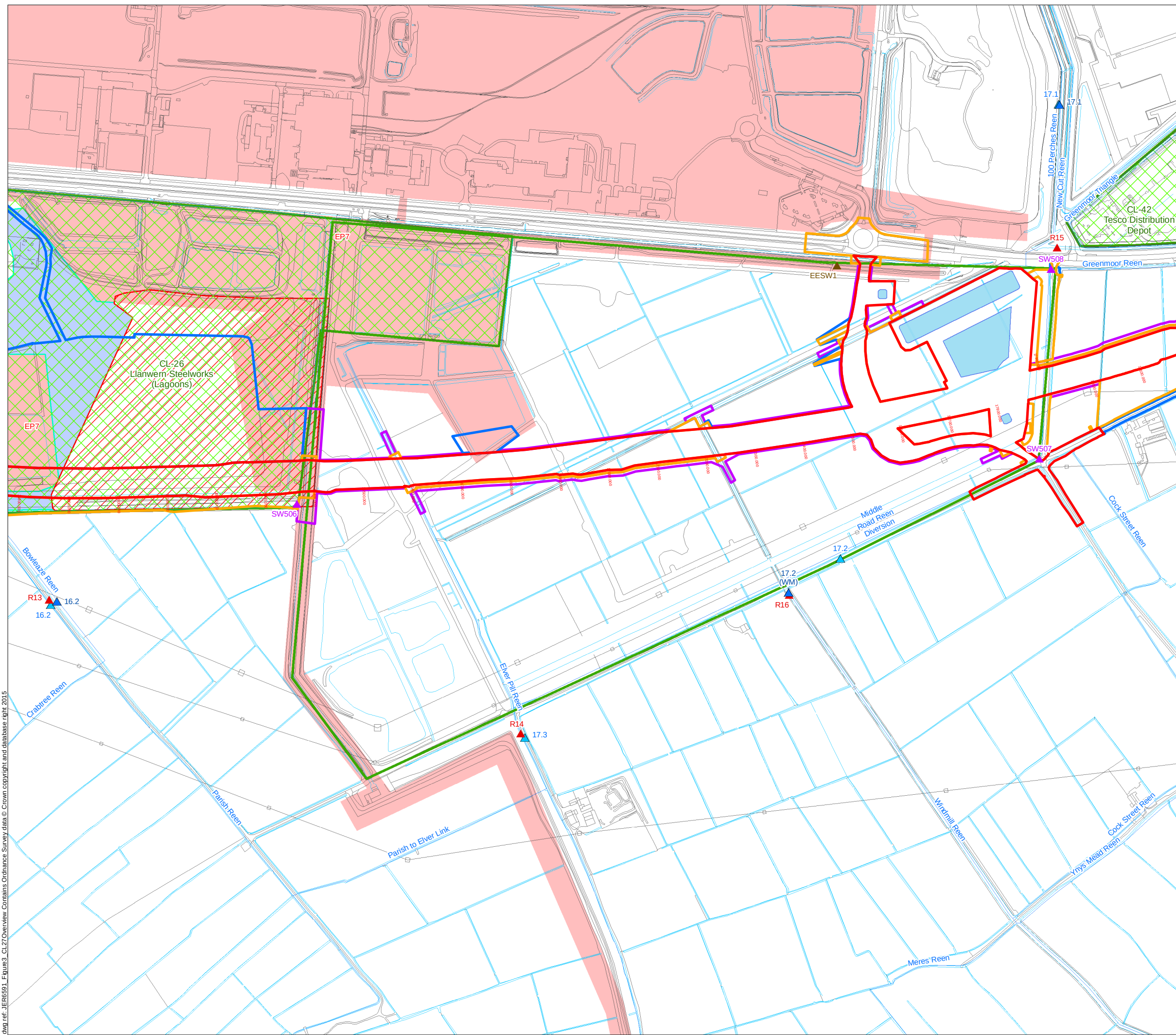
Checked: FB

Not to Scale

Ground conditions based on available information

dwg ref:JER6591_Figure2_CL27ConceptualSiteModel

dwg ref: JER6591_Figure3_CL27Overview 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

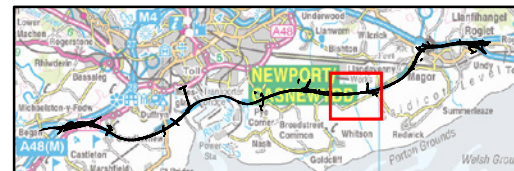
Permit Boundaries

- EP7 Tata Steel Strip products UK (Llanwern Steelworks), EPR/BS3905IP - Active Permissions
- EP5 Llanwern South Side of Queensway Towards a State of Closure
- EP6 South Side Queensway Non-hazardous Landfill, EPR/GP3331SV - Active Permissions

Surface Water Monitoring

Locations

- ▲ 2015 (RPS) - Q2
- ▲ 2015 (RPS) - Q1
- ▲ 2015 (Geotechnical Engineering)
- ▲ 2008-2009 (Titan Surveys)
- ▲ 2006 (Enviros)



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Welsh Government

Appendix R11.1 Annex D CL-27

Overview Site Plan for CL-27 with Permit Boundaries

Figure: 3	Revision: -
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB



Appendices

Appendix 1

Exploratory Records



Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.

BHK2

Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	338344.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon	Ground Level	185347.3 N
Client	Welsh Office	Driller	A.M	Orientation	Vertical
Consultant	Ove Arup and Partners	Logged by	T.R	Date Started	16/10/1997
				Date Completed	16/10/1997

PROGRESS						DRILLING DETAILS			
Date	Time	Hole depth	Casing depth	Water depth	Remarks	Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
16/10/1997	1800	11.25	8.60	6.80		10.80	11.25	1.00	

CASING				WATER STRIKES							
Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.	Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
150	11.25	150	8.00	16/10/1997	1500	6.80	6.80	20.0	seepage	5.85	5.85
				16/10/1997	1700	10.75	9.50	15.0	fast	8.00	0.00

GENERAL NOTES		SPT DETAILS		
1. Borehole complete at 11.25m, grouted to ground level.		Depth	Type	Incremental blow count/penetration in mm
		2.00	S	N=7 (1,1,1,2,2,2)
		4.00	S	N=3 (0,1,1,0,1,1)
		8.15	S	N=20 (3,4,5,4,5,6)
		9.15	S	N=42 (4,7,8,10,10,14)
		10.55	S	37/150mm
		11.10	S	80/150mm*
		* 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.

BHK2

Sheet 1 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	338344.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185347.3 N
Client	Welsh Office	Driller	A.M	Ground Level	7.30m AOD
Consultant	Ove Arup and Partners	Logged by	T.R	Orientation	Vertical
				Date Started	16/10/1997
				Date Completed	16/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Installation
TOPSOIL		0.30	7.00	B 0.30 - 0.90			
Soft brown mottled grey CLAY with occasional partings of light brown fine sand and rootlets. (Estuarine Alluvium)				D 0.95 - 1.45	(7)		
				U 1.00			
				D 1.45			
				D 2.00	S7	S 2.00	2.45
				B 2.45 - 3.00			
		3.00	4.30	D 3.05 - 3.55	(6)		
				U 3.10			
				D 3.55			
				D 4.00	S0	S 4.00	4.23
				B 4.45 - 5.00			
				D 5.10 - 5.60	(6)		
				U 5.15			
				D 5.60			
		5.90	1.40	B 5.90 - 6.00	(7)		
				U 6.00 - 6.45			
		6.45	0.85	D 6.45			
Very soft to soft dark grey sandy organic CLAY with occasional gravel size pockets of dark brown sandy clayey peat. (Estuarine Alluvium)				D 7.20			
				U 7.50 - 7.95	(10)		
				D 7.95			
		8.10	-0.80	D 8.15	S20	S 8.15	8.60
				B 8.60 - 9.10			
				D 9.15 - 9.60	S42	S 9.15	9.60
				B 9.60 - 10.75			

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.

BHK2

Sheet 2 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	338344.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185347.3 N
Client	Welsh Office	Driller	A.M	Ground Level	7.30m AOD
		Logged by	T.R	Orientation	Vertical
				Date Started	16/10/1997
Consultant	Ove Arup and Partners			Date Completed	16/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install- ation
Bluish green grey completely weathered MUDSTONE, very weak. (Mercia Mudstone Group)				D 10.55	S37/150mm	S 10.55 10.85	
---at 10.80m reddish brown moderately to highly weathered weak		11.25	-3.95		S80/150mm*	S 11.10 11.25	
Cable Percussion boring complete at 11.25 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



Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.

BHK3

Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	338602.4 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon	Ground Level	185393.9 N
Client	Welsh Office	Driller	A.M	Orientation	Vertical
Consultant	Ove Arup and Partners	Logged by	M.B	Date Started	17/10/1997
				Date Completed	17/10/1997

PROGRESS						DRILLING DETAILS			
Date	Time	Hole depth	Casing depth	Water depth	Remarks	Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
17/10/1997	1800	11.20	9.50	7.10		0.70 1.45 10.85	0.95 1.75 11.20	0.25 0.25 1.00	

CASING				WATER STRIKES							
Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.	Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
150	11.20	150	9.50	17/10/1997	0000	10.80	7.10	15.0	fast	9.50	0.00

GENERAL NOTES		SPT DETAILS		
- Borehole complete at 11.20m. - Backfilled with grout from 11.20m.		Depth	Type	Incremental blow count/penetration in mm
		1.00	C	N=43 (4,5,7,10,10,16)
		1.80	S	N=6 (2,2,1,2,2,1)
		4.00	S	N=2 (1,0,1,0,1,0)
		6.80	S	N=13 (1,1,3,3,4,3)
		10.20	S	N=81 (8,8,12,16,22,31)
		11.05	S	80/150mm*
* 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.

BHK3

Sheet 1 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	338602.4 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185393.9 N
Client	Welsh Office	Driller	A.M	Ground Level	6.00m AOD
		Logged by	M.B	Orientation	Vertical
				Date Started	17/10/1997
Consultant	Ove Arup and Partners			Date Completed	17/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install- ation
MADE GROUND: Reddish brown sandy gravelly clay with some gravel sized black clayey ash sand and occasional cobbles and boulders.		0.95	5.05	B 0.00 - 0.95			
MADE GROUND: Reddish brown very sandy clay with much angular to sub-angular siliceous clinker and occasional cobbles and boulders.		1.80	4.20	B 1.00 - 1.80	C43	C 1.00	1.45
Soft becoming very soft brown mottled grey slightly sandy CLAY locally very silty. (Estuarine Alluvium)				D 1.80 - 2.25	S6	S 1.80	2.25
---at 1.80m very silty							
				D 4.00	S2	S 4.00	4.45
				B 4.50 - 5.00			
				D 5.30			
				B 5.40 - 5.90	(4)		
				U 5.40 - 5.85			
---at 5.95m becoming grey mottled black slightly organic clay				D 5.95 - 6.45	(11)		
---at 6.00m very silty		6.45	-0.45	D 6.45			
Spongy dark brown slightly sandy clayey fibrous PEAT. (Peat)				D 6.80	S13	S 6.80	7.25
		7.40	-1.40				
Soft dark grey slightly sandy CLAY. (Estuarine Alluvium)				D 7.80			
				U 8.10 - 8.55	(11)		
				D 8.55			
---at 8.70m becoming grey mottled black slightly organic clay				D 8.70 - 9.20			
				U 8.75			
		9.25	-3.25	D 9.20			
Light grey mottled blue completely weathered slightly sandy MUDSTONE, very weak. (Mercia Mudstone Group)				U 9.40 - 9.80	(48)		
				D 9.80			

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.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.

BHK3

Sheet 2 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	338602.4 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185393.9 N
Client	Welsh Office	Driller	A.M	Ground Level	6.00m AOD
		Logged by	M.B	Orientation	Vertical
				Date Started	17/10/1997
Consultant	Ove Arup and Partners			Date Completed	17/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install- ation
Light grey mottled blue completely weathered slightly sandy MUDSTONE, very weak. (Mercia Mudstone Group)				B 10.20 - 10.80 D 10.20 - 10.65	S81	S 10.20 10.65	
Reddish brown highly weathered silty MUDSTONE, weak to very weak. (Mercia Mudstone Group)		10.80	-4.80	W 10.80			
		11.20	-5.20	D 11.05	S80/150mm*	S 11.05 11.20	
Cable Percussion boring complete at 11.20 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.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.

BHK4

Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	338949.9 E
Project	M4 Relief Road Magor to Castleton Stage 2				185441.6 N
Client	Welsh Office	Drilling Rig	Pilcon	Ground Level	5.50m AOD
		Driller	LM	Orientation	Vertical
		Logged by	T.R	Date Started	16/10/1997
Consultant	Ove Arup and Partners			Date Completed	17/10/1997

PROGRESS						DRILLING DETAILS			
Date	Time	Hole depth	Casing depth	Water depth	Remarks	Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
16/10/1997	1800	10.00	10.00	Dry		1.25	1.50	1.00	
17/10/1997	0800	10.00	10.00	8.20		10.80	11.05	1.00	
17/10/1997	1000	11.05	10.80	8.20					

CASING				WATER STRIKES							
Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.	Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
150	11.05	150	10.80	16/10/1997	0000	1.10	1.00	15.0	slight	1.00	3.00

GENERAL NOTES					SPT DETAILS		
					Depth	Type	Incremental blow count/penetration in mm
					1.00	C	67/115mm (10,11,17,50)
					2.00	C	N=18 (6,7,7,8,2,1)
					3.50	S	N=3 (1,0,1,0,1,1)
					6.00	S	N=7 (1,2,2,1,3,1)
					9.40	S	N=30 (4,6,7,7,8,8)
					10.50	S	80/150mm (14,19,30,50)
					11.05	S	50/20mm*
					* Seating blows only.		

NB 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

Borehole No.

BHK4

Sheet 1 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	338949.9 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185441.6 N
Client	Welsh Office	Driller	IM	Ground Level	5.50m AOD
Consultant	Ove Arup and Partners	Logged by	T.R	Orientation	Vertical
				Date Started	16/10/1997
				Date Completed	17/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Installation
MADE GROUND: Dark brown black sandy fine to coarse angular to subangular ash, clinker and silicious gravel.				B 0.00 - 0.50			
				D 1.00	C67/115mm	C 1.00	
				W 1.00		1.27	
				D 2.00	C18	C 2.00	
		2.30	3.20			2.45	
MADE GROUND: Very soft to soft greyish blue silty slightly organic clay with occasional gravel size pockets of black fine to coarse ash sand and fine to coarse subangular to subrounded clinker and silicious gravel.				D 2.50	(6)		
				U 2.60 - 3.05			
				D 3.05			
		3.20	2.30	D 3.30			
Very soft light greyish blue slightly organic CLAY. (Estuarine Alluvium)				D 3.50	S3	S 3.50	
						3.95	
				B 4.00 - 4.50			
				U 4.50 - 4.95	(8)		
		4.60	0.90				
Spongy dark brownish black fibrous PEAT. (Peat)				D 4.95			
---from 5.50m with occasional gravel to cobble size pockets of light grey very organic clay				D 5.50			
---from 6.00m becoming spongy to firm				D 6.00	S7	S 6.00	
				B 6.50 - 7.00		6.45	
				D 7.40	(3)		
		7.40	-1.90	U 7.50 - 7.95			
Very soft to soft light greyish blue organic CLAY. (Estuarine Alluvium)				D 7.95			
---from 7.95 to 8.50m very organic				D 8.50			
				D 9.10			
		9.10	-3.60	D 9.40	S30	S 9.40	
Blue greenish grey completely weathered silty MUDSTONE, very weak. (Mercia Mudstone)						9.85	
				B 10.00 - 10.50			
		10.00	-4.50				

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.

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BOREHOLE LOG - CABLE PERCUSSION

Borehole No.

BHK4

Sheet 2 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	338949.9 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185441.6 N
Client	Welsh Office	Driller	I.M	Ground Level	5.50m AOD
		Logged by	T.R	Orientation	Vertical
Consultant	Ove Arup and Partners			Date Started	16/10/1997
				Date Completed	17/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install- ation
Blue greenish grey completely weathered silty MUDSTONE, very weak. (Mercia Mudstone)		10.00	-4.50	B 10.00 - 10.50			
Red brown mottled grey green highly to completely weathered silty MUDSTONE very weak to weak. (Mercia Mudstone Group)		10.80	-5.30	D 10.50	S80/150mm	S 10.50 10.80	
Brown highly weathered silty MUDSTONE, weak. (Mercia Mudstone Group)		11.05	-5.55	D 11.05	S50/20mm*	S 11.05 11.07	
Cable Percussion boring complete at 11.05 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.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.

BHK5

Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	339228.1 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon	Ground Level	185536.9 N
Client	Welsh Office	Driller	IM	Orientation	Vertical
Consultant	Ove Arup and Partners	Logged by	T.R	Date Started	17/10/1997
				Date Completed	17/10/1997

PROGRESS						DRILLING DETAILS			
Date	Time	Hole depth	Casing depth	Water depth	Remarks	Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
17/10/1997	1800	11.55	11.30	Dry		11.30	11.55	1.00	

CASING				WATER STRIKES							
Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.	Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
150	11.55	150	11.30	17/10/1997	1600	9.20	5.40	15.0	fast	9.00	11.30

GENERAL NOTES						SPT DETAILS		
						Depth	Type	Incremental blow count/penetration in mm
						2.00	S	N=7 (2,1,3,1,2,1)
						4.00	S	1/450mm*
						11.50	S	50/50mm*

* Seating blows only.

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

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BOREHOLE LOG - CABLE PERCUSSION

Borehole No.

BHK5

Sheet 1 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	339228.1 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185536.9 N
Client	Welsh Office	Driller	I.M	Ground Level	5.20m AOD
Consultant	Ove Arup and Partners	Logged by	T.R	Orientation	Vertical
				Date Started	17/10/1997
				Date Completed	17/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Installation
TOPSOIL		0.30	4.90	B 0.30 - 1.00			
Firm greyish brown occasionally thinly laminated CLAY. (Estuarine Alluvium)				U 1.00 - 1.45	(10)		
				D 1.45			
				D 1.80			
---at 2.00m becoming soft				D 2.00	S7	S 2.00	2.45
		2.40	2.80	B 2.50 - 3.00			
Very soft grey very silty CLAY. (Estuarine Alluvium)				U 3.00 - 3.45	(4)		
				D 3.45			
				D 3.80			
				D 4.00 - 4.60	S1/450mm*	S 4.00	4.45
				B 4.60 - 5.00			
		5.30	-0.10	D 5.40			
Firm dark brownish black fibrous PEAT with gravel to cobble size pockets of grey organic clay. (Peat)				W 5.40 - 6.05	(7)		
				U 5.60			
				D 6.05			
				B 6.50 - 7.10			
		7.10	-1.90	D 7.20			
Very soft grey organic CLAY with gravel to cobble size pockets of dark brown slightly clayey peat. (Estuarine Alluvium)				U 7.40 - 7.85	(8)		
				D 7.85			
				D 8.50			
		8.90	-3.70	D 8.90			
Soft to firm reddish brown sandy very clayey SILT with gravel size pockets of sandy clay and occasional fine to medium angular to subrounded gravel. (Mercia Mudstone Group)				U 9.20 - 9.65	(20)		
				D 9.65			

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.

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BOREHOLE LOG - CABLE PERCUSSION

Borehole No.

BHK5

Sheet 2 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	339228.1 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185536.9 N
Client	Welsh Office	Driller	I.M	Ground Level	5.20m AOD
Consultant	Ove Arup and Partners	Logged by	T.R	Orientation	Vertical
				Date Started	17/10/1997
				Date Completed	17/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install- ation
Soft to firm reddish brown sandy very clayey SILT with gravel size pockets of sandy clay and occasional fine to medium angular to subrounded gravel. (Mercia Mudstone Group)		10.30	-5.10	D 10.30 B 10.50 - 11.30 D 10.50			
Blue greenish grey completely weathered silty MUDSTONE, very weak. (Mercia Mudstone Group)		11.55	-6.35	D 11.50	S50/50mm*	S 11.50 11.55	
---from 11.30m becoming moderately to highly weathered							
Cable Percussion boring complete at 11.55 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.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.

BHL1

Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	339545.0 E
Project	M4 Relief Road Magor to Castleton Stage 2				185562.1 N
Client	Welsh Office	Drilling Rig	Pilcon	Ground Level	5.00m AOD
		Driller	A.M	Orientation	Vertical
		Logged by	M.B	Date Started	18/10/1997
Consultant	Ove Arup and Partners			Date Completed	18/10/1997

PROGRESS						DRILLING DETAILS			
Date	Time	Hole depth	Casing depth	Water depth	Remarks	Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
18/10/1997	1600	10.91	9.30	8.80		10.40	10.70	1.00	

CASING				WATER STRIKES							
Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.	Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
150	10.91	150	9.30	18/10/1997	0000	1.68	1.68	0.00	slight	1.50	NR
				18/10/1997	0000	6.10	5.80	15.0	slow	6.00	NR
				18/10/1997	0000	10.40	8.80	15.0	fast	8.85	NR

GENERAL NOTES				SPT DETAILS		
- Borehole complete at 10.93m. - Backfilled with bentonite/grout from 10.93m.				Depth	Type	Incremental blow count/penetration in mm
				1.95	S	0/450mm*
				4.00	S	0/450mm*
				6.20	S	N=7 (1,1,2,2,1,2)
				9.00	S	N=22 (3,4,4,6,5,7)
				10.70	S	50/75mm (17,34,50)

* Seating blows only.

NB 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

Borehole No.

BHL1

Sheet 1 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	339545.0 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185562.1 N
Client	Welsh Office	Driller	A.M	Ground Level	5.00m AOD
Consultant	Ove Arup and Partners	Logged by	M.B	Orientation	Vertical
				Date Started	18/10/1997
				Date Completed	18/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Installation
Firm to stiff grey mottled brown slightly sandy CLAY with occasional rootlets. (Estuarine Alluvium)				B 0.50 - 0.90			
				D 0.95			
				U 1.05 - 1.50	(12)		
				D 1.50			
		1.68	3.32				
Very soft grey slightly sandy CLAY. (Estuarine Alluvium)				D 1.95	S0/450mm*	S 1.95	
--from 1.95 to 3.00m slightly organic							2.40
				B 2.60 - 3.00			
				D 3.05			
				D 3.10			
				D 3.55			
				D 4.00	S0/450mm*	S 4.00	
							4.45
				B 4.55 - 5.00			
				D 5.05 - 5.55	(5)		
				U 5.10			
		5.63	-0.63	D 5.55			
Firm black slightly sandy fibrous PEAT. (Peat)				B 5.70 - 6.10	NR		
				U 5.70 - 6.10			
		6.10	-1.10				
Soft dark grey mottled black slightly organic very sandy CLAY. (Estuarine Alluvium)				B 6.20 - 7.15	S7	S 6.20	
				D 6.20			6.65
		7.15	-2.15	D 7.20			
Very soft dark grey mottled black sandy CLAY with occasional thin beds of firm black fibrous peat. (Estuarine Alluvium)				U 7.30 - 7.75	(9)		
		7.75	-2.75	D 7.75			
Soft dark grey slightly organic sandy CLAY with occasional sub-angular gravel and cobbles. (Estuarine Alluvium)				U 8.10 - 8.55	NR		
				B 8.55 - 8.80			
		8.80	-3.80				
Grey mottled pale blue highly weathered sandy MUDSTONE, weak to moderately weak. (Mercia Mudstone Group)				D 9.00	S22	S 9.00	
							9.45
				B 9.45 - 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.

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BOREHOLE LOG - CABLE PERCUSSION

Borehole No.

BHL1

Sheet 2 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	339545.0 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185562.1 N
Client	Welsh Office	Driller	A.M	Ground Level	5.00m AOD
		Logged by	M.B	Orientation	Vertical
				Date Started	18/10/1997
Consultant	Ove Arup and Partners			Date Completed	18/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Installation
Grey mottled pale blue highly weathered sandy MUDSTONE, weak to moderately weak. (Mercia Mudstone Group)		10.40	-5.40	W 10.40 W 10.40 D 10.70	S50/75mm	S 10.70	
Brown mottled grey highly weathered sandy MUDSTONE, moderately weak to moderately strong. (Mercia Mudstone Group)		10.93	-5.93			10.93	
Cable Percussion boring complete at 10.93 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.

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Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.

BHL2

Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	339715.5 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon	Ground Level	185640.1 N
Client	Welsh Office	Driller	LM	Orientation	6.10m AOD
Consultant	Ove Arup and Partners	Logged by	T.R	Date Started	18/10/1997
				Date Completed	18/10/1997

PROGRESS						DRILLING DETAILS			
Date	Time	Hole depth	Casing depth	Water depth	Remarks	Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
18/10/1997	1800	11.00	9.20	8.60		10.50	10.80	1.00	

CASING				WATER STRIKES							
Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.	Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
150	11.00	150	9.20	18/10/1997	1600	10.40	9.05	20.0	slow	9.20	NR

GENERAL NOTES		SPT DETAILS		
- Borehole complete at 11.00m. - Borehole backfilled with bentonite/cement grout.		Depth	Type	Incremental blow count/penetration in mm
		2.10	S	N=3 (1,0,0,1,1,1)
		4.00	S	N=1 (1,0,1,0,0,0)
		7.20	S	N=3(1,0,1,1,1,0)
		9.20	S	N=25 (2,4,5,6,7,7)
		10.80	S	50/60mm (19,36,50)
* Seating blows only.				

NB All depths in metres, all diameters in millimetres,
water strike rise time in minutes, chiselling time in hours.

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BOREHOLE LOG - CABLE PERCUSSION

Borehole No.

BHL2

Sheet 1 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	339715.5 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185640.1 N
Client	Welsh Office	Driller	I.M	Ground Level	6.10m AOD
Consultant	Ove Arup and Partners	Logged by	T.R	Orientation	Vertical
				Date Started	18/10/1997
				Date Completed	18/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Installation
TOPSOIL		0.20	5.90				
Soft to firm becoming soft brownish grey occasionally thinly laminated CLAY with occasional rootlets. (Estuarine Alluvium)				B 0.50 - 1.00 D 0.50			
---at 1.00m becoming soft very silty				U 1.00 - 1.45	(10)		
				D 1.45 D 1.70			
		2.10	4.00	D 2.10	S3	S 2.10	
Very soft bluish grey very silty CLAY. (Estuarine Alluvium)				B 2.55 - 3.00		2.55	
				U 3.00 - 3.45	(2)		
				D 3.45 D 3.70			
				D 4.00	S1	S 4.00	
				B 4.50 - 5.00		4.45	
				U 5.00 - 5.45	(3)		
		5.60	0.50	D 5.45 D 5.60			
Firm dark brownish black slightly sandy fibrous PEAT. (Peat)				U 5.70 - 6.15	(20)		
---from 5.70m with gravel to cobble size pockets of brownish green slightly sandy clayey very organic silt				D 6.15 - 6.80 B 6.20			
		6.80	-0.70				
Very soft grey sandy CLAY. (Estuarine Alluvium)				D 7.00 D 7.20	S3	S 7.20	
				B 7.65 - 8.00		7.65	
				U 8.30 - 8.75	(7)		
				D 8.95 W 9.05 W 9.05 D 9.20	S25	S 9.20	
		9.20	-3.10			9.65	
Greenish blue completely weathered silty MUDSTONE, very weak. (Mercia Mudstone Group)				B 9.70 - 10.50			

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.

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BOREHOLE LOG - CABLE PERCUSSION

Borehole No.

BHL2

Sheet 2 of 2

Contract No.	F10895	Method	Cable Percussion	Coordinates	339715.5 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon		185640.1 N
Client	Welsh Office	Driller	I.M	Ground Level	6.10m AOD
		Logged by	T.R	Orientation	Vertical
				Date Started	18/10/1997
Consultant	Ove Arup and Partners			Date Completed	18/10/1997

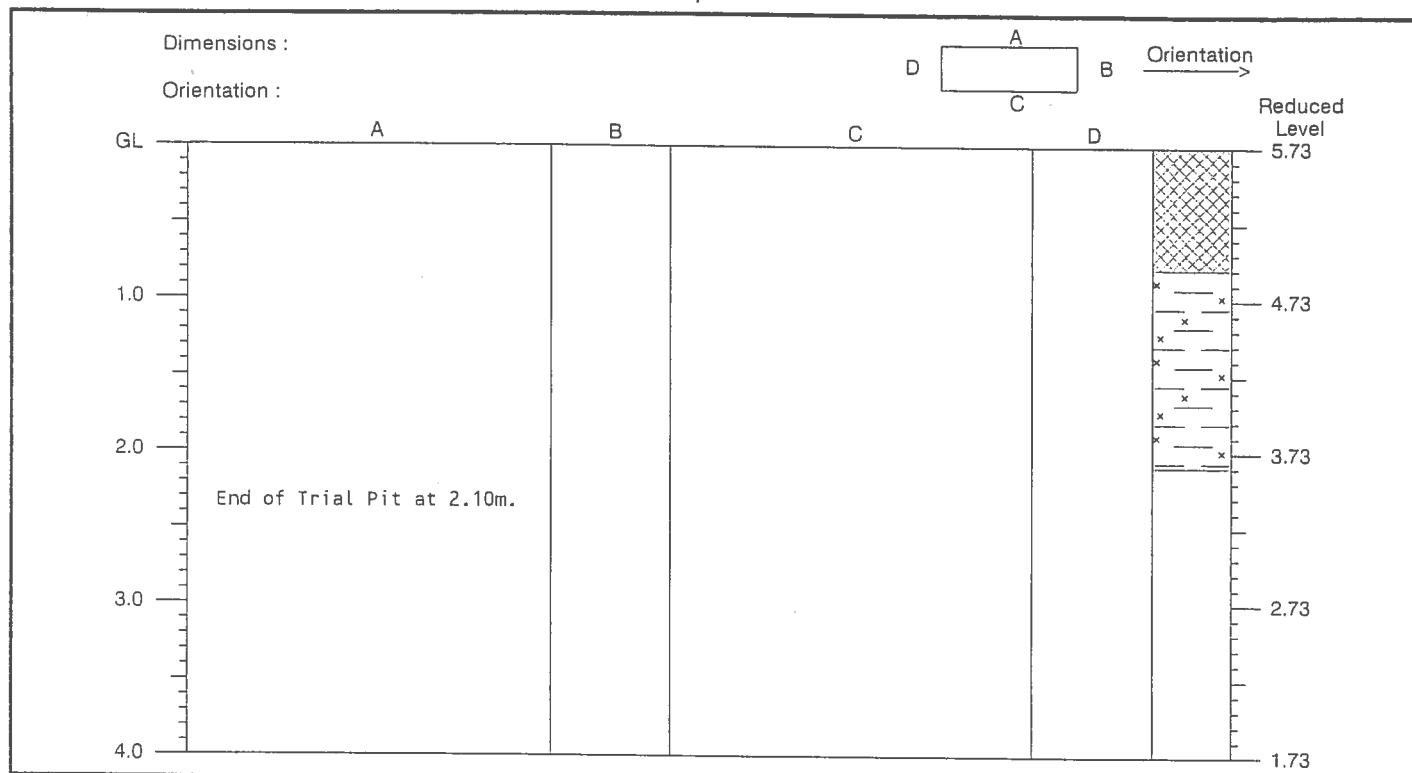
Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Install- ation
Greenish blue completely weathered silty MUDSTONE, very weak. (Mercia Mudstone Group)		10.50	-4.40	D 10.50			
Light greyish green moderately weathered slightly sandy SILTSTONE moderately weak. (Mercia Mudstone Group)		11.00	-4.90		S50/60mm	S 10.80 11.01	
Cable Percussion boring complete at 11.00 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 CP LOG

Version 2.00

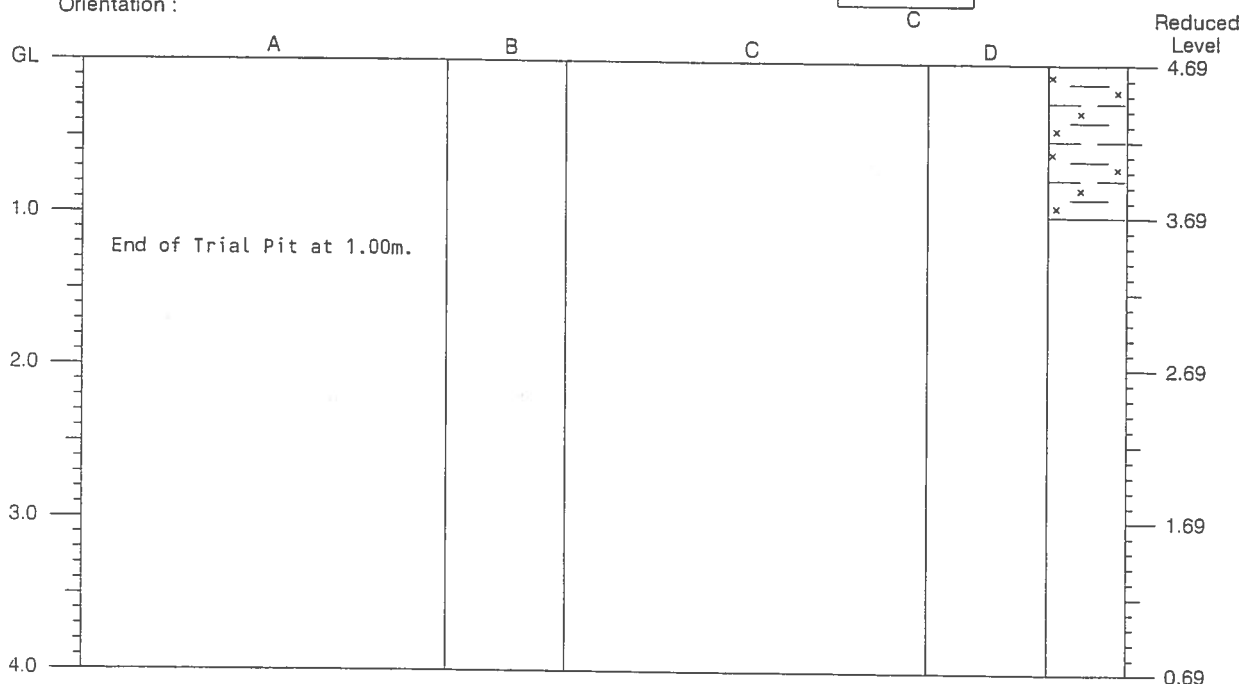
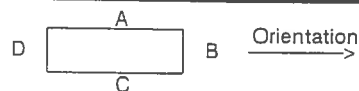
Revised 19/12/1996



Strata			Samples and Tests		
Depth (m)	No.	Description	Depth (m)	Type	Results
0.00-0.80	1	MADE GROUND: Loose brown sandy slightly silty sub-angular to sub-rounded fine to coarse gravel and cobbles of slag, ash and brick.	0.00-0.50	BTO	
0.80-2.10	2	Firm to stiff blue grey mottled green grey and brown very silty organic CLAY with much root material. from 1.90m becoming soft to firm.	0.80-1.10	BTO	
			1.90-2.10	BTO	
			2.10-0.80	W	
Date of Excavation 03/02/00 Equipment JCB 3CX Stability Stable		Groundwater No. Struck Behaviour 1 0.80 medium inflow	Ground Level 5.73 m OD Coordinates 338603.12 mE 185406.50 mN Logged by DC Checked by AF		
Remarks See key sheet and appendices for explanations.					
Trial Pit Record		Project M4 Relief Road - Stage 2. Preliminary Chemical Investigation Ove Arup & Partners	Contract 150006		
 Exploration Associates			Trial Pit CH51		

Dimensions :

Orientation :



Strata

Samples and Tests

Depth (m)	No.	Description	Depth (m)	Type	Results
0.00-1.00	1	Soft to firm grey mottled brown and dark grey very silty organic CLAY with much root material.	0.50-1.00	BTO	
			0.00	W	

Date of Excavation 03/02/00

Equipment JCB 3CX

Stability Stable

Groundwater

No. Struck Behaviour

Surface groundwater present

Ground Level 4.69 m OD

Coordinates 338945.93 mE
185445.65 mNLogged by DC
Checked by AF

Remarks Pit stopped at 1.00m (surface water filled trial pit).

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Project

M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

Contract 150006

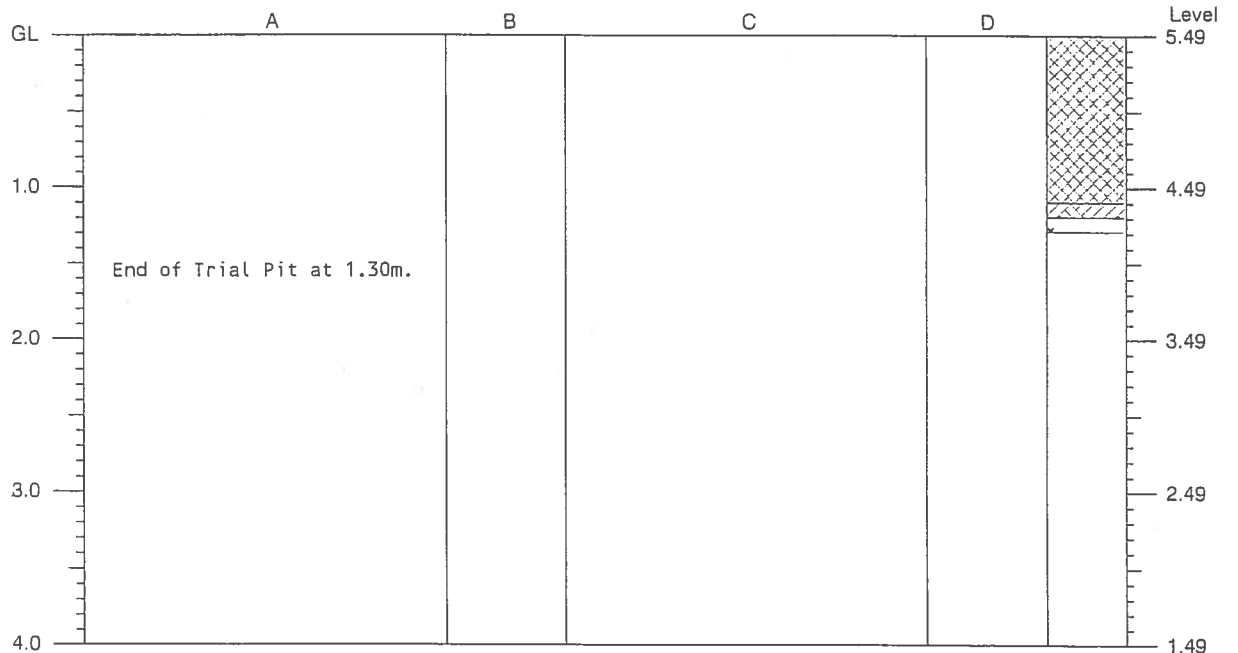
Trial Pit CH52



Exploration Associates

Dimensions : 1.80 x 1.00

Orientation : S



Strata

Samples and Tests

Depth (m)	No.	Description	Depth (m)	Type	Results
0.00-1.10	1	MADE GROUND: Moderately compact grey sandy slightly silty sub-angular to sub-rounded fine to coarse gravel and cobbles of slag,ash,siltstone and limestone	0.30 0.80	BTO W	
1.10-1.20	2	TOPSOIL			
1.20-1.30	3	Firm to stiff grey brown very silty CLAY with much root material	1.20	BTO	

Date of Excavation 16/02/00
Equipment JCB 3CX
Stability Stable

Groundwater
No. Struck Behaviour
1 0.80 Fast

Ground Level 5.49 m OD
Coordinates 338946.51 mE
185449.82 mN

Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Project

M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

Contract 150006

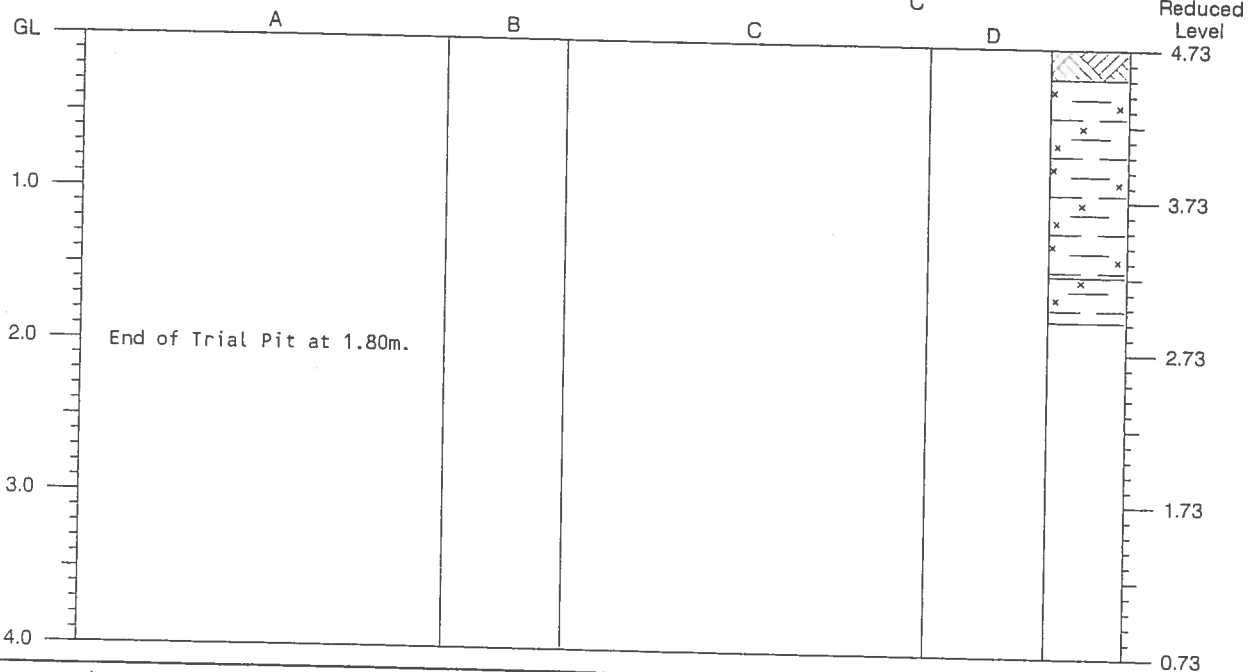
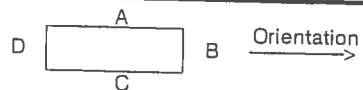
Trial Pit CH52A



Exploration Associates

Dimensions :

Orientation :



Strata

Samples and Tests

Depth (m)	No.	Description	Depth (m)	Type	Results
0.00-0.20	1	Brown very silty clayey TOPSOIL.			
0.20-1.50	2	Firm to stiff grey mottled brown very silty CLAY with much root material.	0.40-0.50	BTO	
1.50-1.80	3	Soft to firm blue grey mottled brown and dark grey very silty CLAY with much organic and root material.	1.50	W	
			1.50-1.80	BTO	

Date of Excavation 03/02/00
Equipment JCB 3CX
Stability Stable

Groundwater
No. Struck Behaviour
1 1.50 medium flow

Ground Level 4.73 m OD
Coordinates 339261.29 mE
185485.43 mN

Logged by DC
Checked by AF

Remarks Water sample taken in rear adjacent to CH53 known as "size No. 9 rear sample".

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Project

Contract 150006

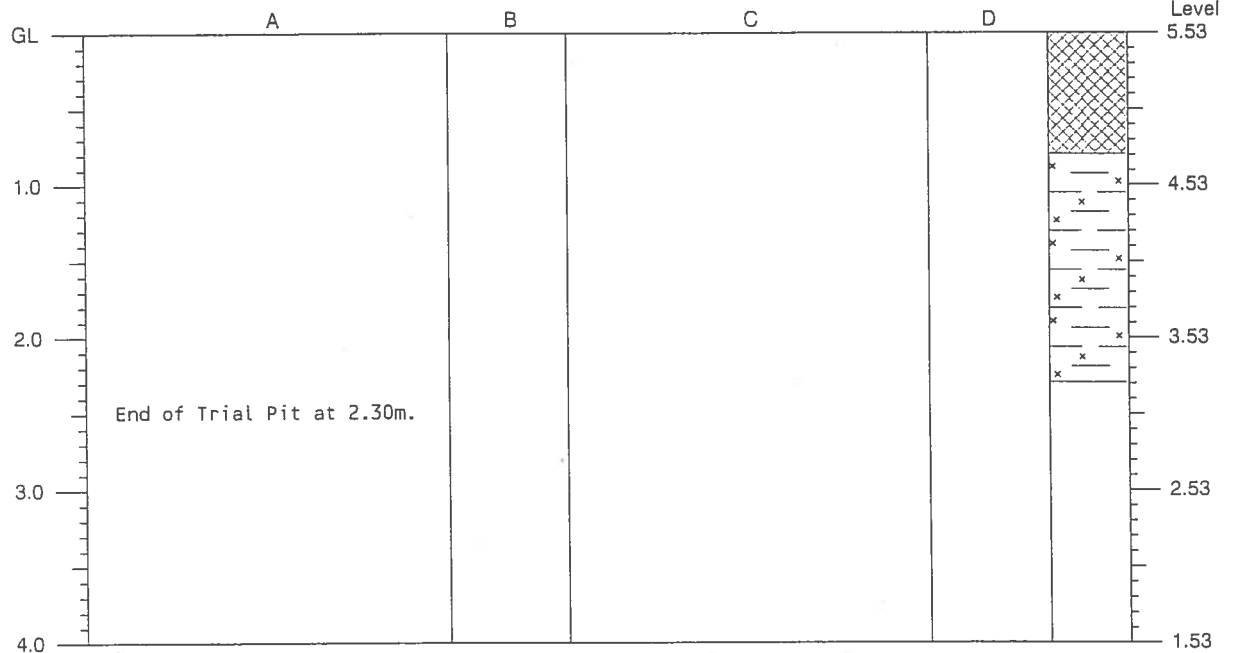
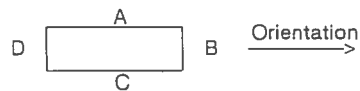
 **Exploration Associates**

M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

Trial Pit CH53

Dimensions : 1.90 x 1.10

Orientation : W



Strata

Samples and Tests

Depth (m)	No.	Description	Depth (m)	Type	Results
0.00-0.80	1	MADE GROUND: Loose grey sandy slightly silty sub-angular to sub-rounded fine to coarse gravel and cobbles of slag,ash,brick,siltstone and limestone	0.40	BTO	
0.80-2.30	2	Firm to stiff grey brown very silty CLAY with much root material from 1.60m becoming soft to firm	1.10	BTO	

Date of Excavation 16/02/00
Equipment JCB 3CX
Stability Stable

Groundwater
No. Struck Behaviour
Not encountered during excavation

Ground Level 5.53 m OD
Coordinates 339262.37 mE
185482.23 mN

Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Project

M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

Contract

150006

Trial Pit

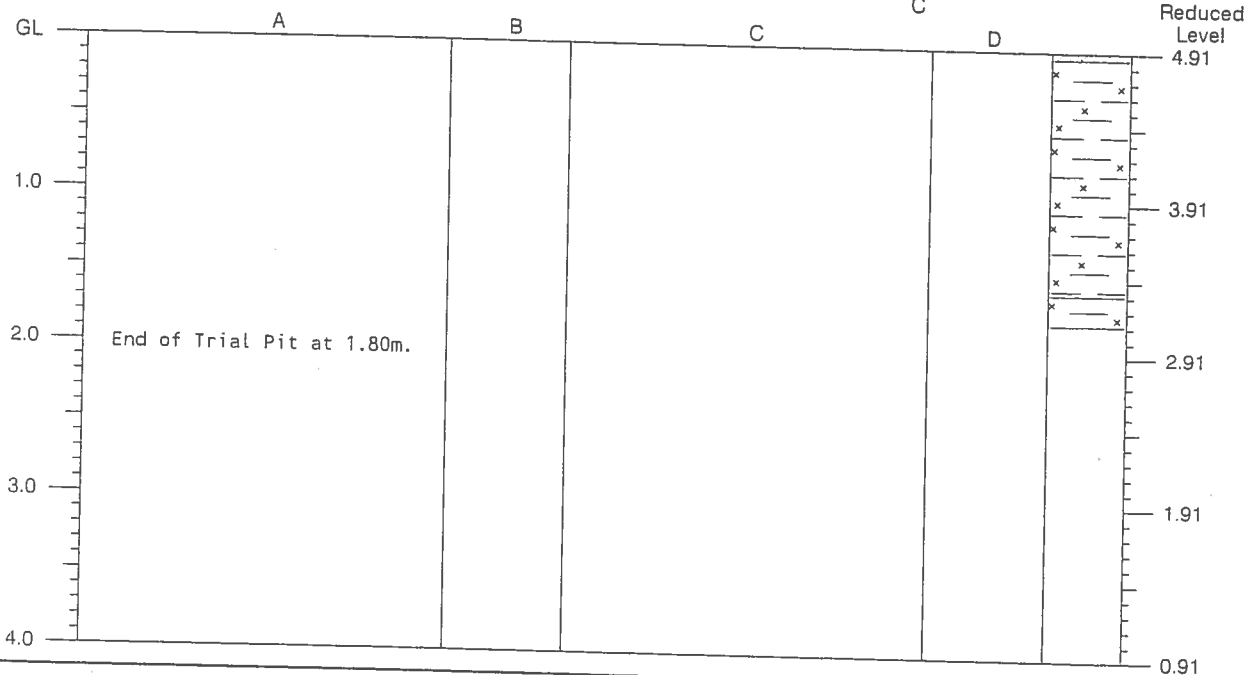
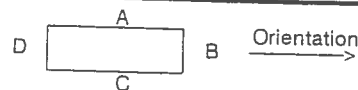
CH53A



Exploration Associates

Dimensions :

Orientation :



Strata

Depth (m)	No.	Description	Samples and Tests		
			Depth (m)	Type	Results
0.00-0.05	1	Brown very silty clayey TOPSOIL.			
0.05-1.60	2	Firm to stiff brown and grey very silty organic CLAY with much root material. from 1.10m becoming soft to firm.	0.05-0.50	BTO	
1.60-1.80	3	Soft to firm grey mottled brown and dark grey very silty organic CLAY with much root material.	1.60-1.80	BTO	

Date of Excavation 03/02/00

Equipment JCB 3CX

Stability Stable

Groundwater

No. Struck Behaviour
1 1.60 slight water seepage

Ground Level 4.91 m OD
Coordinates 339514.60 mE
185546.01 mN

Logged by DC
Checked by AF

Remarks

See key sheet
and appendices
for explanations.

Form 2/0

Trial Pit Record

Project

M4 Relief Road - Stage 2. Preliminary
Chemical Investigation
Ove Arup & Partners

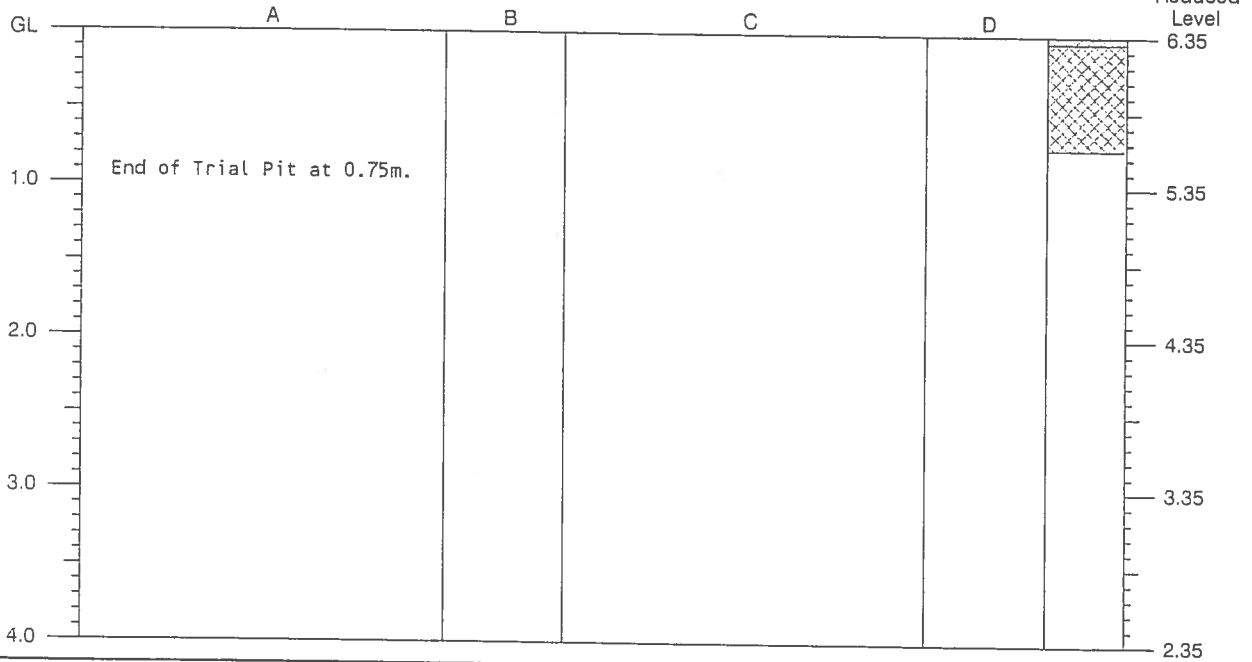
Contract 150006

Trial Pit CH54

 Exploration Associates

Dimensions : 0.50 x 0.50

Orientation : N/A



Strata

Samples and Tests

Depth (m)	No.	Description	Depth (m)	Type	Results
0.00-0.05	1	Brown clayey very silty TOPSOIL			
0.05-0.75	2	MADE GROUND: Firm to stiff grey brown very silty CLAY with occasional to some root material	0.40	BTO	

Date of Excavation 16/02/00
 Equipment Hand Dug
 Stability Stable

Groundwater
 No. Struck Behaviour
 Not encountered during excavation

Ground Level 6.35 m OD
 Coordinates 339512.35 mE
 185556.72 mN

Logged by DC
 Checked by AF

Remarks CH54A Excavated by hand due to unsuitable access for the JCB 3CX

See key sheet
 and appendices
 for explanations.

Form 2/0

Trial Pit Record

Project

Contract 150006

 **Exploration Associates**

M4 Relief Road - Stage 2. Preliminary
 Chemical Investigation
 Ove Arup & Partners

Trial Pit CH54A

Borehole Log



Exploration Associates

Drilled by NF
Logged by JN
Checked by

Equipment and Methods
Cable Percussion 150 mm diameter from 0.00m to 7.00m.

Ground Level + 4.59 m OD
National Grid E 338486.07
Coordinates N 186080.47

Samples and Tests

Strata

Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend
1.00	ES1		30/01/2002		MADE GROUND: Black and grey sandy GRAVEL. Gravel is angular and subangular fine to coarse of slag and limestone.	(1.50)	
2.50	ES2				Soft to firm grey slightly gravelly CLAY. Gravel is angular and fine. Driller reports sandy clay.	1.50 +3.09 (1.70)	
					Very soft PEAT (DRILLERS DESCRIPTION).	3.20 +1.39 (3.80pen)	
7.00		KRH	30/01/2002 7.00		EXPLORATORY HOLE ENDS AT 7.00 m.	7.00 -2.41	

Groundwater
No. Struck Behaviour
1 0.30m Seepage

Remarks
Chiselling : 1.10m to 1.50m 90minutes
Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 1.00m Bentonite (b). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 1.00m to 7.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project ENVIRONMENTAL INVESTIGATION AT LLANWERN
Project no. STEELWORKS
Carried out for 152002
Corus plc

Borehole
RBBH1
Sheet 1 of 1

Borehole Log



Exploration Associates

Drilled by IH
Logged by LM
Checked by

Equipment and Methods
Cable Percussion 150 mm diameter from 0.00m to 7.00m.

Ground Level + 5.22 m OD
National Grid E 338597.19
Coordinates N 185909.39

Samples and Tests

Strata

Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend
0.90	ES1		29/01/2002		MADE GROUND : Dark grey SAND AND GRAVEL. Gravel is angular to subrounded fine and medium of slag.	(1.50)	c
2.50	ES2				Soft to firm grey mottled brown sandy CLAY.	1.50 +3.72 (2.70)	b
4.50	ES3				Black spongy pseudofibrous PEAT with frequent soft light grey SILT pockets.	4.20 +1.02 (1.90)	
6.80 7.00	ES4	xRH	29/01/2002 0.00		Soft dark grey SILT.	6.10 -0.88 (0.90pen)	
					EXPLORATORY HOLE ENDS AT 7.00 m.	7.00 -1.78	

Groundwater
Not encountered during drilling.

Remarks
Hole backfill : 0.00m to 0.50m Concrete (c), 0.50m to 2.00m Bentonite (b). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 2.00m to 7.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project ENVIRONMENTAL INVESTIGATION AT LLANWERN
Project no. STEELWORKS
Carried out for 152002
Corus plc

Borehole
RBBH2
Sheet 1 of 1

Borehole Log



Exploration Associates

Drilled by GW Logged by LM Checked by		Equipment and Methods Inspection Pit from 0.00m to 1.20m. Cable Percussion 150 mm diameter from 1.20m to 7.00m.				Ground Level + 4.64 m OD National Grid E 338770.81 Coordinates N 185836.90	
Samples and Tests				Strata			
Depth	Type & No.	Records	Date Casing Time Water	Description	Depth, Level (Thickness)	Legend	
0.50	ES1		29/01/2002	MADE GROUND : Dark grey SAND AND GRAVEL. Gravel is angular to rounded fine to coarse of Slag.	(0.70)		
1.00	ES2				0.70 +3.94		
				Soft to firm grey mottled orange brown slightly sandy CLAY.	(4.70)		
5.50	ES3		29/01/2002 7.00	Soft light grey mottled dark grey and brown SILT with black spongy pseudofibrous PEAT pockets.	5.40 -0.76 (1.60pen)		
				EXPLORATORY HOLE ENDS AT 7.00 m.	7.00 -2.36		
Groundwater No. Struck Behaviour 1 0.70m Rising to 0.70m after 20 mins. Sealed 1.00. Slow inflow				Remarks Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 0.90m Bentonite (b). Surface protection : Stop Cock Cover Standpipe installed, 50mm diameter, response zone from 0.90m to 7.00m.			
Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1 : 50				Project ENVIRONMENTAL INVESTIGATION AT LLANWERN Project no. 152002 Carried out for Corus plc		Borehole RBBH3 Sheet 1 of 1	

Borehole Log



Exploration Associates

Drilled by GW
Logged by JN
Checked by

Equipment and Methods
Cable Percussion 150 mm diameter from 0.00m to 7.00m.

Ground Level + 5.05 m OD
National Grid E 338433.74
Coordinates N 185791.62

Samples and Tests

Strata

Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend
0.50	ES1		30/01/2002		MADE GROUND: Grey brown very sandy GRAVEL. Gravel is angular and subangular fine and medium of slag.	(1.00)	
1.20	ES2					1.00 +4.05	
					Firm grey mottled orange brown slightly sandy CLAY.	(5.60)	
6.70	ES3		30/01/2002 0.00	dry	PEAT (DRILLERS DESCRIPTION).	6.60 -1.55 (0.40pen)	
					EXPLORATORY HOLE ENDS AT 7.00 m.	7.00 -1.95	

Groundwater
Not encountered during drilling.

Remarks

Chiselling : 0.00m to 1.00m 180minutes
Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 0.90m Bentonite (b). Surface protection : Stop Cock Cover
Standpipe installed, 50mm diameter, response zone from 0.90m to 7.00m.

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project

Project no.

Carried out for

ENVIRONMENTAL INVESTIGATION AT LLANWERN
STEELWORKS
152002
Corus plc

Borehole

RBBH4

Sheet 1 of 1

Borehole Log



Exploration Associates

Drilled by GW Logged by LM Checked by		Equipment and Methods Inspection Pit from 0.00m to 1.00m. Cable Percussion 150 mm diameter from 1.00m to 7.00m.				Ground Level National Grid Coordinates	
Samples and Tests					Strata		
Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend
0.50	ES1		29/01/2002		MADE GROUND: Dark grey SAND AND GRAVEL. Gravel is subangular and subrounded fine and medium of slag.	(1.50)	
1.70	ES2				Soft to firm grey mottled orange brown slightly sandy CLAY with rare pockets of decaying plant matter.	1.50	
6.80 7.00	ES3	KRH	29/01/2002 7.00		Soft dark grey SILT with frequent brown spongy pseudofibrous PEAT pockets.	6.70 (0.30pen)	
					EXPLORATORY HOLE ENDS AT 7.00 m.	7.00	
Groundwater No. Struck Behaviour 1 1.50m Rising to 1.30m after 20 mins. Sealed 2.00. Slow inflow					Remarks Chiselling: 1.00m to 1.50m 90minutes Hole backfill: 0.00m to 0.30m Concrete (c), 0.30m to 0.90m Bentonite (b). Surface protection: Stop Cock Cover Standpipe installed, 50mm diameter, response zone from 0.90m to 7.00m.		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50					Project ENVIRONMENTAL INVESTIGATION AT LLANWERN Project no. 152002 Carried out for Corus plc		Borehole RBBH5 Sheet 1 of 1

RPS		BOREHOLE LOG							Borehole No. SBHK01 CP			
									Sheet 1 of 2			
Project Name: M4 CaN (Temp)		Co-ordinates:		Date(s): 06/12/2007 - 07/12/2007				Hole Type:				
Project No: JER6591-Temp		Easting: 338433		Drilling Method:				CP				
Location:		Northing: 185614		Dando		Casing Diameter (mm) 200		Casing Depth (m) 12.50				
Client:		Ground Level (mAOD): 5.26		Logged By: DH				Scale: 1:50				
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale		
		Depth (m)	Type	Results								
					0.00		5.26		Firm grey mottled orangish brown slightly gravelly CLAY with occasional rootlets. Gravel is angular fine of mudstone. (Estuarine Alluvium) (TFD)			
		0.50 - 1.00	B1			(1.50)				1		
		1.00 1.00	W1 W001									
		1.50 1.50	D3 SPT(S)	N=8 (1,1/1,2,2,3)	1.50		3.76		---from 1.30m becomes firm			
		2.00 - 2.50	D4						Very soft to soft grey silty CLAY (Organic odour). (Estuarine Alluvium) (TFD)	2		
		3.00 3.00 - 3.45 3.00	ES006 U6 U006	Blows=6		(3.20)				3		
		3.50 3.50 - 3.95 3.50	D7 D8 SPT(S)	N=4 (1,0/1,1,1,1)						4		
		4.70	D9		4.70		0.56		Spongy black pseudofibrous PEAT. (Peat) (PEAT)			
		5.00 - 5.45	U10	Blows=10					---from 4.70m to 5.50m with closely spaced coarse gravel sized pockets of very soft grey silty clay	5		
		5.50 - 5.95 5.50 5.50	D12 D11 SPT(S)	N=7 (1,1/2,1,2,2)		(2.10)				6		
		6.00 - 6.50	B13									
		6.80 6.80 6.80	D14 W1 W001		6.80		-1.54		Uncompact grey and black clayey slightly sandy SILT (Organic odour). Estuarine Alluvium) (TFD)	7		
		7.00 - 7.45	U15	Blows=5								
		7.50 7.50 - 7.95 7.50	D16 D17 SPT(S)	N=2 (1,0/0,1,0,1)		(2.20)				8		
8.00 - 8.50	B18											
9.00 - 9.45	U19	Blows=12	9.00		-3.74		Very soft grey slightly silty slightly sandy gravelly CLAY with occasional medium to coarse gravel sized pockets of black pseudofibrous peat. Gravel is subangular to subrounded fine to coarse of sandstone and mudstone. (Estuarine Alluvium) (TFD)	9				
9.50 9.50 9.50 - 9.95	D20 D021 D21			(1.00)								
10.00 - 10.50	B22		10.00		-4.74			Continued on next sheet	10			
Remarks						Groundwater		Chiselling		AGS		
1. Cable Percussive boring terminated at 13.50m. 2. 50mm standpipe installed, slotted from 4.80m to 6.80m.						Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Duration (Mins)		Top Depth (m)	Base Depth (m)
									01:00		12.90	13.20

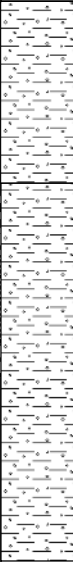
		BOREHOLE LOG						Borehole No. SBHK01 CP				
Project Name: M4 CaN (Temp)		Co-ordinates:		Date(s): 06/12/2007 - 07/12/2007				Sheet 2 of 2				
Project No: JER6591-Temp		Easting: 338433		Drilling Method:				Hole Type: CP				
Location:		Northing: 185614		Dando		Casing Diameter (mm)	Casing Depth (m)	Scale:				
Client:		Ground Level (mAOD): 5.26		Logged By: DH		200	12.50	1:50				
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale		
		Depth (m)	Type	Results								
		10.50 10.50 - 10.90	U023 U23	Blows=100	10.40	(0.40)	-5.14		Soft to firm greenish grey slightly sandy gravelly CLAY with occasional cobbles. Gravel is subangular to subrounded fine to coarse of sandstone, mudstone and limestone. Cobbles are subangular of limestone. (Estuarine Alluvium?) (TFD)			
		11.00 11.00 - 11.40 11.00	D24 D25 SPT(S)	50 (6,8/50 for 200mm)					Very stiff very high strength reddish brown slightly gravelly CLAY. Gravel is angular fine to medium (Weathered Mudstone). (Mercia Mudstone Group) (MMG)	11		
		11.50 - 12.00	B26			(3.10)				12		
		12.50 - 12.90 12.50	D27 SPT(S)	50 (9,13/50 for 190mm)						13		
		13.20 - 13.50 13.20	D28 SPT(S)	50 (8,15/50 for 170mm)						14		
		End of Borehole at 13.50m								15		
										16		
										17		
										18		
										19		
										20		
Remarks						Groundwater		Chiselling				
1. Cable Percussive boring terminated at 13.50m. 2. 50mm standpipe installed, slotted from 4.80m to 6.80m.						Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Duration (Mins)		Top Depth (m)	Base Depth (m)
									01:00		12.90	13.20

Project Name:	M4 CaN (Temp)	Co-ordinates:	Date(s): 11/12/2007 - 12/12/2007			Hole Type:
Project No:	JER6591-Temp	Easting:	338651	Drilling Method:		CP
Location:		Northing:	185597	Dando	Casing Diameter (mm)	Casing Depth (m)
Client:		Ground Level (mAOD):	5.53	Logged By: DH	200	12.00
						1:50

Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		Depth (m)	Type	Results						

Remarks	Groundwater			Chiselling		
	Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Duration (Mins)	Top Depth (m)	Base Depth (m)
	1.00	0.00	0.80	01:00	13.00	13.40
1. Cable Percussive boring complete at 13.70m. 2. Insitu permeability testing carried out from 12.00m to 13.70m. 3. 50mm standpipe installed, slotted from 7.20m to 11.20m.						



		BOREHOLE LOG						Borehole No. SBHK02 CP				
Project Name: M4 CaN (Temp)		Co-ordinates:		Date(s): 11/12/2007 - 12/12/2007				Sheet 2 of 2				
Project No: JER6591-Temp		Easting: 338651		Drilling Method:				Hole Type: CP				
Location:		Northing: 185597		Dando		Casing Diameter (mm) 200	Casing Depth (m) 12.00	Scale: 1:50				
Client:		Ground Level (mAOD): 5.53		Logged By: DH								
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale		
		Depth (m)	Type	Results								
		10.50	D28			(2.10)			Very stiff reddish brown slightly gravelly CLAY. Gravel is subangular fine to coarse of mudstone siltstone and sandstone (Weathered Mudstone). (Mercia Mudstone Group) (MMG)	11		
		11.20	W001		11.20	-5.67				12		
		11.20	W1									
		11.30	D29									
		11.50 - 11.75	B30									
		11.80 - 12.20	D31									
		11.80	SPT(S)	50 (10,15/50 for 155mm)								
		12.50	D32			(2.50)						
		12.80 - 13.10	D33									
		12.80	SPT(S)	50 (26 for 135mm/50 for 115mm)						13		
	13.20	D34										
	13.40 - 13.70	D35										
	13.40	SPT(S)	50 (25 for 125mm/50 for 85mm)						14			
								End of Borehole at 13.70m	15			
									16			
									17			
									18			
									19			
									20			
Remarks						Groundwater			Chiselling			
1. Cable Percussive boring complete at 13.70m. 2. Insitu permeability testing carried out from 12.00m to 13.70m. 3. 50mm standpipe installed, slotted from 7.20m to 11.20m.						Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Duration (Mins)	Top Depth (m)		Base Depth (m)
						1.00	0.00	0.80	01:00	13.00		13.40

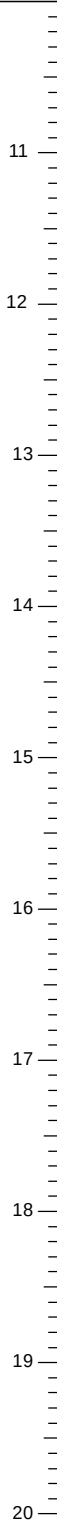
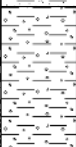
RPS		BOREHOLE LOG						Borehole No. SBHK03 CP			
								Sheet 1 of 2			
Project Name: M4 CaN (Temp)		Co-ordinates:		Date(s): 18/12/2007 - 20/12/2007				Hole Type:			
Project No: JER6591-Temp		Easting: 338868		Drilling Method:				CP			
Location:		Northing: 185648		Dando		Casing Diameter (mm)	Casing Depth (m)	Scale:			
Client:		Ground Level (mAOD): 5.83		Logged By: PH		200	11.00	1:50			
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale	
		Depth (m)	Type	Results							
		0.30	ES1		0.00		5.83		MADE GROUND: Very compact slag. (Driller's description) (MG)		
						(1.20)					
		0.89	W1								
		0.89	W001							1	
		1.00	ES2		1.20		4.63				
		1.00	L002						Firm grey mottled greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine of mudstone. (Estuarine Alluvium) (TFD)		
		1.00	ES002			(0.70)					
		1.20	D3								
		1.20 - 1.65	U4	Blows=14					---from 1.46m soft		
		1.70	D005		1.90		3.93				
		1.70	D5						Soft grey silty CLAY with rare pieces of organic material. (Estuarine Alluvium) (TFD)	2	
		1.70	D6								
		1.70	SPT(S)	N=8 (2,2/3,2,2,1)							
		2.00	ES007								
		2.00	ES7								
		2.50	D008								
		2.50	D8								
		3.00 - 3.45	U10	Blows=5						3	
		3.00	ES9			(2.60)					
		3.50	D12								
		3.50	D11								
		3.50	D011								
		3.50	SPT(S)	N=2 (1,0/1,0,1,0)						4	
		4.00	ES13								
					4.50		1.33		Interbedded extremely closely spaced very thin laminations of soft grey silty CLAY and plastic black amorphous PEAT. (Estuarine Alluvium with peat bands) (TFDP)		
						(0.40)					
		5.00 - 5.45	U16		4.90		0.93		Spongy black pseudofibrous PEAT. (Peat) (PEAT)	5	
		5.00	U016								
		5.00	ES015			(1.00)					
		5.00	ES15								
		5.50	D017								
		5.50	D18								
		5.50	D17		5.90		-0.07		Extremely low strength grey SILT. (Estuarine Alluvium) (TFD)	6	
		5.50	SPT(S)	N=10 (1,2/2,3,3,2)							
		5.90	W001								
		5.90	W1								
		6.00	D19								
		7.00 - 7.45	U21	Blows=3						7	
		7.00	U021			(2.60)					
		7.00	ES021								
		7.00	D020								
		7.00	D20						---from 7.50m coarse gravel sized pockets of fine sand		
		7.50	D022								
		7.50	D23								
		7.50	D22							8	
		7.50	SPT(S)	N=1 (1,0/0,1,0,0)							
		8.50	D24		8.50		-2.67		Soft grey silty CLAY with medium to coarse gravel sized lenses of peat. (Estuarine Aluvium) (TFD)		
		8.50	D024								
		9.00 - 9.45	U25	Blows=11		(1.00)				9	
		9.50	D026		9.50		-3.67		Firm grey slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is subangular fine to coarse of sandstone. (Estuarine Alluvium)		
		9.50	D26			(0.50)					
		9.50	D27								
		9.50	SPT(S)	N=12 (2,2/3,3,3,3)							
		10.00	D028		10.00		-4.17			10	
		10.00	D28						Continued on next sheet		
Remarks 1. Cable Percussive boring from GL to 11.50m. 2. 50mm standpipe installed, slotted from 4.90m to 5.90m.					Groundwater			Chiselling			AGS
					Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Duration (Mins)	Top Depth (m)	Base Depth (m)	
								02:30	0.00	1.00	
								01:00	1.00	1.20	
								01:00	11.20	11.50	

Project Name:	M4 CaN (Temp)	Co-ordinates:	Date(s): 18/12/2007 - 20/12/2007			Hole Type:	
Project No:	JER6591-Temp	Easting:	338868	Drilling Method:			CP
Location:		Northing:	185648	Dando	Casing Diameter (mm) 200	Casing Depth (m) 11.00	Scale:
Client:		Ground Level (mAOD):	5.83	Logged By: PH			1:50

[illegible]

Remarks 1. Cable Percussive boring from GL to 11.50m. 2. 50mm standpipe installed, slotted from 4.90m to 5.90m.	Groundwater			Chiselling			
	Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Duration (Mins)	Top Depth (m)		Base Depth (m)
				02:30	0.00		1.00
				01:00	1.00		1.20
				01:00	11.20		11.50

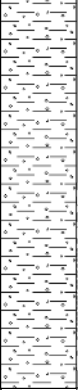
		BOREHOLE LOG						Borehole No. SBHK04 CP				
Project Name: M4 CaN (Temp)		Co-ordinates:		Date(s): 08/12/2007 - 10/12/2007			Sheet 1 of 2					
Project No: JER6591-Temp		Easting: 339197		Drilling Method:			Hole Type: CP					
Location:		Northing: 185656		Dando		Casing Diameter (mm) 200	Casing Depth (m) 11.00	Scale: 1:50				
Client:		Ground Level (mAOD): 5.55		Logged By: DH								
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale		
		Depth (m)	Type	Results								
		0.30	ES1	Blows=12	0.00		5.55		Firm to stiff grey mottled orangish brown CLAY. (Estuarine Alluvium) (TFD)	1		
		0.30	L001									
		0.30	ES001									
		1.00	U4	N=12 (1,2/3,3,3,3)						2		
		1.00	ES2									
		1.00	ES002									
		1.00	D3									
		1.50	D6									
		1.50	D5									
		1.50	SPT(S)									
		2.00	D7	Blows=11						3		
		2.00	ES8									
		3.00	D9									
		3.00	ES10	N=7 (1,2/1,2,2,2)							4	
		3.00	U11									
		3.50	D12									
		3.50	SPT(S)	Blows=12							5	
		4.00	D14									
		4.00	ES15									
		5.00	ES017	N=12 (2,2/2,3,3,4)							6	
		5.00	D16									
		5.00	ES17									
		5.00 - 5.45	U18									
		5.50	D20									
		5.50	D19	Blows=14							7	
		5.50	SPT(S)									
		6.00	D21									
		7.00 - 7.45	U23	N=3 (1,0/1,0,1,1)							8	
		7.00	D22									
		7.50	D25									
7.50	D24											
7.50	SPT(S)											
8.00	D26	Blows=11							9			
8.87	W1											
8.87	W001											
9.00 - 9.45	U28	N=26 (3,3/6,6,7,7)							10			
9.00	ES028											
9.00	D27											
9.00	U028											
9.50	D30											
9.50	D29	Continued on next sheet										
9.50	SPT(S)											
Remarks						Groundwater			Chiselling			
1. Cable Percussive boring complete at 12.20m. 2. 50mm standpipe installed, slotted from 10.20m to 12.20m.						Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Duration (Mins)	Top Depth (m)	Base Depth (m)	
									01:00	12.00	12.20	

		BOREHOLE LOG						Borehole No. SBHK04 CP				
Project Name: M4 CaN (Temp)		Co-ordinates:		Date(s): 08/12/2007 - 10/12/2007				Sheet 2 of 2				
Project No: JER6591-Temp		Easting: 339197		Drilling Method:				Hole Type: CP				
Location:		Northing: 185656		Dando		Casing Diameter (mm)	Casing Depth (m)	Scale:				
Client:		Ground Level (mAOD): 5.55		Logged By: DH		200	11.00	1:50				
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale		
		Depth (m)	Type	Results								
									---from 10.00m becomes slightly gravelly. Gravel is subangular to subrounded fine to medium of sandstone and mudstone			
									Very stiff medium strength reddish brown slightly gravelly CLAY. Gravel is angular fine to medium of mudstone (Weathered Mudstone). (Mercia Mudstone Group) (MMG)			
									---from 12.00m becomes very stiff			
								End of Borehole at 12.20m				
Remarks						Groundwater			Chiselling			
1. Cable Percussive boring complete at 12.20m. 2. 50mm standpipe installed, slotted from 10.20m to 12.20m.						Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Duration (Mins)	Top Depth (m)		Base Depth (m)
									01:00	12.00		12.20

RPS		BOREHOLE LOG						Borehole No. SBHL01 CP			
Project Name: M4 CaN (Temp)		Co-ordinates:		Date(s): 11/12/2007 - 12/12/2007			Hole Type:				
Project No: JER6591-Temp		Easting: 339456		Drilling Method:			CP				
Location:		Northing: 185700		Dando		Casing Diameter (mm)	Casing Depth (m)	Scale:			
Client:		Ground Level (mAOD): 4.93		Logged By: DH		200	10.50	1:50			
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale	
		Depth (m)	Type	Results							
					0.00		4.93		Firm grey mottled orangish brown silty CLAY with occasional rootlets. (Estuarine Alluvium) (TFD)		
		1.00 - 1.45	U2 D1 U002 ES002	Blows=16		(2.00)				1	
		1.00									
		1.00									
		1.00									
		1.50	D4								
		1.50	D3								
		1.50	SPT(S)	N=12 (2,2/2,3,3,4)							
					2.00		2.93		Very soft grey locally mottled orangish brown slightly gravelly CLAY. Gravel is angular fine of mudstone. (Estuarine Alluvium) (TFD)	2	
		2.50	D5								
		3.00 - 3.45	U6	Blows=7						3	
		3.50	D7								
		3.50	D8			(3.31)					
		3.50	SPT(S)	N=1 (1,0/0,1,0,0)						4	
		4.50	D9								
		5.00 - 5.45	U10	Blows=14						5	
		5.50	D12		5.31		-0.38		Spongy black fibrous PEAT. (Peat) (PEAT)		
		5.50	SPT(S)	N=15 (2,2/3,3,4,5)		(1.19)				6	
		6.50	D13		6.50		-1.57		Spongy dark brown amorphous PEAT with coarse gravel sized pockets of soft grey silty clay. (Peat) (PEAT)		
		7.00	U14	Blows=12	7.10		-2.17		Firm grey silty organic CLAY. (Estuarine Aluvium) (TFD)		
		7.00	ES014								
		7.50	D15			(1.40)				8	
		7.50	D16								
		7.50	SPT(S)	N=14 (2,3/4,3,3,4)							
		8.50	W17		8.50		-3.57		Dense grey slightly sandy subangular to rounded fine to coarse GRAVEL of mudstone, siltstone, sandstone and limestone with medium cobble content. Sand is fine to coarse. Cobbles are subrounded of sandstone and siltstone. (Fluvial Alluvium) (FLUV)	9	
		8.50	SPT(C)	N=44 (7,9/9,11,12,12)		(1.90)					
		9.00	B018								
		9.00 - 9.50	B18								
		10.00	D19							10	
Continued on next sheet											
Remarks						Groundwater			Chiselling		
1. Cable Percussive boring complete at 11.50m. 2. Borehole grouted upon completion.						Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Duration (Mins)	Top Depth (m)	Base Depth (m)
						8.50	8.50	5.20	00:50	9.10	9.30
									01:00	11.20	11.50
						AGS					

Remarks 1. Cable Percussive boring complete at 11.50m. 2. Borehole grouted upon completion.	Groundwater			Chiselling			
	Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Duration (Mins)	Top Depth (m)		Base Depth (m)
	8.50	8.50	5.20	00:50 01:00	9.10 11.20		9.30 11.50

RPS		BOREHOLE LOG							Borehole No. SBHL02 CP													
									Sheet 1 of 2													
Project Name: M4 CaN (Temp)		Co-ordinates:		Date(s): 06/12/2007 - 07/12/2007				Hole Type:														
Project No: JER6591-Temp		Easting: 339805		Drilling Method:				CP														
Location:		Northing: 185767		Dando		Casing Diameter (mm) 200		Casing Depth (m) 12.00														
Client:		Ground Level (mAOD): 6.52		Logged By: DH				Scale: 1:50														
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale												
		Depth (m)	Type	Results																		
		0.00					6.52		Soft to firm low strength grey mottled orangish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone. (Estuarine Alluvium) (TFD)													
		1.00 - 1.45 1.00	U2 D1	Blows=14																		
		1.50 1.50 1.50	D3 D4 SPT(S)	N=6 (1,2/2,2,1,1)								---from 1.50m to 2.00m soft										
		2.00 2.00	D5 ES005		(4.10)																	
		3.00 3.00 - 3.45 3.00	D6 U7 U007	Blows=12																		
		3.50 3.50 3.50	D8 D9 SPT(S)	N=5 (2,2/1,2,1,1)																		
		4.00	D10		4.10																	
		5.00 5.00	U12 D11	Blows=5		(2.40)																
		5.50 5.50 5.50	D14 D13 SPT(S)	N=1 (1,0/0,1,0,0)																		
		6.00	D15																			
		6.50 - 7.00 6.50	B16 B016		6.50		0.02					Spongy black psuedofibrous PEAT. (Peat) (PEAT)										
		7.00 7.00 - 7.45 7.00	D17 U18 U018	Blows=12		(1.40)																
		7.00 7.00 7.00	ES018 ES017 D19																			
		7.50 - 7.95 7.50	D20 SPT(S)	N=14 (2,2/3,5,3,3)	7.90		-1.38								Soft grey CLAY with occasional coarse gravel sized pockets of brown and black psuedofibrous locally fibrous peat. (Estuarine Alluvium) (TFD)							
		8.00 8.00	ES021 D21			(1.40)																
		9.00 - 9.45 9.00	U23 D22	Blows=10																		
		9.50 9.50 9.50	D25 D24 SPT(S)	N=23 (3,4/4,6,6,7)	9.30		-2.78											Very stiff greenish grey slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone (Weathered Mudstone). (Mercia Mudstone Group) (MMG)				
		10.00	D26																			
		Continued on next sheet																				
		Remarks																				
1. Cable Percussive boring complete at 12.60m. 2. Borehole grouted upon completion.																						
Groundwater					Chiselling			AGS														
Strike Depth (m)		Casing Depth (m)		Level After 20 Mins (m)		Duration (Mins)																
10.80		10.50		10.80		01:00																
					12.10		12.50															

		BOREHOLE LOG						Borehole No. SBHL02 CP				
Project Name: M4 CaN (Temp)		Co-ordinates:		Date(s): 06/12/2007 - 07/12/2007				Sheet 2 of 2				
Project No: JER6591-Temp		Easting: 339805		Drilling Method:				Hole Type: CP				
Location:		Northing: 185767		Dando		Casing Diameter (mm) 200		Casing Depth (m) 12.00				
Client:		Ground Level (mAOD): 6.52		Logged By: DH				Scale: 1:50				
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale		
		Depth (m)	Type	Results								
		11.00 - 11.45 11.00 11.00	U28 U028 D27	Blows=71		(3.30)				11		
		11.50 - 11.90 11.50 11.50	D30 D29 SPT(S)	50 (8,15/50 for 170mm)						12		
		12.00	D31									
		12.50 12.50	D32 SPT(S)	50 (25 for 20mm/50 for 45mm)					End of Borehole at 12.60m	13		
										14		
										15		
										16		
										17		
										18		
										19		
										20		
Remarks						Groundwater			Chiselling			
1. Cable Percussive boring complete at 12.60m. 2. Borehole grouted upon completion.						Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Duration (Mins)	Top Depth (m)		Base Depth (m)
						10.80	10.50	10.80	01:00	12.10		12.50

RPS		ROTARY BOREHOLE LOG						Borehole No. SBHL02 RC		
Project Name: M4 CaN (Temp)		Co-ordinates:		Date(s): 11/12/2007 - 12/12/2007				Sheet 1 of 3		
Project No: JER6591-Temp		Easting: 339806		Drilling Method:				Hole Type: RC		
Location:		Northing: 185767		Dando Tractor		Casing Diameter (mm)	Casing Depth (m)	Scale:		
Client:		Ground Level (mAOD): 6.53		Logged By: DH		121	11.20	1:50		
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		Depth (m)	Type & Fl	Results & Coring						
					0.00		6.53		Grey CLAY. (Driller's description) (OH-OH)	
					1.00	(1.00)	5.53		Brown grey CLAY. (Driller's description) (OH-OH)	1
						(2.30)				2
					3.30		3.23		PEAT. (Driller's description) (OH-OH)	3
						(1.70)				4
					5.00		1.53		Grey blue CLAY. (Driller's description) (OH-OH)	5
						(1.20)				6
					6.20		0.33		PEAT. (Driller's description) (OH-OH)	7
						(2.10)				8
					8.30		-1.77		Grey CLAY. (Driller's description) (OH-OH)	9
						(2.90)				10
Continued on next sheet										
Remarks 1. Rotary Openhole drilling from GL to 11.20m. 2. Rotary Coring from 11.20m to 20.30m. 3. 19mm piezometer installed, tip at 15.20m, with response zone from 14.80m to 15.40. 4. 0.00*indicates openhole drilling.						Groundwater			Drilling Progress	
						Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Depth	Remarks
						12.00	11.20		14.90 14.90 20.30	Start of Shift End of Shift End of Hole
						AGS				

RPS		ROTARY BOREHOLE LOG						Borehole No. SBHL02 RC			
Project Name: M4 CaN (Temp)		Co-ordinates:		Date(s): 11/12/2007 - 12/12/2007			Sheet 2 of 3				
Project No: JER6591-Temp		Easting: 339806		Drilling Method:			Hole Type: RC				
Location:		Northing: 185767		Dando Tractor			Casing Diameter (mm) 121				
Client:		Ground Level (mAOD): 6.53		Logged By: DH			Casing Depth (m) 11.20				
Scale: 1:50											
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale	
		Depth (m)	Type & Fl	Results & Coring							
		11.20 - 12.20			11.20		-4.67		Zone of core loss. MARL/LIMESTONE. (Driller's description) (NR)	11	
						(1.00)					
		12.20 - 13.20	C1		12.20		-5.67		Extremely weak to weak reddish brown locally mottled greenish grey locally greenish grey MUDSTONE. Recovered as non intact core (angular to subangular medium to coarse gravel sized fragments). (Mercia Mudstone Group) (MMG)	12	
		12.20	C007								
		12.20	C7								
		12.20	C001								
		12.20	SPT(S)	100 (25 for 0mm/100 for 0mm)		(1.55)			---from 12.54m to 13.20m assumed zone of core loss	13	
		12.20 - 13.20		RQD: 0							
				TCR: 34							
		13.20 - 14.00		SCR: 0							
				RQD: 0							
		13.20 - 14.00		TCR: 100	13.75		-7.22		Very weak to weak reddish brown locally mottled greenish grey locally greenish grey MUDSTONE. Discontinuities: 1) 0 -10 deg extremely closely to medium spaced undulating rough to smooth. 2) 60 - 90 deg medium to widely spaced undulating rough and smooth. (Mercia Mudstone Group) (MMG)	14	
		14.00 - 14.90	C2								
		14.00	C002								
		14.00	SPT(S)	100 (25 for 75mm/100 for 75mm)					---from 13.94m to 13.95m recovered as non intact core (angular fine to coarse gravel sized fragments)	15	
		14.00 - 14.90		RQD: 0					---from 14.00m to 14.10m recovered as non intact core (angular medium to coarse gravel sized fragments)		
				TCR: 74					---from 14.38m to 14.42m recovered as non intact core (angular medium to coarse gravel sized fragments)		
		14.10	ES008						---from 14.50m to 14.58m recovered as non intact core (angular fine to coarse gravel sized fragments)		
		14.10	C8						---from 14.63m to 14.67m recovered as non intact core (angular fine to coarse gravel sized fragments)		
		14.90 - 16.00		RQD: 14					---from 14.67m to 14.90m assumed zone of core loss	16	
				TCR: 86					---from 15.18m to 16.59m 1 No medium bed of greenish grey mudstone		
				SCR: 43					---from 15.19m to 15.26m recovered as non intact core (angular fine to coarse gravel sized fragments)		
		15.00	C009						---from 15.30m to 15.36m recovered as non intact core (angular fine to medium gravel sized fragments)		
		15.00	C9						---from 15.57m to 15.73m recovered as non intact core (angular fine to medium gravel sized fragments)	17	
		16.00 - 18.00	C3						---from 15.85m to 16.00m assumed zone of core loss		
		16.00	C003						---from 16.00m to 16.20m recovered as non intact core (angular fine to coarse gravel sized fragments)		
		16.00 - 18.00		RQD: 21		(6.55)			---from 16.40m to 16.59m recovered as non intact core (angular fine to coarse gravel sized fragments)		
				TCR: 95					---from 16.76m to 16.87m recovered as non intact core (angular fine to coarse gravel sized fragments)	18	
				SCR: 60					---from 17.10m to 17.18m recovered as non intact core (angular fine to coarse gravel sized fragments)		
		17.00	C10						---from 17.50m to 17.63m recovered as non intact core (angular fine to coarse gravel sized fragments)		
		17.00	ES010						---from 17.85m to 17.90m recovered as non intact core (angular fine to coarse gravel sized fragments)	19	
									---from 17.90m to 18.00m assumed zone of core loss		
		18.00 - 20.30	C4						---from 18.00m to 18.70m 1 No thick bed of greenish grey mudstone		
		18.00	C004						---from 18.44m to 18.55m recovered as non intact core (angular fine to coarse gravel sized fragments)		
		18.00 - 20.30		RQD: 19					---from 18.84m to 19.00m recovered as non intact core (angular medium to coarse gravel sized fragments)	20	
				TCR: 100					---from 19.13m to 19.20m recovered as non intact core		
				SCR: 63							
Continued on next sheet											
Remarks						Groundwater		Drilling Progress		AGS	
1. Rotary Openhole drilling from GL to 11.20m. 2. Rotary Coring from 11.20m to 20.30m. 3. 19mm piezometer installed, tip at 15.20m, with response zone from 14.80m to 15.40. 4. 0.00*indicates openhole drilling.						Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Depth		Remarks
						12.00	11.20		14.90		Start of Shift
									14.90		End of Shift
									20.30	End of Hole	

		ROTARY BOREHOLE LOG						Borehole No. SBHL02 RC Sheet 3 of 3		
Project Name: M4 CaN (Temp)		Co-ordinates:		Date(s): 11/12/2007 - 12/12/2007				Hole Type: RC		
Project No: JER6591-Temp		Easting: 339806		Drilling Method:						
Location:		Northing: 185767		Dando Tractor		Casing Diameter (mm) 121	Casing Depth (m) 11.20	Scale: 1:50		
Client:		Ground Level (mAOD): 6.53		Logged By: DH						
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		Depth (m)	Type & Fl	Results & Coring					---from 19.13m to 19.20m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 19.50m to 19.89m recovered as non intact core (angular fine to coarse gravel sized fragments) ---from 19.61m to 19.89m 1 no thin bed of greenish grey mudstone ---from 20.00m to 20.10m recovered as non intact core (angular fine to coarse gravel sized fragments) End of Borehole at 20.30m	21
										22
										23
										24
										25
										26
										27
										28
										29
										30
Remarks						Groundwater			Drilling Progress	
1. Rotary Openhole drilling from GL to 11.20m. 2. Rotary Coring from 11.20m to 20.30m. 3. 19mm piezometer installed, tip at 15.20m, with response zone from 14.80m to 15.40. 4. 0.00*indicates openhole drilling.						Strike Depth (m)	Casing Depth (m)	Level After 20 Mins (m)	Depth	Remarks
						12.00	11.20		14.90	Start of Shift
									14.90	End of Shift
								20.30	End of Hole	
										

		TRIAL PIT LOG						Pit No. STPK01 Sheet 1 of 1		
Project Name: M4 CaN (Temp)		Co-ordinates:		Date(s): 18/12/2007				Hole Type:		
Project No: JER6591-Temp		Easting: 338514		Equipment:		Orientation: 262°		TP		
Location:		Northing: 185603		JCB 3CX		Pit Length: 3.42 m		Scale:		
Client:		Ground Level (mAOD): 5.58		Logged By: GS		Pit Width: 0.72 m		1:25		
Backfill	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		Depth (m)	Type	Results						
					0.00		5.58		MADE GROUND: Light reddish brown very gravelly clay. Gravel sized fragments are subangular to angular fine to coarse of clinker, concrete, brick and slag. With low cobble content, cobble sized fragments are subangular of clinker, concrete, brick and slag. (MG)	
		0.34 0.34 0.34 0.60	ES1 L001 ES001 D2			(0.84)				
					0.84		4.74		Soft to firm light grey mottled brown CLAY with frequent roots and rootlets up to 2mm diameter. (Estuarine Alluvium) (TFD)	1
		1.20 1.20 1.20 - 1.27 1.27 1.27 1.27 1.27 1.27 1.27	B005 ES005 B5 ES3 ES003 D4 IVN03 IVN01 IVN02	55kPa 60kPa 55kPa		(2.00)				2
		2.00 - 2.30	B8							
		2.30 2.31 2.31 2.31 2.31	D7 ES6 IVN05 IVN06 IVN04	15kPa 20kPa 20kPa						
		3.00 3.00 - 3.30	ES011 B11		2.84	(0.52)	2.74		Very soft light grey slightly silty CLAY with occasional pockets of dark brown black organic matter and rare roots and rootlets up to 6mm in diameter. (Estuarine Alluvium) (TFD)	3
		3.30 3.36	D10 ES9						End of Pit at 3.36m	
										4
										5
Remarks: 1. Trial pit complete at 3.36m.										
Groundwater:										
Stability: All faces stable										
										

		TRIAL PIT LOG						Pit No. STPK02 Sheet 1 of 1		
Project Name: M4 CaN (Temp)		Co-ordinates:		Date(s): 18/12/2007				Hole Type:		
Project No: JER6591-Temp		Easting: 338872		Equipment:		Pit Length: 4.44 m Pit Width: 0.75 m		TP		
Location:		Northing: 185642		JCB 3CX				Scale:		
Client:		Ground Level (mAOD): 6.04		Logged By: GS				1:25		
Backfill	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		Depth (m)	Type	Results						
					0.00		6.04		MADE GROUND: Dark brown black slightly angular fine to coarse gravel sized fragments of concrete, tarmacadam, clinker and slag with with high cobble content. Cobble sized fragments are angular of concrete, slag and tarmacadam. (MG)	
		0.30 0.30 0.30 0.50	L001 ES1 ES001 D2			(1.24)				1
		1.24 - 1.34 1.24 1.24 1.24	B5 D4 ES003 ES3		1.24		4.80		Soft light grey mottled brown CLAY with frequent roots and rootlets up to 2mm in diameter. (Estuarine Alluvium) (TFD)	2
		2.00 - 2.30 2.00 2.24 2.24 2.24 2.30 2.30	B8 ES008 IVN03 IVN01 IVN02 ES6 D7	17kPa 19kPa 19kPa	2.40		3.64		Very soft light grey silty CLAY. With occasional pockets of dark brown black organic material and occasional roots and rootlets up to 4mm in diameter. (Estuarine Alluvium) (TFD)	3
		3.00 3.00 - 3.28 3.00 3.28 3.28 3.28	B011 B11 ES011 ES9 D10 IVN04	0kPa		(1.73)				4
		4.13 4.13	D13 ES12						End of Pit at 4.13m	5
Remarks: 1. Trial pit complete at 4.13m										
Groundwater:										
Stability: All faces stable										
										

		TRIAL PIT LOG						Pit No. STPL01 Sheet 1 of 1				
Project Name: M4 CaN (Temp)		Co-ordinates:		Date(s): 18/12/2007				Hole Type:				
Project No: JER6591-Temp		Easting: 339528		Equipment:		Pit Length: 3.50 m Pit Width: 0.45 m		TP				
Location:		Northing: 185721		JCB 3CX				Scale:				
Client:		Ground Level (mAOD): 5.15		Logged By: GS				1:25				
Backfill	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale		
		Depth (m)	Type	Results								
					0.00	(0.16)	5.15		TOPSOIL. (TOP)			
					0.16		4.99				Soft light grey mottled brown silty slightly sandy CLAY. With frequent roots and rootlets up to 2mm diameter. (Estuarine Alluvium) (TFD)	
		0.31	ES1									1
		0.54	D2									
		0.54 - 1.00	B3									
		0.54	ES003									
		0.54	B003									
		1.00 - 1.39	B6			(1.72)						
		1.15	IVN03	14kPa								
		1.15	IVN02	15kPa								
		1.15	IVN01	15kPa								
		1.39	D5									
		1.39	ES4									
		1.88 - 2.22	B9			1.88		3.27				2
		1.88	ES009								Very soft grey silty slightly sandy CLAY. With frequent pockets of dark brown black organic material and frequent roots and rootlets up to 4mm in diameter. (Estuarine Alluvium) (TFD)	
1.88	B009											
2.20	D8											
2.22	ES7											
2.22	IVN05	10kPa										
2.22	IVN06	10kPa										
2.22	IVN04	8kPa										
3.00 - 3.69	B12			(2.31)				3				
3.60	D11											
3.69	ES10											
4.00 - 4.19	B15							4				
4.19	D14											
4.19	ES13											
							End of Pit at 4.19m		5			
Remarks: 1. Trial pit complete at 4.19m.												
Groundwater:												
Stability: All faces stable												
												

BOREHOLE LOG



CLIENT WELSH GOVERNMENT

BH525

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 1 of 3

Start Date 24 February 2015 Easting 338301.6

Scale 1 : 50

End Date 26 February 2015 Northing 185578.3 Ground level 5.95mOD

Depth 22.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru- ment	description	depth (m)	reduced level (m)	legend
24/02/15 0800hrs								Large slag BOULDERS (Driller's description). (MG)			
	1D	1.00 - 1.45	1.00	S 5					1.00	4.95	
	2B	1.00 - 1.50									
	3D*	1.00 - 1.20		Vo 0.2					1.30	4.65	
	4D	1.50 - 1.95	1.50	S 8				Soft dark grey slightly gravelly silty CLAY. Gravel is angular and subangular fine to coarse brick, slag and limestone. (MG)			
	5B	1.50 - 2.00									
	6D*	1.50 - 1.70		Vo 0.2				Stiff yellowish brown and grey slightly gravelly silty sandy CLAY. Gravel is angular and subangular fine to coarse slag and limestone. (MG)			
	7B	2.00 - 2.50									
	8D*	2.00 - 2.20		Vo 0.2							
		2.50		V 36					2.50	3.45	
24/02/15 1630hrs 1.50m	9UT	2.50 - 2.95	2.50					Very soft dark grey slightly sandy silty CLAY. (TFD)			
	11D*	2.75 - 3.00		Vo 0.0				2.54m: Low strength.			
25/02/15 0800hrs	10D	2.95 - 3.05									
	12D	3.00 - 3.45	3.00	S<1							
	13B	3.00 - 3.50									
	14D*	3.00 - 3.50		Vo 0.0							
	15B	3.50 - 4.00									
	16D*	3.50 - 4.00		Vo 0.0							
		3.95		V 36							
	17P	4.00 - 5.00	4.00					3.95m: Low strength.			
	18B	5.00 - 5.50									
		5.55		V 10							
	19P	5.50 - 6.50	5.50					5.55m: Extremely to very low strength.			
	20B	6.50 - 7.00									
		7.10		V 12							
	21P	7.00 - 7.60	7.00					7.10m: Very low strength.			
25/02/15 1700hrs NR									7.60	-1.65	
26/02/15 0800hrs								Very soft grey silty CLAY interbedded with firm dark brown fibrous PEAT. (PEAT)			
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical Pioneer rig. METHOD: Cable percussion (200mm) 0.00-2.00m and (150mm) 2.00-12.20m. Waterflush rotary core drilled (116mm) 12.20-22.70m. CASING: 200mm diam to 2.00m, 150mm diam to 12.20m.

BACKFILL: On completion, borehole backfilled with bentonite pellets 22.70-11.80m. A slotted standpipe (50mm) with geo-sock was installed to 11.60m, granular response zone 11.80-9.80m and bentonite seal 9.80-2.80m. A second slotted standpipe (35mm) with geo-sock was installed to 2.60m, granular response zone 2.80-0.50m, bentonite seal 0.50-0.25m, concrete and stopcock cover 0.25-0.00m.

REMARKS: Hole advanced by chiselling 0.00-1.00m (1hr10mins) and 10.90-12.20m (2hr). Downhole magnetometry for UXO risk mitigation undertaken 0.00-11.00m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 1.00-2.00m, prior to reduction in casing diameter.

Permeability test undertaken at 7.00m- 8.00m.

MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks	AGS	CONTRACT	CHECKED
1.50	1.50	1.30	20	Medium flow.		30238	EC

BOREHOLE LOG



CLIENT WELSH GOVERNMENT

BH525

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 2 of 3

Start Date 24 February 2015 Easting 338301.6

Scale 1 : 50

End Date 26 February 2015 Northing 185578.3 Ground level 5.95mOD

Depth 22.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru- ment	description	depth (m)	reduced level (m)	legend
26/02/15 1620hrs 5.90m 27/02/15 0915hrs 7.87m	22D	8.00 - 8.45	8.00	S 15							
	23B	8.50 - 9.00									
	24UT	9.50 - 9.95	9.50								
	25D	9.95 - 10.05									
	26D	10.10 - 10.20						Stiff dark reddish brown slightly gravelly CLAY. Gravel is subangular and subrounded fine and medium sandstone and siltstone. (RTD)	10.10	-4.15	
	27B	10.50 - 11.00									
	28D	11.00 - 11.45	11.00	S 39							
	29B	11.50 - 12.20									
	30D	12.20 - 12.43	12.10	S*113							
	31C	12.20 - 12.50			97	NA					
	32C	12.50 - 13.70	12.10		100			12.90 - 13.05m: Light greenish grey.			
	33C	13.70 - 15.20	12.10		100	NA		13.60 - 13.70m: Light greenish grey.	13.70	-7.75	
								Very stiff fissured dark reddish brown very gravelly CLAY. Gravel is subangular and subrounded fine and medium lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical extremely closely spaced. (MMG) (Grade III)			
	34C	15.20 - 16.70	12.10		100 19 0	NI 40 80		Stiff fissured reddish brown gravelly CLAY. Gravel is angular and subangular fine and medium lithorelicts of extremely weak mudstone and very stiff clay. Fissures are subhorizontal to 20° very closely spaced planar smooth. (MMG) (Grade III)	14.80	-8.85	
								15.55 - 15.70m: 70° to subvertical planar smooth.	15.60	-9.65	
	35C	16.70 - 18.20	12.10		93 5 0			Weak thinly laminated reddish brown MUDSTONE with rare light greenish grey reduction spots (up to 20mm). Fractures are subhorizontal to 20° and subvertical very closely and closely spaced planar smooth. (MMG) (Grade I/II)			
								15.60 - 16.20m: Light greenish grey. 15.70 - 15.80m: Tending to light greenish grey clay. 16.20 - 16.30m: Tending to reddish brown clay. 16.70 - 17.10m: Tending to light greenish grey clay. 17.30 - 17.40m: Tending to reddish brown clay. 17.50 - 17.60m: Tending to reddish brown clay. 17.60 - 18.20m: Subvertical fracture.			
								Continued Next Page	{18.00}		
water strike (m) casing (m) rose to (m) time to rise (m) remarks									AGS CONTRACT 30238 CHECKED EC		

BOREHOLE LOG

CLIENT WELSH GOVERNMENT

BH525

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 3 of 3

Start Date 24 February 2015 Easting 338301.6

Scale 1 : 50

End Date 26 February 2015 Northing 185578.3 Ground level 5.95mOD

Depth 22.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru -ment	description	depth (m)	reduced level (m)	legend
27/02/15 1420hrs 2.60m	36C	18.20 - 19.70	12.10		100 62 37			Very weak and weak thinly laminated reddish brown MUDSTONE with rare light greenish grey reduction spots (up to 20mm). Fractures are subhorizontal to 20° and subvertical closely and medium spaced planar smooth. (MMG) (Grade I/II) 19.20 - 19.25m: 20° fracture with a veneer of reddish brown clay. 21.25 - 21.80m: 80° to vertical fracture undulating smooth. 22.00 - 22.40m: Tending to reddish brown clay. 22.40m: Calcite crystals (up to 20mm).	18.60	-12.65	
					80 120 400						
	37C	19.70 - 21.20	12.10		100 100 61						
	38C	21.20 - 22.70	12.10		100 90 57						
								Borehole completed at 22.70m.	22.70	-16.75	
									{28.00}		
water strike (m) casing (m) rose to (m) time to rise (m) remarks								AGS	CONTRACT 30238	CHECKED EC	

BOREHOLE LOG

CLIENT WELSH GOVERNMENT

BH526

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 1 of 2

Start Date 3 March 2015 Easting 338509.4

Scale 1 : 50

End Date 9 March 2015 Northing 185587.2 Ground level 5.95mOD

Depth 17.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru- ment	description	depth (m)	reduced level (m)	legend
03/03/15 1100hrs	1B 2D* 3B 4D*	0.20 - 0.50 0.20 - 0.50 0.50 - 1.00 0.50 - 1.00		Vo 0.0 Vo 0.0				SLAG (Driller's description). (MG) Orangish brown and grey angular and subangular fine to coarse limestone GRAVEL with low subangular sandstone cobble content. (MG)	0.20	5.75	
03/03/15 1700hrs Dry	5B 6D*	1.00 - 1.45 1.00 - 1.50 1.00 - 1.50	1.00 1.45	C 10 Vo 0.0				1.00 - 1.30m: Loose to medium dense.	1.30	4.65	
04/03/15 0800hrs Dry	7UT 8D* 9D 10B 11D*	1.50 - 1.95 1.50 - 1.70 2.00 - 2.45 2.00 - 2.50 2.00 - 2.50	1.50 2.00	Vo 0.0 S 4 Vo 0.0				Firm light grey mottled brown slightly gravelly CLAY. Gravel is angular and subangular fine to coarse limestone. (MG) Very soft light grey mottled brown CLAY. (TFD)	1.50	4.45	
	12UT 13D 14D*	2.50 - 2.95 3.00 - 3.45 3.00 - 3.50	2.50 3.00								
	15UT 16D* 17D 18B 19D*	3.50 - 3.95 3.50 - 3.70 4.00 - 4.45 4.00 - 4.50 4.00 - 4.50	3.50 4.00	Vo 0.0 S<1 Vo 0.0					4.00	1.95	
	UT 20B 21D 22B 23D*	4.50 - 4.95 4.50 - 5.00 5.00 - 5.45 5.00 - 5.50 5.00 - 5.50	4.50 5.00					Very soft dark grey silty CLAY. (TFD)			
	24B	5.50 - 6.00									
04/03/15 1700hrs 3.50m	25D	6.50 - 6.95	6.50	S 10				Firm dark grey peaty CLAY. (TFDP)	6.60	-0.65	
05/03/15 0800hrs 2.65m								Firm spongy black PEAT (Driller's description). (PEAT)	7.00	-1.05	
	26B	7.50 - 8.00							7.70	-1.75	
	27D	8.00 - 8.45	8.00	S 8				Soft dark grey peaty CLAY. (TFDP)	8.00	-2.05	
								Continued Next Page	{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Cable percussion (200mm) 1.00-11.50m. Waterflush rotary core drilled (140mm) 11.50-17.70m.

CASING: 200mm diam to 11.50m and 140mm diam to 11.70m.

BACKFILL: On completion, hole backfilled with bentonite pellets 17.70-0.40m and gravel 0.40-0.00m.

REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-10.00m. No anomalies encountered.

Permeability test undertaken at 6.00m- 7.00m.

MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
2.50	2.50	2.10	20	


CONTRACT
30238
CHECKED
EC

BOREHOLE LOG

CLIENT WELSH GOVERNMENT

BH526

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 2 of 2

Start Date 3 March 2015 Easting 338509.4

Scale 1 : 50

End Date 9 March 2015 Northing 185587.2 Ground level 5.95mOD

Depth 17.70 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru -ment	description	depth (m)	reduced level (m)	legend	
05/03/15 1700hrs 8.15m	28B	8.00 - 8.50						Firm black fibrous PEAT. (PEAT)	8.50	-2.55		
	29B	8.50 - 9.00					Soft dark grey peaty CLAY. (TFDP)					
	30D 31B	9.50 - 9.95 9.50 - 10.00	9.50	S 18			Stiff dark reddish brown slightly gravelly CLAY. Gravel is subangular fine to coarse mudstone lithorelicts. (MMG)	9.50	-3.55			
	32D	10.00 - 10.45	10.00	S 43		10.00 - 11.70m: Very stiff.						
	33B	10.50 - 11.00										
	09/03/15 1040hrs 0.83m	34D	11.50 - 11.81	11.50	S*81			Stiff dark reddish brown slightly gravelly CLAY. Gravel is subangular fine to coarse extremely weak mudstone lithorelicts of very stiff clay and extremely weak mudstone. Fissures are subhorizontal to 20° and subvertical extremely closely spaced planar smooth. (MMG) (Grade III)	11.70	-5.75		
		35C	11.70 - 13.20	11.70		100						
		36C	13.20 - 14.70	11.70		100						
		37C	14.70 - 16.20	11.70		100 44 40						
		38C	16.20 - 17.70	11.70		100 83 20						
09/03/15 1715hrs 2.96m							Weak and medium strong reddish brown MUDSTONE. Fractures are subhorizontal to 20° and subvertical closely to medium spaced locally non intact planar smooth. (MMG) (Grade I)	15.60	-9.65			
							16.30 - 16.35m: Tending to reddish brown clay. 16.60 - 16.80m: Tending to light greenish grey clay. 16.60 - 17.40m: Light greenish grey. 17.00 - 17.10m: 40° fracture planar smooth.					
								Borehole completed at 17.70m.	17.70	-11.75		
									{18.00}			
water strike (m) casing (m) rose to (m) time to rise (m) remarks									AGS		CONTRACT 30238	CHECKED EC

BOREHOLE LOG

CLIENT WELSH GOVERNMENT

BH527

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 1 of 3

Start Date 9 March 2015 Easting 338871.9

Scale 1 : 50

End Date 12 March 2015 Northing 185644.4 Ground level 5.95mOD

Depth 19.10 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru- ment	description	depth (m)	reduced level (m)	legend
09/03/15 0800hrs	1B	0.20 - 0.50						Dark grey sandy angular and subangular fine to coarse slag and limestone GRAVEL. (MG)			
	2D*	0.20 - 0.30		Vo 0.0							
	3B	0.50 - 1.00									
	4D*	0.50 - 1.00		Vo 0.0							
		1.00 - 1.08	1.00	C*200				1.00m: Very dense.			
	5D*	1.00 - 1.10		Vo 0.1							
		1.50 - 1.95	1.50	C 5				Soft dark greenish grey slightly gravelly CLAY. Gravel is angular and subangular fine to coarse limestone. (MG)	1.50	4.45	
	6D*	1.50 - 1.60		Vo 0.0					1.75	4.20	
	7B	1.75 - 2.00						Soft dark grey slightly sandy silty CLAY. (TFD)			
	8D	2.00 - 2.45	2.00	S 5							
	9B	2.00 - 2.50									
	10D*	2.00 - 2.50		Vo 0.0							
	11P	2.50 - 3.50	2.50								
	12B	2.50 - 3.00									
09/03/15 1700hrs 4.10m	13P	3.00 - 4.00	3.00								
	14B	4.00 - 4.50									
	15D*	4.00 - 4.50		Vo 0.0							
		4.50		V 28							
	16P	4.50 - 4.70	4.50						4.60	1.35	
	17UT	4.70 - 5.15	4.70					Woody PEAT (Driller's description). (PEAT)	4.70	1.25	
	18D	5.00 - 5.15						Very soft dark grey peaty silty CLAY. (TFDP)			
		5.50 - 6.00									
	19B										
10/03/15 0800hrs 1.10m	20D	6.50 - 6.70	6.50	S<1							
	21B	6.50 - 7.00									
		7.50 - 8.00									
	22B										
Continued Next Page									{8.00}		

EQUIPMENT: Light cable percussive (shell and auger) rig and Geotechnical pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Cable percussion (200mm) 1.00-2.00m and (150mm) 2.00m to 13.10m. Waterflush rotary core drilled (116mm) 13.10-19.10m. CASING: 200mm diam to 2.00m and 150mm diam to 12.60m.

BACKFILL: On completion, borehole backfilled with bentonite pellets 19.10-19.00m. A slotted standpipe (50mm) with geo-sock was installed to 19.00m, granular response zone 19.00-12.90m and bentonite seal 12.90-9.00m. A second slotted standpipe (35mm) with geo-sock was installed to 9.00m, granular response zone 9.00-4.90m, bentonite seal 4.90-0.50m, concrete and stopcock cover 0.50-0.00m.

REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-11.00m. No anomalies encountered. Bentonite seal for aquifer protection installed during drilling 2.00m, prior to reduction in casing diameter. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

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.CONTRACT
30238CHECKED
EC



BH527

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 2 of 3

Start Date 9 March 2015 Easting 338871.9

Scale 1 : 50

End Date	12 March 2015	Northing	185644.4	Ground level	5.95mOD

Depth 19.10 m

progress date/time	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
	23UT	8.00 - 8.45	8.00								
	24D	8.45 - 8.55									
	25B	9.00 - 9.50									
	26D	9.50 - 9.95	9.50	S 28				Stiff dark reddish brown and greenish grey slightly gravelly CLAY. Gravel is subangular fine to coarse mudstone lithorelicts. (MMG) (Grade III)	9.50	-3.55	
	27B	10.50 - 11.00									
	28D	11.00 - 11.45	11.00	S 42				11.00 - 13.10m: Very stiff.			
10/03/15 1700hrs 3.10m											
11/03/15 0800hrs 10.60m	29B	12.00 - 12.50									
	30D	12.50 - 12.67	12.50	S*500							
11/03/15 1700hrs 10.60m	31D	12.70 - 13.00									
12/03/15 1130hrs 11.28m	32C	13.10 - 14.60	12.60		100 23 0	NA		13.00 - 14.20m: Light greenish grey. Very stiff fissured reddish brown CLAY. Relict fissures are randomly orientated very closely spaced. (MMG) (Grade IVb) 13.50m: Subhorizontal band (30mm) of extremely weak mudstone. 13.70m: 20° band (50mm) of extremely weak thinly laminated mudstone.	13.10	-7.15	
	33C	14.60 - 16.10	12.60		100 46 0	NI 20 60		Extremely weak thinly laminated reddish brown MUDSTONE recovered non intact. Fractures are subhorizontal to 20° and 70° to subvertical very closely spaced planar smooth rarely stained back. (MMG) (Grade II)	14.25	-8.30	
	34C	16.10 - 17.60	12.60		100 36 0	NI NI 60		Extremely weak thinly laminated reddish brown MUDSTONE locally disintegrated to subrounded coarse mudstone lithorelicts with 30% stiff clay matrix. Fractures are subhorizontal to 20° and 70° to subvertical extremely closely and very closely spaced planar smooth rarely stained back. (MMG) (Grade II/III) 15.70m: 70° fracture planar smooth stained black.	15.30	-9.35	
	35C	17.60 - 19.10	12.60		100 56 36	NI 40 60		Extremely weak to weak thinly laminated reddish brown MUDSTONE locally recovered non intact. Fractures are subhorizontal to 20° and 70° to subvertical very closely spaced planar smooth rarely stained back. (MMG) (Grade II) 16.55 - 16.65m: Greenish grey gravelly clay.	16.45	-10.50	
						NA			17.70	-11.75	
									18.00	-12.05	
								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	CHECKED	
									30238	EC	



CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT

Start Date 9 March 2015 Easting 338871.9

End Date 12 March 2015 Northing 185644.4 Ground level 5.95mOD

BH527

Sheet 3 of 3

Scale 1 : 50

Depth 19.10 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru -ment	description	depth (m)	reduced level (m)	legend
12/03/15 1700hrs 2.31m						NI 90 200	Very stiff greenish grey gravelly CLAY. Gravel is subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° and 70° to subvertical very closely spaced planar smooth. (MMG) (Grade III) Weak thickly laminated reddish brown MUDSTONE. Fissures are subhorizontal to 20° and 70° very closely and closely spaced planar smooth frequently stained black. (MMG) (Grade II) Borehole completed at 19.10m.	19.10	-13.15		
									{28.00}		
water strike (m) casing (m) rose to (m) time to rise (m) remarks									CONTRACT 30238	CHECKED EC	
Groundwater not encountered prior to use of water flush.											

BOREHOLE LOG

CLIENT WELSH GOVERNMENT

BH528

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 1 of 2

Start Date 3 March 2015 Easting 339268.2

Scale 1 : 50

End Date 4 March 2015 Northing 185680.5 Ground level 5.20mOD

Depth 17.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru- ment	description	depth (m)	reduced level (m)	legend
03/03/15 1000hrs	1B 2D*	0.25 - 0.40 0.25 - 0.40 0.35		Vo 0.1 H 36				Grass over firm dark grey mottled orangish brown silty CLAY with frequent rootlets (up to 1mm diam). (TFD)	1.20	4.00	
	3B 4D*	0.70 - 0.90 0.70 - 0.90		Vo 0.0							
	5B 6D*	1.00 - 1.20 1.00 - 1.20		Vo 0.0							
	7UT 10X	1.20 - 1.65 1.20 - 2.40	Nil					Very soft dark bluish grey silty CLAY with frequent plant fragments (up to 50mm). (TFD)			
	8D 11D*	1.65 - 1.80 1.70 - 1.90									
	9D	1.80 - 2.25	Nil	S<1							
	12D*	2.20 - 2.40									
	13UT 16X	2.40 - 2.85 2.40 - 3.50	2.40								
	14D 15D	2.85 - 3.00 3.00 - 3.45	2.40	S 1							
	17D*	3.30 - 3.50									
	18UT 21X	3.50 - 3.95 3.50 - 4.60	3.50								
	19D 20D	3.95 - 4.10 4.10 - 4.55	3.50	S<1							
	22UT 25X	4.60 - 5.05 4.60 - 6.10	4.60								
	23D 24D	5.05 - 5.20 5.20 - 5.65	4.60	S<1							
	26UT 28X	6.10 - 6.55 6.10 - 7.60	6.10					Firm black fibrous PEAT. (PEAT)	5.95	-0.75	
	27D	6.55 - 6.70						Soft dark bluish grey organic CLAY with frequent plant fragments (up to 50mm). (TFD)	6.60	-1.40	
								7.10 - 7.15m: Firm black fibrous peat.			
	29D 30X	7.60 - 8.05 7.60 - 9.10	7.60	S<1							
Continued Next Page									{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (113mm) 1.20-11.00m. Waterflush rotary core drilled (116mm) 11.00-17.00m. CASING: 140mm diam to 10.60m.

BACKFILL: On completion, a slotted standpipe (50mm) with geo-sock was installed to 17.00m, granular response zone 17.00-11.80m and bentonite seal 11.80-7.00m. A second slotted standpipe (35mm) with geo-sock was installed to 7.00m, granular response zone 7.00-6.00m, bentonite seal 6.00-0.25m, concrete and raised cover 0.25-0.00m. REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-10.60m. No anomalies encountered.

Permeability test undertaken at 8.90m- 10.60m. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001). Falling head permeability test undertaken at 10.60m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks	AGS	CONTRACT	CHECKED
0.25	Nil	0.20	20			30238	EC

BOREHOLE LOG



CLIENT WELSH GOVERNMENT

BH528

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 2 of 2

Start Date 3 March 2015

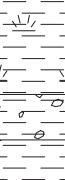
Easting 339268.2

Scale 1 : 50

End Date 4 March 2015

Northing 185680.5 Ground level 5.20mOD

Depth 17.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru- ment	description	depth (m)	reduced level (m)	legend
03/03/15 1740hrs 1.80m	31UT 33X	9.10 - 9.55 9.10 - 10.60	9.10	S*56	100	NA		8.40 - 8.60m: Firm black fibrous peat.	8.80	-3.60	
	32D	9.55 - 9.70						Firm light brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine and medium sandstone. (TFD)	9.10	-3.90	
04/03/15 1100hrs 1.83m	34D 35X	10.60 - 11.02 10.60 - 11.00	9.10 10.60					Firm light greenish grey slightly sandy silty CLAY. (TFD)			
	36C	11.00 - 12.50	10.60								
	37C	12.50 - 14.00	10.60					Very stiff dark reddish brown very gravelly CLAY with frequent light greenish grey reduction spots (up to 20mm). Gravel is subangular fine to coarse extremely weak mudstone and very stiff clay. Fissures are subhorizontal to 20° and subvertical extremely closely spaced planar smooth. (MMG) (Grade III)	10.60	-5.40	
04/03/15 1400hrs 2.15m	38C	14.00 - 15.50	10.60	NA	100	NA					
	39C	15.50 - 17.00	10.60					Very stiff dark reddish brown very gravelly CLAY. Gravel is angular and subangular fine to coarse lithorelicts of extremely weak mudstone. Fissures are subhorizontal to 20° extremely closely spaced planar smooth. (MMG) (Grade III)	12.50	-7.30	
								14.15 - 14.40m: Light greenish grey.			
				NA	100	NA		15.20 - 15.40m: Tending to extremely weak mudstone.			
								Borehole completed at 17.00m.	17.00	-11.80	
									{18.00}		
water strike (m) casing (m) rose to (m) time to rise (m) remarks									CONTRACT 30238		CHECKED EC

BOREHOLE LOG



CLIENT WELSH GOVERNMENT

BH529

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 1 of 3

Start Date 23 March 2015 Easting 339657.7

Scale 1 : 50

End Date 25 March 2015 Northing 185730.8 Ground level 5.10mOD

Depth 18.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru- ment	description	depth (m)	reduced level (m)	legend
23/03/15 1150hrs	1B 2D* 3B 4D* 5B 6D*	0.20 - 0.50 0.20 - 0.50 0.50 - 0.80 0.50 - 0.80 0.80 - 1.20 0.80 - 1.20		Vo 24.0 Vo 23.8 Vo 15.0				Grass over firm dark greenish grey mottled orangish brown silty CLAY with frequent rootlets. (TFD)	1.20	3.90	
	P 7X	1.20 - 2.00 1.20 - 2.00	Nil					Soft dark grey silty CLAY. (TFD)			
23/03/15 1325hrs 1.52m	8D*	1.50 - 1.60									
24/03/15 0930hrs 1.62m	9X	2.00 - 2.50	2.00								
	10D* 11X	2.30 2.40 - 2.50 2.50 - 3.30	2.00	V 14				2.30m: Very low strength.			
	12X 13D* 14X	3.30 - 3.80 3.50 - 3.60 3.60 3.80 - 4.60	2.00 3.80	V 24							
	15D 16X	4.60 - 5.05 4.60 - 5.50	3.80	S 2				Very soft dark grey and black peaty silty CLAY. (TFDP)	4.60	0.50	
									5.15	-0.05	
	17D 18X	5.50 - 5.95 5.50 - 7.00	3.80 5.50	S 2				Very soft black fibrous PEAT. (PEAT)	5.60	-0.50	
								Very loose dark grey silty fine and medium SAND. (TFD)			
	19D 20X	7.00 - 7.45 7.00 - 8.50	5.50 7.00	S<1					7.25	-2.15	
								Very soft dark grey silty peaty CLAY. (TFDP)	7.80	-2.70	
								7.70 - 7.80m: Tending to firm black fibrous peat.			
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (113mm) 1.20-9.50m. Waterflush rotary core drilled (116mm) 9.50-18.50m.

CASING: 140mm diam to 9.00m.

BACKFILL: On completion, hole backfilled with bentonite pellets.

REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-9.50m. No anomalies encountered.

MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001). Falling head permeability test undertaken at 10.60m.

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

water strike (m)	casing (m)	rose to (m)	time to rise (min)	remarks
0.90	Nil	0.52	20	


CONTRACT
30238
CHECKED
EC

BOREHOLE LOG



CLIENT WELSH GOVERNMENT

BH529

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 2 of 3

Start Date 23 March 2015 Easting 339657.7

Scale 1 : 50

End Date 25 March 2015 Northing 185730.8 Ground level 5.10mOD

Depth 18.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru -ment	description	depth (m)	reduced level (m)	legend
24/03/15 1640hrs 0.40m	21D	8.50 - 8.95	7.00	S 17				Stiff light greenish grey slightly sandy silty CLAY with frequent plant fragments (up to 50mm). (TFD)			
25/03/15 0850hrs 0.50m	22X	8.50 - 9.50	8.50								
	23D	9.50 - 9.85	8.50	S*83							
	24C	9.50 - 11.00	9.00		92	NA		9.50 - 10.10m: Very stiff.	10.10	-5.00	
								Very stiff fissured light greenish grey slightly gravelly CLAY. Gravel is angular and subangular fine to coarse very stiff clay and extremely weak mudstone lithorelicts. Fissures are subhorizontal to 20° planar smooth. (MMG) (Grade III)			
	25C	11.00 - 11.32 11.00 - 12.50	9.00	C*88	100 0 0	NI		Extremely weak thinly bedded light greenish grey MUDSTONE. Fractures are subhorizontal to 20° and subvertical extremely closely spaced planar smooth. Recovered non intact. (MMG) (Grade II)	11.30	-6.20	
	26C	12.50 - 14.00	9.00		97 23 0			Extremely weak locally weak thinly bedded reddish brown MUDSTONE. Fractures are subhorizontal to 20° and subvertical extremely closely spaced planar smooth. Recovered non intact. (MMG) (Grade III) 13.00 - 13.10m: Tending to stiff reddish brown clay.	12.50	-7.40	
	27C	14.00 - 15.50	9.00		99 27 0			13.70 - 13.80m: Tending to stiff reddish brown clay.			
	28C	15.50 - 17.00	9.00		95 30 10						
						NI 60 150		Weak thinly laminated to very thinly bedded dark reddish brown MUDSTONE. Fractures are subhorizontal to 20° extremely closely and closely spaced planar smooth. (MMG) (Grade II)	16.55	-11.45	
	29C	17.00 - 18.50	9.00		92 79 17				17.60	-12.50	
						250		Weak thinly bedded light greenish grey MUDSTONE. Fractures are subhorizontal to 20° and subvertical	18.00	-12.90	
								Continued Next Page	{18.00}		
water strike (m) casing (m) rose to (m) time to rise (m) remarks											
								AGS	CONTRACT 30238	CHECKED EC	



BH529

Sheet 3 of 3

Scale 1 : 50

Depth 18.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru -ment	description	depth (m)	reduced level (m)	legend
25/03/15 1545hrs 1.30m						NI		medium spaced locally non intact planar smooth. (MMG) (Grade II) 17.80 - 18.00m: Tending to light greenish grey clay.	18.50	-13.40	
								Weak thinly laminated to very thinly bedded light greenish grey MUDSTONE. Fractures are subhorizontal to 20° extremely closely and very closely spaced planar smooth. (MMG) (Grade I/II) Borehole completed at 18.50m.			
									{28.00}		

water strike (m)

casing (m)

rose to (m)

time to rise (m)

remarks

AGS

CONTRACT

30238

CHECKED

EC



BH530

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 1 of 3

Start Date	18 March 2015	Easting	339811.7

Scale 1 : 50

End Date	20 March 2015	Northing	185831.4	Ground level	6.25mOD

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
18/03/15 0800hrs	1B	0.20 - 0.50							Soft dark grey CLAY with frequent rootlets (up to 1mm). (MG)	0.50	5.75	
	2D*	0.20 - 0.50		Vo 0.3								
	3B	0.50 - 0.80		H 43					Soft dark grey mottled light bluish grey slightly sandy silty CLAY with rare fibrous roots (up to 3mm diam) and rootlets (up to 1mm diam). (TFD)			
	4D*	0.50 - 0.80		Vo 3.9								
	5B	0.80 - 1.00										
	6D*	0.80 - 1.00		Vo 6.2								
	6UT	1.00 - 1.45	Nil									
	7D	1.45 - 1.50										
	8D	1.50 - 1.95	Nil	S 5					2.00 - 2.50m: Firm.			
	9X	1.50 - 2.00										
	10D*	1.50 - 1.60										
	11UT	2.00 - 2.45	Nil									
	12D	2.45 - 2.50										
	13D	2.50 - 2.95	Nil	S 6					3.00 - 4.10m: Very soft.			
	14X	2.50 - 3.00										
	15D*	2.50 - 2.60										
	16UT	3.00 - 3.45	Nil									
	17D	3.50 - 3.95	Nil	S 1					Very soft dark grey mottled light grey CLAY. (TFD)	4.10	2.15	
	18X	3.50 - 4.00										
	19D*	3.50 - 3.60										
UT	4.00 - 4.45	Nil						Soft black clayey fibrous PEAT with fine fibrous organic fragments (up to 5mm). (PEAT)	4.90	1.35		
20X	4.00 - 4.50											
21D	4.50 - 4.95	Nil	S<1									
22X	4.50 - 5.00											
23D	5.00 - 5.45	5.00	S 4					Very soft light grey mottled yellowish grey CLAY. (TFD)	5.00	1.25		
24X	5.00 - 6.50											
								Spongy black pseudofibrous PEAT with rare rootlets (up to 1mm diam). (PEAT)	5.25	1.00		
								Very soft light grey mottled black very peaty CLAY with frequent rootlets (up to 1mm diam) and organic material (up to 3mm). (TFDP)	6.85	-0.60		
18/03/15 1700hrs 3.40m	25D	6.50 - 6.95	5.00	S 1				Light grey very clayey SAND with rare rootlets. (TFD)	7.65	-1.40		
	26X	6.50 - 8.00	6.50									
	27D	8.00 - 8.45	6.50	S 2				Continued Next Page	7.75	-1.50		
									7.95	-1.70		
									8.00			

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Dynamic sampled (128mm) 1.00-4.00m and (113mm) 4.00-10.60m. Waterflush rotary core drilled (116mm) 10.60-21.00m.

CASING: 140mm diam to 9.80m.

BACKFILL: On completion, a slotted standpipe (50mm) was installed to 21.00m, granular response zone 21.00-12.00m and bentonite seal 12.00-8.00m. A second slotted standpipe (35mm) was installed to 8.00m, granular response zone 8.00-5.00m, bentonite seal 5.00-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: Downhole magnetometry for UXO risk mitigation undertaken 0.00-10.60m. No anomalies encountered. Falling head permeability test undertaken at 8.00m- 9.50m. MMG = Mercia Mudstone Group. Weathering zone after Chandler RJ and Forster CIRIA C570; Engineering in Mercia Mudstone (2001).

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



CONTRACT

30238

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EC



BH530

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 2 of 3

Start Date	18 March 2015	Easting	339811.7

Scale 1 : 50

End Date	20 March 2015	Northing	185831.4	Ground level	6.25mOD

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	lf	instru -ment	description	depth (m)	reduced level (m)	legend
19/03/15 0800hrs 0.37m	28X	8.00 - 9.50	8.00					Soft light grey sandy CLAY with rare rootlets. (TFD)	8.75	-2.50	
								Very soft light grey mottled dark grey slightly sandy silty CLAY with rare rootlets (up to 1mm diam). (TFD)			
	29D 30X	9.50 - 9.95 9.50 - 10.60	8.00 9.50	S 23				8.45 - 8.75m: Slightly gravelly. Gravel is rounded fine to coarse sandstone.			
	31D 32C	10.60 - 10.83 10.60 - 11.95	9.50	S*158	86			Stiff light greenish grey slightly sandy silty CLAY with rare fragments of black organic material (up to 2mm). (TFD)	10.80	-4.55	
	33C	11.95 - 12.11 11.95 - 13.40	9.50	C*176	90 0 0			Stiff fissured light greenish grey slightly sandy gravelly CLAY. Gravel is subangular and subrounded fine to coarse lithorelicts of very stiff clay and extremely weak mudstone. (MMG) (Grade III)			
	34C	13.40 - 14.90	9.50		100 0 0			Extremely weak and very weak thinly laminated light reddish brown MUDSTONE recovered non intact as sandy subangular fine to coarse gravel. (MMG) (Grade II)	14.15	-7.90	
	35C	14.90 - 16.40	9.50		100			Stiff fissured light greenish grey sandy gravelly CLAY. Gravel is subangular and angular fine and medium lithorelicts of very stiff clay and extremely weak mudstone. (MMG) (Grade III)	14.40	-8.15	
	36C	16.40 - 17.90	9.50		98			Very stiff fissured reddish brown sandy gravelly CLAY. Gravel is subangular fine to coarse mudstone lithorelicts. (MMG) (Grade III)	16.40	-10.15	
19/03/15 1700hrs 2.60m								Very stiff locally stiff fissured reddish brown gravelly CLAY. Gravel is subangular and subrounded fine to coarse lithorelicts of extremely weak and very weak mudstone. Fissures are subhorizontal to 20° and subvertical very closely and closely spaced undulating smooth. (MMG) (Grade III)	17.90	-11.65	
								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

CHECKED EC



CLIENT WELSH GOVERNMENT

BH530

SITE M4 CORRIDOR AROUND NEWPORT

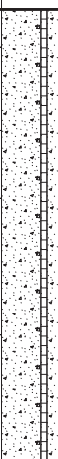
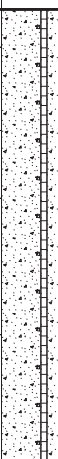
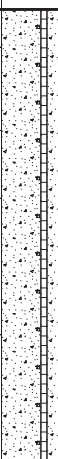
Sheet 3 of 3

Start Date	18 March 2015	Easting	339811.7

Scale 1 : 50

End Date	20 March 2015	Northing	185831.4	Ground level	6.25mOD

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	
20/03/15 0910hrs 2.20m	37C	17.90 - 19.00	9.80		100 0 0	NI		Weak thinly laminated to very thinly bedded reddish brown MUDSTONE recovered non intact. (MMG) (Grade II)	18.25	-12.00		
						NA		Very stiff fissured light bluish grey gravelly CLAY. Gravel is subangular and subrounded fine to coarse lithorelicts of extremely weak siltstone. (MMG) (Grade III)	18.80	-12.55		
						NI		Weak and medium strong thinly laminated to very thinly bedded reddish brown MUDSTONE recovered non intact. (MMG) (Grade I/II)	19.25	-13.00		
	38C	19.00 - 20.50	9.80		100 8 8	NA		Stiff and very stiff fissured reddish brown gravelly CLAY. Gravel is subangular and subrounded fine and medium mudstone lithorelicts. Fissures are subhorizontal to 20° and subvertical planar smooth. (MMG) (Grade IVa)	20.15	-13.90		
NI 50 120						19.65 - 19.80m: Very weak thinly laminated reddish brown mudstone.						
						Very weak and weak thinly laminated to very thinly bedded reddish brown MUDSTONE. Fractures are 20° very closely and closely spaced planar smooth. (MMG) (Grade I)		21.00	-14.75			
20/03/15 1230hrs 3.20m	39C	20.50 - 21.00	9.80		100 36 24			Borehole completed at 21.00m.				
									{28.00}			
water strike (m) casing (m) rose to (m) time to rise (m) remarks												
Groundwater not encountered prior to use of water flush.												
									CONTRACT 30238		CHECKED EC	

TRIAL PIT LOG



TP510

CLIENT

WELSH GOVERNMENT

SITE

M4 CORRIDOR AROUND NEWPORT

Start Date

13 February 2015

Easting

338872.1

Scale

1 : 25

End Date

13 February 2015

Northing

185638.5

Ground level

5.90mOD

Depth

4.50 m

Sheet

1 of 2

water record	sample/test			description	depth (m)	level (m)	legend
	no/type	result	depth (m)				
1.05m: Rapid ingress	1B		0.00- 0.30	Dark purplish grey sandy angular and subangular fine to coarse slag GRAVEL with rare angular and subangular slag cobbles. (MG)	0.90	5.00	
	2D*	Vo 0.8	0.00- 0.30				
	3B		0.70- 0.90				
	4D*	Vo 1.1	0.70- 0.90				
	5B	H 53	1.00- 1.20	Firm locally stiff dark bluish grey mottled light orangish brown slightly gravelly sandy CLAY with rare angular and subangular slag cobbles. Gravel is angular and subangular fine slag. (MG)	1.80	4.10	
	6D*	Vo 1.2	1.00- 1.20				
	7B		1.60- 1.80				
	8D*	Vo 1.4	1.60- 1.80				
	9B		1.80- 2.00	Soft light bluish grey slightly sandy CLAY with rare organic fragments (<1mm). (TFD)	2.50	3.40	
	10D*	Vo 0.5 H 28	1.80- 2.00 2.00				
	11B		2.50- 2.70				
	12D*	Vo 0.5	2.50- 2.70				
	13B	H 17	3.00 3.10- 3.30	Very soft dark bluish grey sandy CLAY with frequent organic fragments (up to 3mm). (TFD)			
	14D*	Vo 0.6	3.10- 3.30				
	15B		3.70- 3.90				
	16D*	Vo 0.8	3.70- 3.90				

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater encountered at 1.05m.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.90x2.60x4.50m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.



CONTRACT

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TRIAL PIT LOG



TP510

CLIENT

WELSH GOVERNMENT

SITE

M4 CORRIDOR AROUND NEWPORT

Start Date

13 February 2015

Easting

338872.1

End Date

13 February 2015

Northing

185638.5

Ground level

5.90mOD

Sheet

2 of 2

Scale

1 : 25

Depth

4.50 m

water record	sample/test			description	depth (m)	level (m)	legend
	no/type	result	depth (m)				
3.80m		H 13	4.00		4.50	1.40	
	17B		4.30- 4.50				
	18D*	Vo 1.0	4.30- 4.50				
	Trial pit completed at 4.50m.						
Notes				Sketch of Foundation - Not to scale. All dimensions in metres.			
Trial pit excavated by JCB 3CX mechanical excavator. Groundwater encountered at 1.05m. Trial pit sides remained stable and vertical. Trial pit dimensions 0.90x2.60x4.50m. On completion, the trial pit was backfilled with materials arising.				 CONTRACT 30238 CHECKED EC			
EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS							

TRIAL PIT LOG



TP511

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 1 of 2

Start Date 13 February 2015 Easting 338633.9

Scale 1 : 25

End Date 13 February 2015 Northing 185592.3 Ground level 5.85mOD

Depth 4.50 m

water record	sample/test			description	depth (m)	level (m)	legend
	no/type	result	depth (m)				
1.05m: Rapid ingress	1B		0.00- 0.40	Dark purplish grey sandy angular and subangular fine to coarse slag GRAVEL with medium subangular slag cobble content. (MG)	0.40	5.45	
	2D*	Vo 0.3	0.00- 0.40				
				Dark brownish grey sandy angular and subangular fine to coarse slag GRAVEL with medium subangular slag cobble content. (MG)			
	3B		0.70- 0.90	0.70 - 0.90m: Frequent angular to subangular coarse dark yellowish brown slag gravel.	0.90	4.95	
	4D*	Vo 0.4	0.70- 0.90				
		H 67	1.00	Firm dark bluish grey slightly sandy slightly gravelly CLAY. Gravel is angular and subangular slag. (MG)			
	5B		1.30- 1.50				
	6D*	Vo 1.9	1.30- 1.50	Firm light grey mottled dark orangish brown slightly sandy CLAY. (TFD)	1.50	4.35	
	7B		1.90- 2.10				
	8D*		1.90- 2.10				
		H 74	2.00				
	9B		2.50- 2.70		2.70	3.15	
	10D*	Vo 0.8	2.50- 2.70				
				Soft light bluish grey sandy CLAY with frequent organic fragments (up to 3mm). (TFD)			
		H 31	3.00				
	11B		3.10- 3.30				
	12D*	Vo 0.6	3.10- 3.30				
	13B		3.70- 3.90				
	14D*	Vo 1.2	3.70- 3.90				

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater encountered at 1.05m.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.80x2.50x4.50m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.



CONTRACT

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EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

TRIAL PIT LOG



TP511

CLIENT

WELSH GOVERNMENT

SITE

M4 CORRIDOR AROUND NEWPORT

Start Date

13 February 2015

Easting

338633.9

Scale

1 : 25

End Date

13 February 2015

Northing

185592.3

Ground level

5.85mOD

Depth

4.50 m

Sheet

2 of 2

water record	sample/test			description	depth (m)	level (m)	legend
	no/type	result	depth (m)				
0.90m		H 19	4.00				
	15B		4.30- 4.50				
	16D*	Vo 1.0	4.30- 4.50	Trial pit completed at 4.50m.	4.50	1.35	

Notes

Trial pit excavated by JCB 3CX mechanical excavator.
Groundwater encountered at 1.05m.
Trial pit sides remained stable and vertical.
Trial pit dimensions 0.80x2.50x4.50m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT
30238

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EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS

TRIAL PIT LOG



TP512

CLIENT

WELSH GOVERNMENT

SITE

M4 CORRIDOR AROUND NEWPORT

Start Date

3 March 2015

Easting

339250.2

Scale

1 : 25

End Date

3 March 2015

Northing

185676.9

Ground level

5.10mOD

Depth

3.00 m

Sheet

1 of 1

water record	sample/test			description	depth (m)	level (m)	legend
	no/type	result	depth (m)				
1.50m: Fast inflow.	1B	Vo 0.00	0.00- 0.10	Grass over soft dark brown silty CLAY (TOP)	0.10	5.00	
	2D*		0.00- 0.10	Firm bluish grey mottled yellowish brown silty CLAY with frequent fine rootlets (up to 1mm). (TFD)			
	3B	Vo 0.00	0.90- 1.00				
	4D*		0.90- 1.00				
	5B	Vo 0.00	2.00- 2.10				
	6D*		2.00- 2.10				
2.70m				Trial pit completed at 3.00m.	3.00	2.10	

Notes

Trial pit excavated by tracked 8 tonne mechanical excavator.

Groundwater encountered at 1.50m.

Trial pit sides collapsed at 1.5m.

Trial pit dimensions 3.10x0.60x3.00m.

On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.

CONTRACT

30238

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EC

EXPLORATORY HOLE LOGS SHOULD BE READ IN CONJUNCTION WITH KEY SHEETS



TP513

Sheet 1 of 1

Scale 1 : 25

Depth 3.60 m

Geotechnical Engineering Ltd. Tel. 01452 527743 30238 YODA.GPJ TRIALJH.GPJ GEOTECH.GLB 16/07/2015 15:53:37 TP SF/RE

Trial pit excavated by tracked 8 tonne mechanical excavator.
Groundwater encountered at 2.90.
Trial pit sides collapsed below 2.00m.
Trial pit dimensions 3.30x0.60x3.60m.
On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.



30238

EC

BOREHOLE LOG

Borehole No.

BHM4CAN044

Sheet 1 of 2

Project Name:

M4 CaN Additional GI

Co-ordinates:

Easting: 339524

Northing: 186014

Date(s): 05/01/2016 - 06/01/2016

Drilling Method:

Pipe Diameter: 50mm

Final Depth:

13.00m

Project No:

JFR8703

Location:

Newport

Client:

Costain Vinci Joint Venture

Ground Level (mAOD):

8.82

Logged By:

ERH

Scale:

1:50

Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		Depth (m)	Type	Results						
	0.10 0.15 - 0.60 0.40	D B ES		0.00		8.82		Medium dense black grey sandy, subangular to angular GRAVEL of slag with frequent cobbles and occasional boulders of slag. (MADE GROUND)	1	
	1.00 - 1.45	B			(1.80)					
	1.50 1.50 1.50 - 1.95 1.80 1.80	ES SPT(C) B D ES	N=15 (8,9/6,4,3,2)	1.80		7.02		Soft grey silty CLAY with occasional brown plant fibres and pockets of black organic matter. (TIDAL FLAT DEPOSITS)	2	
	2.60 2.60 - 3.00 3.00 3.00 - 3.45	D ES SPT(S) B	0 (0 for 450mm/0 for 0mm)		(2.90)			Becoming very soft below 3m.	3	
	4.50 4.50 - 4.95 4.80	SPT(S) B ES	N=3 (1,0/1,0,1,1)	4.70		4.12		Brown spongy pseudofibrous PEAT. (PEAT)	5	
	6.00 6.00 - 6.45	SPT(S) B	N=2 (1,0/1,0,1,0)	6.40		2.42		Very soft bluish grey silty slightly sandy CLAY with frequent pockets of black organic matter. (TIDAL FLAT DEPOSITS)	7	
	7.00 7.50 7.50 - 7.95	ES SPT(S) B	0 (0 for 450mm/0 for 0mm)		(1.80)			Brown spongy pseudofibrous PEAT. (PEAT)	8	
	8.20 8.80 8.90 9.00 9.00 - 9.45	D ES SPT(C) B	N=39 (3,6/7,10,10,12)	8.80		0.02		Dense grey slightly sandy clayey angular to rounded sandstone GRAVEL. Fine gravels are predominantly angular while coarse gravels predominately rounded. (GLACIOFLUVIAL DEPOSITS)	9	
								Continued on next sheet	10	

Remarks:

METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 13.00m. Borehole terminated within bedrock upon SPT refusal.

BACKFILL: On completion hole backfilled with bentonite 11.0 - 8.0m and 2.0 - 0.2m, gravel 13.0 - 11.0m and 8.0 - 2.0m and concrete 0.2 - 0.0m. One standpipe (35mm) was installed with slotted section between 11.5 - 13.0m and a second standpipe (50mm) was installed with slotted section between 2.0 - 8.0m.

REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.8 - 8.8m. No anomalies encountered. Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.

Groundwater

Depth Strike (m)

0.90
7.90
12.70

Depth Casing (m)

7.30
12.20

Level After 20 Mins

0.50
7.10
3.90

Chiselling

Duration (hh:mm)

01:00

Top Depth (m)

12.70

Base Depth (m)

13.00

RPS

BOREHOLE LOG

Borehole No.
BHM4CAN044

Sheet 2 of 2

Project Name: M4 CaN Additional GI

Co-ordinates:

Date(s): 05/01/2016 - 06/01/2016

Final Depth:

Project No: JFR8703

Easting: 339524

Drilling Method:

Pipe Diameter: 50mm

13.00m

Location: Newport

Northing: 186014

Dando 2000

Casing Diameter (mm)
150
200

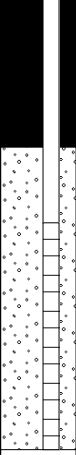
Casing Depth (m)
12.20
1.80

Scale:
1:50

Client: Costain Vinci Joint Venture

Ground Level (mAOD): 8.82

Logged By: ERH

Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		Depth (m)	Type	Results						
		10.50	SPT(C)	N=45 (5,8/8,11,11,15)						
		10.50 - 10.95	B							
		11.10	D		11.10		-2.28		Stiff reddish grey CLAY. (WEATHERED MERCIA MUDSTONE) Occasional subangular to rounded fine gravel in the top 0.1m of the stratum.	11
		12.00	SPT(S)	50 (7,10/50 for 180mm)		(1.10)				
		12.00 - 12.45	B		12.20		-3.38		Stiff red laminated CLAY recovered as angular gravels. (Weathering Grade V) (MERCIA MUDSTONE)	12
		12.70 - 13.00	B		(0.80)					
		13.00	SPT(C)	50 (25 for 85mm/50 for 70mm)					End of Borehole at 13.00m	13
										14
										15
										16
										17
										18
										19
										20

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Cable percussion 1.20m - 13.00m. Borehole terminated within bedrock upon SPT refusal.
BACKFILL: On completion hole backfilled with bentonite 11.0 - 8.0m and 2.0 - 0.2m, gravel 13.0 - 11.0m and 8.0 - 2.0m and concrete 0.2 - 0.0m. One standpipe (35mm) was installed with slotted section between 11.5 - 13.0m and a second standpipe (50mm) was installed with slotted section between 2.0 - 8.0m.
REMARKS: Bentonite seal for aquifer protection installed during drilling (2.0 - 1.0m) prior to reduction in casing diameter. Downhole magnetometry for UXO risk mitigation undertaken 1.8 - 8.8m. No anomalies encountered. Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.

Groundwater

Chiselling

Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
0.90		0.50			
7.90	7.30	7.10	01:00	12.70	13.00
12.70	12.20	3.90			

AGS

		WINDOW SAMPLE LOG						Borehole No. WSM4CAN025		
Project Name: M4 CaN Additional GI		Co-ordinates:		Date(s): 26/02/2016				Sheet 1 of 1		
Project No: JFR8703		Easting: 338534		Drilling Method:				Final Depth: 0.35m		
Location: Newport		Northing: 185627		Dando Terrier		Casing Diameter (mm) Casing Depth (m)		Scale: 1:25		
Client: Costain Vinci Joint Venture		Ground Level (mAOD): 5.62		Logged By: JA						
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		Depth (m)	Type	Results						
		0.20 0.20	B ES		0.00	(0.35)	5.62		Very dense greyish brown sandy, angular to sub-rounded GRAVEL of slag. (MADE GROUND)	
									End of Borehole at 0.35m	
										1
										2
										3
										4
										5
Remarks: Unable to progress hand dug pit after 0.35m due to very dense fill materials. 300 blows with window sampler refused. No groundwater encountered. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.										
Groundwater						Chiselling				
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)					
										

Project Name:	M4 CaN Additional GI	Co-ordinates:	Date(s): 25/02/2016			Final Depth:
Project No:	JFR8703	Easting:	338675	Drilling Method:	Pipe Diameter: 35mm	6.00m
Location:	Newport	Northing:	185593	Dando Terrier	Casing Diameter (mm) 100	Casing Depth (m) 5.00
Client:	Costain Vinci Joint Venture	Ground Level (mAOD):	5.69	Logged By:	JA	Scale: 1:25

Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		Depth (m)	Type	Results						
		0.50 0.50	B ES		0.00	(0.90)	5.69	[Pattern]	Greyish brown sandy angular to sub-rounded GRAVEL of slag. (MADE GROUND)	1
		1.10 1.20 - 2.00	ES Core	100% Recovery	0.90	(1.10)	4.79	[Pattern]	Firm to soft greyish brown silty CLAY. (TIDAL FLAT DEPOSITS)	
		2.00 - 3.00	Core	100% Recovery	2.00		3.69	[Pattern]	Very soft blueish grey silty CLAY with occasional decaying organic material. (TIDAL FLAT DEPOSITS)	2
		3.00 - 4.00	Core	100% Recovery						3
		4.00 - 5.00	Core	100% Recovery						4
		5.00 - 6.00	Core	80% Recovery						5
		Continued on next sheet								

Remarks:

METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving final depth.

BACKFILL: On completion hole backfilled with gravel 6.0 - 4.0m, bentonite 4.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 4.0 - 6.0m.

REMARKS: Installed with raised cover. Position not accessible at time of survey due to nesting cranes: co-ordinates are approximate.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
3.50					



Project Name: M4 CaN Additional GI		Co-ordinates:		Date(s): 26/02/2016			Final Depth: 6.00m
Project No: JFR8703		Easting: 338845		Drilling Method:	Pipe Diameter: 35mm		
Location: Newport		Northing: 185664		Dando Terrier	Casing Diameter (mm) 200	Casing Depth (m) 5.00	Scale: 1:25
Client: Costain Vinci Joint Venture		Ground Level (mAOD): 5.88		Logged By: JA			

Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		Depth (m)	Type	Results						

Remarks:
METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 1.3m. Terminated upon achieving proposed final depth.
BACKFILL: On completion hole backfilled with gravel 6.0 - 4.0m, bentonite 4.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 4.0 - 6.0m.
REMARKS: Installed with raised cover. Position not accessible at time of survey due to nesting cranes: co-ordinates are approximate.

Groundwater			Chiselling		
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)
3.50					



RPS		WINDOW SAMPLE LOG						Borehole No. WSM4CAN029					
								Sheet 2 of 2					
Project Name: M4 CaN Additional GI		Co-ordinates:		Date(s): 26/02/2016				Final Depth:					
Project No: JFR8703		Easting: 338845		Drilling Method:		Pipe Diameter: 35mm		6.00m					
Location: Newport		Northing: 185664		Dando Terrier		Casing Diameter (mm) 200	Casing Depth (m) 5.00	Scale:					
Client: Costain Vinci Joint Venture		Ground Level (mAOD): 5.88		Logged By: JA				1:25					
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale			
		Depth (m)	Type	Results									
					5.60	(0.40)	0.28		Plastic brown amorphous PEAT. (TIDAL FLAT DEPOSITS)				
									End of Borehole at 6.00m	6			
										7			
										8			
										9			
										10			
Remarks: METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 1.3m. Terminated upon achieving proposed final depth. BACKFILL: On completion hole backfilled with gravel 6.0 - 4.0m, bentonite 4.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 4.0 - 6.0m. REMARKS: Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.													
			Groundwater			Chiselling			AGS				
Depth Strike (m)		Depth Casing (m)		Level After 20 Mins		Duration (hh:mm)		Top Depth (m)			Base Depth (m)		
3.50													

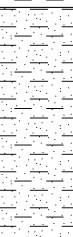
RPS		WINDOW SAMPLE LOG					Borehole No. WSM4CAN030		
Project Name: M4 CaN Additional GI		Co-ordinates:		Date(s): 26/02/2016			Sheet 1 of 2		
Project No: JFR8703		Easting: 339047		Drilling Method:		Pipe Diameter: 35mm		Final Depth: 6.00m	
Location: Newport		Northing: 185656		Dando Terrier		Casing Diameter (mm) 100	Casing Depth (m) 3.00	Scale: 1:25	
Client: Costain Vinci Joint Venture		Ground Level (mAOD): 5.69		Logged By: JA					
Well	Water Strike(s)	Samples & In Situ Testing		Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		Depth (m)	Type	Results					
					0.00		5.69	Grass over dark brown CLAY. (TOPSOIL)	
					0.40	(0.40)	5.29	Firm to soft greyish brown silty CLAY. (TIDAL FLAT DEPOSITS)	
		0.50 0.50	B ES			(1.10)			1
		1.20 - 2.00	Core	100% Recovery	1.50	4.19	Very soft, blueish grey silty CLAY with occasional decaying organic material. (TIDAL FLAT DEPOSITS)		
		2.00 - 3.00	Core	100% Recovery					2
		3.00 - 4.00	Core	100% Recovery					3
					(3.40)				
		4.00 - 5.00	Core	100% Recovery					4
		5.00 - 6.00	Core	100% Recovery	4.90	0.79		Plastic dark brown amorphous PEAT.	5
Continued on next sheet									
Remarks: METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving proposed final depth. BACKFILL: On completion hole backfilled with gravel 6.0 - 1.0m, bentonite 1.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 1.0 - 6.0m. REMARKS: Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.									
Groundwater						Chiselling			
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)				
3.20									
						AGS			

RPS		WINDOW SAMPLE LOG						Borehole No. WSM4CAN030		
								Sheet 2 of 2		
Project Name: M4 CaN Additional GI		Co-ordinates:		Date(s): 26/02/2016				Final Depth:		
Project No: JFR8703		Easting: 339047		Drilling Method:		Pipe Diameter: 35mm		6.00m		
Location: Newport		Northing: 185656		Dando Terrier		Casing Diameter (mm) 100	Casing Depth (m) 3.00	Scale:		
Client: Costain Vinci Joint Venture		Ground Level (mAOD): 5.69		Logged By: JA				1:25		
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		Depth (m)	Type	Results		(1.10)			(PEAT)	
									End of Borehole at 6.00m	6
										7
										8
										9
										10
Remarks: METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving proposed final depth. BACKFILL: On completion hole backfilled with gravel 6.0 - 1.0m, bentonite 1.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 1.0 - 6.0m. REMARKS: Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.										
Groundwater						Chiselling			AGS	
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)					
3.20										

RPS		WINDOW SAMPLE LOG						Borehole No. WSM4CAN031		
Project Name: M4 CaN Additional GI		Co-ordinates:		Date(s): 29/02/2016				Sheet 1 of 2		
Project No: JFR8703		Easting: 339366		Drilling Method:		Pipe Diameter: 35mm		Final Depth: 6.00m		
Location: Newport		Northing: 185701		Dando Terrier		Casing Diameter (mm) 100	Casing Depth (m) 5.00	Scale: 1:25		
Client: Costain Vinci Joint Venture		Ground Level (mAOD): 5.29		Logged By: JA						
Well	Water Strike(s)	Samples & In Situ Testing		Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale	
		Depth (m)	Type	Results						
		0.00			0.00	(0.25)	5.29		Dark brown CLAY with frequent rootlets. (TOPSOIL)	
		0.25			0.25		5.04		Firm to soft becoming very soft, grey mottled brown silty CLAY. (TIDAL FLAT DEPOSITS)	
		0.50	B							
		0.50	ES							
		1.20 - 2.00	Core	100% Recovery	(1.55)				1	
		2.00 - 3.00	Core	100% Recovery	1.80	3.49		Very soft, blueish grey silty CLAY with occasional decaying organic material. (TIDAL FLAT DEPOSITS)	2	
		3.00 - 4.00	Core	100% Recovery					3	
		4.00 - 5.00	Core	100% Recovery	(3.80)				4	
		5.00 - 6.00	Core	100% Recovery					5	
Continued on next sheet										
Remarks: METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving proposed final depth. BACKFILL: On completion hole backfilled with gravel 6.0 - 1.0m, bentonite 1.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 1.0 - 6.0m. REMARKS: No groundwater strike identified. Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.										
Groundwater						Chiselling				
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)					
AGS										

RPS		WINDOW SAMPLE LOG						Borehole No. WSM4CAN031					
								Sheet 2 of 2					
Project Name: M4 CaN Additional GI		Co-ordinates:		Date(s): 29/02/2016				Final Depth:					
Project No: JFR8703		Easting: 339366		Drilling Method:		Pipe Diameter: 35mm		6.00m					
Location: Newport		Northing: 185701		Dando Terrier		Casing Diameter (mm) 100	Casing Depth (m) 5.00	Scale:					
Client: Costain Vinci Joint Venture		Ground Level (mAOD): 5.29		Logged By: JA				1:25					
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale			
		Depth (m)	Type	Results									
					5.60	(0.40)	-0.31		Plastic brown amorphous PEAT. (TIDAL FLAT DEPOSITS)				
									End of Borehole at 6.00m	6			
										7			
										8			
										9			
										10			
Remarks: METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 6.0m. Terminated upon achieving proposed final depth. BACKFILL: On completion hole backfilled with gravel 6.0 - 1.0m, bentonite 1.0 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 1.0 - 6.0m. REMARKS: No groundwater strike identified. Installed with raised cover. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.													
			Groundwater			Chiselling			AGS				
Depth Strike (m)		Depth Casing (m)		Level After 20 Mins		Duration (hh:mm)		Top Depth (m)			Base Depth (m)		

RPS		TRIAL PIT LOG						Pit No. TPM4CAN019		
Project Name: M4 CaN Additional GI		Co-ordinates:		Date(s): 01/03/2016				Sheet 1 of 1		
Project No: JFR8703		Easting: 339163		Equipment:		Pit Length: 2.50 m		Final Depth: 3.50m		
Location: Newport		Northing: 185672		8 Tonne Excavator				Scale:		
Client: Costain Vinci Joint Venture		Ground Level (mAOD): 5.81		Logged By: ERH		Pit Width: 0.65 m		1:25		
Backfill	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		Depth (m)	Type	Results						
		0.00	B D ES IVN1	3.2, 2.1, 1.6kPa	0.00	(1.68)	5.81		Grass over soft dark grey CLAY with rootlets. (TOPSOIL)	1
		0.02			5.79		Firm light grey mottled orange slightly sandy CLAY with frequent plant fibres. (TIDAL FLAT DEPOSITS)			
		0.40								
		0.40								
		0.50								
		1.00	IVN2	0.8, 1.2, 0.6kPa						2
		1.70	B D ES IVN3	0.2, 0.4, 0.2kPa	1.90	(1.80)	4.11		Soft blueish grey silty CLAY with frequent plant fibres. (TIDAL FLAT DEPOSITS)	3
		0.02								
		1.90								
		1.90								
2.00										
3.50	IVN4	0.2, 0.1, 0.2kPa						4		
									5	
End of Pit at 3.50m										
Remarks: Terminated due to collapse. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.										
Groundwater: 1.7m Groundwater ingres										
Stability: Collapse from 3.5m										
AGS										

RPS		TRIAL PIT LOG						Pit No. TPM4CAN020		
Project Name: M4 CaN Additional GI		Co-ordinates:		Date(s): 01/03/2016				Sheet 1 of 1		
Project No: JFR8703		Easting: 339655		Equipment:		Pit Length: 2.50 m		Final Depth: 4.00m		
Location: Newport		Northing: 185753		8 Tonne Excavator				Scale: 1:25		
Client: Costain Vinci Joint Venture		Ground Level (mAOD): 4.91		Logged By: ERH		Pit Width: 0.65 m				
Backfill	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		Depth (m)	Type	Results						
		0.10	ES		0.00	(0.20)	4.91		Dark brown soft CLAY with roots. (TOPSOIL)	
					0.20		4.71		Soft to firm light grey mottled slightly sandy CLAY with frequent plant fibres and occasional pockets of black organic matter. (TIDAL FLAT DEPOSITS)	
	0.70	B								
	0.70	D								
	1.00	ES			(1.90)					
	1.50	IVN1	1.2, 1.4, 1.2kPa							
	2.10				2.81			Soft to very soft blueish grey silty CLAY with frequent plant fibres. (TIDAL FLAT DEPOSITS)		
	2.50	B								
	2.50	D								
	2.50	ES								
2.50	IVN2	0.4, 0.8, 0.4kPa		(1.70)						
3.50	IVN3	0.2, 0.2, 0.2kPa		3.80	(0.20)	1.11		Dark brown/black spongy pseudo fibrous PEAT. (PEAT)		
3.90	B									
3.90	D									
3.90	ES							End of Pit at 4.00m		
Remarks: Terminated due to collapse. Position not accessible at time of survey due to nesting cranes; co-ordinates are approximate.										
Groundwater: 2.1m steady ingress										
Stability: Stable										
AGS										



Appendix 2

Gas and Groundwater Monitoring Results

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						

[illegible]

Project Name New M4 Preliminary Ground Investigation						Groundwater Readings For Installations			Fig no. 03			
Project No. F15056												
Engineer Ove Arup & Partners Ltd												
Client Transport Wales, Welsh Assembly Government												
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						

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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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH527	20/03/15 10:00:00	10332	3								1.3	7		37 litres purged, base depth 9.00m.
BH527	20/03/15 10:01:00										0.9			
BH527	20/03/15 10:02:00										1.3			
BH527	20/03/15 10:03:00										0.9			
BH527	20/03/15 10:04:00										0.4			
BH527	20/03/15 10:05:00			0.0	0.0	19.8	0.0	0	0	0.5				
BH527	20/03/15 10:06:00			0.0	0.0	19.8	0.0	0	0	0.4				
BH527	20/03/15 10:07:00			0.0	0.0	19.8	0.0	0	0	0.3				
BH527	20/03/15 10:08:00			0.0	0.0	19.8	0.0	0	0	0.3				
BH527	20/03/15 10:09:00			0.0	0.0	19.7	0.0	0	0	0.8				
BH527	20/03/15 10:14:00												0.67	Upsurge at 5min 10sec. Unable to obtain further readings.
BH527	27/03/15 08:30:00	1023	1								0.1	9		32 litres purged, base depth 9.00m.
BH527	27/03/15 08:31:00										0.6			
BH527	27/03/15 08:32:00										0.4			
BH527	27/03/15 08:33:00										0.3			
BH527	27/03/15 08:34:00										0.2			
BH527	27/03/15 08:35:00			0.0	0.0	19.9	0.0	0	0	0.9				
BH527	27/03/15 08:36:00			0.0	0.0	19.9	0.0	0	0	0.6				
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

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks		
BH527	27/03/15 08:37:00	1037	-1.05	0.0	0.0	19.9	0.0	0	0	0.5		12	1.75	33 litres purged, base depth 9.00m.		
BH527	27/03/15 08:38:00			0.0	0.0	19.9	0.0	0	0	0.4						
BH527	27/03/15 08:39:00			0.0	0.0	19.9	0.0	0	0	0.3						
BH527	27/03/15 08:40:00			0.0	0.0	19.9	0.0	0	0	0.2						
BH527	27/03/15 08:41:00			0.0	0.0	19.9	0.0	0	0	0.1						
BH527	27/03/15 08:42:00			0.0	0.0	19.9	0.0	0	0	0.1						
BH527	27/03/15 08:43:00			0.0	0.0	19.9	0.0	0	0	0.1						
BH527	27/03/15 08:44:00			0.0	0.0	19.9	0.0	0	0	0.1						
BH527	13/04/15 09:30:00			0.0	3.4	19.6	61.0	0	0	2.5	0.0					
BH527	13/04/15 09:31:00			0.0	2.5	19.9	45.0	0	0	3.0	0.0					
BH527	13/04/15 09:32:00			0.0	1.8	20.1	35.0	0	0	3.1	0.0					
BH527	13/04/15 09:33:00			0.0	1.6	20.2	31.0	0	0	3.1	0.0					
BH527	13/04/15 09:34:00			0.0	1.4	20.2	26.0	0	0	3.2	0.0					
BH527	13/04/15 09:35:00															
BH527	13/04/15 09:36:00															
BH527	13/04/15 09:37:00															
BH527	13/04/15 09:38:00															
BH527	13/04/15 09:39:00															
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.																
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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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks		
BH527	13/04/15 09:40:00	1001	0	0.0	1.2	20.3	23.0	0	0	3.1	0.0	15	1.48			
BH527	13/04/15 09:41:00			0.0	1.0	20.3	20.0	0	0	3.0						
BH527	13/04/15 09:42:00			0.0	0.9	20.3	18.0	0	0	3.0						
BH527	13/04/15 09:43:00			0.0	0.8	20.4	16.0	0	0	2.9						
BH527	13/04/15 09:44:00			0.0	0.8	20.3	16.0	0	0	2.9						
BH527	08/05/15 09:32:00															
BH527	08/05/15 09:33:00															
BH527	08/05/15 09:34:00															
BH527	08/05/15 09:35:00															
BH527	08/05/15 09:36:00															
BH527	08/05/15 09:37:00					0.0	0.0	20.1	0.0	0					0	0.0
BH527	08/05/15 09:38:00					0.0	0.0	20.1	0.0	0					0	0.0
BH527	08/05/15 09:39:00					0.0	0.0	20.1	0.0	0					0	0.0
BH527	08/05/15 09:40:00					0.0	0.0	20.1	0.0	0					0	0.0
BH527	08/05/15 09:41:00					0.0	0.0	20.1	0.0	0					0	0.0
BH527	08/05/15 09:42:00					0.0	0.0	20.1	0.0	0					0	0.0
BH527	08/05/15 09:43:00					0.0	0.0	20.1	0.0	0					0	0.0
BH527	08/05/15 09:44:00					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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH527	08/05/15 09:45:00			0.0	0.0	20.1	0.0	0	0	0.0					
BH527	08/05/15 09:46:00			0.0	0.0	20.1	0.0	0	0	0.0					
BH527	08/05/15 09:47:00												2.74		
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



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SITE: M4 CORRIDOR AROUND NEWPORT

Borehole /trial pit no.	date and time	barometric pressure (mb)	pressure differentiation (mm H ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH527	20/03/15 10:14:00												1.89	102 litres purged, base depth 19.00m. 102 litres purged, base depth 19.00m. 102 litres purged, base depth 19.00m.	
BH527	27/03/15 08:44:00												1.71		
BH527	13/04/15 09:44:00												1.91		
BH527	08/05/15 09:48:00												3.10		
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

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH528	20/03/15 12:00:00	1031	1								0.4	10		13 litres purged, base depth 7.00m. Slow recharge during purging.
BH528	20/03/15 12:01:00										0.0			
BH528	20/03/15 12:02:00										0.0			
BH528	20/03/15 12:03:00										0.0			
BH528	20/03/15 12:04:00										0.0			
BH528	20/03/15 12:05:00			0.0	0.0	20.3	0.0	0	0	0.4				
BH528	20/03/15 12:06:00			0.0	0.0	20.1	0.0	0	0	0.3				
BH528	20/03/15 12:07:00			0.0	0.0	20.1	0.0	0	0	0.2				
BH528	20/03/15 12:08:00			0.0	0.0	20.1	0.0	0	0	0.1				
BH528	20/03/15 12:09:00			0.0	0.0	20.1	0.0	0	0	0.1				
BH528	20/03/15 12:10:00			0.0	0.0	20.1	0.0	0	0	0.1				
BH528	20/03/15 12:11:00			0.0	0.0	20.1	0.0	0	0	0.1				
BH528	20/03/15 12:12:00			0.0	0.0	20.1	0.0	0	0	0.1				
BH528	20/03/15 12:13:00			0.0	0.0	20.1	0.0	0	0	0.1				
BH528	20/03/15 12:14:00			0.0	0.0	20.1	0.0	0	0	0.1			0.49	
BH528	27/03/15 10:30:00	1028	-1.18								0.0	9		10 litres purged, base depth 7.00m. Purging dry, with slow recharge.
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

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH528	27/03/15 10:31:00										0.0			
BH528	27/03/15 10:32:00										0.0			
BH528	27/03/15 10:33:00										0.0			
BH528	27/03/15 10:34:00										0.0			
BH528	27/03/15 10:35:00			0.0	0.0	20.9	0.0	0	0	0.0				
BH528	27/03/15 10:36:00			0.0	0.0	20.8	0.0	0	0	0.0				
BH528	27/03/15 10:37:00			0.0	0.0	20.8	0.0	0	0	0.0				
BH528	27/03/15 10:38:00			0.0	0.0	20.8	0.0	0	0	0.0				
BH528	27/03/15 10:39:00			0.0	0.0	20.8	0.0	0	0	0.0				
BH528	27/03/15 10:40:00			0.0	0.0	20.8	0.0	0	0	0.0				
BH528	27/03/15 10:41:00			0.0	0.0	20.7	0.0	0	0	0.0				
BH528	27/03/15 10:42:00			0.0	0.0	20.7	0.0	0	0	0.0				
BH528	27/03/15 10:43:00			0.0	0.0	20.7	0.0	0	0	0.0				
BH528	27/03/15 10:44:00			0.0	0.0	20.6	0.0	0	0	0.0			0.99	
BH528	13/04/15 12:00:00	1032	0.54								0.0	13		12 litres purged, base depth 7.00m. Purging dry with slow recharge.
BH528	13/04/15 12:01:00										0.0			
BH528	13/04/15 12:02:00										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 30238	CHECKED EC

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH528	13/04/15 12:03:00	1019	0								0.0	15	0.58	Upsurge at 2min 45sec. Unable to obtain further readings. Purging dry, with slow recharge.
BH528	13/04/15 12:04:00										0.0			
BH528	13/04/15 12:05:00			8.1	31.0	11.8	#	0	4	0.0				
BH528	13/04/15 12:06:00			7.8	30.0	12.1	#	0	5	0.0				
BH528	13/04/15 12:14:00													
BH528	08/05/15 10:36:00										0.0			
BH528	08/05/15 10:37:00										0.0			
BH528	08/05/15 10:38:00										0.0			
BH528	08/05/15 10:39:00										0.0			
BH528	08/05/15 10:40:00										0.0			
BH528	08/05/15 10:41:00				0.0	0.0	20.3	0.0	0	0	0.0			
BH528	08/05/15 10:42:00				0.0	0.0	20.3	0.0	0	0	0.0			
BH528	08/05/15 10:43:00				0.0	0.0	20.2	0.0	0	0	0.0			
BH528	08/05/15 10:44:00				0.0	0.0	20.2	0.0	0	0	0.0			
BH528	08/05/15 10:45:00				1.3	0.0	19.9	0.0	0	0	0.0			
BH528	08/05/15 10:46:00				0.5	0.2	20.0	0.0	0	0	0.0			
BH528	08/05/15 10:47:00				0.0	0.0	20.2	0.0	0	0	0.0			
BH528	08/05/15 10:48:00				0.0	0.0	20.2	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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH528	08/05/15 10:49:00			0.0	0.0	20.2	0.0	0	0	0.0					
BH528	08/05/15 10:50:00			0.0	0.0	20.2	0.0	0	0	0.0					
BH528	08/05/15 10:51:00												1.63		
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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH528	20/03/15 12:14:00												1.28	94 litres purged, base depth 17.00m. 92 litres purged, base depth 17.00m. 92 litres purged, base depth 17.00m.	
BH528	27/03/15 10:44:00												1.30		
BH528	13/04/15 12:14:00												1.65		
BH528	08/05/15 10:52:00												2.90		
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

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH530	30/03/15 12:00:00	1014	0								0.0	10		29 litres purged, base depth 8.00m.	
BH530	30/03/15 12:01:00										0.0				
BH530	30/03/15 12:02:00										0.0				
BH530	30/03/15 12:03:00										0.0				
BH530	30/03/15 12:04:00										0.0				
BH530	30/03/15 12:05:00			0.0	0.0	20.3	0.0	0	0	0.5					
BH530	30/03/15 12:06:00			0.0	0.0	20.3	0.0	0	0	0.4					
BH530	30/03/15 12:07:00			0.0	0.0	20.3	0.0	0	0	0.2					
BH530	30/03/15 12:08:00			0.0	0.0	20.3	0.0	0	0	0.2					
BH530	30/03/15 12:09:00			0.0	0.0	20.3	0.0	0	0	0.1					
BH530	30/03/15 12:10:00			0.0	0.0	20.3	0.0	0	0	0.1					
BH530	30/03/15 12:11:00			0.0	0.0	20.3	0.0	0	0	0.1					
BH530	30/03/15 12:12:00			0.0	0.0	20.3	0.0	0	0	0.0					
BH530	30/03/15 12:13:00			0.0	0.0	20.3	0.0	0	0	0.0					
BH530	30/03/15 12:14:00			0.0	0.0	20.3	0.0	0	0	0.0					
												1.52			
BH530	14/04/15 13:30:00	1027	-0.07								0.0	16		26 litres purged, base depth 8.00m.	
BH530	14/04/15 13:31:00										0.0				
BH530	14/04/15 13:32:00										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

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH530	14/04/15 13:33:00										0.0			
BH530	14/04/15 13:34:00										0.0			
BH530	14/04/15 13:35:00			5.3	14.8	15.0	#	0	10	0.0				
BH530	14/04/15 13:36:00			5.3	14.7	15.1	#	0	9	0.0				
BH530	14/04/15 13:37:00			5.1	14.4	15.2	#	0	9	0.0				
BH530	14/04/15 13:38:00			5.1	14.1	15.2	#	0	8	0.0				
BH530	14/04/15 13:39:00			5.0	13.9	15.3	#	0	8	0.0				
BH530	14/04/15 13:40:00			4.9	13.6	15.4	#	0	7	0.0				
BH530	14/04/15 13:41:00			4.8	13.3	15.6	#	0	6	0.0				
BH530	14/04/15 13:42:00			4.8	13.4	15.5	#	0	4	0.0				
BH530	14/04/15 13:43:00			4.8	13.2	15.5	#	0	6	0.0				
BH530	14/04/15 13:44:00			4.7	13.0	15.4	#	0	4	0.0			2.07	
BH530	21/04/15 09:30:00	1040	-0.82								0.0	12		27 litres purged, base depth 8.00m.
BH530	21/04/15 09:31:00										0.0			
BH530	21/04/15 09:32:00										0.0			
BH530	21/04/15 09:33:00										0.0			
BH530	21/04/15 09:34:00										0.0			
BH530	21/04/15 09:35:00			3.7	8.4	17.7	#	0	1	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. Shallow install.													CONTRACT 30238	CHECKED EC

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH530	21/04/15 09:36:00	1019	0	2.6	5.2	18.7	97.0	0	1	0.5		15	1.84	
BH530	21/04/15 09:37:00			2.0	3.7	19.2	69.0	0	1	0.7				
BH530	21/04/15 09:38:00			1.6	3.0	19.4	55.0	0	0	1.1				
BH530	21/04/15 09:39:00			1.3	2.2	19.7	42.0	0	0	1.1				
BH530	21/04/15 09:40:00			1.2	1.9	19.7	37.0	0	0	1.1				
BH530	21/04/15 09:41:00			1.0	1.6	19.9	30.0	0	0	1.1				
BH530	21/04/15 09:42:00			0.8	1.4	19.9	27.0	0	0	1.1				
BH530	21/04/15 09:43:00			0.7	1.2	20.0	24.0	0	0	1.0				
BH530	21/04/15 09:44:00			0.7	1.1	20.0	22.0	0	0	1.0				
BH530	11/05/15 09:21:00										0.0			
BH530	11/05/15 09:22:00										0.0			
BH530	11/05/15 09:23:00										0.0			
BH530	11/05/15 09:24:00										0.0			
BH530	11/05/15 09:25:00										0.0			
BH530	11/05/15 09:26:00			0.0	0.0	20.2	0.0	0	0	0.0				
BH530	11/05/15 09:27:00			0.1	0.0	20.1	1.3	0	0	0.0				
BH530	11/05/15 09:28:00			0.4	0.2	20.0	7.0	0	0	0.0				
BH530	11/05/15 09:29:00			0.6	0.4	19.9	10.3	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

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH530	11/05/15 09:30:00			0.8	0.5	19.9	12.9	0	0	0.0				
BH530	11/05/15 09:31:00			0.9	0.6	19.8	15.0	0	0	0.0				
BH530	11/05/15 09:32:00			0.9	0.6	19.8	15.4	0	0	0.0				
BH530	11/05/15 09:33:00			1.2	0.7	19.7	18.9	0	0	0.0				
BH530	11/05/15 09:34:00			0.5	0.6	19.9	11.2	0	0	0.0				
BH530	11/05/15 09:35:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH530	11/05/15 09:36:00												2.62	
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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH530	30/03/15 12:14:00												2.00	114 litres purged, base depth 21.00m. 112 litres purged, base depth 21.00m. 111 litres purged, base depth 21.00m.	
BH530	14/04/15 13:44:00												2.19		
BH530	21/04/15 09:44:00												2.44		
BH530	11/05/15 09:37:00												3.49		
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

M4CAN
Gas Monitoring
CL-Z7

Loc. Ref.	Install Ref. ¹	Reading Ref. ²	Location Notes	Gas Monitoring																Additional Notes / Comments	
				Date	Time	Min	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak LEL	Flow Rate (l/hr)	Differential Pressure (pa)	Air Pressure (mb)		Air Temperature (°C)
						Oxygen (O ₂) %		Carbon Dioxide (CO ₂) %		Carbon Monoxide (CO) ppm		Hydrogen Sulphide (H ₂ S) ppm		Methane (CH ₄) %							
BHM4CAN044	1	1	Shallow	06/05/16		18.30	18.30	0.40	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.27	1010.00		
BHM4CAN044	2	1	Deep	06/05/16		3.00	4.10	0.60	0.60	1.00	0.00	0.00	0.00	75.40	67.60	>>	7.50	-0.27	1010.00		
BHM4CAN044	1	2	Shallow	19/05/16	11:00 AM	20.50	20.50	0.10	0.10	0.00	0.00	0.00	0.00	0.50	0.40	0.00					
BHM4CAN044	2	2	Deep	19/05/16	11:15 AM	20.40	20.50	0.10	0.10	0.00	0.00	0.00	0.00	0.40	0.40	0.00					
BHM4CAN044	1	3	Shallow	02/06/16	08:30 AM	20.60	20.60	0.10	0.00	0.00	0.00	0.00	0.00	0.80	0.80	0.00	0.50				
BHM4CAN044	2	3	Deep	02/06/16	08:30 AM	20.20	20.30	0.60	0.40	1.00	1.00	0.00	0.00	0.40	0.40	0.00	0.50				
WSM4CAN026	1	1		14/06/16		21.60	21.60	0.30	0.30	0.00	0.00	0.00	0.00	11.00	11.00	>>	0.00	0.00	996.00		
WSM4CAN027	1	1		14/06/16		21.50	21.50	0.30	0.30	0.00	0.00	0.00	0.00	10.00	10.00	>>	0.50	1.00	996.00		
WSM4CAN028	1	1		14/06/16	08:40 AM	19.80	21.40	0.40	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	997.00		
WSM4CAN029	1	1		14/06/16	09:35 AM	21.60	21.60	0.30	0.30	0.00	0.00	0.00	0.00	12.50	11.00	>>	0.01	0.00	997.00		
WSM4CAN030	1	1		14/06/16		21.70	21.90	0.20	0.20	0.00	0.00	0.00	0.00	0.40	0.40	1.10	0.00	0.00	997.00		
WSM4CAN031	1	1		14/06/16		21.20	21.30	0.30	0.20	2.30	0.00	0.00	0.00	5.90	5.90	>>	0.01	0.00	996.00		

M4CAN
Groundwater Monitoring
CL-27

Legend

DO	Dissolved Oxygen	ORP	Oxidation Reduction Potential	mAOD	meters Above Ordnance Datum
RWL	Resting Water Level	mbGL	meters below Ground Level		

Loc. Ref.	Install Ref. ^{*1}	Monitoring Round ^{*2}	Location Notes	Groundwater & Product Levels							Water Quality									Additional Notes / Comments
				Date	Time	Depth to Product (mbGL)	Groundwater Level (mbGL)	Depth to Base (mbGL)	Ground Level (mAOD)	RWL (mAOD)	Measurement Approach ^{*3}	Temperature (°C)	pH	Electrical Conductivity (µS/cm)	DO (%)	ORP (mV)	Stabilised Water Level (mbGL)	Time (min)	Logged Data Available (Y/N)	
BHM4CAN044	1	1	Shallow	06/05/16	12:17 PM		0.89	5.85		-0.89	GS	13.65	7.6	1397	24	-95	2.01			Collected sample via water level stabilisation. Murky grey.
BHM4CAN044	2	1	Deep	06/05/16	12:05 PM		1.41	12.81		-1.41	GS	15.73	7.6	5022	20	-73	1.48			Salinity 3.3 psu. Recovery rate good. Collected sample via stabilising water level. No odour.
BHM4CAN044	1	2	Shallow	19/05/16	11:00 AM		0.97	5.83			GS	12.76	7.9	882	33.50	-75.20	1.96			Good recovery. 3 well volumes (28 l) purged prior to sampling.
BHM4CAN044	2	2	Deep	19/05/16	11:15 AM		1.47	12.82			GS	12.51	7.3	3653	8.20	-93.90	1.59			3 well volumes (32.75 l) purged prior to sampling.
BHM4CAN044	1	3	Shallow	02/06/16	08:30 AM		1.13	5.84			GS	11.62	7.8	768	14.10	-113.10	2.25			Good recovery, bailer used. Organic odour. Salinity 0.5 psu. 3 well volumes (27 l) purged prior to sampling.
BHM4CAN044	2	3	Deep	02/06/16	08:25 AM		1.50	12.81			GS	12.17	7.2	4247	9.30	-97.90	1.62			Good recovery. Slight sulphurous odour. 3 well volumes (32.64 l) purged prior to sampling.
WSM4CAN026	1	3		14/06/16	09:10 AM		0.77	1.47												Insufficient water to take sample.
WSM4CAN027	1	3		14/06/16			DRY	1.27		DRY										Dry
WSM4CAN028	1	3		14/06/16			0.63	5.58												No water quality readings. Grab sample taken after 3 well volume purge.
WSM4CAN029	1	3		14/06/16			0.64	5.49												No water quality readings. Grab sample taken after 3 well volume purge.
WSM4CAN030	1	3		14/06/16			0.87													No water quality readings. Grab sample taken after 3 well volume purge.
WSM4CAN031	1	3		14/06/16			0.39	5.81												No water quality readings. Grab sample taken after 3 well volume purge.

Appendix 3

Soil Laboratory Data

M4CAN
Soil Analysis Results & Screening Assessment
CL-27
17/06/2016

Sample Reference	Units
Location Type	
Specimen Depth (m)	
OD Level (m)	
Sample Type	
Geology Code	
Cluster Code	
Inorganics	
Antimony	mg/kg
Arsenic	mg/kg
Barium	mg/kg
Boron	mg/kg
Boron Water Soluble	mg/kg
Cadmium	mg/kg
Chromium	mg/kg
Chromium VI	mg/kg
Copper	mg/kg
Lead	mg/kg
Mercury	mg/kg
Molybdenum	mg/kg
Manganese	mg/kg
Nickel	mg/kg
Selenium	mg/kg
Vanadium	mg/kg
Zinc	mg/kg
Iron	mg/kg
Cyanide (total)	mg/kg
Cyanide (free)	mg/kg
Thiocyanate	mg/kg
Ferro/ferricyanide	mg/kg
Acid Soluble Sulphate	mg/kg
Sulphate (soluble)	g/l
Sulphate (total)	mg/kg
Sulphide	mg/kg
Other	
Asbestos Presence Screen	None
Asbestos Identification	%
Loss on Ignition	%
Total Organic Carbon	%
Organic Matter	%
pH Value	pH Units
Material >2mm	%
Organics	
PAH (Screening)	mg/kg
TPH FTIR (AR)	mg/kg
OIL FTIR	mg/kg
PCBs	
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/kg
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/kg
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/kg
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/kg
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/kg
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	ug/kg
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/kg
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/kg
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/kg
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/kg
Sum of detected WHO 12 PCBs	ug/kg
Phenols	
Phenol Index	mg/kg
Phenols Monohydric	mg/kg
Phenol	mg/kg
Cresols	mg/kg
Xylenols	mg/kg
BTEX	
GRO (C4-C12)	mg/kg
GRO TOT (Moisture Corrected)	mg/kg
MTBE	mg/kg
Benzene	mg/kg
Toluene	mg/kg
Ethyl benzene	mg/kg
m & p Xylene	mg/kg
o Xylene	mg/kg
sum of detected BTEX by GC	mg/kg
sum of detected mpo xylene by GC	mg/kg
TPH	
TPH >C6-C8.	mg/kg
TPH >C8-C10.	mg/kg
TPH >C10-C12.	mg/kg
TPH >C12-C16.	mg/kg
TPH >C16-C21.	mg/kg
TPH >C21-C35.	mg/kg
Aliphatics C5-C6	mg/kg
Aliphatics >C6-C8	mg/kg
Aliphatics >C8-C10	mg/kg
Aliphatics >C10-C12	mg/kg
Aliphatics >C12-C16	mg/kg

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
10	9	36	1.8	SBHK02 CP @ 1mbGL		
47	36	55	1.15	TP510 @ 0.0 - 0.3mbGL	170	0
10	9	120	32	SBHK03 CP @ 1mbGL		
28	26	24.9	0.63	TPM4CAN020 @ 1mbGL	46000	0
10	1	3.5	3.5	SBHK03 CP @ 1mbGL		
47	28	8.6	0.128	BHK4 @ 2mbGL	190	0
47	47	1800	26.3	STPK02 @ 1.24mbGL	33	41
3	0	None > LOD	None > LOD		33	0
47	42	45	0	STPK02 @ 1.24mbGL	44000	0
47	45	980	6.9	SBHK02 CP @ 3mbGL	1300	0
47	13	1.3	0.02	BH527 @ 0.2 - 0.3mbGL	30	0
10	2	1.5	0.8	SBHK02 CP @ 1mbGL		
3	3	42100	6600	RBBH003 @ 0.5mbGL		
47	44	63	2	TP510 @ 1.0 - 1.2mbGL	980	0
47	14	10.7	0	WSM4CAN026 @ 1.5mbGL	1800	0
10	10	616	34.7	WSM4CAN026 @ 1.5mbGL	5000	0
47	47	660	24.4	SBHK02 CP @ 3mbGL	170000	0
8	8	169000	23.1	RBBH005 @ 0.5mbGL		
37	5	3	0.1	CH51 @ 0mbGL		
25	0	None > LOD	None > LOD			
7	2	1	0.8	RBBH004 @ 0.5mbGL		
4	0	None > LOD	None > LOD			
9	9	5820	644	RBBH004 @ 0.5mbGL		
10	7	0.56	0.018	SBHK03 CP @ 2mbGL		
4	4	1146	297	BHK4 @ 2mbGL		
9	7	66	2.3	CH53A @ 0.4mbGL		
23	0	None > LOD	None > LOD			
8	0	None > LOD	None > LOD			
5	5	5.1	1.1	SBHK04 CP @ 0.3mbGL		
6	5	58	0.3	SBHK04 CP @ 0.3mbGL		
7	7	2.3	1.3	SBHK02 CP @ 4.5mbGL		
46	46	12.9	7.1	RBBH003 @ 0.5mbGL	6-9	25
7	4	57.7	1.4	STPK02 @ 2mbGL		
6	4	82	11	CH51 @ 0mbGL	1.1	4
6	5	225	37	CH53A @ 0.4mbGL	2000	0
6	6	585	43	CH51 @ 0mbGL		
5	0	None > LOD	None > LOD		0.24	0
5	0	None > LOD	None > LOD		0.24	0
5	0	None > LOD	None > LOD		0.24	0
5	0	None > LOD	None > LOD		0.24	0
5	0	None > LOD	None > LOD		0.24	0
5	0	None > LOD	None > LOD		0.24	0
5	0	None > LOD	None > LOD		0.24	0
5	0	None > LOD	None > LOD		0.24	0
5	0	None > LOD	None > LOD		0.24	0
5	0	None > LOD	None > LOD		0.24	0
5	0	None > LOD	None > LOD		0.24	0
9	0	None > LOD	None > LOD		440	0
7	0	None > LOD	None > LOD		440	0
17	0	None > LOD	None > LOD		440	0
3	0	None > LOD	None > LOD			
3	0	None > LOD	None > LOD			
10	2	0.025	0.014	STPK01 @ 1.27mbGL		
8	2	0.0578	0.0483	WSM4CAN027 @ 0.5mbGL		
20	0	None > LOD	None > LOD			
24	0	None > LOD	None > LOD		27	0
24	0	None > LOD	None > LOD		56000	0
24	0	None > LOD	None > LOD		5700	0
24	2	0.025	0.014	STPK01 @ 1.27mbGL	5900	0
24	0	None > LOD	None > LOD		6600	0
8	0	None > LOD	None > LOD			
8	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD		7800	0
6	0	None > LOD	None > LOD		2000	0
6	0	None > LOD	None > LOD		9200	0
6	1	6.6	6.6	BH526 @ 0.4 - 0.5mbGL	10000	0
6	3	11	3.1	BH526 @ 0.4 - 0.5mbGL	7600	0
6	2	28	4.7	BH526 @ 0.4 - 0.5mbGL	7800	0
23	0	None > LOD	None > LOD		3200	0
23	1	0.137	0.137	WSM4CAN029 @ 0.5mbGL	7800	0
23	1	0.118	0.118	WSM4CAN027 @ 0.5mbGL	2000	0
23	1	0.171	0.171	WSM4CAN027 @ 0.5mbGL	9700	0
23	3	0.53	0.33	SBHK03 CP @ 2mbGL	25000	0

M4CAN
Soil Analysis Results & Screening Assessment
CL-27
17/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria
Laboratory detection level higher than screening criterion

Sample Reference		Units	BHK3	BHK3	BHK4	BHK4	CH51	CH52A	CH53A	CH54A	RBBH003	RBBH004	RBBH005	SBHK03 CP	SBHK02 CP
Location Type	BH		BH	BH	BH	TP	TP	TP	TP	BH	BH	BH	BH	BH	
Specimen Depth (m)	0		1	1	2	0	0.3	0.4	0.4	0.4	0.5	0.5	0.5	1	1
OD Level (m)	6		5	4.5	3.5	5.73	5.19	5.13	5.95					4.83	4.53
Sample Type	B		B	D	D	D	D	D	D	D				ES	ES
Geology Code	MG		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
Cluster Code		1997 GI	1997 GI	1997 GI	1997 GI	2000 GI	2000 GI	2000 GI	2000 GI	2002 GI	2002 GI	2002 GI	2002 GI	2007 GI	2007 GI
Inorganics															
Antimony	mg/kg													21	36
Arsenic	mg/kg	11.7	12.2	3.6	4.2	2.82	15.2	1.15	8.3	<3	<3	<3	<3	<3	<3
Barium	mg/kg													120	71
Boron	mg/kg	<0.2	<0.2	1.5	0.9	0.9	1.6	6	0.8	2.7	1.1	2.8			
Boron Water Soluble	mg/kg													3.5	<3.5
Cadmium	mg/kg	0.8	0.7	8	8.6	0.13	0.15	1.6	0.13	<1	<1	<1	<0.3	<0.3	<0.3
Chromium	mg/kg	46.7	51.5	561.4	504.3	706	53	670	36	913	305	805	590	590	590
Chromium VI	mg/kg														
Copper	mg/kg	32.9	26.1	21.6	18.1	24	15	19	10	17	18	9	<6	7	7
Lead	mg/kg	46.7	43	60.9	60.9	62	59	71	35	66	57	32	28	460	460
Mercury	mg/kg	0.1	<0.1	0.4	0.4	0.07	<0.01	0.02	<0.01	<0.5	<0.5	<0.5	<0.6	<0.6	<0.6
Molybdenum	mg/kg													<0.6	1.5
Manganese	mg/kg									42100	16700	6600			
Nickel	mg/kg	43.1	51.1	40.2	40.2	5	42	7	27	2	6	6	<0.9	<0.9	<0.9
Selenium	mg/kg	0.3	0.2	0.1	<0.1	1.63	<0.5	1.6	<0.5	1.22	3.44	1.15	<3	<3	<3
Vanadium	mg/kg														
Zinc	mg/kg	115.2	99.6	85.9	80.8	69	118	61	69	60	57	65	170	73	73
Iron	mg/kg					14300		131000		168000	87000	169000			110000
Cyanide (total)	mg/kg	0.2	0.2	0.2	0.1	3	<1	<1	<1	<1	<1	<1	<1	<1	<1
Cyanide (free)	mg/kg	<0.1	<0.1	<0.1	<0.1		<1	<1							
Thiocyanate	mg/kg	<1	<1	<1	<1					<0.5	1	0.8			
Ferro/ferricyanide	mg/kg	<10	<10	<10	<10										
Acid Soluble Sulphate	mg/kg					4020	678	2660	866	2160	5820	2750			
Sulphate (soluble)	g/l													<0.003	<0.003
Sulphate (total)	mg/kg	650	297	828	1146										
Sulphide	mg/kg	2.3	3.1	27.4	21.8	6	<1	66							
Other															
Asbestos Presence Screen	None													NFD	NFD
Asbestos Identification	%														
Loss on Ignition	%													1.2	1.1
Total Organic Carbon	%													0.3	<0.2
Organic Matter	%														
pH Value	pH Units	7.8	8.1	11.5	11.5	12.2	8	12.2	10	12.9	12.4	12.7	11.73	12.31	12.31
Material >2mm	%														
Organics															
PAH (Screening)	mg/kg					82	11	26	<10						
TPH FTIR (AR)	mg/kg					198	37	225	<20						
OIL FTIR	mg/kg					585	95	164	77						
PCBs															
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/kg														
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/kg														
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/kg														
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/kg														
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/kg														
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	ug/kg														
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/kg														
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg														
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg														
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/kg														
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/kg														
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/kg														
Sum of detected WHO 12 PCBs	ug/kg														
Phenols															
Phenol Index	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Phenols Monohydric	mg/kg	<1	<1	<1	<1										
Phenol	mg/kg	<1	<1	<1	<1									<0.15	<0.15
Cresols	mg/kg														
Xylenols	mg/kg														
BTEX															
GRO (C4-C12)	mg/kg													<0.01	<0.01
GRO TOT (Moisture Corrected)	mg/kg														
MTBE	mg/kg													<0.01	<0.01
Benzene	mg/kg													<0.01	<0.01
Toluene	mg/kg													<0.01	<0.01
Ethyl benzene	mg/kg													<0.01	<0.01
m & p Xylene	mg/kg													<0.01	<0.01
o Xylene	mg/kg													<0.01	<0.01
sum of detected BTEX by GC	mg/kg														

M4CAN	
Soil Analysis Results & Screening Assessment	
CL-27	
17/06/2016	
Notes	
NFD = No Fibres Detected	
NAD = No Asbestos Detected	
Chromium VI criteria used	
Elemental Mercury criteria used	
Screening criterion for Pb is C4SL in the absence of a S4UL	
Geological Formation legend	
Made Ground	MG
Tidal Flat Deposits	TFD
Screening Values and Assessment	
Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	STPK01	STPK02	BH526	BH526	BH527	BH527	BH530	TP510	TP510	CH52A	CH53A	SBHK01 CP	SBHK02 CP	
Location Type		TP	TP	BH	BH	BH	BH	BH	TP	TP	TP	TP	BH	BH	
Specimen Depth (m)		0.34	0.3	0.0 - 0.2	0.4 - 0.5	0.2 - 0.3	0.5 - 1.0	0.2 - 0.5	0.0 - 0.3	1.0 - 1.2	1.2	1.1	3	3	
OD Level (m)		5.24	5.74	5.95	5.55	5.75	5.25	6.05	5.9	4.9	4.29	4.43	2.26	2.53	
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	D	D	U	ES	
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	TFD
Cluster Code		2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2000 GI	2000 GI	2007 GI	2007 GI	
Inorganics															
Antimony	mg/kg	<1.5	14											2.9	
Arsenic	mg/kg	<3	10	32	34	38	38	19	55	41	2.23	13.2		6	
Barium	mg/kg	80	81											32	
Boron	mg/kg			0.64	0.63	1.9	1.9	1.6	1.9	1.4	2	1			
Boron Water Soluble	mg/kg	<3.5	<3.5											<3.5	
Cadmium	mg/kg	0.6	<0.3	0.28	0.27	0.4	0.32	<0.1	0.26	<0.1	0.14	0.17		<0.3	
Chromium	mg/kg	55	440	140	170	890	920	47	1200	1200	647	48		32	
Chromium VI	mg/kg														
Copper	mg/kg	10	6	0	2.1	11	29	20	19	14	23	13		10	
Lead	mg/kg	38	<2	7.7	6.9	11	12	33	63	20	65	53		980	
Mercury	mg/kg	<0.6	<0.6	0.26	0.33	1.3	1.2	<0.1	0.48	0.62	<0.01	<0.01		<0.6	
Molybdenum	mg/kg	<0.6	<0.6											<0.6	
Manganese	mg/kg														
Nickel	mg/kg	4	<0.9	16	19	40	54	36	34	63	4	38		21	
Selenium	mg/kg	<3	<3	0	0	<0.2	<0.2	<0.2	<0.2	<0.2	1.46	<0.5		<3	
Vanadium	mg/kg														
Zinc	mg/kg	110	120	53	48	140	140	120	240	87	44	130		660	
Iron	mg/kg													24000	
Cyanide (total)	mg/kg	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1		<1	
Cyanide (free)	mg/kg			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1			
Thiocyanate	mg/kg														
Ferro/ferricyanide	mg/kg														
Acid Soluble Sulphate	mg/kg										1750	644			
Sulphate (soluble)	g/l	0.076	<0.003											0.1	
Sulphate (total)	mg/kg														
Sulphide	mg/kg										48	<1			
Other															
Asbestos Presence Screen	None	NFD	NFD	NAD	NAD	NAD	NAD	NAD	NAD	NAD				NFD	
Asbestos Identification	%			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001					
Loss on Ignition	%	1.7	3.2												
Total Organic Carbon	%	0.9	0.4												
Organic Matter	%												1.9		
pH Value	pH Units	8.6	12.53	10.9	10.9	12.3	12.2	8.1	12.8	12.9	12.3	9		8.28	
Material >2mm	%												<0.1		
Organics															
PAH (Screening)	mg/kg										12	<10			
TPH FTIR (AR)	mg/kg										190	55			
OIL FTIR	mg/kg										133	43			
PCBs															
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/kg														
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/kg														
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/kg														
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/kg														
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/kg														
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	ug/kg														
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/kg														
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg														
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg														
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/kg														
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/kg														
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/kg														
Sum of detected WHO 12 PCBs	ug/kg														
Phenols															
Phenol Index	mg/kg										<0.5	<0.5			
Phenols Monohydric	mg/kg														
Phenol	mg/kg	<0.15	<0.15											<0.15	
Cresols	mg/kg														
Xylenols	mg/kg														
BTEX															
GRO (C4-C12)	mg/kg	0.014	<0.01											<0.01	
GRO TOT (Moisture Corrected)	mg/kg														
MTBE	mg/kg	<0.01	<0.01					<0.001						<0.01	
Benzene	mg/kg	<0.01	<0.01					<0.001	<0.001	<0.001				<0.01	
Toluene	mg/kg	<0.01	<0.01					<0.001	<0.001	<0.001				<0.01	
Ethyl benzene	mg/kg	<0.01	<0.01					<0.001	<0.001	<0.001				<0.01	
m & p Xylene	mg/kg	0.014	<0.01					<0.001	<0.001	<0.001				<0.01	
o Xylene	mg/kg	<0.01	<0.01					<0.001	<0.001	<0.001				<0.01	
sum of detected BTEX by GC	mg/kg														

M4CAN Soil Analysis Results & Screening Assessment CL-27 17/06/2016	
Notes NFD = No Fibres Detected NAD = No Asbestos Detected Chromium VI criteria used Elemental Mercury criteria used Screening criterion for Pb is C4SL in the absence of a S4UL	
Geological Formation legend	
Made Ground	MG
Tidal Flat Deposits	TFD
Screening Values and Assessment	
Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	BH528	BH529	BH530	TP510	TP512	TP513	BHM4CAN044	TPM4CAN020	WSM4CAN025	WSM4CAN026
Location Type		BH	BH	BH	TP	TP	TP	BH	TP	WS	WS
Specimen Depth (m)		0.25 - 0.4	0.0 - 0.4	0.8 - 1.0	1.8 - 2.0	0.0 - 0.1	1.0 - 1.1	1.5	1	0.2	1.5
OD Level (m)		4.95	5.1	5.45	4.1	5.1	5.3				
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	MG	TFD	MG	MG
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI	2016 GI
Inorganics											
Antimony	mg/kg										
Arsenic	mg/kg	18	8.3	19	6.9	13	14	<6	13.8	<6	<6
Barium	mg/kg										
Boron	mg/kg	1.5	1.2	1.3	1.3	2.2	0.66		24.9		
Boron Water Soluble	mg/kg										
Cadmium	mg/kg	<0.1	<0.1	<0.1	<0.1	0.26	<0.1	1.44	0.319	0.896	0.828
Chromium	mg/kg	44	32	44	36	32	32	851	36.6	614	941
Chromium VI	mg/kg							<0.6			<0.6
Copper	mg/kg	4.1	9	13	2.7	12	8.5	24.5	9	<14	<14
Lead	mg/kg	28	19	34	9.4	36	19	17	29.1	<7	14.7
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	0.12	<0.1	<0.14	<0.14	<0.14	<0.14
Molybdenum	mg/kg										
Manganese	mg/kg										
Nickel	mg/kg	35	24	34	9.8	27	32	27	35	6.62	5.08
Selenium	mg/kg	<0.2	<0.2	<0.2	0.31	0.21	<0.2	<10	<1	<10	10.7
Vanadium	mg/kg							447	51.3	501	616
Zinc	mg/kg	120	71	110	30	74	68	118	104	31.1	24.4
Iron	mg/kg							23.1			
Cyanide (total)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5				
Cyanide (free)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<1	
Thiocyanate	mg/kg										
Ferro/ferricyanide	mg/kg										
Acid Soluble Sulphate	mg/kg										
Sulphate (soluble)	g/l										
Sulphate (total)	mg/kg										
Sulphide	mg/kg										
Other											
Asbestos Presence Screen	None										NAD
Asbestos Identification	%										
Loss on Ignition	%										
Total Organic Carbon	%										
Organic Matter	%										
pH Value	pH Units	8	8.2	8.2	10.8	7.1	8.3	12.6		12.3	12.6
Material >2mm	%										
Organics											
PAH (Screening)	mg/kg										
TPH FTIR (AR)	mg/kg										
OIL FTIR	mg/kg										
PCBs											
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/kg										<3
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/kg										<3
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/kg										<3
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/kg										<3
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/kg										<3
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	ug/kg										<3
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/kg										<3
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg										<3
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg										<3
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/kg										<3
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/kg										<3
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/kg										<3
Sum of detected WHO 12 PCBs	ug/kg										<36
Phenols											
Phenol Index	mg/kg										
Phenols Monohydric	mg/kg									<0.035	
Phenol	mg/kg									<0.01	
Cresols	mg/kg									<0.01	
Xylenols	mg/kg									<0.015	
BTEX											
GRO (C4-C12)	mg/kg										
GRO TOT (Moisture Corrected)	mg/kg							<0.044	<0.044	<0.044	<0.044
MTBE	mg/kg			<0.001				<0.005	<0.005	<0.005	<0.005
Benzene	mg/kg	<0.001		<0.001				<0.01	<0.01	<0.01	<0.01
Toluene	mg/kg	<0.001		<0.001				<0.002	<0.002	<0.002	<0.002
Ethyl benzene	mg/kg	<0.001		<0.001				<0.003	<0.003	<0.003	<0.003
m & p Xylene	mg/kg	<0.001		<0.001				<0.006	<0.006	<0.006	<0.006
o Xylene	mg/kg	<0.001		<0.001				<0.003	<0.003	<0.003	<0.003
sum of detected BTEX by GC	mg/kg							<0.024	<0.024	<0.024	<0.024

M4CAN Soil Analysis Results & Screening Assessment CL-27 17/06/2016	
Notes	
NFD = No Fibres Detected NAD = No Asbestos Detected Chromium VI criteria used Elemental Mercury criteria used Screening criterion for Pb is C4SL in the absence of a S4UL	
Geological Formation legend	
Made Ground	MG
Tidal Flat Deposits	TFD
Screening Values and Assessment	
Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	WSM4CAN026	WSM4CAN027	WSM4CAN029	WSM4CAN029	WSM4CAN030	WSM4CAN031
Location Type		WS	WS	WS	WS	WS	WS
Specimen Depth (m)		2.2	0.5	0.5	1.2	0.5	0.5
OD Level (m)							
Sample Type		ES	ES	ES	ES	ES	ES
Geology Code		TFD	MG	MG	TFD	TFD	TFD
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
Inorganics							
Antimony	mg/kg						
Arsenic	mg/kg	15.7	<6	<6	10	11.6	14.1
Barium	mg/kg						
Boron	mg/kg						
Boron Water Soluble	mg/kg						
Cadmium	mg/kg	0.351	2.04	1.22	0.173	0.128	0.283
Chromium	mg/kg	26.3	495	573	31.7	45.1	33.5
Chromium VI	mg/kg		<0.6				
Copper	mg/kg	7.78	19.6	<14	8.19	7.33	10.4
Lead	mg/kg	14.9	8.22	13.5	18.6	31.7	24.2
Mercury	mg/kg	<0.14	<0.14	<1.4	<1.4	<0.14	<0.14
Molybdenum	mg/kg						
Manganese	mg/kg						
Nickel	mg/kg	22.9	12.2	8.81	28	38.1	28.4
Selenium	mg/kg	<1	<10	<10	<1	<1	<1
Vanadium	mg/kg	34.7	432	434	41.6	56.9	48.8
Zinc	mg/kg	73.6	60.1	144	88.6	117	80.6
Iron	mg/kg						
Cyanide (total)	mg/kg						
Cyanide (free)	mg/kg			<1	<1		
Thiocyanate	mg/kg						
Ferro/ferricyanide	mg/kg						
Acid Soluble Sulphate	mg/kg						
Sulphate (soluble)	g/l						
Sulphate (total)	mg/kg						
Sulphide	mg/kg						
Other							
Asbestos Presence Screen	None	NAD	NAD	NAD	NAD		
Asbestos Identification	%						
Loss on Ignition	%						
Total Organic Carbon	%						
Organic Matter	%						
pH Value	pH Units	8.59	11.8	10.4	8.25	8.64	7.64
Material >2mm	%						
Organics							
PAH (Screening)	mg/kg						
TPH FTIR (AR)	mg/kg						
OIL FTIR	mg/kg						
PCBs							
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/kg	<3	<3	<3	<3		
Sum of detected WHO 12 PCBs	ug/kg	<36	<36	<36	<36		
Phenols							
Phenol Index	mg/kg						
Phenols Monohydric	mg/kg			<0.035	<0.035		
Phenol	mg/kg			<0.01	<0.01		
Cresols	mg/kg			<0.01	<0.01		
Xylenols	mg/kg			<0.015	<0.015		
BTEX							
GRO (C4-C12)	mg/kg						
GRO TOT (Moisture Corrected)	mg/kg	<0.044	0.0578	0.0483	<0.044		
MTBE	mg/kg	<0.005	<0.005	<0.005	<0.005		
Benzene	mg/kg	<0.01	<0.01	<0.01	<0.01		
Toluene	mg/kg	<0.002	<0.002	<0.002	<0.002		
Ethyl benzene	mg/kg	<0.003	<0.003	<0.003	<0.003		
m & p Xylene	mg/kg	<0.006	<0.006	<0.006	<0.006		
o Xylene	mg/kg	<0.003	<0.003	<0.003	<0.003		
sum of detected BTEX by GC	mg/kg	<0.024	<0.024	<0.024	<0.024		

M4CAN	
Soil Analysis Results & Screening Assessment	
CL-27	
17/06/2016	
Notes	
NFD = No Fibres Detected	
NAD = No Asbestos Detected	
Chromium VI criteria used	
Elemental Mercury criteria used	
Screening criterion for Pb is C4SL in the absence of a S4UL	
Geological Formation legend	
Made Ground	MG
Tidal Flat Deposits	TFD
Screening Values and Assessment	
Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	STPK01	STPK02	BH526	BH526	BH527	BH527	BH530	TP510	TP510	CH52A	CH53A	SBHK01 CP	SBHK02 CP
Location Type		TP	TP	BH	BH	BH	BH	BH	TP	TP	TP	TP	BH	BH
Specimen Depth (m)		0.34	0.3	0.0 - 0.2	0.4 - 0.5	0.2 - 0.3	0.5 - 1.0	0.2 - 0.5	0.0 - 0.3	1.0 - 1.2	1.2	1.1	3	3
OD Level (m)		5.24	5.74	5.95	5.55	5.75	5.25	6.05	5.9	4.9	4.29	4.43	2.26	2.53
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	D	D	U	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	TFD
Cluster Code		2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2000 GI	2000 GI	2007 GI	2007 GI
sum of detected mpo xylene by GC	mg/kg													
TPH														
TPH >C6-C8.	mg/kg			<1	<1	<1	<1							
TPH >C8-C10.	mg/kg			<1	<1	<1	<1							
TPH >C10-C12.	mg/kg			<1	<1	<1	<1							
TPH >C12-C16.	mg/kg			<1	6.6	<1	<1							
TPH >C16-C21.	mg/kg			3.1	11	4.5	<1							
TPH >C21-C35.	mg/kg			4.7	28	<1	<1							
Aliphatics C5-C6	mg/kg	<0.01	<0.01					<0.1	<0.1	<0.1				<0.01
Aliphatics >C6-C8	mg/kg	<0.01	<0.01					<0.1	<0.1	<0.1				<0.01
Aliphatics >C8-C10	mg/kg	<0.01	<0.01					<0.1	<0.1	<0.1				<0.01
Aliphatics >C10-C12	mg/kg	<0.01	<0.01					<1	<1	<1				<0.01
Aliphatics >C12-C16	mg/kg	<0.1	<0.1					<1	<1	<1				<0.1
Aliphatics >C16-C21	mg/kg	<0.1	<0.1					<1	<1	<1				<0.1
Aliphatics >C21-C35	mg/kg	12	40					<1	<1	<1				6.7
Total Aliphatics C5-C35	mg/kg	12	40											6.7
Aliphatics >C35-44	mg/kg							<1	<1	<1				
Aromatics >C5-C7	mg/kg							<0.1	<0.1	<0.1				
Aromatics C6-C7	mg/kg	<0.01	<0.01											<0.01
Aromatics >C7-C8	mg/kg	<0.01	<0.01					<0.1	<0.1	<0.1				<0.01
Aromatics >EC8-EC10	mg/kg	0.014	<0.01					<0.1	<0.1	<0.1				<0.01
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01					<1	<1	<1				<0.01
Aromatics >EC12-EC16	mg/kg	<0.1	1.7					<1	<1	<1				6.1
Aromatics >EC16-EC21	mg/kg	<0.1	1.1					<1	<1	<1				5.3
Aromatics >EC21-EC35	mg/kg	6.6	6.7					<1	<1	<1				21
Total Aromatics C6-C35	mg/kg	6.6	9.4											33
Aromatics >C35-44	mg/kg							<1	<1	<1				
Aromatics >EC40-EC44	mg/kg													
Total Aliphatic TPH	mg/kg							<5	<5	<5				
Total Aromatic TPH	mg/kg							<5	<5	<5				
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	18	49											40
Total Aliphatics & Aromatics >C5-C44	mg/kg													
Total petroleum hydrocarbons	mg/kg							<10	<10	<10				
PAH														
Acenaphthene	mg/kg	<0.014	<0.014	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.014
Acenaphthylene	mg/kg	0.012	0.006	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.005
Anthracene	mg/kg	0.032	<0.009	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.009
Benzo(a)anthracene	mg/kg	0.17	0.041	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				0.027
Benzo(a)pyrene	mg/kg	0.16	0.036	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				0.014
Benzo(b)fluoranthene	mg/kg	0.22	0.041	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				0.021
Benzo(ghi)perylene	mg/kg	0.14	0.033	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				0.015
Benzo(k)fluoranthene	mg/kg	0.13	0.031	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.025
Chrysene	mg/kg	0.21	0.048	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.026
Dibenzo(ah)anthracene	mg/kg	0.028	<0.008	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.008
Fluoranthene	mg/kg	0.28	0.043	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.025
Fluorene	mg/kg	0.014	<0.012	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.012
Indeno(123cd)pyrene	mg/kg	0.1	0.021	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.011
Naphthalene	mg/kg	0.089	0.018	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				0.013
Phenanthrene	mg/kg	0.16	0.046	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				0.037
Pyrene	mg/kg	0.23	0.038	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				0.022
PAH 16 Total	mg/kg	2	0.4	<2	<2	<2	<2	<2	<2	<2				0.18
VOCs														
1,1,1,2-Tetrachloroethane	ug/kg							< 2.0						
1,1,1-Trichloroethane	ug/kg							< 1.0						
1,1-Dichloropropene	ug/kg							< 1.0						
1,2,3-Trichloropropane	ug/kg							< 50						
1,1,2,2-Tetrachloroethane	ug/kg													
1,1,2-Trichloroethane	ug/kg							< 10						
1,2,3-Trichlorobenzene	ug/kg							< 2.0						
1,1-Dichloroethane	ug/kg							< 1.0						
1,1-Dichloroethene	ug/kg							< 1.0						
1,2-Dichloroethane	ug/kg							< 2.0						
1,2-Dichlorobenzene	ug/kg							< 1.0						
cis-1,2-Dichloroethene	ug/kg							< 1.0						
1,2-Dichloropropane	ug/kg							< 1.0						
1,2-Dibromo-3-Chloropropane	ug/kg							< 50						
cis-1,3-Dichloropropene	ug/kg							< 10						
1,3,5-Trimethylbenzene	ug/kg							< 1.0						
1,2,4-Trichlorobenzene	ug/kg							< 1.0						

M4CAN	
Soil Analysis Results & Screening Assessment	
CL-27	
17/06/2016	
Notes	
NFD = No Fibres Detected	
NAD = No Asbestos Detected	
Chromium VI criteria used	
Elemental Mercury criteria used	
Screening criterion for Pb is C4SL in the absence of a S4UL	
Geological Formation legend	
Made Ground	MG
Tidal Flat Deposits	TFD
Screening Values and Assessment	
Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	BH528	BH529	BH530	TP510	TP512	TP513	BHM4CAN044	TPM4CAN020	WSM4CAN025	WSM4CAN026
Location Type		BH	BH	BH	TP	TP	TP	BH	TP	WS	WS
Specimen Depth (m)		0.25 - 0.4	0.0 - 0.4	0.8 - 1.0	1.8 - 2.0	0.0 - 0.1	1.0 - 1.1	1.5	1	0.2	1.5
OD Level (m)		4.95	5.1	5.45	4.1	5.1	5.3				
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	MG	TFD	MG	MG
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI	2016 GI
sum of detected mpo xylene by GC	mg/kg							<0.009	<0.009	<0.009	<0.009
TPH											
TPH >C6-C8.	mg/kg			<1	<1						
TPH >C8-C10.	mg/kg			<1	<1						
TPH >C10-C12.	mg/kg			<1	<1						
TPH >C12-C16.	mg/kg			<1	<1						
TPH >C16-C21.	mg/kg			<1	<1						
TPH >C21-C35.	mg/kg			<1	<1						
Aliphatics C5-C6	mg/kg	<0.1						<0.01	<0.01	<0.01	<0.01
Aliphatics >C6-C8	mg/kg	<0.1						<0.01	<0.01	<0.01	<0.01
Aliphatics >C8-C10	mg/kg	<0.1						<0.01	<0.01	<0.01	<0.01
Aliphatics >C10-C12	mg/kg	<1						<0.01	<0.01	<0.01	<0.01
Aliphatics >C12-C16	mg/kg	<1						<0.1	<0.1	0.434	0.33
Aliphatics >C16-C21	mg/kg	<1						8.95	<0.1	0.541	0.989
Aliphatics >C21-C35	mg/kg	<1						155	<0.1	5.48	9.55
Total Aliphatics C5-C35	mg/kg										
Aliphatics >C35-44	mg/kg	<1						62.6	<0.1	0.113	0.543
Aromatics >C5-C7	mg/kg	<0.1						<0.01	<0.01	<0.01	<0.01
Aromatics C6-C7	mg/kg										
Aromatics >C7-C8	mg/kg	<0.1						<0.01	<0.01	<0.01	<0.01
Aromatics >EC8-EC10	mg/kg	<0.1						<0.01	<0.01	<0.01	<0.01
Aromatics >EC10-EC12	mg/kg	<1						<0.01	<0.01	<0.01	<0.01
Aromatics >EC12-EC16	mg/kg	<1						<0.1	<0.1	<0.1	<0.1
Aromatics >EC16-EC21	mg/kg	<1						0.774	0.162	<0.1	<0.1
Aromatics >EC21-EC35	mg/kg	<1						25.4	0.182	3.1	2.13
Total Aromatics C6-C35	mg/kg										
Aromatics >C35-44	mg/kg	<1						16.7	<0.1	0.518	<0.1
Aromatics >EC40-EC44	mg/kg							7.72	0.254	<0.1	<0.1
Total Aliphatic TPH	mg/kg	<5						227	<0.1	6.57	11.4
Total Aromatic TPH	mg/kg	<5						42.9	0.344	3.62	2.13
TPH (Aliphatics and Aromatics C5-C35)	mg/kg										
Total Aliphatics & Aromatics >C5-C44	mg/kg							269	0.344	10.2	13.5
Total petroleum hydrocarbons	mg/kg	<10									
PAH											
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.008	<0.008	<0.008	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.012	<0.012	<0.012	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.016	<0.016	<0.016	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.014	<0.014	<0.014	<0.1
Benzo(a)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015	<0.015	<0.015	0.0271
Benzo(b)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015	<0.015	<0.015	0.0367
Benzo(ghi)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.024	<0.024	<0.024	<0.1
Benzo(k)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.014	<0.014	<0.014	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	0.0211
Dibenzo(ah)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.023	<0.023	<0.023	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.017	<0.017	<0.017	0.0195
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.1
Indeno(123cd)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.018	<0.018	<0.018	<0.1
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.009	<0.009	<0.009	<0.260
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015	<0.015	<0.015	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015	<0.015	<0.015	0.0221
PAH 16 Total	mg/kg	<2	<2	<2	<2	<2	<2	<0.118	<0.118	<0.118	0.126
VOCs											
1,1,1,2-Tetrachloroethane	ug/kg			< 2.0							<200
1,1,1-Trichloroethane	ug/kg			< 1.0							<140
1,1-Dichloropropene	ug/kg			< 1.0							<200
1,2,3-Trichloropropane	ug/kg			< 50							<320
1,1,2,2-Tetrachloroethane	ug/kg										<200
1,1,2-Trichloroethane	ug/kg			< 10							<200
1,2,3-Trichlorobenzene	ug/kg			< 2.0							<400
1,1-Dichloroethane	ug/kg			< 1.0							<160
1,1-Dichloroethene	ug/kg			< 1.0							<200
1,2-Dichloroethane	ug/kg			< 2.0							<100
1,2-Dichlorobenzene	ug/kg			< 1.0							<200
cis-1,2-Dichloroethene	ug/kg			< 1.0							<120
1,2-Dichloropropane	ug/kg			< 1.0							<200
1,2-Dibromo-3-Chloropropane	ug/kg			< 50							<280
cis-1,3-Dichloropropene	ug/kg			< 10							<200
1,3,5-Trimethylbenzene	ug/kg			< 1.0							<160
1,2,4-Trichlorobenzene	ug/kg			< 1.0							<400

M4CAN	
Soil Analysis Results & Screening Assessment	
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Notes	
NFD = No Fibres Detected	
NAD = No Asbestos Detected	
Chromium VI criteria used	
Elemental Mercury criteria used	
Screening criterion for Pb is C4SL in the absence of a S4UL	
Geological Formation legend	
Made Ground	MG
Tidal Flat Deposits	TFD
Screening Values and Assessment	
Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	WSM4CAN026	WSM4CAN027	WSM4CAN029	WSM4CAN029	WSM4CAN030	WSM4CAN031
Location Type		WS	WS	WS	WS	WS	WS
Specimen Depth (m)		2.2	0.5	0.5	1.2	0.5	0.5
OD Level (m)							
Sample Type		ES	ES	ES	ES	ES	ES
Geology Code		TFD	MG	MG	TFD	TFD	TFD
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
sum of detected mpo xylene by GC	mg/kg	<0.009	<0.009	<0.009	<0.009		
TPH							
TPH >C6-C8.	mg/kg						
TPH >C8-C10.	mg/kg						
TPH >C10-C12.	mg/kg						
TPH >C12-C16.	mg/kg						
TPH >C16-C21.	mg/kg						
TPH >C21-C35.	mg/kg						
Aliphatics C5-C6	mg/kg	<0.01	<0.01	<0.01	<0.01		
Aliphatics >C6-C8	mg/kg	<0.01	<0.01	0.137	<0.01		
Aliphatics >C8-C10	mg/kg	<0.01	0.118	<0.01	<0.01		
Aliphatics >C10-C12	mg/kg	<0.01	0.171	<0.01	<0.01		
Aliphatics >C12-C16	mg/kg	<0.1	<0.1	<0.1	<0.1		
Aliphatics >C16-C21	mg/kg	0.118	1.6	1.21	<0.1		
Aliphatics >C21-C35	mg/kg	2.04	26.4	22.6	<0.1		
Total Aliphatics C5-C35	mg/kg						
Aliphatics >C35-44	mg/kg	0.302	3.16	2.37	<0.1		
Aromatics >C5-C7	mg/kg	<0.01	<0.01	<0.01	<0.01		
Aromatics C6-C7	mg/kg						
Aromatics >C7-C8	mg/kg	<0.01	<0.01	<0.01	<0.01		
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01	<0.01	<0.01		
Aromatics >EC10-EC12	mg/kg	<0.01	0.107	<0.01	<0.01		
Aromatics >EC12-EC16	mg/kg	<0.1	<0.1	<0.1	<0.1		
Aromatics >EC16-EC21	mg/kg	<0.1	1.1	0.261	<0.1		
Aromatics >EC21-EC35	mg/kg	0.926	14.3	10.3	0.956		
Total Aromatics C6-C35	mg/kg						
Aromatics >C35-44	mg/kg	<0.1	5.67	4.45	0.315		
Aromatics >EC40-EC44	mg/kg	0.178	3.22	2	<0.1		
Total Aliphatic TPH	mg/kg	2.46	31.1	26.2	<0.1		
Total Aromatic TPH	mg/kg	0.926	21.1	15	1.27		
TPH (Aliphatics and Aromatics C5-C35)	mg/kg						
Total Aliphatics & Aromatics >C5-C44	mg/kg	3.39	52.2	41.2	1.27		
Total petroleum hydrocarbons	mg/kg						
PAH							
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.008	<0.008
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.012	<0.012
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.016	<0.016
Benzo(a)anthracene	mg/kg	<0.1	0.0241	0.0218	<0.1	<0.014	<0.014
Benzo(a)pyrene	mg/kg	<0.1	0.0316	0.0288	<0.1	<0.015	<0.015
Benzo(b)fluoranthene	mg/kg	<0.1	0.0417	0.0465	<0.1	<0.015	<0.015
Benzo(ghi)perylene	mg/kg	<0.1	0.0465	0.0342	<0.1	<0.024	<0.024
Benzo(k)fluoranthene	mg/kg	<0.1	0.0183	0.0196	<0.1	<0.014	<0.014
Chrysene	mg/kg	<0.1	0.0387	0.029	<0.1	<0.01	<0.01
Dibenzo(ah)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.023	<0.023
Fluoranthene	mg/kg	<0.1	0.0344	0.038	<0.1	0.0322	<0.017
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.01	<0.01
Indeno(123cd)pyrene	mg/kg	<0.1	0.0212	0.0259	<0.1	<0.018	<0.018
Naphthalene	mg/kg	<0.013	<0.130	<0.013	<0.013	<0.009	<0.009
Phenanthrene	mg/kg	<0.1	0.0248	0.0286	<0.1	<0.015	<0.015
Pyrene	mg/kg	<0.1	0.0441	0.0355	<0.1	0.0251	<0.015
PAH 16 Total	mg/kg	<0.118	0.325	0.308	<0.118	<0.118	<0.118
VOCs							
1,1,1,2-Tetrachloroethane	ug/kg	<10	<100	<10	<10		
1,1,1-Trichloroethane	ug/kg	<7	<70	<7	<7		
1,1-Dichloropropene	ug/kg	<10	<100	<20	<20		
1,2,3-Trichloropropane	ug/kg	<16	<160	<16	<16		
1,1,2,2-Tetrachloroethane	ug/kg	<10	<100	<10	<10		
1,1,2-Trichloroethane	ug/kg	<10	<100	<10	<10		
1,2,3-Trichlorobenzene	ug/kg	<20	<200	<20	<20		
1,1-Dichloroethane	ug/kg	<8	<80	<8	<8		
1,1-Dichloroethene	ug/kg	<10	<100	<10	<10		
1,2-Dichloroethane	ug/kg	<5	<50	<5	<5		
1,2-Dichlorobenzene	ug/kg	<10	<100	<10	<10		
cis-1,2-Dichloroethene	ug/kg	<6	<60	<6	<6		
1,2-Dichloropropane	ug/kg	<10	<100	<10	<10		
1,2-Dibromo-3-Chloropropane	ug/kg	<14	<140	<14	<14		
cis-1,3-Dichloropropene	ug/kg	<10	<100	<10	<10		
1,3,5-Trimethylbenzene	ug/kg	<8	<80	<8	<8		
1,2,4-Trichlorobenzene	ug/kg	<20	<200	<20	<20		

M4CAN
Soil Analysis Results & Screening Assessment
CL-27
17/06/2016

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria
Laboratory detection level higher than screening
criterion

X

[illegible]

M4CAN Soil Analysis Results & Screening Assessment CL-27 17/06/2016	
Notes	
NFD = No Fibres Detected NAD = No Asbestos Detected Chromium VI criteria used Elemental Mercury criteria used Screening criterion for Pb is C4SL in the absence of a S4UL	
Geological Formation legend	
Made Ground	MG
Tidal Flat Deposits	TFD
Screening Values and Assessment	
Exceeds S4ULs criteria Laboratory detection level higher than screening criterion	X

Sample Reference	Units	STPK01	STPK02	BH526	BH526	BH527	BH527	BH530	TP510	TP510	CH52A	CH53A	SBHK01 CP	SBHK02 CP
Location Type		TP	TP	BH	BH	BH	BH	BH	TP	TP	TP	TP	BH	BH
Specimen Depth (m)		0.34	0.3	0.0 - 0.2	0.4 - 0.5	0.2 - 0.3	0.5 - 1.0	0.2 - 0.5	0.0 - 0.3	1.0 - 1.2	1.2	1.1	3	3
OD Level (m)		5.24	5.74	5.95	5.55	5.75	5.25	6.05	5.9	4.9	4.29	4.43	2.26	2.53
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	D	D	U	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	TFD
Cluster Code		2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2000 GI	2000 GI	2007 GI	2007 GI
1,2-Dibromoethane	ug/kg							< 5.0						
1,2,4-Trimethylbenzene	ug/kg							< 1.0						
1,3-Dichlorobenzene	ug/kg							< 1.0						
1,4-Dichlorobenzene	ug/kg							< 1.0						
1,3-Dichloropropane	ug/kg							< 2.0						
2,2-Dichloropropane	ug/kg													
2-Chlorotoluene	ug/kg							< 1.0						
4-Chlorotoluene	ug/kg							< 1.0						
4-Isopropyltoluene	ug/kg							< 1.0						
Benzene	ug/kg							< 1.0	<1.0	<1.0				
Bromobenzene	ug/kg							< 1.0						
Bromodichloromethane	ug/kg							< 5.0						
Bromochloromethane	ug/kg							< 5.0						
Bromoform	ug/kg													
Bromomethane	ug/kg							< 20						
Tribromomethane	ug/kg							< 1.0						
Carbon Disulphide	ug/kg													
Carbontetrachloride	ug/kg													
Chloroethane	ug/kg							< 2.0						
Chloroform	ug/kg							< 1.0						
Chloroethene	ug/kg							< 1.0						
Chloromethane	ug/kg							< 1.0						
Chlorobenzene	ug/kg							< 1.0						
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg							< 1.0						
Dichlorodifluoromethane	ug/kg							< 1.0						
Dichloromethane	ug/kg													
Dibromomethane	ug/kg							< 1.0						
Ethylbenzene	ug/kg							< 1.0	<1.0	<1.0				
Dibromochloromethane	ug/kg							< 10						
Hexachlorobutadiene (HCBD)	ug/kg							< 1.0						
Isopropylbenzene	ug/kg							< 1.0						
n-Butylbenzene	ug/kg							< 1.0						
Methyl tert-butyl ether (MTBE)	ug/kg							< 1.0						
m,p xylenes	ug/kg							< 1.0	<1.0	<1.0				
O-Xylene	ug/kg							< 1.0	<1.0	<1.0				
n-propylbenzene	ug/kg							< 1.0						
trans-1,2-Dichloroethene	ug/kg							< 1.0						
Propylbenzene	ug/kg													
Styrene	ug/kg							< 1.0						
Sec-Butylbenzene	ug/kg							< 1.0						
Term-amyl methyl ether	ug/kg													
Tert-Butylbenzene	ug/kg							< 1.0						
trans-1,3-Dichloropropene	ug/kg							< 10						
Tetrachloroethene	ug/kg							< 1.0						
Toluene	ug/kg							< 1.0	<1.0	<1.0				
Trichlorofluoromethane	ug/kg							< 1.0						
Trichloroethene	ug/kg							< 1.0						
Ethylbenzene	ug/kg							< 1.0						
Benzene	ug/kg							< 1.0						
m,p xylenes	ug/kg							< 1.0						
O-Xylene	ug/kg							< 1.0						
Toluene	ug/kg							< 1.0						
Vinyl Chloride	ug/kg													
SVOCs														
2,4,5-Trichlorophenol	mg/kg							< 0.50						
2,4-Dichlorophenol	mg/kg							< 0.50						
2,4,6-Trichlorophenol	mg/kg							< 0.50						
2,4-Dimethylphenol	mg/kg							< 0.50						
2,6-Dinitrotoluene	mg/kg							< 0.50						
2-Methylnaphthalene	mg/kg							< 0.50						
2,4-Dinitrotoluene	mg/kg							< 0.50						
2-Methylphenol	mg/kg							< 0.50						
2-Chlorophenol	mg/kg							< 0.50						
2-Chloronaphthalene	mg/kg							< 0.50						
2-Methyl-4,6-Dinitrophenol	mg/kg							< 0.50						
4-Chloro-3-Methylphenol	mg/kg							< 0.50						
3-Nitroaniline	mg/kg							< 0.50						
4-Chloroaniline	mg/kg							< 0.50						
2-Nitrophenol	mg/kg							< 0.50						
4-Chlorophenyl Phenyl Ether	mg/kg							< 0.50						

M4CAN Soil Analysis Results & Screening Assessment CL-27 17/06/2016	
Notes NFD = No Fibres Detected NAD = No Asbestos Detected Chromium VI criteria used Elemental Mercury criteria used Screening criterion for Pb is C4SL in the absence of a S4UL	
Geological Formation legend	
Made Ground	MG
Tidal Flat Deposits	TFD
Screening Values and Assessment	
Exceeds S4ULs criteria Laboratory detection level higher than screening criterion	X

Sample Reference	Units	BH528	BH529	BH530	TP510	TP512	TP513	BHM4CAN044	TPM4CAN020	WSM4CAN025	WSM4CAN026
Location Type		BH	BH	BH	TP	TP	TP	BH	TP	WS	WS
Specimen Depth (m)		0.25 - 0.4	0.0 - 0.4	0.8 - 1.0	1.8 - 2.0	0.0 - 0.1	1.0 - 1.1	1.5	1	0.2	1.5
OD Level (m)		4.95	5.1	5.45	4.1	5.1	5.3				
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	MG	TFD	MG	MG
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI	2016 GI
1,2-Dibromoethane	ug/kg			< 5.0							<200
1,2,4-Trimethylbenzene	ug/kg			< 1.0							<180
1,3-Dichlorobenzene	ug/kg			< 1.0							<160
1,4-Dichlorobenzene	ug/kg			< 1.0							<100
1,3-Dichloropropane	ug/kg			< 2.0							<140
2,2-Dichloropropane	ug/kg										<200
2-Chlorotoluene	ug/kg			< 1.0							<180
4-Chlorotoluene	ug/kg			< 1.0							<200
4-Isopropyltoluene	ug/kg			< 1.0							<200
Benzene	ug/kg	<1.0		< 1.0							<180
Bromobenzene	ug/kg			< 1.0							<200
Bromodichloromethane	ug/kg			< 5.0							<140
Bromochloromethane	ug/kg			< 5.0							<200
Bromoform	ug/kg										<200
Bromomethane	ug/kg			< 20							<200
Tribromomethane	ug/kg			< 1.0							
Carbon Disulphide	ug/kg										<140
Carbontetrachloride	ug/kg										<200
Chloroethane	ug/kg			< 2.0							<200
Chloroform	ug/kg			< 1.0							<160
Chloroethene	ug/kg			< 1.0							
Chloromethane	ug/kg			< 1.0							<140
Chlorobenzene	ug/kg			< 1.0							<100
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg			< 1.0							
Dichlorodifluoromethane	ug/kg			< 1.0							<120
Dichloromethane	ug/kg										<200
Dibromomethane	ug/kg			< 1.0							<180
Ethylbenzene	ug/kg	<1.0		< 1.0							<80
Dibromochloromethane	ug/kg			< 10							<200
Hexachlorobutadiene (HCBd)	ug/kg			< 1.0							<400
Isopropylbenzene	ug/kg			< 1.0							<100
n-Butylbenzene	ug/kg			< 1.0							<220
Methyl tert-butyl ether (MTBE)	ug/kg			< 1.0							<200
m,p xylenes	ug/kg	<1.0		< 1.0							
O-Xylene	ug/kg	<1.0		< 1.0							<200
n-propylbenzene	ug/kg			< 1.0							
trans-1,2-Dichloroethene	ug/kg			< 1.0							<200
Propylbenzene	ug/kg										<200
Styrene	ug/kg			< 1.0							<200
Sec-Butylbenzene	ug/kg			< 1.0							<200
Term-amyl methyl ether	ug/kg										<200
Tert-Butylbenzene	ug/kg			< 1.0							<280
trans-1,3-Dichloropropene	ug/kg			< 10							<200
Tetrachloroethene	ug/kg			< 1.0							<100
Toluene	ug/kg	<1.0		< 1.0							<140
Trichlorofluoromethane	ug/kg			< 1.0							<120
Trichloroethene	ug/kg			< 1.0							<180
Ethylbenzene	ug/kg			< 1.0							
Benzene	ug/kg			< 1.0							
m,p xylenes	ug/kg			< 1.0							<200
O-Xylene	ug/kg			< 1.0							
Toluene	ug/kg			< 1.0							
Vinyl Chloride	ug/kg										<120
SVOCs											
2,4,5-Trichlorophenol	mg/kg			< 0.50							<0.1
2,4-Dichlorophenol	mg/kg			< 0.50							<0.1
2,4,6-Trichlorophenol	mg/kg			< 0.50							<0.1
2,4-Dimethylphenol	mg/kg			< 0.50							<0.1
2,6-Dinitrotoluene	mg/kg			< 0.50							<0.1
2-Methylnaphthalene	mg/kg			< 0.50							<0.1
2,4-Dinitrotoluene	mg/kg			< 0.50							<0.1
2-Methylphenol	mg/kg			< 0.50							<0.1
2-Chlorophenol	mg/kg			< 0.50							<0.1
2-Chloronaphthalene	mg/kg			< 0.50							<0.1
2-Methyl-4,6-Dinitrophenol	mg/kg			< 0.50							
4-Chloro-3-Methylphenol	mg/kg			< 0.50							<0.1
3-Nitroaniline	mg/kg			< 0.50							<0.1
4-Chloroaniline	mg/kg			< 0.50							<0.1
2-Nitrophenol	mg/kg			< 0.50							<0.1
4-Chlorophenyl Phenyl Ether	mg/kg			< 0.50							<0.1

M4CAN Soil Analysis Results & Screening Assessment CL-27 17/06/2016	
Notes	
NFD = No Fibres Detected NAD = No Asbestos Detected Chromium VI criteria used Elemental Mercury criteria used Screening criterion for Pb is C4SL in the absence of a S4UL	
Geological Formation legend	
Made Ground	MG
Tidal Flat Deposits	TFD
Screening Values and Assessment	
Exceeds S4ULs criteria Laboratory detection level higher than screening criterion	X

Sample Reference	Units	WSM4CAN026	WSM4CAN027	WSM4CAN029	WSM4CAN029	WSM4CAN030	WSM4CAN031
Location Type		WS	WS	WS	WS	WS	WS
Specimen Depth (m)		2.2	0.5	0.5	1.2	0.5	0.5
OD Level (m)							
Sample Type		ES	ES	ES	ES	ES	ES
Geology Code		TFD	MG	MG	TFD	TFD	TFD
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
1,2-Dibromoethane	ug/kg	<10	<100	<10	<10		
1,2,4-Trimethylbenzene	ug/kg	<9	<90	<9	<9		
1,3-Dichlorobenzene	ug/kg	<8	<80	<8	<8		
1,4-Dichlorobenzene	ug/kg	<5	<50	<5	<5		
1,3-Dichloropropane	ug/kg	<7	<70	<7	<7		
2,2-Dichloropropane	ug/kg	<10	<100	<10	<10		
2-Chlorotoluene	ug/kg	<9	<90	<9	<9		
4-Chlorotoluene	ug/kg	<10	<100	<10	<10		
4-Isopropyltoluene	ug/kg	<10	<100	<10	<10		
Benzene	ug/kg	<9	<90	<9	<9		
Bromobenzene	ug/kg	<10	<100	<10	<10		
Bromodichloromethane	ug/kg	<7	<70	<7	<7		
Bromochloromethane	ug/kg	<10	<100	<10	<10		
Bromoform	ug/kg	<10	<100	<10	<10		
Bromomethane	ug/kg	<10	<100	<10	<10		
Tribromomethane	ug/kg						
Carbon Disulphide	ug/kg	<7	<70	<7	<7		
Carbontetrachloride	ug/kg	<10	<100	<10	<10		
Chloroethane	ug/kg	<10	<100	<10	<10		
Chloroform	ug/kg	<8	<80	<8	<8		
Chloroethene	ug/kg						
Chloromethane	ug/kg	<7	<70	<7	<7		
Chlorobenzene	ug/kg	<5	<50	<5	<5		
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg						
Dichlorodifluoromethane	ug/kg	<6	<60	<6	<6		
Dichloromethane	ug/kg	<10	<100	<10	<10		
Dibromomethane	ug/kg	<9	<90	<9	<9		
Ethylbenzene	ug/kg	<4	<40	<4	<4		
Dibromochloromethane	ug/kg	<10	<100	<10	<10		
Hexachlorobutadiene (HCBD)	ug/kg	<20	<200	<20	<20		
Isopropylbenzene	ug/kg	<5	<50	<5	<5		
n-Butylbenzene	ug/kg	<11	<110	<11	<11		
Methyl tert-butyl ether (MTBE)	ug/kg	<10	<100	<10	<10		
m,p xylenes	ug/kg						
O-Xylene	ug/kg	<10	<100	<10	<10		
n-propylbenzene	ug/kg						
trans-1,2-Dichloroethene	ug/kg	<10	<100	<10	<10		
Propylbenzene	ug/kg	<10	<100	<10	<10		
Styrene	ug/kg	<10	<100	<10	<10		
Sec-Butylbenzene	ug/kg	<10	<100	<10	<10		
Term-amyl methyl ether	ug/kg	<10	<100	<10	<10		
Tert-Butylbenzene	ug/kg	<14	<140	<14	<14		
trans-1,3-Dichloropropene	ug/kg	<10	<100	<10	<10		
Tetrachloroethene	ug/kg	<5	<50	<5	<5		
Toluene	ug/kg	<7	<70	<7	<7		
Trichlorofluoromethane	ug/kg	<6	<60	<6	<6		
Trichloroethene	ug/kg	<9	<90	<9	<9		
Ethylbenzene	ug/kg						
Benzene	ug/kg						
m,p xylenes	ug/kg	<10	<100	<10	<10		
O-Xylene	ug/kg						
Toluene	ug/kg						
Vinyl Chloride	ug/kg	<6	<60	<6	<6		
SVOCs							
2,4,5-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
2,4-Dichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
2,4,6-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
2,4-Dimethylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
2,6-Dinitrotoluene	mg/kg	<0.1	<0.1	<0.1	<0.1		
2-Methylnaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1		
2,4-Dinitrotoluene	mg/kg	<0.1	<0.1	<0.1	<0.1		
2-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
2-Chlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
2-Chloronaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1		
2-Methyl-4,6-Dinitrophenol	mg/kg						
4-Chloro-3-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
3-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1		
4-Chloroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1		
2-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
4-Chlorophenyl Phenyl Ether	mg/kg	<0.1	<0.1	<0.1	<0.1		

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Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

[illegible]

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Soil Analysis Results & Screening Assessment
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17/06/2016

Notes
NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend
Made GroundMG
Tidal Flat DepositsTFD

Screening Values and Assessment
Exceeds S4ULs criteria
Laboratory detection level higher than screening criterionX

Sample Reference	Units	STPK01	STPK02	BH526	BH526	BH527	BH527	BH530	TP510	TP510	CH52A	CH53A	SBHK01 CP	SBHK02 CP
Location Type		TP	TP	BH	BH	BH	BH	BH	TP	TP	TP	TP	BH	BH
Specimen Depth (m)		0.34	0.3	0.0 - 0.2	0.4 - 0.5	0.2 - 0.3	0.5 - 1.0	0.2 - 0.5	0.0 - 0.3	1.0 - 1.2	1.2	1.1	3	3
OD Level (m)		5.24	5.74	5.95	5.55	5.75	5.25	6.05	5.9	4.9	4.29	4.43	2.26	2.53
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	D	D	U	ES
Geology Code		MG	MG	MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	TFD
Cluster Code		2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2000 GI	2000 GI	2007 GI	2007 GI
4-Bromophenyl Phenyl Ether	mg/kg							< 0.50						
2-Nitroaniline	mg/kg							< 0.50						
4-Methylphenol	mg/kg							< 0.50						
4-Nitrophenol	mg/kg							< 0.50						
n-nitrosodimethylamine	mg/kg							< 0.50						
4-Nitroaniline	mg/kg							< 0.50						
Azobenzene	mg/kg							< 0.50						
Bis(2-chloroethyl)ether	mg/kg							< 0.50						
Butylbenzylphthalate	mg/kg							< 0.50						
Bis(2-chloroisopropyl)ether	mg/kg							< 0.50						
Bis(2-ethylhexyl)phthalate	mg/kg							< 0.50						
Bis(2-chloroethoxy)methane	mg/kg							< 0.50						
Carbazole	mg/kg							< 0.50						
Diethylphthalate	mg/kg							< 0.50						
Dibenzofuran	mg/kg							< 0.50						
Di-N-Octyl Phthalate	mg/kg							< 0.50						
Di-N-Butyl Phthalate	mg/kg							< 0.50						
Dimethylphthalate	mg/kg							< 0.50						
Hexachlorobenzene (HCB)	mg/kg							< 0.50						
Hexachloroethane	mg/kg							< 0.50						
Hexachlorocyclopentadiene	mg/kg							< 0.50						
Isophorone	mg/kg							< 0.50						
N-Nitroso-Di-N-Propylamine	mg/kg							< 0.50						
Nitrobenzene	mg/kg							< 0.50						
Phenol	mg/kg							< 0.50						
Pentachlorophenol (PCP)	mg/kg							< 0.50						

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Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	BH528	BH529	BH530	TP510	TP512	TP513	BHM4CAN044	TPM4CAN020	WSM4CAN025	WSM4CAN026
Location Type		BH	BH	BH	TP	TP	TP	BH	TP	WS	WS
Specimen Depth (m)		0.25 - 0.4	0.0 - 0.4	0.8 - 1.0	1.8 - 2.0	0.0 - 0.1	1.0 - 1.1	1.5	1	0.2	1.5
OD Level (m)		4.95	5.1	5.45	4.1	5.1	5.3				
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		TFD	TFD	TFD	TFD	TFD	TFD	MG	TFD	MG	MG
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI	2016 GI
4-Bromophenyl Phenyl Ether	mg/kg			< 0.50							<0.1
2-Nitroaniline	mg/kg			< 0.50							<0.1
4-Methylphenol	mg/kg			< 0.50							<0.1
4-Nitrophenol	mg/kg			< 0.50							<0.1
n-nitrosodimethylamine	mg/kg			< 0.50							
4-Nitroaniline	mg/kg			< 0.50							<0.1
Azobenzene	mg/kg			< 0.50							<0.1
Bis(2-chloroethyl)ether	mg/kg			< 0.50							<0.1
Butylbenzylphthalate	mg/kg			< 0.50							<0.1
Bis(2-chloroisopropyl)ether	mg/kg			< 0.50							
Bis(2-ethylhexyl)phthalate	mg/kg			< 0.50							<0.1
Bis(2-chloroethoxy)methane	mg/kg			< 0.50							<0.1
Carbazole	mg/kg			< 0.50							<0.1
Diethylphthalate	mg/kg			< 0.50							<0.1
Dibenzofuran	mg/kg			< 0.50							<0.1
Di-N-Octyl Phthalate	mg/kg			< 0.50							<0.1
Di-N-Butyl Phthalate	mg/kg			< 0.50							<0.1
Dimethylphthalate	mg/kg			< 0.50							<0.1
Hexachlorobenzene (HCB)	mg/kg			< 0.50							<0.1
Hexachloroethane	mg/kg			< 0.50							<0.1
Hexachlorocyclopentadiene	mg/kg			< 0.50							<0.1
Isophorone	mg/kg			< 0.50							<0.1
N-Nitroso-Di-N-Propylamine	mg/kg			< 0.50							<0.1
Nitrobenzene	mg/kg			< 0.50							<0.1
Phenol	mg/kg			< 0.50							<0.1
Pentachlorophenol (PCP)	mg/kg			< 0.50							<0.1

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Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Screening Values and Assessment

Exceeds S4ULs criteria	
Laboratory detection level higher than screening criterion	X

Sample Reference	Units	WSM4CAN026	WSM4CAN027	WSM4CAN029	WSM4CAN029	WSM4CAN030	WSM4CAN031
Location Type		WS	WS	WS	WS	WS	WS
Specimen Depth (m)		2.2	0.5	0.5	1.2	0.5	0.5
OD Level (m)							
Sample Type		ES	ES	ES	ES	ES	ES
Geology Code		TFD	MG	MG	TFD	TFD	TFD
Cluster Code		2016 GI	2016 GI	2016 GI	2016 GI	2016 GI	2016 GI
4-Bromophenyl Phenyl Ether	mg/kg	<0.1	<0.1	<0.1	<0.1		
2-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1		
4-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
4-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
n-nitrosodimethylamine	mg/kg						
4-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1		
Azobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1		
Bis(2-chloroethyl)ether	mg/kg	<0.1	<0.1	<0.1	<0.1		
Butylbenzylphthalate	mg/kg	<0.1	<0.1	<0.1	<0.1		
Bis(2-chloroisopropyl)ether	mg/kg						
Bis(2-ethylhexyl)phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1		
Bis(2-chloroethoxy)methane	mg/kg	<0.1	<0.1	<0.1	<0.1		
Carbazole	mg/kg	<0.1	<0.1	<0.1	<0.1		
Diethylphthalate	mg/kg	<0.1	<0.1	<0.1	<0.1		
Dibenzofuran	mg/kg	<0.1	<0.1	<0.1	<0.1		
Di-N-Octyl Phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1		
Di-N-Butyl Phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1		
Dimethylphthalate	mg/kg	<0.1	<0.1	<0.1	<0.1		
Hexachlorobenzene (HCB)	mg/kg	<0.1	<0.1	<0.1	<0.1		
Hexachloroethane	mg/kg	<0.1	<0.1	<0.1	<0.1		
Hexachlorocyclopentadiene	mg/kg	<0.1	<0.1	<0.1	<0.1		
Isophorone	mg/kg	<0.1	<0.1	<0.1	<0.1		
N-Nitroso-Di-N-Propylamine	mg/kg	<0.1	<0.1	<0.1	<0.1		
Nitrobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1		
Phenol	mg/kg	<0.1	<0.1	<0.1	<0.1		
Pentachlorophenol (PCP)	mg/kg	<0.1	<0.1	<0.1	<0.1		

Appendix 4

Groundwater Laboratory Data

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-27
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Location	Units	Screening Criteria	
Monitoring Round		EQS	DWS
Location Type			
Response Zone (RZ) Details			
Depth			
Installation Details			
Strata Water Level Encountered on Sampling			
Date Sampled			
Metals			
Arsenic Dissolved	ug/l	50	10
Boron Dissolved	ug/l	2000	1000
Calcium Dissolved	ug/l		
Chromium Dissolved	ug/l		50
Copper Dissolved	ug/l	10	2000
Iron Dissolved	ug/l	1000	200
Lead Dissolved	ug/l	1.2	10
Magnesium Dissolved	ug/l		
Manganese Dissolved	ug/l	30	50
Nickel Dissolved	ug/l	4	20
Selenium Dissolved	ug/l		10
Cadmium Dissolved	ug/l	0.15	5
Vanadium Dissolved	ug/l		
Zinc Dissolved	ug/l	75	
Mercury Dissolved	ug/l	0.07	1
Cadmium Total	ug/l	0.15	5
Zinc Total	ug/l	75	
Mercury Total	ug/l	0.07	1
Non-Metal Inorganics			
Hardness Total	mg/l		
Total Alkalinity as CaCO3	mg/l		
BOD	mg/l	5	
COD	mg/l		
Potassium Dissolved	mg/l		
Sodium Dissolved	mg/l		200
Nitrate as NO3	mg/l		50
Nitrite as NO2	mg/l		
Total Diss Sulphur	mg/l		
Sulphate (soluble)	mg/l	400	250
Chloride	mg/l	250	250
Sulphide	mg/l		
Ammoniacal Nitrogen as N	mg/l	0.6	
Unionised ammonia	mg/l		
Total Ammonium as NH4	mg/l		0.5
Phenols Monohydric	mg/l		
Thiocyanate	mg/l		
Total Cyanide	mg/l	0.001	0.05
Free Cyanide	mg/l		
Complex Cyanide	mg/l		
Carbon Dioxide Dissolved	ug/l		
Conductivity @ 20 deg.C	mS/cm		
pH Value	pH units	6-9	6.5-10
Organics			
GRO (C4-C12)	ug/l		
GRO Surrogate % recovery**	%		
MTBE	ug/l		
Benzene	ug/l	10	1
Toluene	ug/l	50	
Ethyl benzene	ug/l	20	
m & p Xylene	ug/l	30	
o Xylene	ug/l	30	
TPH			
Aliphatics C5-C6	ug/l		
Aliphatics >C6-C8	ug/l		
Aliphatics >C8-C10	ug/l		
Aliphatics >C10-C12	ug/l		
Aliphatics >C12-C16 Aqueous	ug/l		
Aliphatics >C16-C21 Aqueous	ug/l		
Aliphatics >C21-C35 Aqueous	ug/l		
Total Aliphatics C5-C35 Aqueous	ug/l		
Aliphatics >C35-44	ug/l		
Aromatics >C5-C7	ug/l		
Aromatics C6-C7	ug/l		
Aromatics >C7-C8	ug/l		
Aromatics >EC8-EC10	ug/l		
Aromatics >EC10-EC12	ug/l		
Aromatics >EC12-EC16 Aqueous	ug/l		
Aromatics >EC16-EC21 Aqueous	ug/l		
Aromatics >EC21-EC35 Aqueous	ug/l		
Total Aromatics C6-C35 Aqueous	ug/l		
Aromatics >C35-44	ug/l		
Total Aliphatic TPH	ug/l		
Total Aromatic TPH	ug/l		
TPH (Aliphatics and Aromatics C5-C35)	ug/l		
Total petroleum hydrocarbons	ug/l		
TPH FTIR	ug/l		
TPH GC	ug/l		
PCBs			
PCB- ARO	ug/l		
Cresols	ug/l		
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0
Pcb-28 2,4,4' - Trichlororobiphenyl	ug/l	0	0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0
PCB congener 105	ug/l		
PCB congener 114	ug/l		
PCB congener 118	ug/l		

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
N/A = Not Available

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Installation Details of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
48	45	216	2	Deep @ BHM4CAN044	6	25
18	17	1900	390	Shallow @ BH530	0	9
11	11	420000	110000	@ SBHK04		
48	40	240	2	Deep @ BH528		9
48	41	110	2	Deep @ BH528	15	0
17	11	3000	10	@ SBHK01	1	7
48	22	14.6	0.05	Single @ WSM4CAN030	10	2
11	10	340000	70300	@ SBHK03		
10	10	1800	0.00137	@ SBHK04	8	8
48	46	20.1	1.6	Single @ WSM4CAN031	24	1
48	45	180	2	Deep @ BH528		22
40	9	0.78	0.092	Shallow @ BH527	5	0
10	10	39.1	0.937	Single @ WSM4CAN028		
31	30	90.3	1	Single @ WSM4CAN028	1	
40	9	1.3	0.6	Deep @ BH528	9	3
8	6	12	0.5	@ SBHK01	6	2
17	17	4800	4	@ SBHK01	8	
8	5	0.05	0.01	@ SBHK01	0	0
8	8	2300	690	@ SBHK04		
38	37	3300	225	@ SBHK01		
8	4	12	3	@ SBHK01	3	
12	11	6200	23	@ SBHK01		
11	11	75	11.8	@ SBHK03		
11	11	3500	112	@ SBHK03		10
21	4	12	0.946	Single @ WSM4CAN028		0
10	2	0.129	0.089	Shallow @ BHM4CAN044		0
3	3	62	26.4	@ CH 51		
17	17	550	71	@ SBHK04	3	8
39	38	5300	55	@ SBHK04	29	29
12	0	None > LOD	None > LOD			
45	44	35	0.2	@ SBHK03	43	
17	17	7.190278222	0.000928984	@ RBBH005		
4	4	35	6.8	@ SBHK04		4
20	0	None > LOD	None > LOD			
10	6	2.3	0.2	@ RBBH004		
38	4	0.4	0.09	@ RBBH004	4	4
19	0	None > LOD	None > LOD			
2	0	None > LOD	None > LOD			
4	4	92	26	@ SBHK04		
10	10	6.1	0.839	Deep @ BHM4CAN044		0
48	47	12.7	7.3	@ RBBH005	0	1
18	1	53	53	Deep @ BHM4CAN044		
10	10	97	79	Shallow @ BHM4CAN044		0
24	0	None > LOD	None > LOD			
36	0	None > LOD	None > LOD		0	0
36	0	None > LOD	None > LOD		0	
36	0	None > LOD	None > LOD		0	
36	1	1.3	1.3	Deep @ BH528	0	
36	0	None > LOD	None > LOD		0	
36	0	None > LOD	None > LOD			
36	1	11	11	Deep @ BHM4CAN044		
36	1	12	12	Deep @ BHM4CAN044		
36	1	11	11	Deep @ BHM4CAN044		
36	1	29	29	Deep @ BH530		
36	3	110	18	Shallow @ BH527		
36	7	1600	0.75	Shallow @ BH527		
18	5	270	58	@ SBHK01		
18	1	46	46	Shallow @ BH527		
18	0	None > LOD	None > LOD			
18	0	None > LOD	None > LOD			
36	0	None > LOD	None > LOD			
36	0	None > LOD	None > LOD			
36	1	3.8	3.8	Deep @ BH530		
36	3	16	5.6	Shallow @ BH527		
36	1	170	170	Shallow @ BH527		
18	0	None > LOD	None > LOD			
18	0	None > LOD	None > LOD			
18	3	1700	18	Shallow @ BH527		
18	3	190	5.6	Shallow @ BH527		
21	8	270	10	@ SBHK01		
18	3	1900	23	Shallow @ BH527		
3	3	90	80	@ CH 51		
3	3	5700	270	@ CH 51		
1	1	1	1	@ CH52 A		
1	0	None > LOD	None > LOD			
12	0	None > LOD	None > LOD		0	0
12	0	None > LOD	None > LOD		0	0
12	0	None > LOD	None > LOD		0	0
12	0	None > LOD	None > LOD		0	0
12	0	None > LOD	None > LOD		0	0
12	0	None > LOD	None > LOD		0	0
12	0	None > LOD	None > LOD		0	0
12	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

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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

N/A = Not Available

Location	Units	Screening Criteria		BHM4CAN044	BHM4CAN044	BHM4CAN044	BHM4CAN044	BHM4CAN044	WSM4CAN028	WSM4CAN029	WSM4CAN030	WSM4CAN031
Monitoring Round		EQS	DWS		2		3		3	3	3	3
Location Type					BH				WS	WS	WS	WS
Response Zone (RZ) Details				TFD	MMG	TFD	MMG	TFD	TFD	TFD	TFD	TFD
Depth				0.89	1.47	0.97	1.5	1.13	0.63	0.64	0.87	0.39
Installation Details				Shallow	Deep	Shallow	Deep	Shallow	Single	Single	Single	Single
Strata Water Level Encountered on Sampling												
Date Sampled				/2016	19/05/2016		02/06/2016		14/06/2016	14/06/2016	14/06/2016	14/06/2016
Metals												
Arsenic Dissolved	ug/l	50	10	8.72	216	4.17	216	6.37	9.87	3.06	4.19	4.69
Boron Dissolved	ug/l	2000	1000									
Calcium Dissolved	ug/l											
Chromium Dissolved	ug/l		50	10.7	30.1	7.24	7.78	2.14	10	9.76	13.9	11.5
Copper Dissolved	ug/l	10	2000	<0.85	<0.85	<0.85	<0.85	<0.85	8.73	2.08	17.2	6.34
Iron Dissolved	ug/l	1000	200									
Lead Dissolved	ug/l	1.2	10	0.265	0.398	<0.02	0.186	0.05	11.4	6.05	14.6	8.44
Magnesium Dissolved	ug/l											
Manganese Dissolved	ug/l	30	50									
Nickel Dissolved	ug/l	4	20	4.35	2.82	4.38	2.25	3.99	3.56	3.6	11.3	20.1
Selenium Dissolved	ug/l		10	3.72	11.8	6.46	10.4	4.37	14	5.78	8.57	12.5
Cadmium Dissolved	ug/l	0.15	5	<0.1	0.228	<0.1	<0.1	<0.1	0.24	<0.1	0.2	0.134
Vanadium Dissolved	ug/l			8.36	9.62	2.63	0.937	1.07	39.1	10.8	5.17	4.33
Zinc Dissolved	ug/l	75		1.6	4.17	2.18	2.04	1.25	90.3	54.9	36	40.6
Mercury Dissolved	ug/l	0.07	1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cadmium Total	ug/l	0.15	5									
Zinc Total	ug/l	75										
Mercury Total	ug/l	0.07	1									
Non-Metal Inorganics												
Hardness Total	mg/l											
Total Alkalinity as CaCO3	mg/l			550	1360	428	1410	429	225	580	415	470
BOD	mg/l	5										
COD	mg/l											
Potassium Dissolved	mg/l											
Sodium Dissolved	mg/l		200									
Nitrate as NO3	mg/l		50	<0.3	<0.3	<0.3	1.08	<0.3	12	<0.3	0.946	<0.3
Nitrite as NO2	mg/l			<0.05	<0.05	0.129	<0.05	<0.05	<0.05	<0.05	0.089	<0.05
Total Diss Sulphur	mg/l											
Sulphate (soluble)	mg/l	400	250									
Chloride	mg/l	250	250	181	1100	60.9	1180	55	383	169	124	199
Sulphide	mg/l											
Ammoniacal Nitrogen as N	mg/l	0.6		3.19	10.8	2.31	11.4	2.22	9.82	2.83	0.723	1.2
Unionised ammonia	mg/l											
Total Ammonium as NH4	mg/l		0.5									
Phenols Monohydric	mg/l											
Thiocyanate	mg/l											
Total Cyanide	mg/l	0.001	0.05									
Free Cyanide	mg/l											
Complex Cyanide	mg/l											
Carbon Dioxide Dissolved	ug/l											
Conductivity @ 20 deg.C	mS/cm			1.32	4.56	0.839	4.75	0.893	1.59	2.54	1.17	1.6

M4CAN

Groundwater Sample Analysis & Screening Assessment

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Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend	
Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

N/A = Not Available

Location	Units	Screening Criteria		SBHK04	SBHK04	BH527	BH527	BH527	BH527	BH527	BH527	BH528	BH528	BH528	BH528	BH528	BH528	BH530	BH530	BH530	BH530	BH530	BH530	BHM4CAN044			
Monitoring Round		EQS	DWS	1	2	1		2		3		1		2		3		1		2		3					
Location Type				BH	BH	BH						BH						BH									
Response Zone (RZ) Details				TFD		MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	
Depth				8.87	12.2	2.92	7.66	1.93	7.29	1.99	4.71	1.76	6.44	1.53	6.8	1.64	6.29	2.53	5.45	2.47	4.57	2.97	5.07	1.41			
Installation Details						Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	
Strata Water Level Encountered on Sampling				TFD																							
Date Sampled				26/02/2008	20/03/2008	20/03/2015		27/03/2015		13/04/2015		20/03/2015		27/03/2015		13/04/2015		30/03/2015		14/04/2015		21/04/2015		06/05			
pH Value	pH units	6-9	6.5-10	7.82	8.95	8.1	7.9	7.5	7.6	9.1	9	8.1	7.9	7.3	I/S	8.2	7.8	7.4	7.3	8.2	7.7	8.3	7.9	7.46			
Organics																											
GRO (C4-C12)	ug/l			<10	<10																			53			
GRO Surrogate % recovery**	%																							82			
MTBE	ug/l			<10	<10							<1	<1			<1	<1					<1	<1	<3			
Benzene	ug/l	10	1	<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	I/S	<1	<1	<1	<1	<1	<1	<1	<1	<7			
Toluene	ug/l	50		<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	I/S	<1	<1	<1	<1	<1	<1	<1	<1	<4			
Ethyl benzene	ug/l	20		<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	I/S	<1	<1	<1	<1	<1	<1	<1	<1	<5			
m & p Xylene	ug/l	30		<10	<10	<1	<1	<1	<1	<1	<1	1.3	<1	<1	I/S	<1	<1	<1	<1	<1	<1	<1	<1	<8			
o Xylene	ug/l	30		<10	<10	<1	<1	<1	<1	<1	<1	<1	<1	<1	I/S	<1	<1	<1	<1	<1	<1	<1	<1	<3			
TPH																											
Aliphatics C5-C6	ug/l			<10	<10	<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	<0.1	<0.1	<0.1	<10			
Aliphatics >C6-C8	ug/l			<10	<10	<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	<0.1	<0.1	<0.1	11			
Aliphatics >C8-C10	ug/l			<10	<10	<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	<0.1	<0.1	<0.1	12			
Aliphatics >C10-C12	ug/l			<10	<10	<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	<0.1	<0.1	<0.1	11			
Aliphatics >C12-C16 Aqueous	ug/l			<10	<10	<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	<0.1	<0.1	<0.1	<10			
Aliphatics >C16-C21 Aqueous	ug/l			<10	<10	<0.1	110	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	53	18	<0.1	<0.1	<0.1	<10			
Aliphatics >C21-C35 Aqueous	ug/l			<10	<10	<0.1	1600	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.75	<0.1	<0.1	<0.1	<0.1	<10			
Total Aliphatics C5-C35 Aqueous	ug/l			<10	<10																			<10			
Aliphatics >C35-44	ug/l					<0.1	46	<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	<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	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Aromatics C6-C7	ug/l			<10	<10																			<10			
Aromatics >C7-C8	ug/l			<10	<10	<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	<0.1	<0.1	<0.1	<10			
Aromatics >EC8-EC10	ug/l			<10	<10	<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	<0.1	<0.1	<0.1	<10			
Aromatics >EC10-EC12	ug/l			<10	<10	<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	<0.1	<0.1	<0.1	<10			
Aromatics >EC12-EC16 Aqueous	ug/l			<10	<10	<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	3.8	<0.1	<0.1	<0.1	<0.1	<10			
Aromatics >EC16-EC21 Aqueous	ug/l			<10	<10	<0.1	16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	14	5.6	<0.1	<0.1	<0.1	<10			
Aromatics >EC21-EC35 Aqueous	ug/l			<10	<10	<0.1	170	<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	<0.1	<10			
Total Aromatics C6-C35 Aqueous	ug/l			<10	<10																			<10			
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	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Total Aliphatic TPH	ug/l					<5	1700	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	83	18	<5	<5	<5	<5				
Total Aromatic TPH	ug/l					<5	190	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	18	5.6	<5	<5	<5	<5				
TPH (Aliphatics and Aromatics C5-C35)	ug/l			<10	<10																			53			
Total petroleum hydrocarbons	ug/l					<10	1900	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	100	23	<10	<10	<10	<10				
TPH FTIR	ug/l																										
TPH GC	ug/l																										
PCBs																											
PCB- ARO	ug/l																										
Cresols	ug/l																										
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0			<0.01	<0.01	<0.01	<0.01	<0.01	<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	0			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01										
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0			<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01										

M4CAN

Groundwater Sample Analysis & Screening Assessment

CL-27

27/06/2016

Screening Values & Assessment	
Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X
Geological Formation legend	
Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG
Notes	
EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
N/A = Not Available	

Location	Units	Screening Criteria		CH 51	CH52	CH52 A	RBBH003	RBBH003	RBBH003	RBBH004	RBBH004	RBBH004	RBBH005	RBBH005	RBBH005	SBHK01	SBHK01	SBHK02	SBHK02	SBHK03	SBHK03
Monitoring Round		EQS	DWS				1	2	3	1	2	3	1	2	3	1	2	1	2	1	2
Location Type				TP	TP	TP	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH
Response Zone (RZ) Details				MG	MG	MG	TFD / PEAT			TFD / PEAT			MG / TFD			TFD / PEAT		TFD / PEAT		TFD / PEAT	
Depth																1	6.8	1.33	11.2	0.89	5.9
Installation Details																					
Strata Water Level Encountered on Sampling				MG	MG	MG										TFD		MG		MG	
Date Sampled				2000	2000	2000	05/03/2002			01/03/2002			01/03/2002			26/02/2008	20/03/2008	26/02/2008	20/03/2008	26/02/2008	20/03/2008
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0																		
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0																		
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0																		
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0																		
PCB congener 105	ug/l																				
PCB congener 114	ug/l																				
PCB congener 118	ug/l																				
PCB congener 123	ug/l																				
PCB congener 126	ug/l																				
PCB congener 156	ug/l																				
PCB congener 157	ug/l																				
PCB congener 167	ug/l																				
PCB congener 169	ug/l																				
PCB congener 189	ug/l																				
PCB congener 77	ug/l																				
PCB congener 81	ug/l																				
Phenols																					
Dimethylphenols	ug/l			<0.5																	
Trimethylphenols	ug/l			<0.5																	
2-Chlorophenol	ug/l	50														<1	<1	<1	<1	<1	<1
2 - Methyl-4,6-Dinitrophenol	ug/l																				
2-Methylphenol	ug/l	100														<1	<1	<1	<1	<1	<1
2-Nitrophenol	ug/l															<1	<1	<1	<1	<1	<1
2,4-Dichlorophenol	ug/l	20														<1	<1	<1	<1	<1	<1
2,4-Dimethylphenol	ug/l															<1	<1	<1	<1	<1	<1
2,4,5-Trichlorophenol	ug/l															<1	<1	<1	<1	<1	<1
2,4,6-Trichlorophenol	ug/l															<1	<1	<1	<1	<1	<1
4-Chloro-3-methylphenol	ug/l	40														<1	<1	<1	<1	<1	<1
4-Methylphenol	ug/l	100														<1	<1	<1	<1	<1	<1
4-Nitrophenol	ug/l															<1	<1	<1	<1	<1	<1
Pentachlorophenol	ug/l	0.4														<1	<1	<1	<1	<1	<1
Phenol	ug/l	7.7		<0.0005												<1	<1	<1	<1	<1	<1
Phenols	mg/l	0.0077														<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
PAHs																					
2-Chloronaphthalene	ug/l															<1	<1	<1	<1	<1	<1
2-Methylnaphthalene	ug/l															<1	<1	<1	<1	<1	<1
Acenaphthene	ug/l			<0.05	<0.05	<0.05			<2			<2			<2	<1	<1	<1	<1	<1	<1
Acenaphthylene	ug/l			<1.00	<1.00	<1.00			<2			<2			<2	<1	<1	<1	<1	<1	<1
Anthracene	ug/l	0.1		<0.05	<0.05	0.07			<2			<2			<2	<1	<1	<1	<1	<1	<1
Benzo(a)anthracene	ug/l			<0.05	<0.05	0.1			<2			<2			<2	<1	<1	<1	<1	<1	<1
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.05	<0.05	0.06			<2			<2			<2	<1	<1	<1	<1	<1	<1
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.05	<0.05	0.07			<2			<2			<2	<1	<1	<1	<1	<1	<1

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Groundwater Sample Analysis & Screening Assessment

CL-27

27/06/2016

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

N/A = Not Available

Location	Units	Screening Criteria		SBHK04	SBHK04	BH527	BH527	BH527	BH527	BH527	BH527	BH528	BH528	BH528	BH528	BH528	BH528	BH530	BH530	BH530	BH530	BH530	BH530	BH530	BHM4CAN044		
Monitoring Round		EQS	DWS	1	2	1		2		3		1		2		3		1		2		3					
Location Type				BH	BH	BH						BH						BH									
Response Zone (RZ) Details				TFD		MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	
Depth				8.87	12.2	2.92	7.66	1.93	7.29	1.99	4.71	1.76	6.44	1.53	6.8	1.64	6.29	2.53	5.45	2.47	4.57	2.97	5.07	1.41			
Installation Details						Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	
Strata Water Level Encountered on Sampling				TFD																							
Date Sampled				26/02/2008	20/03/2008	20/03/2015		27/03/2015		13/04/2015		20/03/2015		27/03/2015		13/04/2015		30/03/2015		14/04/2015		21/04/2015		06/05			
Benzo(ghi)perylene	ug/l	0.0082	0.1	<1	<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	<0.1	<0.1	<0.1	<0.1	<0.016			
Benzo(k)fluoranthene	ug/l	0.017	0.1	<1	<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	<0.1	<0.1	<0.1	<0.1	<0.027			
Chrysene	ug/l			<1	<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	<0.1	<0.1	<0.1	<0.1	<0.013			
Dibenzo(a,h)anthracene	ug/l			<1	<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	<0.1	<0.1	<0.1	<0.1	<0.016			
Fluoranthene	ug/l	0.0063		<1	<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	<0.1	<0.1	<0.1	<0.1	<0.017			
Fluorene	ug/l			<1	<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	<0.1	<0.1	<0.1	<0.1	<0.014			
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<1	<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	<0.1	<0.1	<0.1	<0.1	<0.014			
Naphthalene	ug/l	2		<1	<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	<0.1	<0.1	<0.1	<0.1	<0.1			
Phenanthrene	ug/l			<1	<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	<0.1	<0.1	<0.1	<0.1	<0.022			
Pyrene	ug/l			<1	<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	<0.1	<0.1	<0.1	<0.1	<0.015			
Total PAHs (USEPA 16)	ug/l					<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<0.344			
Phthalates																											
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<2	<2							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	3.29			
Butylbenzyl phthalate	ug/l	20		<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1			
Di-n-butyl phthalate	ug/l	8		<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1			
Di-n-Octyl phthalate	ug/l	20		<5	<5							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1			
Diethyl phthalate	ug/l	200		<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1			
Dimethyl phthalate	ug/l	800		<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1			
VOCs																											
Full suite	ug/l																										
1,1,1,2-Tetrachloroethane	ug/l											<2	<2			<2	<2					<2	<2	<1			
1,1,1-Trichloroethane	ug/l	100										<1	<1			<1	<1					<1	<1	<1			
1,1,2-Trichloroethane	ug/l	400										<10	<10			<10	<10					<10	<10	<1			
1,1-Dichloroethane	ug/l											<1	<1			<1	<1					<1	<1	<1			
1,1-Dichloroethene	ug/l											<1	<1			<1	<1					<1	<1	<1			
1,1-Dichloropropene	ug/l											<1	<1			<1	<1					<1	<1	<1			
1,2,3-Trichlorobenzene	ug/l	0.4										<2	<2			<2	<2					<2	<2	<1			
1,2,3-Trichloropropane	ug/l											<50	<50			<50	<50					<50	<50	<1			
1,2,4-Trichlorobenzene	ug/l	0.4										<1	<1			<1	<1					<1	<1	<1			
1,2,4-Trimethylbenzene	ug/l											<1	<1			<1	<1					<1	<1	<1			
1,2-Dibromo-3-Chloropropane	ug/l											<50	<50			<50	<50					<50	<50	<1			
1,2-Dibromoethane	ug/l											<5	<5			<5	<5					<5	<5	<1			
1,2-Dichlorobenzene	ug/l	20										<1	<1			<1	<1					<1	<1	<1			
1,2-Dichloroethane	ug/l	10	3									<2	<2			<2	<2					<2	<2	<1			
1,2-Dichloropropane	ug/l											<1	<1			<1	<1					<1	<1	<1			
1,3,5-Trimethylbenzene	ug/l											<1	<1			<1	<1					<1	<1	<1			
1,3-Dichloropropane	ug/l											<2	<2			<2	<2					<2	<2	<1			
1,4-Dichlorobenzene	ug/l	20										<1	<1			<1	<1					<1	<1	<1			
2-Chlorotoluene	ug/l											<1	<1			<1	<1					<1	<1	<1			
4-Bromofluorobenzene**	%																							94.6			
4-Chlorotoluene	ug/l											<1	<1			<1	<1					<1	<1	<1			
4-Isopropyltoluene	ug/l											<1	<1			<1	<1					<1	<1	<1			

M4CAN
Groundwater Sample Analysis & Screening Assessment
CL-27
27/06/2016

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

N/A = Not Available

Location	Units	Screening Criteria		BHM4CAN044	BHM4CAN044	BHM4CAN044	BHM4CAN044	BHM4CAN044	WSM4CAN028	WSM4CAN029	WSM4CAN030	WSM4CAN031
Monitoring Round		EQS	DWS		2		3		3	3	3	3
Location Type					BH				WS	WS	WS	WS
Response Zone (RZ) Details				TFD	MMG	TFD	MMG	TFD	TFD	TFD	TFD	TFD
Depth				0.89	1.47	0.97	1.5	1.13	0.63	0.64	0.87	0.39
Installation Details				Shallow	Deep	Shallow	Deep	Shallow	Single	Single	Single	Single
Strata Water Level Encountered on Sampling												
Date Sampled				/2016	19/05/2016		02/06/2016		14/06/2016	14/06/2016	14/06/2016	14/06/2016
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027
Chrysene	ug/l			<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013	<0.013
Dibenzo(a,h)anthracene	ug/l			<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016
Fluoranthene	ug/l	0.0063		<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017
Fluorene	ug/l			<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	<0.014
Naphthalene	ug/l	2		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	ug/l			<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	0.0251
Pyrene	ug/l			<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.0161
Total PAHs (USEPA 16)	ug/l			<0.344	<0.344	<0.344	<0.344	<0.344	<0.344	<0.344	<0.344	<0.344
Phthalates												
Bis(2-ethylhexyl) phthalate	ug/l	1.3		5.29	<1	2.01	<1	<1	<1	<1	3.1	3.22
Butylbenzyl phthalate	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1
Di-n-butyl phthalate	ug/l	8		<1	<1	<1	<1	<1	<1	<1	<1	1.47
Di-n-Octyl phthalate	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1
Diethyl phthalate	ug/l	200		<1	<1	<1	<1	<1	2.41	1.09	<1	1.99
Dimethyl phthalate	ug/l	800		<1	<1	<1	<1	<1	<1	<1	<1	<1
VOCs												
Full suite	ug/l											
1,1,1,2-Tetrachloroethane	ug/l			<1	<1	<1			<1	<1	<1	<1
1,1,1-Trichloroethane	ug/l	100		<1	<1	<1			<1	<1	<1	<1
1,1,2-Trichloroethane	ug/l	400		<1	<1	<1			<1	<1	<1	<1
1,1-Dichloroethane	ug/l			<1	<1	<1			<1	<1	<1	<1
1,1-Dichloroethene	ug/l			<1	<1	<1			<1	<1	<1	<1
1,1-Dichloropropene	ug/l			<1	<1	<1			<1	<1	<1	<1
1,2,3-Trichlorobenzene	ug/l	0.4		<1	<1	<1			<1	<1	<1	<1
1,2,3-Trichloropropane	ug/l			<1	<1	<1			<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1	<1			<1	<1	<1	<1
1,2,4-Trimethylbenzene	ug/l			<1	<1	<1			<1	<1	<1	<1
1,2-Dibromo-3-Chloropropane	ug/l			<1	<1	<1			<1	<1	<1	<1
1,2-Dibromoethane	ug/l			<1	<1	<1			<1	<1	<1	<1
1,2-Dichlorobenzene	ug/l	20		<1	<1	<1			<1	<1	<1	<1
1,2-Dichloroethane	ug/l	10	3	<1	<1	<1			<1	<1	<1	<1
1,2-Dichloropropane	ug/l			<1	<1	<1			<1	<1	<1	<1
1,3,5-Trimethylbenzene	ug/l			<1	<1	<1			<1	<1	<1	<1
1,3-Dichloropropane	ug/l			<1	<1	<1			<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l	20		<1	<1	<1			<1	<1	<1	<1
2-Chlorotoluene	ug/l			<1	<1	<1			<1	<1	<1	<1
4-Bromofluorobenzene**	%			94.9	99.1	98.5			99.8	99.8	98.9	98.2
4-Chlorotoluene	ug/l			<1	<1	<1			<1	<1	<1	<1
4-Isopropyltoluene	ug/l			<1	<1	<1			<1	<1	<1	<1

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Groundwater Sample Analysis & Screening Assessment

CL-27

27/06/2016

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend	
Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes

EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

N/A = Not Available

Location	Units	Screening Criteria		CH 51	CH52	CH52 A	RBBH003	RBBH003	RBBH003	RBBH004	RBBH004	RBBH004	RBBH005	RBBH005	RBBH005	SBHK01	SBHK01	SBHK02	SBHK02	SBHK03	SBHK03
Monitoring Round		EQS	DWS				1	2	3	1	2	3	1	2	3	1	2	1	2	1	2
Location Type				TP	TP	TP	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH	BH
Response Zone (RZ) Details				MG	MG	MG	TFD / PEAT			TFD / PEAT			MG / TFD			TFD / PEAT		TFD / PEAT		TFD / PEAT	
Depth																1	6.8	1.33	11.2	0.89	5.9
Installation Details																					
Strata Water Level Encountered on Sampling				MG	MG	MG										TFD		MG		MG	
Date Sampled				2000	2000	2000	05/03/2002			01/03/2002			01/03/2002			26/02/2008	20/03/2008	26/02/2008	20/03/2008	26/02/2008	20/03/2008
Benzene	ug/l	10	1																		
Bromobenzene	ug/l																				
Bromochloromethane	ug/l		100																		
Bromodichloromethane	ug/l																				
Bromomethane	ug/l																				
Chlorobenzene	ug/l																				
Chloroethane	ug/l																				
Chloroethene	ug/l																				
Chloroform	ug/l	2.5	100																		
Chloromethane	ug/l																				
cis-1,2-Dichloroethene	ug/l																				
cis-1,3-Dichloropropene	ug/l																				
Dibromofluoromethane**	%																				
Dibromochloromethane	ug/l		100																		
Dibromomethane	ug/l																				
Dichlorodifluoromethane	ug/l																				
Ethylbenzene	ug/l	20																			
Hexachlorobutadiene (HCBd)	ug/l	0.6																			
Isopropylbenzene	ug/l																				
m,p xylenes	ug/l	30																			
Methyl tert-butyl ether (MTBE)	ug/l																				
n-Butylbenzene	ug/l																				
n-propylbenzene	ug/l																				
O-Xylene	ug/l	30																			
Sec-Butylbenzene	ug/l																				
Styrene	ug/l	50																			
Tert-Butylbenzene	ug/l																				
Tetrachloroethene	ug/l	10	10																		
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3																		
Toluene-d8**	%																				
Toluene	ug/l	50																			
trans-1,2-Dichloroethene	ug/l																				
trans-1,3-Dichloropropene	ug/l																				
Tribromomethane	ug/l		100																		
Trichloroethene	ug/l	10	10																		
Trichlorofluoromethane	ug/l																				
Other Semi-Volatiles																					
1,2-Dichlorobenzene	ug/l	20														<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l	0.4														<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	ug/l	20														<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l	20														<1	<1	<1	<1	<1	<1
2-Nitroaniline	ug/l															<1	<1	<1	<1	<1	<1

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Groundwater Sample Analysis & Screening Assessment

CL-27

27/06/2016

Screening Values & Assessment	
Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend	
Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes	
EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
N/A = Not Available	

Location	Units	Screening Criteria		SBHK04	SBHK04	BH527	BH527	BH527	BH527	BH527	BH527	BH528	BH528	BH528	BH528	BH528	BH528	BH530	BH530	BH530	BH530	BH530	BH530	BHM4CAN044		
Monitoring Round		EQS	DWS	1	2	1		2		3		1		2		3		1		2		3				
Location Type				BH	BH	BH						BH				BH				BH						
Response Zone (RZ) Details				TFD		MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG	TFD	MMG
Depth				8.87	12.2	2.92	7.66	1.93	7.29	1.99	4.71	1.76	6.44	1.53	6.8	1.64	6.29	2.53	5.45	2.47	4.57	2.97	5.07		1.41	
Installation Details						Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Strata Water Level Encountered on Sampling				TFD																						
Date Sampled				26/02/2008	20/03/2008	20/03/2015		27/03/2015		13/04/2015		20/03/2015		27/03/2015		13/04/2015		30/03/2015		14/04/2015		21/04/2015		06/05/2015		
Benzene	ug/l	10	1			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1			
Bromobenzene	ug/l											<1	<1			<1	<1					<1	<1	<1		
Bromochloromethane	ug/l		100									<5	<5			<5	<5					<5	<5	<1		
Bromodichloromethane	ug/l											<5	<5			<5	<5					<5	<5	<1		
Bromomethane	ug/l											<5	<5			<5	<5					<5	<5	<1		
Chlorobenzene	ug/l											<1	<1			<1	<1					<1	<1	<1		
Chloroethane	ug/l											<2	<2			<2	<2					<2	<2	<1		
Chloroethene	ug/l											<1	<1			<1	<1					<1	<1	<1		
Chloroform	ug/l	2.5	100									<1	<1			<1	<1					<1	<1	<1		
Chloromethane	ug/l											<1	<1			<1	<1					<1	<1	<1		
cis-1,2-Dichloroethene	ug/l											<1	<1			<1	<1					<1	<1	<1		
cis-1,3-Dichloropropene	ug/l											<10	<10			<10	<10					<10	<10	<1		
Dibromofluoromethane**	%																							112		
Dibromochloromethane	ug/l		100									<10	<10			<10	<10					<10	<10	<1		
Dibromomethane	ug/l											<10	<10			<10	<10					<10	<10	<1		
Dichlorodifluoromethane	ug/l											<1	<1			<1	<1					<1	<1	<1		
Ethylbenzene	ug/l	20				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Hexachlorobutadiene (HCBd)	ug/l	0.6										<1	<1			<1	<1					<1	<1	<1		
Isopropylbenzene	ug/l											<1	<1			<1	<1					<1	<1	<1		
m,p xylenes	ug/l	30				<1	<1	<1	<1	<1	<1	1.3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Methyl tert-butyl ether (MTBE)	ug/l											<1	<1			<1	<1					<1	<1	<1		
n-Butylbenzene	ug/l											<1	<1			<1	<1					<1	<1	<1		
n-propylbenzene	ug/l											<1	<1			<1	<1					<1	<1	<1		
O-Xylene	ug/l	30				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
Sec-Butylbenzene	ug/l											<1	<1			<1	<1					<1	<1	<1		
Styrene	ug/l	50										<1	<1			<1	<1					<1	<1	<1		
Tert-Butylbenzene	ug/l											<1	<1			<1	<1					<1	<1	<1		
Tetrachloroethene	ug/l	10	10									<1	<1			<1	<1					<1	<1	<1		
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3									<1	<1			<1	<1					<1	<1	<1		
Toluene-d8**	%																							98.6		
Toluene	ug/l	50				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1		
trans-1,2-Dichloroethene	ug/l											<1	<1			<1	<1					<1	<1	<1		
trans-1,3-Dichloropropene	ug/l											<10	<10			<10	<10					<10	<10	<1		
Tribromomethane	ug/l		100									<1	<1			<1	<1					<1	<1	<1		
Trichloroethene	ug/l	10	10									<1	<1			<1	<1					<1	<1	<1		
Trichlorofluoromethane	ug/l											<1	<1			<1	<1					<1	<1	<1		
Other Semi-Volatiles																										
1,2-Dichlorobenzene	ug/l	20		<1	<1																			<1		
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1																			<1		
1,3-Dichlorobenzene	ug/l	20		<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1		
1,4-Dichlorobenzene	ug/l	20		<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1		
2-Nitroaniline	ug/l			<1	<1							<0.5	<0.5			<0.5	<0.5					<0.5	<0.5	<1		

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Groundwater Sample Analysis & Screening Assessment
CL-27
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Screening Values & Assessment	
Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend	
Made Ground	MG
Tidal Flat Deposits	TFD
Peat	PEAT
Mercia Mudstone Group	MMG

Notes	
EQS calcium carbonate 100-150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
N/A = Not Available	

Location	Units	Screening Criteria		BHM4CAN044	BHM4CAN044	BHM4CAN044	BHM4CAN044	BHM4CAN044	WSM4CAN028	WSM4CAN029	WSM4CAN030	WSM4CAN031
Monitoring Round		EQS	DWS		2		3		3	3	3	3
Location Type					BH				WS	WS	WS	WS
Response Zone (RZ) Details				TFD	MMG	TFD	MMG	TFD	TFD	TFD	TFD	TFD
Depth				0.89	1.47	0.97	1.5	1.13	0.63	0.64	0.87	0.39
Installation Details				Shallow	Deep	Shallow	Deep	Shallow	Single	Single	Single	Single
Strata Water Level Encountered on Sampling												
Date Sampled				/2016	19/05/2016		02/06/2016		14/06/2016	14/06/2016	14/06/2016	14/06/2016
2,4-Dinitrotoluene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
2,6-Dinitrotoluene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
2-Methylnaphthalene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
3-Nitroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Bromophenylphenylether	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Chloroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Chlorophenylphenylether	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
4-Nitroaniline	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Azobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Bis(2-chloroethoxy)methane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Bis(2-chloroethyl)ether	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Bis(2-chloroisopropyl)ether	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbazole	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Dibenzofuran	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobenzene	ug/l	0.05		<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	ug/l	0.6		<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorocyclopentadiene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachloroethane	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Isophorone	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
N-nitrosodi-n-propylamine	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrobenzene	ug/l			<1	<1	<1	<1	<1	<1	<1	<1	<1
Acenaphthene	ug/l			<1	<1	<1						
Acenaphthylene	ug/l			<1	<1	<1						
Anthracene	ug/l			<1	<1	<1						
Benzo(a)anthracene	ug/l			<1	<1	<1						
Benzo(a)pyrene	ug/l			<1	<1	<1						
Benzo(b)fluoranthene	ug/l			<1	<1	<1						
Benzo(g,h,i)perylene	ug/l			<1	<1	<1						
Benzo(k)fluoranthene	ug/l			<1	<1	<1						
Chrysene	ug/l			<1	<1	<1						
Dibenzo(a,h)anthracene	ug/l			<1	<1	<1						
Fluoranthene	ug/l			<1	<1	<1						
Fluorene	ug/l			<1	<1	<1						
Indeno(1,2,3-cd)pyrene	ug/l			<1	<1	<1						
Naphthalene	ug/l			<1	<1	<1						
Phenanthrene	ug/l			<1	<1	<1						
Pyrene	ug/l			<1	<1	<1						

Appendix 5

Surface Water Laboratory Data

Monitoring Round / Location	Units	Screening Criteria			1 / EESW1	2 / EESW1	3 / EESW1	4 / EESW1	Q1 / 17.1	Q1 / 17.2	Q1 / 17.3	E1 / R14	E2 / R14	E3 / R14	E4 / R14	E1 / R15
Date Sampled					03/03/2004	15/06/2004	20/09/2004	06/05/2005	03/06/2015	03/06/2015	03/06/2015	11/12/2007	17/03/2008	23/06/2008	24/09/2008	11/12/2007
		EQS	DWS	CCW												
Metals & Non-Metal Inorganics																
Hardness Total	mg/l				2	2	<1	1	1.01	5.31	3.02	226	135	236	287	204
Arsenic Dissolved	ug/l	50	10													
Boron Dissolved	ug/l	2000	1000		180	90	60	80								
Calcium Dissolved	ug/l			300000					54.1	142	69	72	36	58	73	52
Cadmium Dissolved	ug/l	0.15	5	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.436					
Chromium Dissolved	ug/l		50		<1	<1	1	<1	1.42	5.79	2.25	<0.22	<0.22	<0.22	<0.22	<0.22
Copper Dissolved	ug/l	10	2000		<1	<1	<1	2				<0.85	<0.85	<0.85	<0.85	<0.85
Lead Dissolved	ug/l	1.2	10	250	<1	<1	<1	<1	0.143	0.049	0.21	<0.02	<0.02	<0.02	<0.02	<0.02
Magnesium Dissolved	ug/l											15	8.8	17	16	14
Nickel Dissolved	ug/l	4	20	100	8	7	4	4	2.23	4.1	2.44	<1	<1	<1	<1	<1
Selenium Dissolved	ug/l		10		3	3	1	2	0.69	1.51	6.22					
Zinc Dissolved	ug/l	75		1000	<2	11	6	<2								
Manganese Dissolved	ug/l	30	50		<2	<10	37	7								
Iron Dissolved	ug/l	1000	200		<10	<10	<10	<10								
Mercury Dissolved	ug/l	0.07	1		<0.1	<0.1	<0.1	<0.1								
Molybdenum Dissolved	ug/l															
Cadmium Total	ug/l	0.15	5	5								<0.5	<0.5	1.5	<0.5	<0.5
Zinc Total	ug/l	75		1000								28	52	22	38	99
BOD	mg/l	5		18					<1	2.4	15.7	9	8	2	3	3
Nitrate as N	mg/l		50	1	<0.3	1.4	<0.3	<0.3				<0.3	0.9	<0.3	<0.3	3.6
Nitrate as NO3	mg/l		50	1					41.5	<0.3	<0.3	1.3	3.99	<0.3	<0.3	15.9
Nitrite as N	mg/l		0.15	1								<0.1	<0.1	<0.1	<0.1	<0.1
Nitrite as NO2	mg/l		0.5	1					0.156	0.06	0					
Nitrogen, Total Oxidised as N	mg/l		50	2					9.43	<0.3	<0.3	<0.3	0.9	<0.3	<0.3	3.6
Phosphate, Ortho as P	mg/l			1	0.02	0.04	0.02	0.03				0.2	0.3	1.2	0.2	0.1
Phosphorus (tot.unfilt)	ug/l	120							229	1200	402					
Sulphate (soluble)	mg/l	400	250	300					24.6	42.3	114					
Sulphate as SO4	mg/l	400	250	300	400	367	171	245				47	<5	16	19	26
Toluene Extractable Material	mg/l				<6	<6	<6	81								
Chloride	mg/l	250	250	300	582	611	424	429	32.3	248	785	39	22	25	34	21
Sulphide	mg/l															
Ammoniacal Nitrogen as N	mg/l	0.6		1	3.2	3.2	2.1	1.7	0.426	0.369	0.266	0.04	0.22	<0.01	0.05	0.05
Cyanide Free	mg/l															
Cyanide Total	mg/l	0.001	0.05		0.07	<0.05	<0.05	<0.05								
Thiocyanate as SCN	mg/l				0.6	0.8	0.4	0.3								
Dissolved Oxygen	mg/l								6.5	2.48	14.6	2.54	5.27	1.03	1.63	9.58
Dissolved Oxygen (Saturation)	%	60										20.2	45.6	10.5	16.1	74.2
pH Value	pH units	6-9	6.5-10	6.8-8.5	12.1	11.8	8.6	10.2				7.3	7.3	7.7	7.3	7.6
Conductivity	us/cm				4490	3710	1940	1880								

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Monitoring Round / Location		E2 / R15	E3 / R15	E4 / R15	E1 / R16	E2 R/16	E3 / R16	E4 / R16	1 / SW506	2 / SW506	3 / SW506	1 /SW507	2 / SW507	3 / SW507	1 / SW508	3 / SW508
Date Sampled		17/03/2008	23/06/2008	24/09/2008	11/12/2007	17/03/2008	23/06/2008	24/09/2008	01/04/2015	15/04/2015	22/04/2015	01/04/2015	15/04/2015	22/04/2015	01/04/2015	22/04/2015
	Units															
Metals & Non-Metal Inorganics																
Hardness Total	mg/l	169	257	245	253	150	290	324								
Arsenic Dissolved	ug/l								1.5	4.6	1.5	1.9	2.8	2.2	1.4	<1
Boron Dissolved	ug/l								710	920	120	690	910	90	670	47
Calcium Dissolved	ug/l	82	63	56	63	84	71	84								
Cadmium Dissolved	ug/l								<0.08	2.9	0.097	<0.08	<0.08	<0.08	<0.08	<0.08
Chromium Dissolved	ug/l	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	9.3	6.2	<0.22	10	4.6	<0.22	10	<0.22
Copper Dissolved	ug/l	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85	<0.85								
Lead Dissolved	ug/l	<0.02	7	<0.02	<0.02	<0.02	<0.02	<0.02	1	<0.02	1.3	<0.02	<0.02	<0.02	<0.02	<0.02
Magnesium Dissolved	ug/l	17	23	20	18	18	30	28								
Nickel Dissolved	ug/l	<1	<1	<1	<1	<1	<1	<1	1.5	4.2	1.3	1.6	1.5	2	1	<1
Selenium Dissolved	ug/l								<1	4.9	1.6	<1	1.9	1.5	<1	1.3
Zinc Dissolved	ug/l															
Manganese Dissolved	ug/l															
Iron Dissolved	ug/l															
Mercury Dissolved	ug/l															
Molybdenum Dissolved	ug/l															
Cadmium Total	ug/l	<0.5	1.8	<0.5	<0.5	<0.5	1.8	<0.5								
Zinc Total	ug/l	42	26	310	38	24	6	18								
BOD	mg/l	3	<1	1	<1	<1	1	<1								
Nitrate as N	mg/l	1.8	<0.3	3.1	2.2	1.5	<0.3	1.7								
Nitrate as NO3	mg/l	7.97	<0.3	13.733	9.7	6.64	<0.3	7.531								
Nitrite as N	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2								
Nitrite as NO2	mg/l															
Nitrogen, Total Oxidised as N	mg/l	1.8	<0.3	3.2	2.3	1.6	<0.3	1.9								
Phosphate, Ortho as P	mg/l	0.2	1.1	<0.1	0.2	0.2	1.1	<0.1								
Phosphorus (tot.unfilt)	ug/l															
Sulphate (soluble)	mg/l															
Sulphate as SO4	mg/l	26	25	26	42	25	23	33								
Toluene Extractable Material	mg/l															
Chloride	mg/l	28	38	21	28	25	37	29	49	52		210	250	320		
Sulphide	mg/l															
Ammoniacal Nitrogen as N	mg/l	0.15	<0.01	0.13	0.2	0.16	<0.01	0.19	0.044	0.044	0.075	0.35	0.16	1.2	0.13	0.35
Cyanide Free	mg/l								<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Cyanide Total	mg/l															
Thiocyanate as SCN	mg/l															
Dissolved Oxygen	mg/l	7.58	9.61	6.98	8.67	7.99	8.14	6.01								
Dissolved Oxygen (Saturation)	%	64	98.2	64.7	66.8	67.8	85.6	57.7								
pH Value	pH units	7.6	7.9	7.6	7.6	7.6	8.1	7.6	8.7	8.9	8.6	8.7	8.9	8.5	8.9	8.6
Conductivity	us/cm															

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Screening Values and Assessment	
EQS	Environmental Quality Standards
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory detection level higher than screening criterion
BOL/ITA	Exceeds CCW

Monitoring Round / Location		Units
Date Sampled		
Metals & Non-Metal Inorganics		
Hardness Total		mg/l
Arsenic Dissolved		ug/l
Boron Dissolved		ug/l
Calcium Dissolved		ug/l
Cadmium Dissolved		ug/l
Chromium Dissolved		ug/l
Copper Dissolved		ug/l
Lead Dissolved		ug/l
Magnesium Dissolved		ug/l
Nickel Dissolved		ug/l
Selenium Dissolved		ug/l
Zinc Dissolved		ug/l
Manganese Dissolved		ug/l
Iron Dissolved		ug/l
Mercury Dissolved		ug/l
Molybdenum Dissolved		ug/l
Cadmium Total		ug/l
Zinc Total		ug/l
BOD		mg/l
Nitrate as N		mg/l
Nitrate as NO3		mg/l
Nitrite as N		mg/l
Nitrite as NO2		mg/l
Nitrogen, Total Oxidised as N		mg/l
Phosphate, Ortho as P		mg/l
Phosphorus (tot.unfilt)		ug/l
Sulphate (soluble)		mg/l
Sulphate as SO4		mg/l
Toluene Extractable Material		mg/l
Chloride		mg/l
Sulphide		mg/l
Ammoniacal Nitrogen as N		mg/l
Cyanide Free		mg/l
Cyanide Total		mg/l
Thiocyanate as SCN		mg/l
Dissolved Oxygen		mg/l
Dissolved Oxygen (Saturation)		%
pH Value		pH units
Conductivity		us/cm

Notes							
EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc							
NDP - No determination possible							

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
12	12	324	135	E4 / R16			
15	13	5.31	1	Q1 / 17.2	0	0	
12	12	920	47	2 / SW506	0	0	
15	15	142	36	Q1 / 17.2			0
15	3	2.9	0.097	2 / SW506	2	0	0
27	9	10	1	1 /SW507		0	
16	1	2	2	4 / EESW1	0	0	
27	6	7	0.049	E3 / R15	2	0	0
12	12	30	8.8	E3 / R16			
27	14	8	1	1 / EESW1	4	0	0
15	12	6.22	0.69	Q1 / 17.3		0	
4	2	11	6	2 / EESW1	0		0
4	2	37	7	3 / EESW1	1	0	
4	0	None > LOD	None > LOD		0	0	
4	0	None > LOD	None > LOD		0	0	
0	0	None > LOD	None > LOD				
12	3	1.8	1.5	E3 / R15	3	0	0
12	12	310	6	E4 / R15	2	0	0
15	10	15.7	1	Q1 / 17.3	3		0
16	8	3.6	0.9	E1 / R15		0	7
15	9	41.5	1.3	Q1 / 17.1		0	9
12	1	0.2	0.2	E4 / R16		1	0
3	3	0.156	0	Q1 / 17.1		0	0
15	8	9.43	0.9	Q1 / 17.1		0	4
16	14	1.2	0.02	E3 / R14			3
3	3	1200	229	Q1 / 17.2	3		0
3	3	114	24.6	Q1 / 17.3	0	0	0
16	15	400	16	1 / EESW1	0	2	2
4	1	81	81	4 / EESW1		0	0
24	24	785	21	Q1 / 17.3	6	6	6
0	0	None > LOD	None > LOD				
27	24	3.2	0.04	1 / EESW1	5		5
8	0	None > LOD	None > LOD				
4	1	0.07	0.07	1 / EESW1	1	1	
4	4	0.8	0.3	2 / EESW1			
15	15	14.6	1.03	Q1 / 17.3	0		
12	12	98.2	10.5	E3 / R15	7		
24	24	12.1	7.3	1 / EESW1	0	0	0
4	4	4490	1880	1 / EESW1		0	0

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Monitoring Round / Location		Units
Date Sampled		
Organics		
GRO (C5-C12)		ug/l
MTBE		ug/l
Benzene		ug/l
Toluene		ug/l
Ethyl benzene		ug/l
m & p Xylene		ug/l
o Xylene		ug/l
TPH		
Aliphatics C5-C6		ug/l
Aliphatics >C6-C8		ug/l
Aliphatics >C8-C10		ug/l
Aliphatics >C10-C12		ug/l
Aliphatics >C12-C16 Aqueous		ug/l
Aliphatics >C16-C21 Aqueous		ug/l
Aliphatics >C21-C35 Aqueous		ug/l
Total Aliphatics C12-C35 Aqueous		ug/l
Aromatics >C5-C7		ug/l
Aromatics >C7-C8		ug/l
Aromatics >EC8-EC10		ug/l
Aromatics >EC10-EC12		ug/l
Aromatics >EC12-EC16 Aqueous		ug/l
Aromatics >EC16-EC21 Aqueous		ug/l
Aromatics >EC21-EC35 Aqueous		ug/l
Total Aromatics C12-C35 Aqueous		ug/l
Total Aliphatic TPH		ug/l
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
Total petroleum hydrocarbons		ug/l

Screening Values and Assessment	
EQS	Environmental Quality Standards
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory detection level higher than screening criterion
<i>BOL/ITA</i>	Exceeds CCW

Notes							
EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc							
NDP - No determination possible							
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
3	0	None > LOD	None > LOD				
10	0	None > LOD	None > LOD				
10	0	None > LOD	None > LOD		0	0	
10	0	None > LOD	None > LOD		0		
10	0	None > LOD	None > LOD		0		
10	0	None > LOD	None > LOD		0		
10	0	None > LOD	None > LOD		0		
10	0	None > LOD	None > LOD				0
10	0	None > LOD	None > LOD				
10	0	None > LOD	None > LOD				
10	0	None > LOD	None > LOD				
10	0	None > LOD	None > LOD				0
10	0	None > LOD	None > LOD				0
10	0	None > LOD	None > LOD				0
10	0	None > LOD	None > LOD				
10	0	None > LOD	None > LOD				
10	0	None > LOD	None > LOD				
10	0	None > LOD	None > LOD				0
10	0	None > LOD	None > LOD				0
10	0	None > LOD	None > LOD				0
3	0	None > LOD	None > LOD				
7	0	None > LOD	None > LOD				
13	0	None > LOD	None > LOD				
13	0	None > LOD	None > LOD				
13	0	None > LOD	None > LOD				
13	0	None > LOD	None > LOD				
13	0	None > LOD	None > LOD				
13	0	None > LOD	None > LOD				
7	0	None > LOD	None > LOD				

Monitoring Round / Location	Units	Screening Criteria			1 / EESW1	2 / EESW1	3 / EESW1	4 / EESW1	Q1 / 17.1	Q1 / 17.2	Q1 / 17.3	E1 / R14	E2 / R14	E3 / R14	E4 / R14	E1 / R15	
Date Sampled					03/03/2004	15/06/2004	20/09/2004	06/05/2005	03/06/2015	03/06/2015	03/06/2015	11/12/2007	17/03/2008	23/06/2008	24/09/2008	11/12/2007	
		EQS	DWS	CCW													
Phenols																	
2-Chlorophenol	ug/l	50															
2 - Methyl-4,6-Dinitrophenol	ug/l																
2-Methylphenol	ug/l	100															
2-Nitrophenol	ug/l																
2,4-Dichlorophenol	ug/l	20															
2,4-Dimethylphenol	ug/l																
2,4,5-Trichlorophenol	ug/l																
2,4,6-Trichlorophenol	ug/l																
4-Chloro-3-methylphenol	ug/l	40															
4-Methylphenol	ug/l	100															
Pentachlorophenol	ug/l	0.4															
Phenol	ug/l	7.7															
Phenols	mg/l	0.0077															
Phenol Index	mg/l				0.05	<0.05	<0.05	<0.05									
PAHs																	
2-Chloronaphthalene	ug/l																
2-Methylnaphthalene	ug/l																
Acenaphthene	ug/l								<0.015	<0.015	<0.015						
Acenaphthylene	ug/l								<0.1	<0.1	<0.1						
Anthracene	ug/l	0.1							<0.015	<0.015	<0.015						
Benzo(a)anthracene	ug/l								<0.017	<0.017	<0.017						
Benzo(a)pyrene	ug/l	0.00017	0.01						<0.1	<0.1	<0.1						
Benzo(b)fluoranthene	ug/l	0.017	0.1						<0.1	<0.1	<0.1						
Benzo(k)fluoranthene	ug/l	0.017	0.1						<0.1	<0.1	<0.1						
Benzo(ghi)perylene	ug/l	0.0082	0.1						<0.016	<0.016	<0.016						
Indeno(1,2,3-cd)pyrene	ug/l		0.1						<0.1	<0.1	<0.1						
Chrysene	ug/l								<0.1	<0.1	<0.1						
Dibenzo(a,h)anthracene	ug/l								<0.1	<0.1	<0.1						
Fluoranthene	ug/l	0.0063							<0.1	<0.1	<0.1						
Fluorene	ug/l								<0.1	<0.1	<0.1						
Naphthalene	ug/l	2							0.318	<0.1	<0.1						
Phenanthrene	ug/l								<0.1	<0.1	<0.1						
Pyrene	ug/l								<0.1	<0.1	<0.1						
Total PAHs (USEPA 16)	ug/l								<0.344	<0.344	<0.344						

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Monitoring Round / Location		Units	E2 / R15	E3 / R15	E4 / R15	E1 / R16	E2 R/16	E3 / R16	E4 / R16	1 / SW506	2 / SW506	3 / SW506	1/SW507	2 / SW507	3 / SW507	1 / SW508	3 / SW508	
Date Sampled			17/03/2008	23/06/2008	24/09/2008	11/12/2007	17/03/2008	23/06/2008	24/09/2008	01/04/2015	15/04/2015	22/04/2015	01/04/2015	15/04/2015	22/04/2015	01/04/2015	22/04/2015	
Phenols																		
2-Chlorophenol	ug/l										<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
2 - Methyl-4,6-Dinitrophenol	ug/l										<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
2-Methylphenol	ug/l										<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
2-Nitrophenol	ug/l										<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
2,4-Dichlorophenol	ug/l										<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
2,4-Dimethylphenol	ug/l										<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
2,4,5-Trichlorophenol	ug/l										<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
2,4,6-Trichlorophenol	ug/l										<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
4-Chloro-3-methylphenol	ug/l										<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
4-Methylphenol	ug/l										<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Pentachlorophenol	ug/l										<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Phenol	ug/l										<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Phenols	mg/l										<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	
Phenol Index	mg/l																	
PAHs																		
2-Chloronaphthalene	ug/l										<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
2-Methylnaphthalene	ug/l										<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Acenaphthene	ug/l										<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	
Acenaphthylene	ug/l										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Anthracene	ug/l										<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	
Benzo(a)anthracene	ug/l										<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	<0.017	
Benzo(a)pyrene	ug/l										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Benzo(b)fluoranthene	ug/l										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Benzo(k)fluoranthene	ug/l										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Benzo(ghi)perylene	ug/l										<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	<0.016	
Indeno(1,2,3-cd)pyrene	ug/l										<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	
Dibenzo(a,h)anthracene	ug/l										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Fluoranthene	ug/l										<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	
Naphthalene	ug/l										<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	
Pyrene	ug/l										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Total PAHs (USEPA 16)	ug/l										<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	

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Screening Values and Assessment	
EQS	Environmental Quality Standards
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory detection level higher than screening criterion
BOL/ITA	Exceeds CCW

Monitoring Round / Location		Units
Date Sampled		
Phenols		
2-Chlorophenol		ug/l
2 - Methyl-4,6-Dinitrophenol		ug/l
2-Methylphenol		ug/l
2-Nitrophenol		ug/l
2,4-Dichlorophenol		ug/l
2,4-Dimethylphenol		ug/l
2,4,5-Trichlorophenol		ug/l
2,4,6-Trichlorophenol		ug/l
4-Chloro-3-methylphenol		ug/l
4-Methylphenol		ug/l
Pentachlorophenol		ug/l
Phenol		ug/l
Phenols		mg/l
Phenol Index		mg/l
PAHs		
2-Chloronaphthalene		ug/l
2-Methylnaphthalene		ug/l
Acenaphthene		ug/l
Acenaphthylene		ug/l
Anthracene		ug/l
Benzo(a)anthracene		ug/l
Benzo(a)pyrene		ug/l
Benzo(b)fluoranthene		ug/l
Benzo(k)fluoranthene		ug/l
Benzo(ghi)perylene		ug/l
Indeno(1,2,3-cd)pyrene		ug/l
Chrysene		ug/l
Dibenzo(a,h)anthracene		ug/l
Fluoranthene		ug/l
Fluorene		ug/l
Naphthalene		ug/l
Phenanthrene		ug/l
Pyrene		ug/l
Total PAHs (USEPA 16)		ug/l

Notes							
EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc							
NDP - No determination possible							
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
7	0	None > LOD	None > LOD		0		
7	0	None > LOD	None > LOD				
7	0	None > LOD	None > LOD		0		
7	0	None > LOD	None > LOD				
7	0	None > LOD	None > LOD		0		
7	0	None > LOD	None > LOD				
7	0	None > LOD	None > LOD				
7	0	None > LOD	None > LOD				
7	0	None > LOD	None > LOD		0		
7	0	None > LOD	None > LOD		0		
7	0	None > LOD	None > LOD		0		
7	0	None > LOD	None > LOD		0		0
0	0	None > LOD	None > LOD				
7	0	None > LOD	None > LOD				
7	0	None > LOD	None > LOD				
10	0	None > LOD	None > LOD				
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				
10	0	None > LOD	None > LOD		0		
10	0	None > LOD	None > LOD				
10	0	None > LOD	None > LOD				
10	1	0.318	0.318	Q1 / 17.1	0		
10	0	None > LOD	None > LOD				
10	0	None > LOD	None > LOD				
3	0	None > LOD	None > LOD				0

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[illegible]

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[illegible]

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Screening Values and Assessment	
EQS	Environmental Quality Standards
	Exceeds EQS
100	Exceeds DWS
<10	Laboratory detection level higher than screening criterion
BOL/ITA	Exceeds CCW

Monitoring Round / Location	Units
Date Sampled	
Styrene	ug/l
Tert-Butylbenzene	ug/l
Tetrachloroethene	ug/l
Tetrachloromethane (Carbon Tetra Chloride)	ug/l
Toluene	ug/l
trans-1,2-Dichloroethene	ug/l
trans-1,3-Dichloropropene	ug/l
Tribromomethane	ug/l
Trichloroethene	ug/l
Trichlorofluoromethane	ug/l

Notes
EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc
NDP - No determination possible

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
8	0	None > LOD	None > LOD		0		
8	0	None > LOD	None > LOD				
8	0	None > LOD	None > LOD		0	0	
8	0	None > LOD	None > LOD		0	0	
8	0	None > LOD	None > LOD		0		
8	0	None > LOD	None > LOD				
8	0	None > LOD	None > LOD				
8	0	None > LOD	None > LOD			0	
8	0	None > LOD	None > LOD		0	0	
8	0	None > LOD	None > LOD				

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Monitoring Round / Location	Units	E2 / R15	E3 / R15	E4 / R15	E1 / R16	E2 R/16	E3 / R16	E4 / R16	1 / SW506	2 / SW506	3 / SW506	1/SW507	2 / SW507	3 / SW507	1 / SW508	3 / SW508
Date Sampled		17/03/2008	23/06/2008	24/09/2008	11/12/2007	17/03/2008	23/06/2008	24/09/2008	01/04/2015	15/04/2015	22/04/2015	01/04/2015	15/04/2015	22/04/2015	01/04/2015	22/04/2015
Phthalates																
Bis(2-ethylhexyl) phthalate	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Butylbenzyl phthalate	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-n-butyl phthalate	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Di-n-Octyl phthalate	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Diethyl phthalate	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dimethyl phthalate	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Other Semi-Volatiles																
1,2-Dichlorobenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l								<1	<1	<1	<1	<1	<1	<1	<1
2-Nitroaniline	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dinitrotoluene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,6-Dinitrotoluene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Methylnaphthalene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
3-Nitroaniline	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Bromophenylphenylether	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chloroaniline	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Chlorophenylphenylether	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4-Nitroaniline	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Azobenzene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethoxy)methane	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethyl)ether	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bis(2-chloroisopropyl)ether	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbazole	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenzofuran	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobutadiene	ug/l								<0	<1	<1	<1	<1	<1	<1	<1
Hexachlorocyclopentadiene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachloroethane	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Isophorone	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrobenzene	ug/l								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
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	<0.01
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl									<0.01	<0.01	<0.01	<0.01	<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	<0.01	<0.01	<0.01	<0.01
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl									<0.01	<0.01	<0.01	<0.01	<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	<0.01	<0.01	<0.01	<0.01
Pcb-28 2,4,4' - Trichlororobiphenyl	ug/l								<0.01	<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	<0.01

Appendix 6

Soil Leachate Laboratory Data

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Leachate Samples Analysis & Screening Assessment
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Sample Reference	Units	Screening Criteria	
Location Type		EQS	DWS
Specimen Depth			
OD Level			
Sample Type			
Geology Code			
Cluster Code			
2:1 Leachate Results			
Arsenic Dissolved	ug/l	50	10
Boron Dissolved	ug/l	2000	1000
Barium Dissolved	ug/l		
Cadmium Dissolved	ug/l	0.15	5
Chromium Dissolved	ug/l		50
Chromium III Dissolved	ug/l	4.7	
Chromium VI Dissolved	ug/l	3.4	
Copper Dissolved	ug/l	10	2000
Iron Dissolved	ug/l	1000	200
Molybdenum Dissolved	ug/l		
Nickel Dissolved	ug/l	4	20
Lead Dissolved	ug/l	1.2	10
Mercury Dissolved	ug/l	0.07	1
Antimony Dissolved	ug/l		5
Selenium Dissolved	ug/l		10
Vanadium Dissolved	ug/l		
Zinc Dissolved	ug/l	75	
Total Cyanide	mg/l	0.001	0.05
Cyanide Free	mg/l		
Total Diss Sulphur	mg/l		
pH	pH units	6-9	6.5-10
Conductivity uS/cm @25C	uS/cm		
Organics			
Phenols			
Phenols	mg/l	0.0077	
Phenols Monohydric	mg/l		
Xylenols	mg/l		
Cresols	mg/l		
BTEX			
Benzene	ug/l	10	1
Toluene	ug/l	50	
Ethylbenzene	ug/l	20	
m,p xylenes	ug/l	30	
O-Xylene	ug/l	30	
Methyl tertiary butyl ether (MTBE)	ug/l		
Sum of detected BTEX	ug/l		
Sum of detected Xylenes	ug/l		
TPH			
GRO >C5-C12	ug/l		
Aliphatics >C5-C6	ug/l		
Aliphatics >C6-C8	ug/l		
Aliphatics >C8-C10	ug/l		
Aliphatics >C10-C12	ug/l		
Aliphatics >C12-C16	ug/l		
Aliphatics >C16-C21	ug/l		
Aliphatics >C21-C35	ug/l		
Aliphatics >C35-44	ug/l		
Aromatics >C5-C7	ug/l		
Aromatics >C7-C8	ug/l		
Aromatics >C8-C10	ug/l		
Aromatics >C10-C12	ug/l		
Aromatics >C12-C16	ug/l		
Aromatics >C16-C21	ug/l		
Aromatics >C21-C35	ug/l		
Aromatics >C35-44	ug/l		
Total Aliphatic TPH	ug/l		
Total Aromatic TPH	ug/l		
Total petroleum hydrocarbons	ug/l		
PAH			
Acenaphthene	ug/l		
Acenaphthylene	ug/l		
Anthracene	ug/l	0.1	
Benzo(a)anthracene	ug/l		
Benzo(a)pyrene	ug/l	0.00017	0.01
Benzo(b)fluoranthene	ug/l	0.017	0.1
Benzo(ghi)perylene	ug/l	0.0082	0.1
Benzo(k)fluoranthene	ug/l	0.017	0.1
Chrysene	ug/l		
Dibenzo(ah)anthracene	ug/l		
Fluoranthene	ug/l	0.0063	
Fluorene	ug/l		
Indeno(123cd)pyrene	ug/l	N/A	0.1
Naphthalene	ug/l	2	
Phenanthrene	ug/l		
Pyrene	ug/l		
PAH 16 Total	ug/l		
PCB			
Pcb-28 2,4,4' - Trichlorobiphenyl	ug/l	0	0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0
VOCs			
1,1,1,2-Tetrachloroethane	ug/l		
1,1,1-Trichloroethane	ug/l	100	

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

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
13	7	27	0.203	TP510 @ 1.0 - 1.2mbGL	0	3
10	6	1200	30	SBHK03 CP @ 1mbGL	0	1
6	6	580	13	STPK01 @ 0.34mbGL		
13	0	None > LOD	None > LOD		0	0
13	7	12	0.579	BH530 @ 0.8 - 1.0mbGL		0
1	0	None > LOD	None > LOD		0	
2	0	None > LOD	None > LOD		0	
13	8	14	1.37	BH526 @ 0.4 - 0.5mbGL	2	0
3	0	None > LOD	None > LOD		0	0
6	4	82	3	SBHK03 CP @ 1mbGL		
13	11	20	1.11	SBHK04 CP @ 0.3mbGL	6	0
13	7	1500	0.605	SBHK02 CP @ 1mbGL	6	3
7	0	None > LOD	None > LOD		0	0
6	1	8	8	SBHK03 CP @ 1mbGL		1
13	8	5.1	0.463	TP510 @ 1.0 - 1.2mbGL		0
3	3	85.6	0.289	WSM4CAN029 @ 0.5mbGL		
13	8	14	0.527	SBHK02 CP @ 1mbGL	0	
10	0	None > LOD	None > LOD		0	0
5	0	None > LOD	None > LOD			
2	2	28	13.9	CH51 @ 0mbGL		
2	2	11.8	10.9	CH53A @ 0.4mbGL	0	0
3	3	6290	560	WSM4CAN026 @ 1.5mbGL		
5	0	None > LOD	None > LOD		0	
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD		0	0
6	0	None > LOD	None > LOD		0	
6	0	None > LOD	None > LOD		0	
6	0	None > LOD	None > LOD		0	
6	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
6	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD			
5	0	None > LOD	None > LOD			
5	0	None > LOD	None > LOD			
5	0	None > LOD	None > LOD			
4	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD			
5	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD			
5	0	None > LOD	None > LOD			
4	0	None > LOD	None > LOD			
5	0	None > LOD	None > LOD			
5	0	None > LOD	None > LOD			
5	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD		0	
6	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD		0	0
6	0	None > LOD	None > LOD		0	0
6	0	None > LOD	None > LOD		0	0
6	0	None > LOD	None > LOD		0	0
6	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD			
6	1	0.0402	0.0402	WSM4CAN026 @ 1.5mbGL	1	
6	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD		0	0
6	0	None > LOD	None > LOD		0	
6	2	0.0693	0.0378	WSM4CAN026 @ 1.5mbGL		
6	1	0.0425	0.0425	WSM4CAN026 @ 1.5mbGL		
6	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD		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
1	0	None > LOD	None > LOD		0	0
2	0	None > LOD	None > LOD		0	0
2	0	None > LOD	None > LOD		0	0
3	0	None > LOD	None > LOD		0	0
2	0	None > LOD	None > LOD		0	0
2	0	None > LOD	None > LOD		0	0
1	0	None > LOD	None > LOD		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
1	0	None > LOD	None > LOD		0	0
2	0	None > LOD	None > LOD		0	0
3	0	None > LOD	None > LOD			
3	0	None > LOD	None > LOD		0	

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Sample Reference	Units	Screening Criteria	
Location Type		EQS	DWS
Specimen Depth			
OD Level			
Sample Type			
Geology Code			
Cluster Code			
Isophorone	ug/l		
Nitrobenzene	ug/l		
n-nitrosodimethylamine	ug/l		
N-Nitroso-Di-N-Propylamine	ug/l		
Pentachlorophenol (PCP)	ug/l	0.4	
Phenol	ug/l	7.7	
PAH			
Acenaphthene	ug/l		
Acenaphthylene	ug/l		
Anthracene	ug/l	0.1	
Benzo(a)anthracene	ug/l		
Benzo(a)pyrene	ug/l	0.00017	0.01
Benzo(b)fluoranthene	ug/l	0.017	0.1
Benzo(ghi)perylene	ug/l	0.0082	0.1
Benzo(k)fluoranthene	ug/l	0.017	0.1
Chrysene	ug/l		
Dibenzo(ah)anthracene	ug/l		
Fluoranthene	ug/l	0.0063	
Fluorene	ug/l		
Indeno(123cd)pyrene	ug/l	N/A	0.1
Naphthalene	ug/l	2	
Phenanthrene	ug/l		
Pyrene	ug/l		
PAH 16 Total	ug/l		

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

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
3	0	None > LOD	None > LOD			
3	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
3	0	None > LOD	None > LOD			
3	0	None > LOD	None > LOD		0	
3	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			
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			
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		0	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			

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Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend

Made Ground	MG
Tidal Flat Deposits	TFD

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals:Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		CH51	CH53A	SBHK02 CP	SBHK03 CP	STPK01	STPK02	BH526	BH527	TP510	SBHK02 CP	SBHK04 CP	BH530	BHM4CAN044	WSM4CAN026	WSM4CAN029
Location Type		EQS	DWS	TP	TP	BH	BH	TP	TP	BH	BH	TP	BH	BH	BH	BH	WS	WS
Specimen Depth				0	0.4	1	1	0.34	0.3	0.4 - 0.5	0.5 - 1.0	1.0 - 1.2	3	0.3	0.8 - 1.0	1.5	1.5	0.5
OD Level				5.73	5.13	4.53	4.83	5.24	5.74	5.95	5.55	4.9	2.53	5.25	5.45			
Sample Type				D	D	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code				MG	MG	MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	MG	MG	MG
Cluster Code				2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2007 GI	2007 GI	2015 GI	2016 GI	2016 GI	2016 GI
2:1 Leachate Results																		
Arsenic Dissolved	ug/l	50	10			<1	13	<1	2	12	<1	27	7	<1	<1	0.203	0.235	<0.12
Boron Dissolved	ug/l	2000	1000			30	1200	<10	<10	59	<20	<20	70	80	43			
Barium Dissolved	ug/l					200	67	580	13				16	280				
Cadmium Dissolved	ug/l	0.15	5			<0.4	<0.4	<0.4	<0.4	<0.08	<0.08	<0.08	<0.4	<0.4	<0.08	<0.1	<0.1	<0.1
Chromium Dissolved	ug/l		50			<1	<1	3	<1	<1	<1	2.8	<1	4	12	7.27	0.579	3.69
Chromium III Dissolved	ug/l	4.7														<30		
Chromium VI Dissolved	ug/l	3.4														<30	<30	
Copper Dissolved	ug/l	10	2000			7	<1	13	3	14	2.9	<1	<1	<1	<1	3.59	1.37	9.44
Iron Dissolved	ug/l	1000	200	<10	<10											<0.019		
Molybdenum Dissolved	ug/l					<1	82	<1	3				3	6				
Nickel Dissolved	ug/l	4	20			4	6	9	5	16	2	<1	4	20	<1	2.35	7.77	1.11
Lead Dissolved	ug/l	1.2	10			1500	14	4	3	<1	<1	<1	<1	14	<1	0.605	4.89	<0.02
Mercury Dissolved	ug/l	0.07	1							<5	<5	<5			<5	<0.01	<0.01	<0.01
Antimony Dissolved	ug/l		5			<5	8	<5	<5				<5	<5				
Selenium Dissolved	ug/l		10			<1	5	<1	3	3.1	<1	5.1	5	<1	1.1	0.731	0.463	<0.39
Vanadium Dissolved	ug/l															0.79	0.289	85.6
Zinc Dissolved	ug/l	75				14	<3	<3	8	1.1	1.5	<1	<3	<3	11	1.98	0.527	0.879
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			
Cyanide Free	mg/l									<0.05	<0.05	<0.05			<0.05			<0.05
Total Diss Sulphur	mg/l			28	13.9													
pH	pH units	6-9	6.5-10	10.9	11.8													
Conductivity uS/cm @25C	uS/cm															4650	6290	560
Organics																		
Phenols																		
Phenols	mg/l	0.0077								<0.03	<0.03	<0.03			<0.03			<0.002
Phenols Monohydric	mg/l																	<0.016
Xylenols	mg/l																	<0.008
Cresols	mg/l																	<0.006
BTEX																		
Benzene	ug/l	10	1							<1	<1	<1			<1	<7	<7	
Toluene	ug/l	50								<1	<1	<1			<1	<4	<4	
Ethylbenzene	ug/l	20								<1	<1	<1			<1	<5	<5	
m,p xylenes	ug/l	30								<1	<1	<1			<1	<8	<8	
O-Xylene	ug/l	30								<1	<1	<1			<1	<3	<3	
Methyl tertiary butyl ether (MTBE)	ug/l															<3	<3	
Sum of detected BTEX	ug/l															<28	<28	
Sum of detected Xylenes	ug/l															<11	<11	
TPH																		
GRO >C5-C12	ug/l															<50	<50	
Aliphatics >C5-C6	ug/l									<0.1	<0.1	<0.1			<0.1	<10	<10	
Aliphatics >C6-C8	ug/l									<0.1	<0.1	<0.1			<0.1	<10	<10	
Aliphatics >C8-C10	ug/l									<0.1	<0.1	<0.1			<0.1	<10	<10	
Aliphatics >C10-C12	ug/l									<0.1	<0.1	<0.1			<0.1	<10	<10	
Aliphatics >C12-C16	ug/l									<0.1	<0.1	<0.1			<0.1	<10		
Aliphatics >C16-C21	ug/l									<0.1	<0.1	<0.1			<0.1	<10		
Aliphatics >C21-C35	ug/l									<0.1	<0.1	<0.1			<0.1	<10		
Aliphatics >C35-44	ug/l									<0.1	<0.1	<0.1			<0.1			
Aromatics >C5-C7	ug/l									<0.1	<0.1	<0.1			<0.1	<10	<10	
Aromatics >C7-C8	ug/l									<0.1	<0.1	<0.1			<0.1	<10	<10	
Aromatics >C8-C10	ug/l									<0.1	<0.1	<0.1			<0.1	<10	<10	

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Leachate Samples Analysis & Screening Assessment
CL-27
17/06/2016

Screening Values & Assessment	
Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation legend	
Made Ground	MG
Tidal Flat Deposits	TFD

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals:Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		CH51	CH53A	SBHK02 CP	SBHK03 CP	STPK01	STPK02	BH526	BH527	TP510	SBHK02 CP	SBHK04 CP	BH530	BHM4CAN044	WSM4CAN026	WSM4CAN029
Location Type		EQS	DWS	TP	TP	BH	BH	TP	TP	BH	BH	TP	BH	BH	BH	BH	WS	WS
Specimen Depth				0	0.4	1	1	0.34	0.3	0.4 - 0.5	0.5 - 1.0	1.0 - 1.2	3	0.3	0.8 - 1.0	1.5	1.5	0.5
OD Level				5.73	5.13	4.53	4.83	5.24	5.74	5.95	5.55	4.9	2.53	5.25	5.45			
Sample Type				D	D	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code				MG	MG	MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	MG	MG	MG
Cluster Code				2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2007 GI	2007 GI	2015 GI	2016 GI	2016 GI	2016 GI
Aromatics >C10-C12	ug/l									<0.1	<0.1	<0.1			<0.1	<10	<10	
Aromatics >C12-C16	ug/l									<0.1	<0.1	<0.1			<0.1	<10		
Aromatics >C16-C21	ug/l									<0.1	<0.1	<0.1			<0.1	<10	<10	
Aromatics >C21-C35	ug/l									<0.1	<0.1	<0.1			<0.1	<10		
Aromatics >C35-44	ug/l									<0.1	<0.1	<0.1			<0.1			
Total Aliphatic TPH	ug/l									<5	<5	<5			<5	<10		
Total Aromatic TPH	ug/l									<5	<5	<5			<5	<10		
Total petroleum hydrocarbons	ug/l									<10	<10	<10			<10	<10		
PAH																		
Acenaphthene	ug/l									<0.1	<0.1	<0.1			<0.1	<0.015	<0.015	
Acenaphthylene	ug/l									<0.1	<0.1	<0.1			<0.1	<0.011	<0.011	
Anthracene	ug/l	0.1								<0.1	<0.1	<0.1			<0.1	<0.015	<0.015	
Benzo(a)anthracene	ug/l									<0.1	<0.1	<0.1			<0.1	<0.017	<0.017	
Benzo(a)pyrene	ug/l	0.00017	0.01							<0.1	<0.1	<0.1			<0.1	<0.009	<0.009	
Benzo(b)fluoranthene	ug/l	0.017	0.1							<0.1	<0.1	<0.1			<0.1	<0.023	<0.023	
Benzo(ghi)perylene	ug/l	0.0082	0.1							<0.1	<0.1	<0.1			<0.1	<0.016	<0.016	
Benzo(k)fluoranthene	ug/l	0.017	0.1							<0.1	<0.1	<0.1			<0.1	<0.027	<0.027	
Chrysene	ug/l									<0.1	<0.1	<0.1			<0.1	<0.013	<0.013	
Dibenzo(ah)anthracene	ug/l									<0.1	<0.1	<0.1			<0.1	<0.016	<0.016	
Fluoranthene	ug/l	0.0063								<0.1	<0.1	<0.1			<0.1	<0.017	0.0402	
Fluorene	ug/l									<0.1	<0.1	<0.1			<0.1	<0.014	<0.014	
Indeno(123cd)pyrene	ug/l	N/A	0.1							<0.1	<0.1	<0.1			<0.1	<0.014	<0.014	
Naphthalene	ug/l	2								<0.1	<0.1	<0.1			<0.1	<0.1	<0.1	
Phenanthrene	ug/l									<0.1	<0.1	<0.1			<0.1	0.0378	0.0693	
Pyrene	ug/l									<0.1	<0.1	<0.1			<0.1	<0.015	0.0425	
PAH 16 Total	ug/l									<2	<2	<2			<2	<0.344	<0.344	
PCB																		
Pcb-28 2,4,4' - Trichlorobiphenyl	ug/l	0	0												<0.01			
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0												<0.01			
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0												<0.01			
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0												<0.01		<0.015	<0.015
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0												<0.01			
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0												<0.01			
Pcb-156 2,3,3',4,4',5-Hexachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	ug/l	0	0														<0.015	<0.015
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0												<0.01			
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	ug/l	0	0														<0.015	<0.015
VOCs																		
1,1,1,2-Tetrachloroethane	ug/l														<2		<1	<1
1,1,1-Trichloroethane	ug/l	100													<1		<1	<1
1,1,2,2-Trichloroethane	ug/l																<1	<1
1,1,2-Trichloroethane	ug/l	400													<10		<1	<1
1,1-Dichloroethane	ug/l														<1		<1	<1

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OD Level				5.73	5.13	4.53	4.83	5.24	5.74	5.95	5.55	4.9	2.53	5.25	5.45			
Sample Type				D	D	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code				MG	MG	MG	MG	MG	MG	MG	MG	MG	TFD	TFD	TFD	MG	MG	MG
Cluster Code				2000 GI	2000 GI	2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2015 GI	2007 GI	2007 GI	2015 GI	2016 GI	2016 GI	2016 GI
trans-1,2-Dichloroethene	ug/l														<1		<1	<1
trans-1,3-Dichloropropene	ug/l														<10		<1	<1
Tribromomethane	ug/l		100												<1			
Trichloroethene	ug/l	10	10												<1		<1	<1
Trichlorofluoromethane	ug/l														<1		<1	<1
Vinyl Chloride	ug/l																<1	<1
SVOCs																		
1,2,4-Trichlorobenzene	ug/l	0.4													<0.5		<1	<1
2,4,5-Trichlorophenol	ug/l														<0.5		<1	<1
2,4,6-Trichlorophenol	ug/l														<0.5		<1	<1
2,4-Dichlorophenol	ug/l	20													<0.5		<1	<1
2,4-Dimethylphenol	ug/l														<0.5		<1	<1
2,4-Dinitrotoluene	ug/l														<0.5		<1	<1
2,6-Dinitrotoluene	ug/l														<0.5		<1	<1
2-Chloronaphthalene	ug/l														<0.5		<1	<1
2-Chlorophenol	ug/l	50													<0.5		<1	<1
2-Methyl-4,6-Dinitrophenol	ug/l														<0.5			
2-Methylnaphthalene	ug/l														<0.5		<1	<1
2-Methylphenol	ug/l	100													<0.5		<1	<1
2-Nitroaniline	ug/l														<0.5		<1	<1
2-Nitrophenol	ug/l														<0.5		<1	<1
3-Nitroaniline	ug/l														<0.5		<1	<1
4-Bromophenyl Phenyl Ether	ug/l														<0.5		<1	<1
4-Chloro-3-Methylphenol	ug/l	40													<0.5		<1	<1
4-Chloroaniline	ug/l														<0.5		<1	<1
4-Chlorophenyl Phenyl Ether	ug/l														<0.5		<1	<1
4-Methylphenol	ug/l	100													<0.5		<1	<1
4-Nitroaniline	ug/l														<0.5		<1	<1
4-Nitrophenol	ug/l														<0.5		<1	<1
Azobenzene	ug/l														<0.5		<1	<1
Bis(2-chloroethoxy)methane	ug/l														<0.5		<1	<1
Bis(2-chloroethyl)ether	ug/l														<0.5		<1	<1
Bis(2-chloroisopropyl)ether	ug/l														<0.5			
Bis(2-ethylhexyl)phthalate	ug/l	1.3													<0.5		<1	2.18
Butylbenzylphthalate	ug/l	20													<0.5		<1	<1
Carbazole	ug/l														<0.5		<1	<1
Dibenzofuran	ug/l														<0.5		<1	<1
Diethylphthalate	ug/l	200													<0.5		<1	<1
Dimethylphthalate	ug/l	800													<0.5		<1	<1
Di-N-Butyl Phthalate	ug/l	8													<0.5		<1	<1
Di-N-Octyl Phthalate	ug/l	20													<0.5		<5	<5
Hexachlorobenzene (HCB)	ug/l	0.05													<0.5		<1	<1
Hexachlorobutadiene (HCBd)	ug/l	0.6													<0.5		<1	<1
Hexachlorocyclopentadiene	ug/l														<0.5		<1	<1
Hexachloroethane	ug/l														<0.5		<1	<1
Isophorone	ug/l														<0.5		<1	<1
Nitrobenzene	ug/l														<0.5		<1	<1
n-nitrosodimethylamine	ug/l														<0.5			
N-Nitroso-Di-N-Propylamine	ug/l														<0.5		<1	<1
Pentachlorophenol (PCP)	ug/l	0.4													<0.5		<1	<1
Phenol	ug/l	7.7													<0.5		<1	<1

Appendix 7

Site Walkover Photographs



Plate 01: CL27 i Elver Pill Reen. 22nd October 2015.



Plate 02: CL27 i Elver Pill Reen. 22nd October 2015

Client: Welsh Government

Project: M4CaN

Job Ref: JER6591 Checked By:

Date: July 2016



Plate 03: CL27 ĩ Elver Pill Reen. 22nd October 2015



Plate 04: CL27 ĩ Elver Pill Reen. 22nd October 2015

Client: Welsh Government

Project: M4CaN

Job Ref: JER6591 Checked By:

Date: July 2016

Appendix 8

Relevant Extract of Additional Environmental Data



Plate 01: Extract of 1991 Aerial Photograph



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:

Client: Welsh Government

Project: M4CaN

Job Ref: JER6591 Checked By:

Date: Oct 2015

Welsh Government

M4 Corridor around Newport

Environmental Statement

Supplement

Land Contamination Assessment

Report Annex D

CL-30 Green Moor Quarry

M4CaN-DJV-EGT-ZG_GEN-RP_EN-0032

At Issue | September 2016

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Appendix 2	Tabulated Gas and Groundwater Monitoring
Appendix 3	Tabulated Soil Laboratory Data
Appendix 4	Tabulated Groundwater Laboratory Data
Appendix 5	Tabulated Soil Leachate Laboratory Data
Appendix 6	Site Walkover Photographs
Appendix 7	Relevant Extract of Additional Mapping

1 Introduction

1.1 Background

1.1.1 This report relates to an area of land potentially affected by contamination (CL-30) known as the 'Green Moor Quarry Landfill' herein referred to as the 'Site'.

1.1.2 The Site is located between chainage 20,100 and 20,225 (see Figure 1), upon an infilled quarry.

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) published in March 2016 and the Land Contamination Assessment Reports formed an annex to Appendix 11.1 of the chapter on Geology and Soils.

1.2.2 A subsequent phase of investigation has been undertaken since the publication of the March 2016 ES. The additional data, herein referred to as the 2016 Additional Ground Investigation, have been incorporated into the summary tables, risk assessment, conceptual site model and associated text of this report where relevant. The conclusions and recommendations have also been refined to reflect the improved understanding of status of the site and associated risk. Therefore this report replaces the original CL-30 report published in Appendix 11.1 of the March 2016 ES.

1.2.3 In 2014, a Preliminary Sources Study Report (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) and the 2016 Additional Ground Investigation. This report relates to the area defined on the Site Plan Figure 1.

1.2.4 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 March 2016 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 the information 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 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 details the key reference documents referred to within the text.
- Section 12: Glossary – This section details the key terms and acronyms used throughout the report.

2 Site Location and Description Setting

- 2.1.1** The Site is located south of Magor, centred at National Grid Reference (NGR) ST 417 870. The Site comprises an area of infilled quarry, the location of which is shown on Figure 1.
- 2.1.2** Review of aerial photography and walkover surveys undertaken in 2014 and 2015 indicated that the Site forms part of a field. The field slopes gently southwards from approximately 20 to 10 m AOD towards the South Wales to London Mainline, which is positioned within a cut (at some 8 m AOD) and delineates the southern extent of the Site. A brewery is located approximately 150 m north of the Site and residential dwellings at Magor are approximately 100 m to the east.
- 2.1.3** Underground pipework with a visible chamber in the south of the Site, (understood to be part of effluent treatment drainage from the brewery), runs north-south directly through the Site. During the 2016 Additional Ground Investigation, it was noted that construction works unrelated to the Scheme in the adjacent field had uncovered metal pipework thought to be a water main, running east-west across the Site. The hamlet of Barecroft Common occupies the northern edge of the Caldicot Levels directly to the south of the railway line.
- 2.1.4** The Site's southern boundary with the railway line comprises a soil embankment.
- 2.1.5** Photographs of the Site are included in Appendix 6.

3 The Scheme

- 3.1.1** The Site is located between approximate chainage 20,100 to 20,225 as shown in Figure 1.
- 3.1.2** The proposed new section of motorway crosses the northern half of the Site and includes a 10 m high embankment which crosses the north western part of the Site. A bridge over the South Wales to London Mainline is located approximately 60 m to the south west. Green Moor Lane which currently bounds the Site to the north is diverted on an embankment alongside the new section of motorway and under the bridge to the southwest. A linear belt of shrubs and trees are proposed running along the east of the proposed side road diversion.
- 3.1.3** The remainder of the Site is excluded from the temporary and permanent land take.

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) (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. No relevant additional information has been identified from this review.

4.1.3 A summary of the Site's history is presented in Table 1 below.

Table 1: Site History

Date	Use	Source of Information
1843 - 1893	The Site comprises a Quarry . It is bound to the south by a railway, beyond which is Barecroft Common.	1:10,560 Historical Mapping
1891 - 1912	The Quarry is now marked as 'Old Quarry' indicating its disuse.	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
1969	The area of the quarry appears to have been infilled .	Aerial Photography
1969 - 1971	No significant change. The Site and wider field to the north is shown as rough ground (possible spoil) with what appears to be a pond in the southern tip.	1:10,560 Historical Mapping
1981	The pond appears to have been infilled, however the image is not clear.	Aerial Photography
1985 - 1996	The remainder of the Site is no longer recorded as rough ground but an agricultural field.	1 : 10,000 Historical Mapping
2006	There is an area of rough vegetation indicated in the south-west corner.	Aerial Photography
2009 - 2010	No significant change.	Aerial Photography
2014	The housing development of Magor to the east has been developed to within approximately 100 m of the Site.	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 sources of information presented above supplement those used in the 2014 PSSR. The Site boundary identified within the 2014 PSSR has been extended to the north based on the presence of possible spoil as indicated by the 1969-1971 mapping as shown in Figure 1. Relevant extracts of maps/photographs are presented in Appendix 7.

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 indicate that the Site is underlain by the bedrock of the Tintern Sandstone Formation. There are no superficial deposits in the southern area of the Site, however, River Terrace Deposits are shown to be present within the northern section of the Site.

5.2 Hydrology

- 5.2.1** There are no surface water features on Site. To the south of the South Wales to London Mainline railway there are a number of drainage ditches and reens, the nearest of which is located approximately 60 m to the south.

5.3 Hydrogeology

- 5.3.1** NRW classifies the River Terrace Deposits as a Secondary A Aquifer and the bedrock as a Principal Aquifer.
- 5.3.2** The Site does not lie within a groundwater Source Protection Zone (SPZ).

5.4 Environmental Information

- 5.4.1** NRW records do not identify any pollution incidents, sewage discharge consents, abstraction licences or any waste management facilities as located on or within 300 m of the Site.
- 5.4.2** The CL-29 Spoil Heap site (Annex D of Appendix 11.1 of the March 2016 ES) is located 85 m to the west of the Site. This is small material stockpile which is not considered to represent a likely offsite source of potential contamination relative to the Site.

6 Scope of Investigations

6.1 General

6.1.1 One intrusive ground investigation has been undertaken at this Site and a number of exploratory holes have also been excavated within 100 m of the Site. These have been considered in order to support an 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 intrusive ground investigations undertaken within and in the vicinity of the Site are summarised in Table 2.

Table 2: Investigation Summary

Date	Contractor	Boreholes	Location	Sampling
1997	Norwest Holst	BHM6	100 m west from Site	Groundwater level
		BHM7	120 m north from Site	No monitoring well installed.
2015	Geotechnical Engineering Limited	BH539	130 m south-west from Site	Groundwater level, sampling Ground gas (BH540 no monitoring well installed)
		BH540	110 m west from Site	
		BH541	60 m west from Site	
		BH542	120 m north from Site	
2016	RPS	WSM4CANA010	Northeast	Groundwater level, soil sampling, ground gas
		WSM4CANA011	East	

6.2.2 Boreholes BH539 and BH541 are also considered within the CL-29 Spoil Heap site (Annex D of Appendix 11.1 of the March 2016 ES).

6.2.3 The 2016 Additional Ground Investigation undertaken by RPS specifically targeted some of the previously identified data gaps as well as enabling verification of the risk levels of the Site and the need for any remedial measures. The scope of the 2016 Additional Ground Investigation included investigation of the Site itself including the northern extent of the quarry footprint.

6.2.4 The well construction details of the above boreholes are summarised in Table 3 below.

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
BHM6	Unknown	10.0	5	7.5	Tintern Sandstone
BH539	35	14.2	1	3	Head Deposits
	50		5	14.2	Tintern Sandstone
BH541	50	11.5	2	11.5	Tintern Sandstone
BH542	35	16	1	4	Tintern Sandstone
	50		10	16	Tintern Sandstone
WSM4CANA010	50	1.7	0.2	1.7	River Terrace Deposits/ Tintern Sandstone
WSM4CANA011	50	2.5	0.5	2.5	Made Ground, Tintern Sandstone

6.3 Surface Water Quality Sampling

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 Photo Ionisation Detector (PID) monitoring for Volatile Organic Compounds (VOCs) was not undertaken in any of the selected offsite boreholes during the previous ground investigations.

6.5 Groundwater Monitoring

6.5.1 A summary of the groundwater sampling, groundwater monitoring and ground gas monitoring rounds is shown in Table 4.

Table 4: Summary of Monitoring Rounds (offsite)

Location Ref. (Borehole Diameter)	Number of Rounds (Date of Sampling)	Monitoring Details	Notes
BHM6	5 no. 15 th November 1997, 25 th November 1997, 2 nd December 1997, 10 th December 1997, 16 th December 1997	Groundwater level	
BH539 (35mm)	4 no. 24 th March 2015, 31 st March 2015, 16 th April 2015, 8 th May 2015	Groundwater level and sampling Ground Gas	Gas monitoring in 35 mm shallow installation only
BH539 (50mm)			
BH541 (50mm)	4 no. 31 st March 2015, 16 th April 2015, 21 st April 2015,	Groundwater level and	

Location Ref. (Borehole Diameter)	Number of Rounds (Date of Sampling)	Monitoring Details	Notes
	11 th May 2015	sampling Ground Gas	
BH542 (35mm)	3 no. 24 th March 2015, 31 st March 2015, 16 th April 2015	Groundwater level Ground Gas	Gas monitoring in 35 mm shallow installation only
BH542 (50mm)			
WSM4CANA010	2 no. 6 th May 2016, 3 rd June 2016	Groundwater level and sampling Ground Gas	
WSM4CANA011	1 no. 6 th May 2016,	Groundwater level and sampling Ground Gas	

6.6 Laboratory Chemical Testing

6.6.1 A summary of all laboratory analysis undertaken on soil onsite and groundwater offsite is shown in Table 5.

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
1997	N/A	N/A	-	
2015	N/A	0	9	Metals, PAH, TPH, pH, cyanide, PCBs, VOCs, SVOCs, BTEX, phenols, inorganics
2016	2	1	0	Metals, cyanide, PCBs, phenols, BTEX, TPH, PAH, SVOCS, phthalates, VOCs, asbestos

Soil Analysis

6.6.2 The following section summarises the laboratory chemical analytical results for soil samples collected during the 2016 Additional Ground Investigation. For the purposes of the conceptual ground model, the analytical data from the Made Ground have been assessed separately from those of natural soils (River Terrace Deposits specifically).

6.6.3 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									
	Metals & Inorganics	SVOCs	PAHs	TPH	Phenol	BTEX	PCBs	Pthalates	VOCs	Asbestos
2016 Data										
Made Ground	1	1	1	1	1	1	1	1	1	1
River Terrace Deposits	1	0	1	1	0	1	0	0	0	1

Soil Leaching Analysis

6.6.4 Chemical analytical leachate data were collected from a single Made Ground sample during the 2016 Additional Ground Investigation and are summarised in Table 7 below.

Table 7: Summary of Analytical Leachate Data

Formation Unit	Number of Soil Leachate Analysis per Analytical Suite							
	Metals & Inorganics	PAHs	TPH	Phenol	BTEX	Volatile Organic Compounds	Semi Volatile Organic Compounds	PCBs
2016 Data								
Made Ground	1	1	0	1	0	1	1	1

Groundwater Analysis

6.6.5 The following section summarise the laboratory analytical results for groundwater samples collected during the 2015 ground investigation within the selected off site boreholes. The available data set has been tabulated and is presented in Appendix 4 with supporting laboratory certificates available in the relevant original report (Geotechnical Engineering, 2015).

6.6.6 The available data relate to samples taken from wells installed within the groundwater of the Superficial Deposits and Tintern Sandstone Formation deposits.

6.6.7 The available information is summarised in Table 8.

Table 8: Summary of Analytical Groundwater Data (offsite)

Groundwater Unit	Number of Groundwater Analyses per Analytical Suites (Number of Well Locations)							
	Metals & Inorganics	PAH	TPH	Phenol	BTEX	SVOCs	VOCs	PCBs
2015 Data								
Perched Groundwater (Superficial Deposits)	3 (1)	3 (1)	3 (1)	3 (1)	3 (1)	2 (1)	2 (1)	1 (1)
Groundwater (Tintern Sandstone Formation)	6 (2)	6 (2)	6 (2)	6 (2)	6 (2)	4 (2)	4 (2)	3 (2)

6.7 Review of Available Data

The 2016 Additional Ground Investigation has provided information relating to ground conditions and confirmation that some areas of the Site have been infilled.

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) and 2016 Additional Ground Investigation has also been used.

Topsoil

7.1.2 The Site is currently used as a grazing field and thus a layer of topsoil is present across the Site at a thickness of 0.2 m.

Made Ground

7.1.3 Made Ground was encountered during the 2016 Additional Ground Investigation within the central area of the Site (WSM4CANA011 was located on the northern edge of the backfilled quarry) to a depth of 2.2 m bGL. This comprised generally a reddish brown sandy clay with gravel of mixed lithologies. A horizon of black clayey gravel of coal, brick, slag, glass, plastics, ceramics and concrete was encountered between 0.7 and 1.8 m bGL.

7.1.4 Based on the above information and the historical mapping showing the extent of the former quarry the Made Ground infill material does not appear to extend under the proposed new section of motorway embankment nor the proposed new side road.

Superficial Deposits

7.1.5 Unconsolidated superficial deposits were typically encountered beneath the topsoil. These comprised predominantly sand and gravel, encountered to 0.5 – 1.4 m bGL. Whilst the historical field records identify this as ‘Head Deposits’, it is believed they represent the River Terrace Deposits in line with BGS records and the 2016 Additional Ground Investigation logs.

7.1.6 The River Terrace Deposits are present beneath the topsoil in the north of the Site and are absent in the central part of the Site and it is considered that the gravels have been extracted from the central and southern areas of the Site with the latter being infilled.

7.1.7 In borehole (BH539) a thin veneer of Tidal Flat Deposits to 2.35 m bGL was recorded. This was encountered as very soft clay. This would indicate that the formation extends further north than indicated by the published geological data. However, the Tidal Flat Deposits were not encountered at the Site.

Bedrock

7.1.8 Beneath the superficial deposits the Tintern Sandstone Formation was encountered. This typically comprised sandstone with interbedded thin mudstones/marls.

Geological Sequence Summary

- 7.1.9** The general geological sequence identified during the previous ground investigations is summarised in Table 9. The near surface geology is based on boreholes drilled on Site and the deeper geology inferred from off Site boreholes.

Table 9: Summary of Geological Sequence

Unit	Description	Thickness Range (m)	Basal Depth (m bGL)
Topsoil	Sandy clay	0.2	0.2
Made Ground	Reddish brown sandy clays with gravel of mixed lithologies, Black gravel of coal, brick, slag, glass, plastics, ceramics and concrete.	2.0	2.2
River Terrace Deposits	Clayey sandstone gravel or cobbles. Slightly gravelly sand.	1.2	1.4
Tintern Sandstone	Bedded sandstone. Horizons of clay/silt/conglomerate. Interbedded mudstone and sandstone	>9.39* - >19.6*	Unproven*

Note: * inferred from offsite exploratory holes.

- 7.1.10** The solid geology beneath the Site is anticipated to be similar to that detailed above although the rockhead is likely to be at a lower elevation given the historical quarrying process.
- 7.1.11** The Site has been subject to gravel extraction from the River Terrace Deposits. Gravels appear to have been extracted from the southern and central areas of the Site but not in the north. Infilling has been undertaken in the central to southern areas of the Site. Based upon desk study information and inferences from boreholes drilled on site, the proposed new section of motorway embankment and side road are unlikely to have infill materials beneath it.

7.2 Visual and Olfactory Evidence of Contamination

- 7.2.1** No gross visual or olfactory evidence of contamination was identified onsite aside from man-made inclusions encountered within the Made Ground in WSM4CANA011 of coal, brick, glass, plastics, ceramics and concrete.

7.3 Gas Monitoring

- 7.3.1** The gas monitoring dataset collected during each of the previous monitoring rounds at the on and offsite boreholes is summarised on the field data sheets provided in Appendix 2. The maximum ground gas concentrations are presented in Table 10.
- 7.3.2** Boreholes BH539 and BH541 have also been considered during the assessment of the gas regime for CL-29 Spoil Heap site (Annex D of Appendix 11.1 of the March 2016 ES), located approximately 85 m to the west.

Table 10: Summary of Gas Monitoring Data

Location ID (Borehole Diameter)	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 ₂ S (ppm) Max.
BH539 (35 mm)	2.1	4.7	0.1	1.0	0.4	20	1.0	0.0
BH541	0.0	6.0	0.1	18.9	1.0	19.2	64	0.0
BH542 (35 mm)	0.2	14.6	0.1	2.0	6.6	0.2	13	0.0
WSM4CAN A010 (50 mm)	-0.4		0.4	-	6.0	14.1	1	0
WSM4CAN A011 (50 mm)	0.1		0.1	1	5.1	11.9	2	0

7.4 Groundwater

Groundwater Encountered During Investigation (off site)

7.4.1 A water strike was encountered during the advancement of the offsite boreholes BHM6 during the 1997 investigation and BH539 during the 2015 investigation, as detailed on the geological logs provided in Appendix 1. This together with additional water level information provided by the exploratory borehole records is summarised below in Table 11.

Table 11: Summary of Groundwater Level Data During Investigation (offsite)

Location	Strike Depth (m bGL)	Geological Formation	Level after 20 minutes (m bGL)	Comments
BH539	1.2	Tidal Flat Deposits	1.0	
BHM6	6.5	Tintern Sandstone	0.0 (log start time taken to rise is 0)	Uncertain on the accuracy of the recorded resting level

7.4.2 Groundwater was not encountered in any other boreholes during the previous ground investigations.

Groundwater Level Dataset

7.4.3 The groundwater level dataset gathered from on site and the selected boreholes offsite is provided in Appendix 2 and summarised in Table 12.

Table 12: Summary of Groundwater Level During Monitoring Rounds (offsite)

Location	Installation	Depth of response zone (m bGL) and Geological Formation	No. Measurements	Min. Depth (m bGL)	Max. Depth (m bGL)	Comments
BHM6	Unknown	5 – 7.5 (Tintern Sandstone formation)	5	1.67	3.52	
BH539	35 mm	1 – 3 (Tidal Flat Deposits)	3	0.56	1.06	
	50 mm	5 – 14.2 (Tintern Sandstone formation)	3	1.09	1.65	
BH541	50 mm	2 – 11.5 (Tintern Sandstone formation)	4	6.67	8.15	
BH542	50 mm	10 -16 (Tintern Sandstone formation)	3	Dry	Dry	
WSM4CANA 010	50 mm	0.2 – 1.7 (River Terrace Deposits)	2	1.68	1.68	Recorded as dry on one occasion.
WSM4CANA 011	50 mm	0.5 – 2.5 (Made Ground)	1	=		Recorded as dry on one occasion.

Groundwater Summary

7.4.4 Groundwater was not encountered within the Made Ground.

7.4.5 The main groundwater body present is anticipated to be within the Tintern Sandstone, with variable resting levels recorded in between monitoring visits. The Tintern Sandstone formation is considered to be in hydraulic continuity with the groundwater within the Head Deposits.

7.4.6 The offsite boreholes are considered to be up gradient to the Site based on a general groundwater flow south-eastwards (Appendix 16.2 of the March 2016 ES).

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 (CSM) presented within the 2014 PSSR has been reviewed and updated based on data from the Supplementary Ground Investigation (Geotechnical Engineering, 2015), the 2016 Additional Ground Investigation and the revised design of the Scheme. The main alterations to the 2014 PSSR model are summarised as follows.

- Addition of ground, groundwater and gas datasets from on site and nearby boreholes.
- Consideration of revised land use post construction.
- Removal of surface water receptor.
- Update of the source-pathway-receptor linkages taking into account the above, and more detailed assessments.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 The potential sources of contamination and associated contaminants which may be present within the Site are detailed below.

- Infill materials of an unknown nature, potentially comprising waste deposited between the late 1960s and early 1980s. Made Ground encountered on the inferred northern edge of the backfilled quarry has identified infill materials with man-made inclusions such as plastics, ceramics, slag and glass. Further north, beyond the quarry boundary in an area indicated by historical mapping to potentially be impacted by spoil, Made Ground has not been encountered.
- Ground gas from quarry backfill materials and organic natural soils;
- Leachate from quarry infill materials.

Potential Receptors

8.2.2 Receptors during the construction and the operational stages of the Scheme that have been considered are as follows.

Construction

- Construction workers during Site development works.
- General public adjacent to construction works including existing A4180 and railway users and residents located within 100 m of the Site.
- Groundwater within the superficial deposits and/or within the Tintern Sandstone formation.

Operational

- General public end users.
- Site neighbours adjacent to areas of permanent land take.
- Maintenance workers.
- Groundwater (principal aquifer) within the bedrock.

Potential Pathways

8.2.3 Pathways during the construction and the operational stages of the Scheme that have been considered are as follows.

- Dermal contact, ingestion, inhalation pathways of potentially contaminated soils possible during construction works and maintenance works.
- Dermal contact, ingestion, inhalation pathways possible for general offsite public.
- Leaching of contaminants from the infill material into underlying groundwater aquifer.
- Vertical or lateral migration of potential ground gases associated with infill material.

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 new data described herein, the following risk evaluation has been reconsidered and includes the below.

- The Site has been subject to backfilling. A single onsite borehole advanced within the quarry footprint encountered 2.0 m of Made Ground with various man-made materials. The infilled area extends under the proposed permanent land take area but may not extend as far as the Green Moor Lane diversion (proposed new road) and the main motorway embankment itself.
- Made Ground was not encountered in the north of the Site within the motorway embankment footprint.
- The construction of the proposed 10 m high embankment and side road will encapsulate or remove any unexpected contaminated infill materials present within its footprint. This will reduce or remove exposure linkages to motorway users and maintenance workers. However, the landfill extends beyond the permanent land take (outside embankments for the M4 and Green Moor Lane) and any potential linkages will remain but are not expected to be affected.
- Motorway users will be within an open environment with no proposed structures or other confined spaces.
- Bedrock directly beneath the Site is classified as a principal aquifer.
- Hardstanding cover which is proposed in some areas of the new motorway corridor is likely to limit infiltration thus reducing leaching in these areas.

- The nearest surface water feature is located 60 m to the south, over the railway line. As such it is considered there is no reasonable pathway between the Site and surface water feature.
- Slightly elevated CO₂ has been identified in boreholes drilled both within the infill material and also in natural ground. The concentration in natural ground has higher methane and carbon dioxide than that in Made Ground. However the monitoring data on site is considered limited

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 of the March 2016 ES). Soil chemical analysis results and the findings of the generic tier 2 human health risk assessment are presented in Appendix 3. All exceedances within Made Ground are summarised in Table 13.

Table 13: Summary of Human Health Soil Screening Exceedances (Made Ground)

Determinant	Units	Range	Screening Criteria	No. samples exceeding Screening Criteria (Total number of results)	Locations of exceedances
Chromium	mg/kg	33.8	33	1 (1)	WSM4CANA011
Benzo(b)fluoranthene	mg/kg	13.4	13	1 (1)	WSM4CANA011
Dibenzo(ah)anthracene	mg/kg	2.16	1.1	1 (1)	WSM4CANA011

8.4.2 Although a marginal exceedance of chromium has been identified within the Made Ground at WSM4CANA011, the criterion relates to the hexavalent form. The result of 33.8 mg/kg is well within the normal background data range (<95 mg/kg) and is therefore not considered to represent a contaminant of concern. Further consideration of chromium is provided in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.4.3 Slightly elevated PAHs have been encountered within a Made Ground sample. This is likely to be associated with the presence of coal and is considered of low risk to human health especially as the proposed new section of motorway and side road will create a barrier between any soil contamination and future site users.

8.4.4 Asbestos was not detected within a sample of Made Ground encountered on the edge of the backfilled quarry.

8.4.5 During construction, conventional construction safety controls including good hygiene and use of Personal Protective Equipment for a typical brownfield development site are considered all that is necessary to manage the low risk to construction works.

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 March 2016 ES) and the groundwater chemical results are presented in Appendix 4. No soil leachate or surface water data is available. All exceedances of relevant generic criteria are summarised in Table 14 for groundwater.

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 Groundwater Baseline Report (Appendix 16.2 of the March 2016 ES) indicates surface water to be generally moderately hard with hardness concentrations within a range of 100 to 150 mg/l (reported as calcium carbonate). Therefore EQSs within this water hardness range have been used for screening purposes.

Soil Leachate Results

8.5.3 One soil sample was subjected to leachate analysis from within the Made Ground. The majority of the soil leachate results were all below the applied screening criteria, with the exception of the contaminants presented in Table 14.

Table 14: 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)
Anthracene	ug/l	0.308	0.1	-	1 (1)	WSM4CAN011 (Made Ground)	-	-
Fluoranthene	ug/l	1.21	0.0063	-	1 (1)	WSM4CAN011 (Made Ground)	-	-

8.5.4 Anthracene and fluoranthene leaching concentrations were found to exceed the Environmental Quality Standards within a sample of Made Ground. Made Ground at this location was noted to include coal fragments, potentially a source of the PAH contaminants.

Groundwater Results

8.5.5 The boreholes drilled at the site did not encounter shallow groundwater or perched groundwater/leachate associated with Made Ground. As such nearby available groundwater analytical data have been considered. This data were included to help identify the local groundwater quality within the vicinity of the Site in order to identify any obvious contamination fingerprint that could be associated with potential contamination from the Site itself.

8.5.6 The groundwater analysis results include data from three rounds of groundwater monitoring results from offsite boreholes, BH541 and BH539, undertaken in 2015. The groundwater samples were taken from the aquifer body within the Tintern Sandstone formation and the perched groundwater within the Head Deposits.

8.5.7 A summary of exceedances with respect to the screening criteria is presented in Table 15 and discussed below.

Table 15: Controlled Waters Screening Exceedances - Groundwater (offsite)

Determinand	Units	Range	EQS	DWS	No. Exceeded Screening Criteria (Total Number of Results) Against EQS	Location of Exceedance	No. Exceeded Screening Criteria (Total Number of Results) Against DWS	Location of Exceedance
Perched Groundwater								
Copper	ug/l	<1 - 21	10	2000	1 (3)	BH539	-	-
Mercury	ug/l	0.65	0.07	1	1 (3)	BH539	-	-
Nickel	ug/l	2.3 - 7	4	20	1 (3)	BH539	-	-
Phenols	ug/l	<0.03 - 0.03	0.007 7	-	1 (3)	BH539	-	-
Aquifer								
Arsenic	ug/l	<1 - 25	50	10	-	-	1 (6)	BH541
Copper	ug/l	<1 - 16	10	2000	1 (6)	BH539	-	-
Mercury	ug/l	<0.5 - 1.3	0.07	1	1 (6)	BH539	1 (6)	BH539
Nickel	ug/l	<1 - 6.3	4	20	2 (6)	BH539 (x2)	-	-
Chloride	mg/l	13 - 620	250	250	1 (6)	BH541	1 (6)	BH541
Ammoniacal Nitrogen	mg/l	<0.01 - 1.4	0.6	-	2 (6)	BH539, BH541	-	-

8.5.8 Review of the groundwater chemical testing results indicated that the deep groundwater offsite has elevated levels of metals (arsenic, copper, mercury and nickel) and inorganics (chloride and ammoniacal nitrogen).

8.5.9 The perched groundwater within the Head Deposits is shown to be impacted by metals (copper, mercury and nickel) and phenols.

8.5.10 All PAH, VOCs, SVOCs, phenols, BTEX, TPH and PCB results were found below their respective limits of detection within both water bodies.

8.5.11 It is noted that the laboratory detection levels for mercury, cyanide, some PAH compounds, VOCs and SVOCs are higher than the applied screening criterion.

8.5.12 Based on these off site boreholes, there does not appear to be any evidence that the infill quarry materials have impacted the groundwater to the west and south west of the site (however these boreholes are considered to be up hydraulic gradient of the Site). It is considered that the proposed works are unlikely to adversely change the existing conditions at the Site in such a way that lead to a deterioration in groundwater quality.

8.6 Ground Gas Risk Assessment

8.6.1 Ground gas data are available for on site and offsite boreholes. On site boreholes WSM4CANA010 and WSM4CANA011 have response zones within the RTD and Made Ground respectively. Off site boreholes BH539, BH541 and BH542 have response zones screened within the Head Deposits or the Tintern Sandstone Formation. Of the gas monitoring rounds available the following comments below have been made.

- No monitoring was undertaken during low barometric pressure, where recorded (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.
- Gas flow was generally recorded as absent or low flow (up to 0.4 l/hr recorded on site) with the exception of the second round for BH539, with a peak of 2.1 l/hr recorded.
- Methane has been recorded generally as nil or up to 0.1 % in all boreholes which is below the initial screening criteria of 1 %. A concentration of 0.4 % was recorded within WSM4CANA010 (located north of the backfilled quarry). The Lower Explosive Limit (LEL) of up to 18.9 % in BH541 is noted. However, given the lack of correlation between methane concentration per volume and per LEL, it is considered these marginal readings to be caused by equipment inaccuracy rather than representative of the presence of actual methane gas. Further monitoring is recommended to confirm gas regime.
- Carbon dioxide is identified between 0 and 1 %, below the screening criteria of 5 % in BH539 and BH541. However, in BH542, WSM4CANA010 and WSM4CANA011 carbon dioxide is identified above that of the screening criteria, with concentrations up to 6.6%.
- Traces of Volatile Organic Compounds of up to 6 ppm have been recorded in BH539 and BH541. BH542 records VOCs of up to 14.6 ppm.
- Hydrogen sulphide was undetected within all boreholes throughout all monitoring rounds.
- Carbon monoxide was recorded as generally absent or ≤ 2 ppm on all rounds for WSM4CANA010, WSM4CANA011 and BH539. BH542 recorded up to 13 ppm. The first round for BH541 identified a maximum of up to 64 ppm, falling to 1 ppm on the second round and nil on the following two rounds. The maximum recorded concentration is above the screening criteria of 30 ppm. Given the obvious falling trend and absence of obvious source, this is considered to be likely caused by the well installation works rather indicative of carbon monoxide flux within the soils.
- Oxygen has been recorded at ambient levels with concentrations between 19.2 and 20.7 % in BH539 and BH541. It is recorded at low concentrations of between 0.2 and 11.4 % in BH542 and minimums of 11.9 % and 14.1 % in WSM4CANA011 and WSM4CANA010 respectively.

8.6.2 On the basis of the above no significant ground gas source has been identified. However, trace concentrations of CH₄, slightly elevated CO₂ and depleted O₂ concentrations have been recorded on site.

- 8.6.3** A gas risk assessment has been undertaken and is set out within the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES). Further ground gas monitoring is recommended to confirm possible risks and gas monitoring should be undertaken during construction to monitor any changes to the baseline conditions. Gas monitoring and a safe system of working will be required in the event that quarry infill materials are encountered during construction.

8.7 Summary

- 8.7.1** The quality of the perched groundwater within the Head Deposits and the aquifer within the sandstone are similar and are shown to have been impacted by metals and inorganics (data from within 100 m from the Site). The groundwater in these locations does not appear to have been affected by potential contaminants originating from the Site.
- 8.7.2** The quality in these groundwater bodies are representative of the general baseline conditions seen in this area of Newport as defined within the Baseline Water Environment Report (Appendix 16.2 of the March 2016 ES). Although no obvious impacts from the Site are identified, the monitoring points are considered to be located upgradient and therefore, may not provide a clear line of evidence. Ground investigation within the Site is recommended to verify possible risks.
- 8.7.3** Trace concentrations of CH₄, elevated CO₂ and depleted O₂ concentrations have been reported for onsite boreholes screened within the RTD and Made Ground. Offsite boreholes screened within the Head Deposits and Tintern Sandstone Formation have indicated no obvious ground gas source. However, the risks to future site users are considered low due to the nature of the permanent works and the lack of nearby receptors. Further gas monitoring is recommended both prior to and during construction.

9 Refined Conceptual Site Model

- 9.1.1** The incorporation of data from the 2015 Supplementary Ground Investigation and the 2016 Additional Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. 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) is 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
Quarry in-fill materials. Details not known however indicated to contain plastics, ceramics, glass and coal.	Construction					
	Construction Workers (C)	Direct dermal (1)	Unlikely	Low	Very low	Construction workers may be exposed to the infill materials during Site construction works; however exposure duration will be short term only. Use of PPE and good hygiene practice throughout earthworks and construction phase is considered sufficient to mitigate risks presented. Slightly elevated PAHs have been identified within the quarry backfill though the concentrations are not considered to represent abnormal constraints to construction worker's health and safety over and above those typical of a brownfield Site. Dust suppression measures are recommended during construction works.
		Ingestion (3)	Unlikely	Low	Very low	
		Inhalation of soil dust (2)	Unlikely	Low	Very low	Construction workers may be exposed to ground gas potentially generated by the quarry in-fill materials during the excavation and ground improvement works. Ground gas data available for the site is limited. However trace CH ₄ , elevated CO ₂ and depleted O ₂ concentrations have been reported. Though this does not indicate a significant gas source a safe system of work including ground gas monitoring is needed during excavations in infilled ground. Monitoring is required to confirm the associated risks.
		Inhalation of ground gas or vapour (2)	Unlikely	Moderate	Low	
	Offsite users / Barecroft Common residents (B)	Dermal contact with soil dust (1)	Unlikely	Low	Very low	Slightly elevated PAHs have been identified within the Made Ground representing the quarry backfill. During construction there is the possibility of Site neighbours/general public inhaling soil dust. Short

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Ingestion of soil dust (3)	Unlikely	Low	Very low	term exposure only. Dust suppression measures are recommended during construction works.
		Inhalation of soil dust (2)	Unlikely	Low	Very low	Potential for lateral gas migration through bedrock. Ground gas data available for the site is limited. However trace CH ₄ , elevated CO ₂ and depleted O ₂ concentrations have been reported though this does not indicate a significant gas source. Further ground gas monitoring is required to confirm the associated risks. However there are limited nearby receptors.
		Inhalation of ground gas or vapour (2)	Unlikely	Low	Very low	
	Groundwater (Principal Aquifer) (Da)	Leaching/migration of contaminants from backfill materials to groundwater (4)	Unlikely	Moderate	Low	The elevation of the quarry base in relation to the water table is unknown and therefore there is a risk of the infill materials being within the groundwater zone. Infill materials were not however encountered within the footprint of the embankment (single exploratory hole). During the embankment construction there is a risk for potential contaminants to be mobilised and migrate to groundwater should infill materials be encountered. Ground improvement techniques may be used to improve geotechnical properties of the infill material. Taking care not to create new/increase vertical pathways. Foundation works risk assessment would be required on confirmation of ground improvement method.
Onsite Quarry in-fill materials. Details	Operational					
	Maintenance Workers (C)	Direct dermal contact (1)	Unlikely	Low	Very low	Ground contamination at the site is limited to slightly elevated PAHs above selected screening

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
not known however indicated to contain plastics, ceramics, glass and coal.		Ingestion (3)	Unlikely	Low	Very low	criteria associated with the quarry backfill. Infill material has not been encountered within the footprint of the embankment therefore the exposure to contamination will likely be limited outside of the motorway embankment. Areas outside the motorway hardstanding are to have topsoil cover and vegetation establishment, reducing the potential for exposure. Exposure duration will be short term only. Site specific risk assessments will be required in line with health and safety guidance. This will enable safe methodologies and appropriate levels of PPE to be put in place. As such all significant risks will be duly considered and suitably mitigated.
		Inhalation of soil dust (2)	Unlikely	Low	Very low	
		Inhalation of ground gas or vapours (2)	Unlikely	Low	Very low	Ground gas data available for the site is limited but gas risks are considered low. Any confined space entry needed by maintenance staff would require safe systems of work and use of PPE. As such all significant risks will be duly considered and suitably mitigated.
	Future Motorway users (A) & Offsite users / Barecroft Common residents) (B)	Direct Dermal contact (1)	Unlikely	Low	Very low	Ground contamination at the site is limited to slightly elevated PAHs within the quarry backfill above selected screening criteria. Infill material has not been encountered within Scheme footprint to be encapsulated by the embankment and therefore the exposure to contamination will likely be limited to areas outside the embankment and also outside permanent land take. Dermal, inhalation and ingestion pathways associated to soil dust only.
		Ingestion (3)	Unlikely	Low	Very low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
		Inhalation of soil dust (2)	Unlikely	Low	Very low	Areas outside the motorway hardstanding are to have topsoil cover and vegetation establishment, reducing the potential for exposure. Off site receptors are located some 100 m from the proposed earthworks. offsite
	Future Motorway users (A)	Inhalation of ground gas or vapours (2)	Unlikely	Low	Very low	Ground gas data available for the site is limited, however gas risk are considered low. Trace CH ₄ , elevated CO ₂ and depleted O ₂ concentrations have been reported though this does not indicate a significant gas source further ground gas monitoring is required to confirm the associated risks. Motorway end users to be within open space. Proposed 13 m high embankment and limited span over landfill associated with unlikely vertical gas migration.
	Offsite users / Barecroft Common residents) (B)	Inhalation of ground gas or vapours (2)	Unlikely	Low	Very low	Ground gas data available for the site is limited. However trace CH ₄ , elevated CO ₂ and depleted O ₂ concentrations have been reported though this does not indicate a significant gas source further ground gas monitoring is required to confirm the associated risks. Part of the landfill to be capped with embankment possibly increasing lateral ground gas migration.
	Groundwater - Aquifer (Da) within Tintern Sandstone formation	Leaching/migration (4) of contamination in infill materials	Unlikely	Moderate	Low	The elevation of the quarry base in relation to the water table is unknown and therefore, there is a risk of the infill materials being within the groundwater zone. Infill materials have not been encountered within the footprint of the embankments (single exploratory hole) however should infill materials be encountered ground

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
						improvement techniques may be used to improve the geotechnical properties of the infill material. Care would be required not to create new/increase vertical pathways. Foundation works risk assessment would be required on confirmation of ground improvement method.

10 Conclusions and Recommendations

10.1 Conclusions

- 10.1.1** The 2016 Additional Ground Investigation undertaken at the Site has proved the presence of Made Ground with various man-made materials, within the footprint of the backfilled quarry located within the area of permanent land take. Further north within the proposed new section of motorway embankment and side road footprints Made Ground was not encountered and thus the infilled materials are not likely to be disturbed during construction.
- 10.1.2** Chemical analytical data have identified slightly elevated PAHs within a sample of Made Ground obtained within the backfilled quarry. The concentrations are most likely associated with the presence of coal and are not considered to represent abnormal constraints to future site users nor construction worker's health and safety over and above that of a brownfield site.
- 10.1.3** Ground gas monitoring undertaken for onsite boreholes has identified a potential ground gas source, although limited monitoring data is available on site. However, as the infilled materials are not likely to be disturbed gas risks are considered low.
- 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 and work force receptors, although such measures would be no more than typically expected on a construction site.

10.2 Recommendations

- 10.2.1** It is recommended that further ground gas monitoring is undertaken on Site. A remediation strategy is to be developed which should include, but not be limited to the following.
- Further ground gas monitoring prior to construction.
 - Gas monitoring and a safe system of working will be required during construction in the event that quarry infill materials are encountered during excavations.
 - Dealing with unexpected contamination.
 - Control measures to prevent risks to construction workers and the general public during construction.
 - Verification of material used as topsoil for suitability of use.
- 10.2.2** The remediation strategy 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

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

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

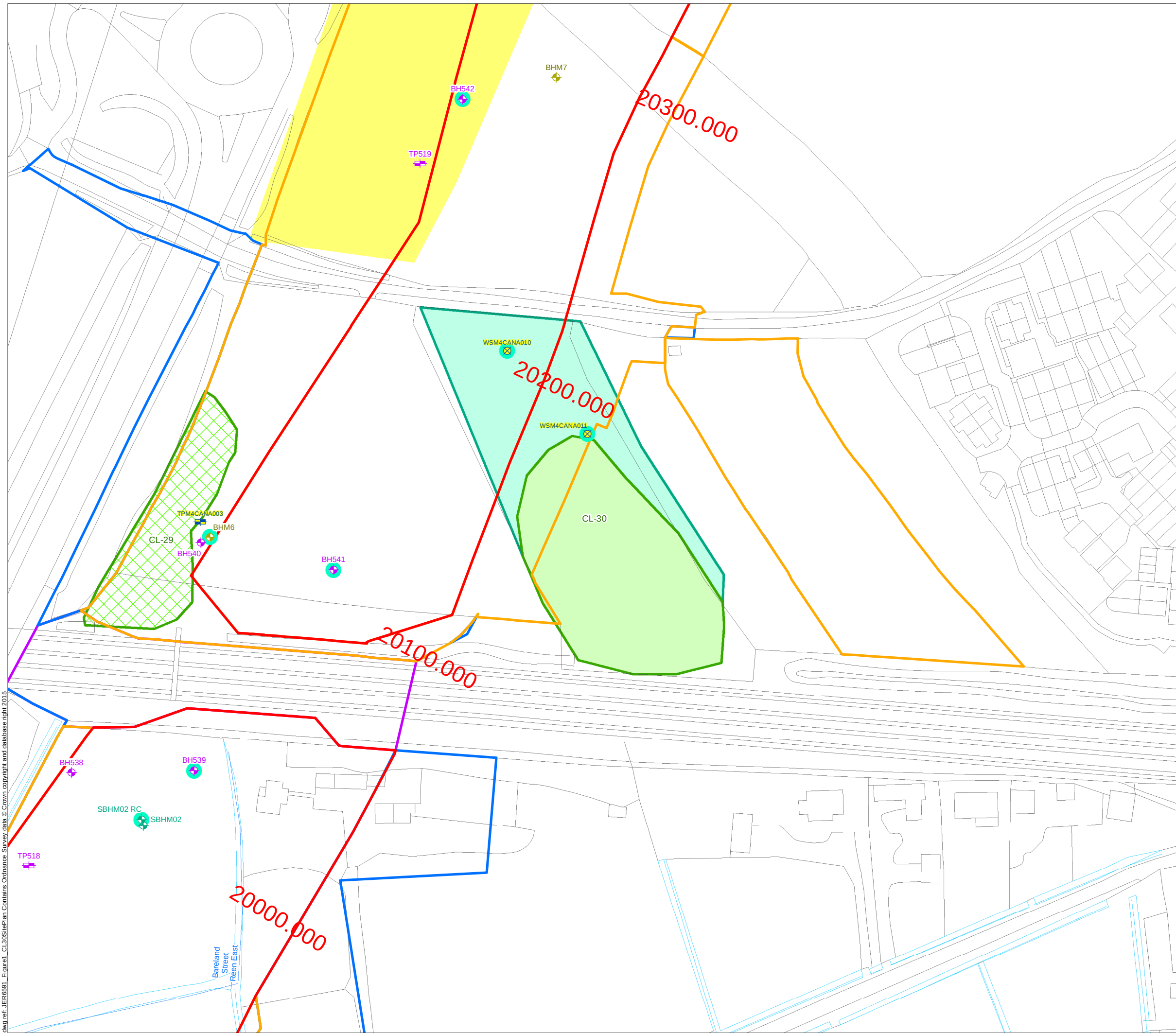
12 Glossary

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
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_CL30SitePlan 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
- 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

2015-2016 (RPS)

- Window Sample
- Trial Pit

2015 (Geotechnical Engineering)

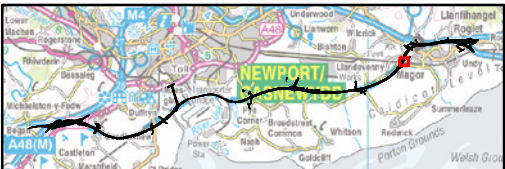
- Borehole
- Trial Pit

2007 (Norwest Holst)

- Borehole

1997 (Norwest Holst)

- Borehole
- Monitoring Well Installation



Llywodraeth Cymru
Welsh Government

Appendix R11.1 Annex D CL-30

Site Plan for CL-30

Figure: 1	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB



Legend

- Topsoil
- Infill Material
- River Terrace Deposits - RTD
- Tintern Sandstone - TS
- Proposed Embankment
- Groundwater (TS)
- Gas Migration Pathway

Potential Receptors

- Humans On-Site (M4 User)
- Humans Off-Site (Site Neighbours)
- Humans On-Site (Construction/Maintenance)
- Groundwater (Aquifer)

Potential Pathways

- Dermal Contact
- Inhalation
- Ingestion
- Leaching / Migration

Potential Sources of Contamination

Possible contamination present on site associated with :

On-Site

- Infill materials
- Impacted groundwater
- Ground gas / leachate

NOTE
Drawing refined from PSSR Drawing Reference
M4-OA-17-00DR-Z-XX-0136 (January 2014)



Appendix R11.1 Annex D CL-30

Conceptual Site Model for CL-30

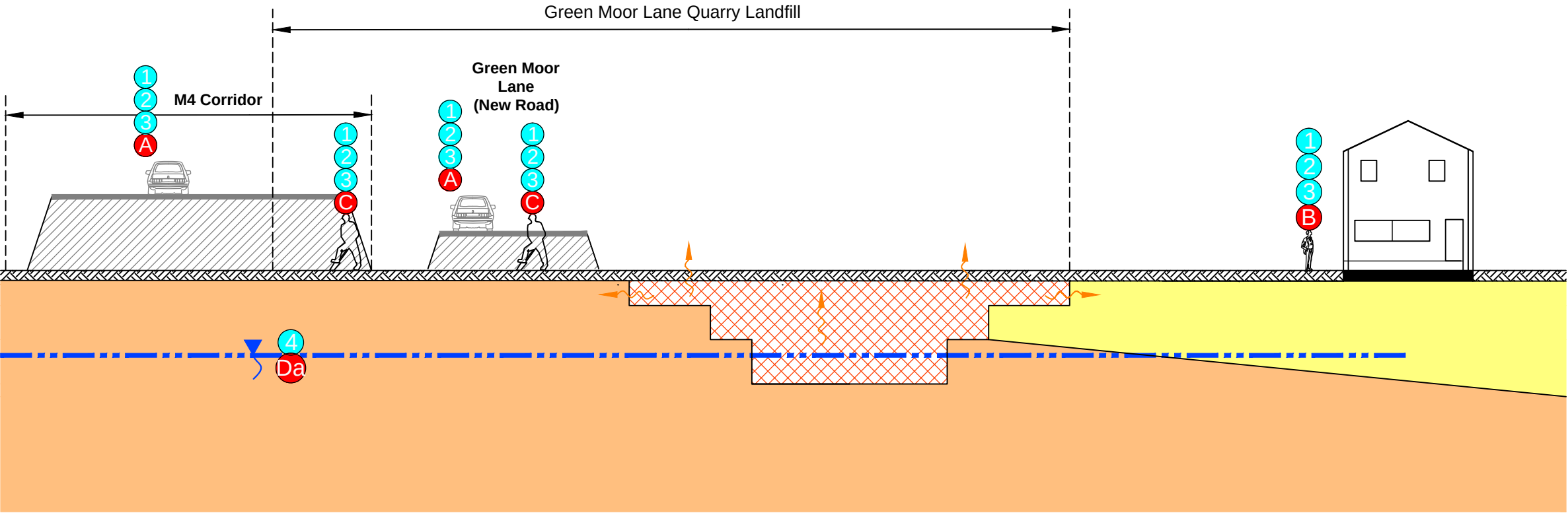
Figure: 2	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

Ground conditions based
on available information

dwg ref: JER6591_Figure2_CL30ConceptualSiteModel

CL-30 Green Moor Lane Quarry Landfill



Appendices

Appendix 1

Exploratory Records



Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - ROTARY

Borehole No.

BHM6

Header

Contract No.	F10895	Method	Rotary Coring	Coordinates	341586.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Knebel 77		187014.0 N
Client	Welsh Office	Driller	E.D	Ground Level	11.10m AOD
		Logged by	T.R/C.D	Orientation	Vertical
Consultant	Ove Arup and Partners	Core barrel	P	Date Started	11/11/1997
		Core bit	Saw Tooth	Date Completed	11/11/1997

PROGRESS						DRILLING DETAILS				
Date	Time	Hole depth	Casing depth	Water depth	Remarks	From depth	To depth	Flush type	Flush return	Core diameter
11/11/1997	1800	10.00	2.50	4.21		0.00 2.00	2.00 10.00	mist mist	100% 100%	0* 92

CASING				WATER STRIKES							
Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.	Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
120	10.00	140	2.50	11/11/1997	0000	6.50	0.00	0		2.50	0.00

GENERAL NOTES						SPT DETAILS		
						Depth	Type	Incremental blow count/penetration in mm
						1.00	S	N=25 (5,5,9,8,5,3)
						2.00	C	50/15mm (13,12,50)
						3.00	C	51/231mm (1,1,11,2,8,30)
						5.60	C	50/75mm*

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.

BHM6

Sheet 1 of 1

Contract No.	F10895	Method	Rotary Coring	Coordinates	341586.8 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Knebel 77		187014.0 N
Client	Welsh Office	Driller	E.D	Ground Level	11.10m AOD
Consultant	Ove Arup and Partners	Logged by	T.R/C.D	Orientation	Vertical
		Core barrel	P	Date Started	11/11/1997
		Core bit	Saw Tooth	Date Completed	11/11/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Coring and Sampling	TCR	SCR	RQD	FI	SPT N & depth	Installation
TOPSOIL		0.10	11.00							
Brown sandstone cobbles in CLAY (drillers description). (Head Deposits)		0.61	10.49							
Weathered SANDSTONE clayey (drillers description). (Tintern Sandstone)									25	1.00 1.45
									C50/15mm	2.00 2.17
		2.50	8.60	2.00 2.50	40	0	0	NI		
Greyish green fine to coarse grained thinly to medium sub-horizontally bedded occasionally thinly and thickly laminated SANDSTONE, strong completely fractured. (Tintern Sandstone)				2.50 3.00	36	0	0	NI		
				3.00 3.50	40	0	0	NI	C51/231mm	3.00 3.38
		3.50	7.60	3.50 4.00	46	10	0	NI		
Reddish brown fine to coarse grained medium sub-horizontally bedded slightly to moderately weathered micaceous SANDSTONE, strong with medium spaced very thin beds of fine gravelly sandstone and closely to medium spaced inclined discontinuities planar rough tight. (Tintern Sandstone)				4.00 4.60	92	83	28	4		
---from 3.50 to 4.00m completely fractured										
---from 4.60 to 4.75m completely fractured				4.60 5.60	10	0	0	NI		
---from 5.60 to 5.75m completely fractured									C50/75mm*	5.60 5.68
---from 6.00 to 6.50m sub-vertical fracture (075°) planar rough tight				6.00 6.50	100	96	0	5		
---from 6.50 to 6.75m moderately weathered		6.50	4.60							
Reddish brown to greyish green fine to medium grained thinly to medium sub-horizontally bedded slightly to moderately weathered micaceous SANDSTONE, moderately strong to strong with closely spaced very thin interbedding of reddish brown mottled grey mudstone with closely to medium spaced sub-horizontal discontinuities planar rough tight. (Tintern Sandstone)				6.50 8.00	100	93	21	12		
---from 7.00 to 7.25m sub-vertical fracture (065°) planar rough tight								6		
---from 7.35 to 7.60m sub-vertical fracture (065°) planar rough tight		8.00	3.10	8.00 9.50	100	97	79	11		
SANDSTONE As Sheet 2				9.50 10.00	90	80	0	5		
Rotary drilling complete at 10.00 m.		10.00	1.10							

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

Form	NH ROTARY LOG
Version	1.00
Revised	16/09/96



Norwest Holst Soil Engineering Ltd.

BOREHOLE LOG - CABLE PERCUSSION

Borehole No.

BHM7

Header

Contract No.	F10895	Method	Cable Percussion	Coordinates	341704.6 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pilcon	Ground Level	187170.2 N
Client	Welsh Office	Driller	LD	Orientation	23.80m AOD
Consultant	Ove Arup and Partners	Logged by	C.D	Date Started	Vertical
				Date Completed	21/10/1997

PROGRESS						DRILLING DETAILS			
Date	Time	Hole depth	Casing depth	Water depth	Remarks	Hardbore from depth	Hardbore to depth	Chiselling hours	Remarks
21/10/1997	0000	2.60	1.50	Dry		2.30	2.60	1.00	

CASING				WATER STRIKES							
Hole diameter	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.	Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
150	2.60	150	1.50								

GENERAL NOTES					SPT DETAILS		
					Depth	Type	Incremental blow count/penetration in mm
					1.50	S	N=73 (5,7,13,15,19,26)
					2.30	S	50/50mm*
					* 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.

BHM7

Sheet 1 of 1

Contract No.	F10895	Method	Cable Percussion	Coordinates	341704.6 E
Project	M4 Relief Road Magor to Castleton Stage 2	Drilling Rig	Pileon		187170.2 N
Client	Welsh Office	Driller	I.D	Ground Level	23.80m AOD
Consultant	Ove Arup and Partners	Logged by	C.D	Orientation	Vertical
				Date Started	21/10/1997
				Date Completed	21/10/1997

Description of Strata	Legend	Depth Below G.L.	O.D. Level	Sampling	SPT N & (U blows)	SPT type & depth	Installation
TOPSOIL		0.40	23.40				
Stiff brown sandy CLAY (drillers description). (River Terrace)		0.60	23.20	U 0.50 - 1.00	(62)		
Yellowish brown mottled light reddish brown occasionally thinly laminated micaceous silty clayey fine and medium SAND. (River Terrace)		1.50	22.30	D 1.20 B 1.50 - 2.00 D 1.50	S73	S 1.50 1.95	
Light yellowish grey brown fine and medium grained thinly laminated highly to completely weathered micaceous silty SANDSTONE, very weak to weak with occasional orange iron staining along discontinuities. (Tintern Sandstone)		2.60	21.20	D 2.20 D 2.30	S50/50mm*	S 2.30 2.35	
---from 2.20m weak							
Cable Percussion boring complete at 2.60 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

BOREHOLE LOG



CLIENT WELSH GOVERNMENT

BH539

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 1 of 2

Start Date 6 March 2015 Easting 341581.4

Scale 1 : 50

End Date 9 March 2015 Northing 186934.6 Ground level 6.35mOD

Depth 14.20 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru- ment	description	depth (m)	reduced level (m)	legend	
06/03/15 0900hrs	1B	0.20 - 0.50		Vo 0.0				Grass over very soft reddish brown sandy gravelly CLAY. Gravel is rounded fine and medium quartz. (TFD)	1.60	4.75		
	2D*	0.20 - 0.50										
	3B	0.50 - 1.00										
	4D*	0.50 - 0.10										
	5B	1.00 - 1.20										
	6D*	1.00 - 1.20										
	7D	1.20 - 1.65										
	8X	1.20 - 2.20										
	9D*	1.30 - 1.40										
	10D	2.20 - 2.65	Nil	S 6				Very soft light brown slightly gravelly very sandy CLAY. Gravel is rounded fine and medium quartz. (TFD)	2.35	4.00		
	11X	2.20 - 3.20										
	12D*	2.30 - 2.40										
	13D	3.20 - 3.65	Nil	S 20				2.20 - 2.35m: Soft. Loose light brown clayey fine SAND. (TSG)	2.75	3.60		
	14X	3.20 - 3.90										
	15D*	3.30 - 3.40										
	16D	3.90 - 4.19	3.90	S*100	89 0 0			Light brown clayey gravelly fine and medium SAND with rare lenses (up to 5mmx5mm) of bluish grey fine sand. Gravel is subrounded fine and medium sandstone. (TSG)	3.10	3.25		
	17C	3.90 - 4.90										
								Medium dense reddish brown clayey silty fine and medium SAND with rare lenses (up to 5x5mm) of bluish grey sand. (TSG)				
								3.90m: Very dense.				
									4.40	1.95		
							NA	Bluish grey silty fine and medium SAND. (TSG)				
									4.80	1.55		
	18C	4.90 - 5.03 4.90 - 6.40	3.90	C*200	100 0 0	NI		Weak and medium strong bluish grey fine and medium SANDSTONE. Fractures are subhorizontal to 20° and 60-70° extremely closely spaced undulating and stepped smooth. (TSG)	6.40	-0.05		
19C	6.40 - 7.90	3.90		100 26 18	50 100 140	NI	Very weak reddish brown fine and medium SANDSTONE. Fractures are subhorizontal to 20° and 70° very closely and closely spaced undulating rough with a veneer of reddish brown clay. (TSG)	6.80	-0.45			
						NI	Reddish brown fine and medium SANDSTONE recovered non intact as slightly clayey sandy angular and subangular and fine to coarse sandstone gravel. (TSG)	7.50	-1.15			
						NI	7.50m: 20° fracture undulating rough infilled (up to 2mm) with reddish brown clay.	7.85	-1.50			
						NI						
Continued Next Page									{8.00}			

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (128mm) 1.20-3.20m, (113mm) 3.20-3.90m. Waterflush rotary core drilled (116mm) 3.90-14.20m.

CASING: 140mm diam to 6.40m.

BACKFILL: On completion, a slotted standpipe (50mm) with geo-sock was installed to 14.00m, granular response zone 14.20-5.00m and bentonite seal 5.00-3.00m. A second slotted standpipe (35mm) with geo-sock was installed to 3.00m, granular response zone 3.00-1.00m, bentonite seal 1.00-0.20m, concrete and stopcock cover 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
1.20	Nil	1.00	20	


CONTRACT
30238
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BOREHOLE LOG

CLIENT WELSH GOVERNMENT

BH539

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 2 of 2

Start Date 6 March 2015 Easting 341581.4

Scale 1 : 50

End Date 9 March 2015 Northing 186934.6 Ground level 6.35mOD Depth 14.20 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru- ment	description	depth (m)	reduced level (m)	legend
06/03/15 1550hrs 1.30m	20C	7.90 - 8.50	3.90		100 0 0			Bluish grey fine and medium SANDSTONE recovered non intact as clayey very sandy angular and subangular fine and medium sandstone gravel. (TSG)	8.50	-2.15	
	21C	8.50 - 8.80	3.90		100 0 0	NI		Weak reddish brown MUDSTONE recovered non intact as slightly clayey slightly sandy angular and subangular medium and coarse gravel. (TSG)	8.80	-2.45	
	22C	8.80 - 8.90	3.90		100 0 0	NI		Light bluish grey mottled reddish brown MUDSTONE recovered non intact as slightly clayey slightly sandy subangular fine to coarse gravel. (TSG)	9.45	-3.10	
	23C	8.90 - 10.00	6.40		100 0 0			Medium strong thinly laminated light bluish grey coarse SANDSTONE. Fractures are 20° extremely closely spaced undulating smooth with rare calcite crystals (up to 2mm). (TSG)			
09/03/15 0850hrs 1.10m	24C	10.00 - 11.20	6.40		100 49 32			Medium strong thinly laminated reddish brown coarse micaceous SANDSTONE with frequent greenish grey reduction spots (up to 30mm). Fractures are subhorizontal to 20° and 70° to subvertical extremely closely spaced undulating and stepped rough with a veneer of reddish brown clay. (TSG)	10.80	-4.45	
						NA			11.20	-4.85	
	25C	11.20 - 12.70	6.40		100 43 30	55		Stiff fissured reddish brown slightly sandy silty CLAY with localised bluish grey reduction spots (up to 30mm). (TSG)	11.85	-5.50	
					80 200 340			Strong thickly laminated light bluish grey fine to coarse SANDSTONE with frequent rounded medium and coarse gravel sized quartz inclusions. (TSG) 11.65 - 11.85m: Reddish brown.	12.70	-6.35	
09/03/15 1415hrs 1.90m	26C	12.70 - 14.20	6.40		100 90 77	30 140 300		Weak thinly laminated off-white mottled dark grey fine to coarse SANDSTONE. Fractures are subhorizontal to 20° and 60° to subvertical closely and medium spaced undulating rough with reddish brown clay veneer. (TSG) 12.60 - 12.70m: Reddish brown.			
								Weak and medium strong thinly laminated greenish grey fine to coarse SANDSTONE with frequent subangular to rounded fine to coarse gravel sized quartz and quartzite inclusions. Fractures are subhorizontal to 20° very closely to medium spaced undulating smooth. (TSG)	14.20	-7.85	
								Borehole completed at 14.20m.	{18.00}		
water strike (m) casing (m) rose to (m) time to rise (m) remarks									AGS CONTRACT 30238		CHECKED EC

BOREHOLE LOG



CLIENT WELSH GOVERNMENT

BH540

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 1 of 2

Start Date 24 March 2015 Easting 341583.7

Scale 1 : 50

End Date 25 March 2015 Northing 187012.1 Ground level 10.85mOD

Depth 11.60 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru- ment	description	depth (m)	reduced level (m)	legend
24/03/15 1000hrs	1B	0.20 - 0.50						Grass over brown sandy gravelly SILT. Gravel is subangular and subrounded fine to coarse sandstone. (HDD)	0.50	10.35	X
	2D*	0.20 - 0.50		Vo 0.4							
	3B	0.50 - 1.00									
	4D*	0.50 - 1.00		Vo 5.1				Brown and yellowish grey clayey sandy subangular and subrounded fine to coarse sandstone GRAVEL with a high subangular sandstone cobble content. (HDD)	1.00	9.85	X
	5C	1.00 - 1.50			60 0 0	NI		Limited recovery. Medium strong yellowish grey medium and coarse SANDSTONE recovered non intact. (TSG)			
	6C	1.50 - 1.88 1.50 - 2.00	1.40	C*67	70 0 0						
	7C	2.00 - 2.50			60 8 0						
	8C	2.50 - 2.86	1.40	C*71					2.50	8.35	
	9D*	2.50 - 3.00 2.50 - 2.60			90	NA		Hard reddish brown slightly sandy silty CLAY. (TSG)	2.75	8.10	X
	10C	3.00 - 4.50	1.40		43 3 0	NI		Thickly laminated reddish brown and greenish grey clayey fine to coarse micaceous SAND. (TSG)	2.90	7.95	
								Limited recovery. Weak to medium strong yellowish grey medium and coarse SANDSTONE. Recovered non intact. (TSG)			
	11C	4.50 - 4.67 4.50 - 5.60	1.40	C*750	82 35 12	NI 50 130		Weak to medium strong reddish brown medium and coarse siliceous SANDSTONE. Fractures are subhorizontal, 50° and 70° very closely and closely spaced planar rough. (TSG)	4.50	6.35	
	12C	5.60 - 7.10	1.40		93 65 37	60 100 260		Weak reddish grey medium and coarse siliceous SANDSTONE. Fractures are subhorizontal and 50° closely and medium spaced planar rough. (TSG)	5.55	5.30	
	13C	7.10 - 8.60	1.40		20 50 110	120		Medium strong reddish brown fine and medium SANDSTONE. Fractures are subhorizontal and 20° very closely and closely spaced planar smooth. (TSG)	6.35	4.50	
					97 97 59	25 120 270		Medium strong reddish brown medium and coarse SANDSTONE with frequent subrounded and rounded fine and medium gravel sized inclusions of quartzite and mudstone. Fractures are subhorizontal and 20° closely spaced undulating rough. (TSG)	6.80	4.05	
									7.05	3.80	
								Continued Next Page	{8.00}		

EQUIPMENT: Comacchio MC205 rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Waterflush rotary core drilled (116mm) 1.00-11.60m.

CASING: 140mm diam to 1.40m.

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.

CONTRACT
30238CHECKED
EC

BOREHOLE LOG

CLIENT WELSH GOVERNMENT

BH540

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 2 of 2

Start Date 24 March 2015 Easting 341583.7

Scale 1 : 50

End Date 25 March 2015 Northing 187012.1 Ground level 10.85mOD

Depth 11.60 m

progress date/time water depth	sample no & type	depth (m) from to		casing depth (m)	test type & value	samp. /core range	lf	instru -ment	description	depth (m)	reduced level (m)	legend
24/03/15 1640hrs 3.60m	14C	8.60 - 10.10	1.40			79 73 48			Weak to strong thinly bedded reddish brown locally greenish grey fine and medium SANDSTONE. Fractures are subhorizontal and 20° very closely to medium spaced planar smooth. (TSG)			
25/03/15 0845hrs 3.50m												
	15C	10.10 - 11.60	1.40			90 80 37	180 180 310		9.15 - 9.80m: Fractures are 20°, 40° and 70° closely spaced planar smooth. 9.80 - 10.45m: Fractures are subhorizontal, 20° and 70° closely and medium spaced planar smooth. 9.90 - 10.05m: Greenish grey. 10.45 - 11.60m: Fractures are subhorizontal, 20° and 70° closely and medium spaced undulating rough. 10.70 - 11.50m: Greenish grey. 10.80 - 10.90m: Non-intact.			
25/03/15 1030hrs 3.60m												
												</



BH541

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 1 of 2

Start Date 26 March 2014

Easting 341628.8

Scale 1 : 50

End Date 30 March 2015

Northing 187002.9 Ground level 11.35mOD

Depth 11.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru -ment	description	depth (m)	reduced level (m)	legend
26/03/15 1445hrs	1B 2D* 3B 4D* 5B 6D* 7D 8X	0.20 - 0.60 0.20 - 0.60 0.60 - 0.80 0.60 - 0.80 0.80 - 1.00 0.80 - 1.00 1.00 - 1.43 1.00 - 1.30		Vo 2.2 Vo 3.4 Vo 3.2 S*57				Grass over reddish brown slightly gravelly silty fine and medium SAND with rare rootlets (up to 2mm diam). Gravel is rounded and well rounded medium and coarse quartzite. (HDD)	0.50	10.85	
	9C	1.30 - 2.00	1.30	Nil Nil	79 21 0	NI 70 120		Dark reddish grey slightly gravelly fine to coarse SAND with a low angular sandstone cobble content. Gravel is angular and subangular fine to coarse sandstone. (HDD) 0.80 - 1.00m: Gravelly.	1.30	10.05	
	10C	2.00 - 2.26 2.00 - 3.50	1.30	C*143	100 52 24			Weak to medium strong very thinly bedded yellowish grey SANDSTONE. Fractures are subhorizontal, subvertical and 20° very closely and closely spaced planar rough. (TSG)			
26/03/15 1700hrs 0.40m						NA			3.30	8.05	
27/03/15 0840hrs 0.60m	11C	3.50 - 3.83 3.50 - 5.00	3.20	C*83	97 31 13	20 90 190		Very stiff reddish brown slightly sandy clayey SILT with frequent angular medium and coarse gravel sized extremely weak siltstone lithorelicts. (TSG)	3.65	7.70	
						NI 20 50		Weak very thinly bedded locally cross bedded reddish brown and greenish grey fine and medium SANDSTONE. Fractures are subhorizontal and 20° very closely and closely spaced planar rough. (TSG)	4.20	7.15	
	12C	5.00 - 5.70	3.20		100 20 20	NI		3.90 - 4.00m: Hard thinly laminated reddish brown slightly sandy clayey silt.			
								Weak locally extremely weak very thinly bedded reddish brown and grey fine and medium SANDSTONE. Fractures are extremely closely and very closely spaced subhorizontal, 20°, 50°, 70° and subvertical undulating rough. Locally non intact. (TSG)	5.20	6.15	
	13C	5.70 - 7.00	3.20		100 68 24	30 80 120		Extremely weak thinly laminated reddish brown MUDSTONE. Non intact. (TSG)	5.55	5.80	
								Very weak locally strong very thinly bedded reddish brown locally greenish grey fine and medium SANDSTONE. Fractures are subhorizontal, 20°, 70° and subvertical very closely and closely spaced undulating and planar rough. (TSG)			
	14C	7.00 - 8.50	3.20		97 59 31				7.40	3.95	
						40 90 240		Weak very thinly bedded reddish brown and greenish grey fine and medium SANDSTONE. Fractures are subhorizontal, 50°, 70° and subvertical very closely and			
Continued Next Page									18.001		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Dynamic sampled (113mm) 1.00-1.30m. Waterflush rotary core drilled (116mm) 1.30-11.50m.

CASING: 140mm diam to 3.20m.

BACKFILL: On completion, a slotted standpipe (50mm) was installed to 11.50m, granular response zone 11.50-2.00m, bentonite seal 2.00-0.30m, concrete and raised helmet cover 0.30-0.00m.

REMARKS: Driller noted reduced flush returns 1.30-5.70m (60-80% returned) and loss of flush 5.70-11.50m.

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



CONTRACT

30238

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BOREHOLE LOG

CLIENT WELSH GOVERNMENT

BH541

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 2 of 2

Start Date 26 March 2014 Easting 341628.8

Scale 1 : 50

End Date 30 March 2015 Northing 187002.9 Ground level 11.35mOD Depth 11.50 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru- ment	description	depth (m)	reduced level (m)	legend
								closely spaced planar rough. (TSG) 8.05 - 8.10m: Cross bedded.			
	15C	8.50 - 8.90	3.20		75 30 30	100 NI 40 90			8.65 8.75	2.70 2.60	
	16C	8.90 - 10.00	3.20		91 7 0			Medium strong reddish brown (80% clast supported) subangular and subrounded fine and medium gravel sized clasts of mudstone and sandstone CONGLOMERATE. (TSG)			
27/03/15 1630hrs 6.30m								Extremely weak to weak thinly interbedded reddish brown and greenish grey MUDSTONE and SANDSTONE locally with clay infill (up to 5mm) along subhorizontal fractures. Fractures are subhorizontal, 70° and subvertical extremely closely and very closely spaced undulating and planar rough. Locally non intact. (TSG)			
30/03/15 0840hrs 6.90m	17C	10.00 - 11.00	3.20		100 38 0	20 70 95		Weak thinly laminated reddish brown locally greenish grey SILTSTONE. Fractures are subhorizontal, subvertical and 50° very closely and closely spaced undulating rough. (TSG)	10.30	1.05	
30/03/15 1310hrs 6.80m	18C	11.00 - 11.50	3.20		100 18 0	20 30 50		Medium strong greenish grey medium and coarse SANDSTONE. Fractures are 20° and 80° very closely spaced undulating rough. (TSG)	11.15 11.50	0.20 -0.15	
								Borehole completed at 11.50m.			
									{18.00}		
water strike (m) casing (m) rose to (m) time to rise (m) remarks									AGS CONTRACT 30238 CHECKED EC		
Groundwater not encountered prior to use of water flush.											

BOREHOLE LOG



CLIENT WELSH GOVERNMENT

BH542

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 1 of 2

Start Date 18 February 2015 Easting 341672.7

Scale 1 : 50

End Date 20 February 2015 Northing 187162.9 Ground level 23.15mOD

Depth 16.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru -ment	description	depth (m)	reduced level (m)	legend
18/02/15 1420hrs	1B	0.00 - 0.30						Dark brown silty gravelly CLAY with medium subangular sandstone cobble content and frequent plant fragments (up to 2mm). Gravel is subangular fine to coarse sandstone. (HDD)	0.30	22.85	
	2D*	0.00 - 0.30		Vo 3.8							
	3B	0.30 - 0.80									
	4D*	0.30 - 0.80		Vo 9.0							
	5B	0.80 - 1.00									
	6D*	0.80 - 1.00		Vo 7.0				Light brown and greenish grey sandy subangular fine to coarse sandstone GRAVEL with medium subangular sandstone cobble content. (HDD)	1.00	22.15	
	7D	1.00 - 1.29		Nil	S*73				1.20	21.95	
	8X	1.00 - 1.20						Yellowish brown mottled reddish brown clayey gravelly SAND. Gravel is subangular fine to coarse sandstone. (TSG)			
	9C	1.20 - 2.00	1.00			50 0 0	NI	Strong greenish grey mottled purplish brown coarse SANDSTONE. Fractures are subhorizontal to 20° closely spaced planar rough. Recovered non-intact. (TSG)	2.00	21.15	
18/02/15 1700hrs 0.40m		2.00 - 2.05	1.20	C*429		100 33 12	NI 70 200	Weak to medium strong yellowish brown mottled purplish brown medium SANDSTONE. Fractures are subhorizontal and 20° and 70° to subvertical very closely and closely spaced planar rough locally infilled (up to 10mm) with reddish brown sandy clay. (TSG)			
19/02/15 0900hrs 1.10m	10C	2.00 - 3.00						2.20 - 2.40m: 70° fracture.			
								3.00 - 4.00m: Limited recovery. Recovered non intact.			
	11C	3.00 - 3.45	1.20	C 4		40 0 0					
		3.00 - 4.00	3.00								
	12C	4.00 - 4.32	3.00	C*88		100 5 0					
		4.00 - 5.00									
	13C	5.00 - 5.45	3.00	C 34		85 12 0	NA	Stiff orangish brown sandy gravelly CLAY. Gravel is subangular fine to coarse sandstone. (TSG)	5.00	18.15	
		5.00 - 6.00					NI	Medium strong purplish brown fine SANDSTONE. Fractures are subhorizontal to 20° and 70° to subvertical planar rough. (TSG)	5.50	17.65	
	14C	6.00 - 6.22	3.00	C*143		100 65 49	NI 60 230	5.90 - 6.00m: Purplish brown mottled yellow sandy clay.	6.00	17.15	
		6.00 - 7.00						Medium strong and strong purplish brown mottled greenish grey coarse SANDSTONE. Fractures are subhorizontal to 20° closely and medium spaced planar rough locally infilled (up to 2mm) with purplish brown sandy clay. (TSG)			
	15C	7.00 - 7.15	3.00	C*231		100 70 48	NI 90 250	Weak purplish brown mottled greenish grey coarse SANDSTONE. Fractures are subhorizontal to 20° closely and medium spaced planar rough locally infilled (up to 2mm) with reddish brown sandy clay. (TSG)	7.00	16.15	
		7.00 - 8.50									
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.00m. Dynamic sampled (113mm) 1.00-1.20m. Waterflush rotary core drilled (116mm) 1.20-16.00m.

CASING: 140mm diam to 6.00m.

BACKFILL: On completion, a slotted standpipe (50mm) was installed to 16.00m, granular response zone 16.00-10.00m and bentonite seal 10.00-4.00m. A second slotted standpipe (35mm) was installed to 4.00m, granular response zone 4.00-1.00m, bentonite seal 1.00-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: Driller notes reduced flush returns 1.20-8.50m: 80-90% returned.

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.

CONTRACT
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BOREHOLE LOG

CLIENT WELSH GOVERNMENT

BH542

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 2 of 2

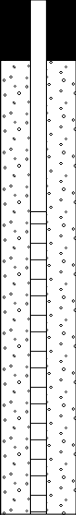
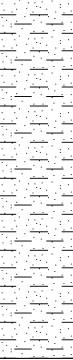
Start Date 18 February 2015 Easting 341672.7

Scale 1 : 50

End Date 20 February 2015 Northing 187162.9 Ground level 23.15mOD

Depth 16.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru- ment	description	depth (m)	reduced level (m)	legend
19/02/15 1630hrs 0.60m	16C	8.50 - 10.00	6.00		100 69 60						
20/02/15 0840hrs 3.14m											
	17C	10.00 - 11.50	6.00		100 66 20			10.55 - 10.65m: Recovered non intact.			
	18C	11.50 - 13.00	6.00		100 80 31	40 80 200		Strong purplish brown mottled greenish grey coarse SANDSTONE. Fractures are subhorizontal to 20° and 70° to subvertical closely spaced planar rough locally infilled (up to 2mm) with reddish brown sandy clay. Surfaces stained light grey. (TSG)	11.60	11.55	
	19C	13.00 - 14.50	6.00		100 86 75	NI 150 250		13.00 - 13.20m: Fine sandstone. 13.00 - 15.20m: Fractures are subhorizontal to 20°.			
	20C	14.50 - 16.00	6.00		100 76 74			15.20 - 15.35m: Recovered non intact.	15.35	7.80	
20/02/15 1630hrs 3.00m								Strong purplish brown mottled greenish grey fine SANDSTONE. Fractures are subhorizontal to 20° closely and medium spaced planar rough locally infilled (up to 2mm) with reddish brown sandy clay. (TSG)	16.00	7.15	
								Borehole completed at 16.00m.			
									{18.00}		
water strike (m) casing (m) rose to (m) time to rise (m) remarks Groundwater not encountered prior to use of water flush.									CONTRACT 30238		CHECKED EC

RPS		WINDOW SAMPLE LOG						Borehole No. WSM4CANA010		
Project Name: M4 CaN Additional GI		Co-ordinates:		Date(s): 24/03/2016				Sheet 1 of 1		
Project No: JFR8703		Easting: 341688		Drilling Method:		Pipe Diameter: 35mm		Final Depth: 1.70m		
Location: Newport		Northing: 187077		Dando Terrier		Casing Diameter (mm) Casing Depth (m)		Scale: 1:25		
Client: Costain Vinci Joint Venture		Ground Level (mAOD): 16.28		Logged By: ERH						
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		Depth (m)	Type	Results						
					0.00		16.28		Dark reddish brown sandy CLAY with rootlets. (TOPSOIL)	
					0.20	(0.20)	16.08			
	0.40 - 0.60	ES	100% Recovery			(1.20)			Reddish brown sandy CLAY with occasional rounded gravels of various lithologies, fine to medium and rare pockets of organic matter. (RIVER TERRACE DEPOSITS)	
	1.00 - 1.20	ES								
	1.20 - 1.70	Core							Gravels becoming larger from 1.2m.	
1.50 - 1.70	ES		1.40	(0.30)	14.88		Weak purplish reddish brown friable sandstone. (TINTERN SANDSTONE FORMATION)			
End of Borehole at 1.70m										
Remarks: METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 1.7m. Terminated due to refusal on bedrock at 1.7m. BACKFILL: On completion hole backfilled with gravel 1.7 - 0.2m, bentonite 0.2 - 0.1m and concrete 0.1 - 0.0m. One standpipe (50mm) installed with slotted section 0.7 - 1.7m. REMARKS: Installed with flush cover. No groundwater encountered.										
Groundwater						Chiselling				
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)					

RPS		WINDOW SAMPLE LOG						Borehole No. WSM4CANA011																				
Project Name: M4 CaN Additional GI		Co-ordinates:		Date(s): 24/03/2016				Sheet 1 of 1																				
Project No: JFR8703		Easting: 341715		Drilling Method:		Pipe Diameter: 35mm		Final Depth: 2.50m																				
Location: Newport		Northing: 187049		Dando Terrier		Casing Diameter (mm)		Casing Depth (m)																				
Client: Costain Vinci Joint Venture		Ground Level (mAOD): 14.57		Logged By: ERH				Scale: 1:25																				
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale																		
		Depth (m)	Type	Results																								
					0.00	(0.20)	14.57		Dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)																			
	0.30 - 0.60	ES		0.20	(0.40)	14.37		Reddish brown sandy slightly gravelly CLAY with frequent large cobbles of stiff reddish brown clay with grey reduction spots. (MADE GROUND)																				
	0.80 - 1.00	ES		0.60	(0.10)	13.97		Red mottled orange brown slightly sandy gravelly CLAY. Gravel is predominantly fine to medium and occasionally coarse, subangular to round various lithologies. (MADE GROUND)																				
	1.20 - 2.00	Core	100% Recovery	0.70	(1.10)	13.87		Black clayey angular GRAVEL of coal, brick, slag, glass, plastics, ceramics and concrete. (MADE GROUND)																				
	1.90 - 2.10	ES		1.80		12.77		Reddish brown sandy CLAY with occasional fine rounded to subangular gravel of various lithologies including quartz. (MADE GROUND)																				
	2.00 - 2.50	Core	100% Recovery	2.20	(0.40)	12.37		Purplish reddish brown highly weathered SANDSTONE. (TINTERN SANDSTONE FORMATION)																				
									End of Borehole at 2.50m																			
Remarks: METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 2.5m. Terminated due to refusal on bedrock at 2.5m. BACKFILL: On completion hole backfilled with gravel 2.5 - 0.5m, bentonite 0.5 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) installed with slotted section 1.0 - 2.5m. REMARKS: Installed with flush cover. No groundwater encountered.																												
<table><tr><th colspan="3">Groundwater</th><th colspan="3">Chiselling</th></tr><tr><td>Depth Strike (m)</td><td>Depth Casing (m)</td><td>Level After 20 Mins</td><td>Duration (hh:mm)</td><td>Top Depth (m)</td><td>Base Depth (m)</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						Groundwater			Chiselling			Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)							AGS				
Groundwater			Chiselling																									
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)																							

Appendix 2

Tabulated Gas and Groundwater Monitoring

NORWEST HOLST SOIL ENGINEERING LTD.

M4 RELIEF ROAD MAGOR TO CASTLETON STAGE 2

PIEZOMETER RECORDS BHM6

DATE	TIME(24hr)	WATER LEVEL(m)	WATER LEVEL mOD
15/11/97	14:00	3.52	7.53
25/11/97	15:25	3.17	7.88
02/12/97	11:00	1.67	9.38
10/12/97	14:30	1.86	9.19
16/12/97	15:35	1.93	9.12

TIP DEPTH:6.53m

TYPE OF COVER:BARREL

HEIGHT OF COVER A.B.G.L:0.22m

HEIGHT OF PIPE A.B.G.L:0.14m

COMMENTS:

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH539	24/03/15 10:30:00	1016	2								0.4	7		10 litres purged, base depth 3.00m.	
BH539	24/03/15 10:31:00										0.0				
BH539	24/03/15 10:32:00										0.0				
BH539	24/03/15 10:33:00										0.0				
BH539	24/03/15 10:34:00										0.0				
BH539	24/03/15 10:35:00			0.0	0.0	20.1	0.0	0	0	0.4				Upsurge at 3min 20sec. Unable to obtain further readings.	
BH539	24/03/15 10:36:00			0.0	0.0	20.0	0.0	0	0	0.2					
BH539	24/03/15 10:37:00			0.0	0.0	20.0	0.0	0	0	0.1					
BH539	24/03/15 10:44:00												0.56		
BH539	31/03/15 11:00:00	1017	-0.78								0.0	11			10 litres purged, base depth 3.00m.
BH539	31/03/15 11:01:00										0.0				
BH539	31/03/15 11:02:00										0.0				
BH539	31/03/15 11:03:00										0.0				
BH539	31/03/15 11:04:00										0.0				
BH539	31/03/15 11:05:00			0.0	0.0	20.9	0.0	0	0	2.7				Upsurge at 3min 20sec. Unable to obtain further readings.	
BH539	31/03/15 11:06:00			0.0	0.0	20.9	0.0	0	0	2.6					
BH539	31/03/15 11:07:00			0.0	0.0	20.9	0.0	0	0	2.5					
BH539	31/03/15 11:14:00												0.71		
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

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks						
BH539	16/04/15 09:02:00										0.0			8 litres purged, base depth 3.00m.						
BH539	16/04/15 09:03:00										0.0									
BH539	16/04/15 09:04:00										0.0									
BH539	16/04/15 09:05:00										0.4				0.1	20.2	1.0	0	1	4.7
BH539	16/04/15 09:06:00										0.4				0.1	20.2	1.0	0	0	4.7
BH539	16/04/15 09:07:00										0.3				0.1	20.2	1.0	0	0	4.4
BH539	16/04/15 09:14:00	1019	-0.75									1.06	Upsurge at 3min 20sec. Unable to obtain further readings.							
BH539	16/04/15 11:00:00																			
BH539	16/04/15 11:01:00																			
BH539	08/05/15 14:53:00	1002	7																	
BH539	08/05/15 14:54:00																			
BH539	08/05/15 14:55:00																			
BH539	08/05/15 14:56:00																			
BH539	08/05/15 14:57:00																			
BH539	08/05/15 14:58:00																			
BH539	08/05/15 14:59:00			0.0	0.0	20.3	0.0	0	0	0.0										
BH539	08/05/15 15:00:00			0.0	0.0	20.2	0.0	0	0	0.0										
BH539	08/05/15 15:01:00			0.0	0.0	20.2	0.0	0	0	0.0										
BH539	08/05/15 15:01:00			0.0	0.0	20.2	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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH539	08/05/15 15:02:00			0.0	0.0	20.2	0.0	0	0	0.0				
BH539	08/05/15 15:03:00			0.0	0.0	20.2	0.0	0	0	0.0				
BH539	08/05/15 15:04:00			0.0	0.0	20.2	0.0	0	0	0.0				
BH539	08/05/15 15:05:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH539	08/05/15 15:06:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH539	08/05/15 15:07:00			0.0	0.0	20.1	0.0	0	0	0.0				
BH539	08/05/15 15:08:00												2.03	
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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH539	24/03/15 10:44:00												1.09	77 litres purged, base depth 14.00m. 76 litres purged, base depth 14.00m. 74 litres purged, base depth 14.00m.	
BH539	31/03/15 11:14:00												1.23		
BH539	16/04/15 09:14:00												1.65		
BH539	08/05/15 15:09:00												3.39		
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

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH541	31/03/15 13:00:00	1016	-0.49								0.0	14		28 litres purged, base depth 11.50m.	
BH541	31/03/15 13:01:00										0.0				
BH541	31/03/15 13:02:00										0.0				
BH541	31/03/15 13:03:00										0.0				
BH541	31/03/15 13:04:00										0.0				
BH541	31/03/15 13:05:00			0.3	0.0	20.1	0.0	0	64	4.2					
BH541	31/03/15 13:06:00			0.3	0.0	20.1	0.0	0	63	3.7					
BH541	31/03/15 13:07:00			0.3	0.0	20.0	0.0	0	62	3.1					
BH541	31/03/15 13:08:00			0.3	0.0	19.9	0.0	0	61	2.3					
BH541	31/03/15 13:09:00			0.3	0.0	19.9	0.0	0	61	2.6					
BH541	31/03/15 13:10:00			0.3	0.0	19.8	0.0	0	60	2.3					
BH541	31/03/15 13:11:00			0.3	0.0	19.8	0.0	0	58	2.1					
BH541	31/03/15 13:12:00			0.3	0.0	19.9	0.0	0	57	2.1					
BH541	31/03/15 13:13:00			0.3	0.0	20.0	0.0	0	55	1.9					
BH541	31/03/15 13:14:00			0.3	0.0	20.2	0.0	0	52	1.8			6.67		
BH541	16/04/15 14:15:00	1014	0.11								0.0	18		28 litres purged, base depth 11.50m.	
BH541	16/04/15 14:16:00										0.0				
BH541	16/04/15 14:17:00										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 30238	CHECKED EC

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH541	16/04/15 14:18:00										0.0			
BH541	16/04/15 14:19:00										0.0			
BH541	16/04/15 14:20:00			0.8	0.1	19.5	2.0	0	1	6.0				
BH541	16/04/15 14:21:00			0.8	0.1	19.4	2.0	0	1	5.3				
BH541	16/04/15 14:22:00			0.9	0.1	19.4	2.0	0	1	4.4				
BH541	16/04/15 14:23:00			0.9	0.1	19.4	2.0	0	0	4.1				
BH541	16/04/15 14:24:00			0.9	0.1	19.4	2.0	0	1	3.7				
BH541	16/04/15 14:25:00			0.9	0.1	19.4	2.0	0	1	3.4				
BH541	16/04/15 14:26:00			0.9	0.1	19.3	2.0	0	1	3.2				
BH541	16/04/15 14:27:00			1.0	0.1	19.3	2.0	0	1	3.0				
BH541	16/04/15 14:28:00			1.0	0.1	19.2	2.0	0	1	2.7				
BH541	16/04/15 14:29:00			1.0	0.1	19.2	2.0	0	0	2.6			6.73	
BH541	21/04/15 11:00:00	1038	-0.81								0.0	13		28 litres purged, base depth 11.50m.
BH541	21/04/15 11:01:00										0.0			
BH541	21/04/15 11:02:00										0.0			
BH541	21/04/15 11:03:00										0.0			
BH541	21/04/15 11:04:00										0.0			
BH541	21/04/15 11:05:00			0.0	0.1	20.7	1.0	0	0	3.6				
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.													CONTRACT 30238	CHECKED EC

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH541	21/04/15 11:06:00	1017	0	0.0	0.1	20.7	1.0	0	0	3.1	0.0	15	6.71		
BH541	21/04/15 11:07:00			0.0	0.1	20.7	1.0	0	0	2.8					
BH541	21/04/15 11:08:00			0.1	0.1	20.6	1.0	0	0	2.7					
BH541	21/04/15 11:09:00			0.2	0.1	20.5	1.0	0	0	2.5					
BH541	21/04/15 11:10:00			0.4	0.1	20.4	1.0	0	0	2.3					
BH541	21/04/15 11:11:00			0.6	0.1	20.3	1.0	0	0	2.1					
BH541	21/04/15 11:12:00			0.6	0.1	20.2	1.0	0	0	2.1					
BH541	21/04/15 11:13:00			0.7	0.1	20.2	1.0	0	0	2.0					
BH541	21/04/15 11:14:00			0.7	0.1	20.2	1.0	0	0	1.9					
BH541	11/05/15 10:24:00														
BH541	11/05/15 10:25:00														
BH541	11/05/15 10:26:00														
BH541	11/05/15 10:27:00														
BH541	11/05/15 10:28:00														
BH541	11/05/15 10:29:00			0.0	0.0	20.1	0.0	0	0	0.0					
BH541	11/05/15 10:30:00			0.0	0.0	20.1	1.3	0	0	0.0					
BH541	11/05/15 10:31:00			0.0	0.0	20.1	7.0	0	0	0.0					
BH541	11/05/15 10:32:00			0.0	0.0	20.1	10.3	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.														CONTRACT 30238	CHECKED EC

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH541	11/05/15 10:33:00			0.0	0.0	20.1	12.9	0	0	0.0				
BH541	11/05/15 10:34:00			0.0	0.0	20.1	15.0	0	0	0.0				
BH541	11/05/15 10:35:00			0.0	0.0	20.1	15.4	0	0	0.0				
BH541	11/05/15 10:36:00			0.0	0.0	20.1	18.9	0	0	0.0				
BH541	11/05/15 10:37:00			0.0	0.0	20.0	11.2	0	0	0.0				
BH541	11/05/15 10:38:00			0.0	0.0	20.0	0.0	0	0	0.0				
BH541	11/05/15 10:39:00												8.15	11.5
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.													CONTRACT 30238	CHECKED EC

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH542	24/03/15 12:30:00	1010	0								0.0	8		0 litres purged, base depth 4.00m.	
BH542	24/03/15 12:31:00										0.0				
BH542	24/03/15 12:32:00										0.0				
BH542	24/03/15 12:33:00										0.0				
BH542	24/03/15 12:34:00										0.0				
BH542	24/03/15 12:35:00			3.1	0.0	0.4	0.0	0	10	14.6					
BH542	24/03/15 12:36:00			3.4	0.0	0.2	0.0	0	10	13.7					
BH542	24/03/15 12:37:00			3.2	0.0	0.3	0.0	0	10	12.6					
BH542	24/03/15 12:38:00			3.5	0.0	0.6	0.0	0	10	10.9					
BH542	24/03/15 12:39:00			4.1	0.0	1.0	0.0	0	10	9.5					
BH542	24/03/15 12:40:00			4.4	0.0	1.5	0.0	0	10	7.5					
BH542	24/03/15 12:41:00			4.9	0.0	2.2	0.0	0	10	6.9					
BH542	24/03/15 12:42:00			5.0	0.0	2.9	0.0	0	13	5.2					
BH542	24/03/15 12:43:00			4.8	0.0	4.0	0.0	0	0	5.6					
BH542	24/03/15 12:44:00			4.8	0.0	4.5	0.0	0	0	5.4			Dry		
BH542	31/03/15 12:30:00	1015	2.5								0.0	14		0 litres purged, base depth 4.00m.	
BH542	31/03/15 12:31:00										0.0				
BH542	31/03/15 12:32:00										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

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH542	31/03/15 12:33:00										0.0			
BH542	31/03/15 12:34:00										0.0			
BH542	31/03/15 12:35:00			4.0	0.0	7.5	0.0	0	3	7.5				
BH542	31/03/15 12:36:00			4.4	0.0	4.3	0.0	0	4	7.7				
BH542	31/03/15 12:37:00			4.6	0.0	3.9	0.0	0	4	7.6				
BH542	31/03/15 12:38:00			4.9	0.0	4.3	0.0	0	4	6.6				
BH542	31/03/15 12:39:00			5.3	0.0	5.5	0.0	0	4	5.5				
BH542	31/03/15 12:40:00			5.5	0.0	6.4	0.0	0	3	5.4				
BH542	31/03/15 12:41:00			5.6	0.0	7.0	0.0	0	4	5.5				
BH542	31/03/15 12:42:00			5.7	0.0	7.9	0.0	0	3	4.9				
BH542	31/03/15 12:43:00			5.8	0.0	8.7	0.0	0	3	4.3				
BH542	31/03/15 12:44:00			5.7	0.0	9.3	0.0	0	3	3.7			Dry	
BH542	16/04/15 13:00:00	1014	-0.17								0.1	17		0 litres purged, base depth 4.00m.
BH542	16/04/15 13:01:00										0.1			
BH542	16/04/15 13:02:00										0.1			
BH542	16/04/15 13:03:00										0.2			
BH542	16/04/15 13:04:00										0.1			
BH542	16/04/15 13:05:00			4.2	0.1	11.1	2.0	0	0	7.1				
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

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH542	16/04/15 13:06:00			4.9	0.1	9.3	2.0	0	0	5.6				
BH542	16/04/15 13:07:00			5.7	0.1	7.7	2.0	0	0	4.8				
BH542	16/04/15 13:08:00			6.2	0.1	8.1	2.0	0	0	4.0				
BH542	16/04/15 13:09:00			6.4	0.1	8.7	2.0	0	1	3.5				
BH542	16/04/15 13:10:00			6.5	0.1	9.4	2.0	0	0	3.3				
BH542	16/04/15 13:11:00			6.6	0.1	9.8	1.0	0	0	3.2				
BH542	16/04/15 13:12:00			6.6	0.1	10.3	1.0	0	1	3.1				
BH542	16/04/15 13:13:00			6.6	0.1	10.9	1.0	0	1	2.9				
BH542	16/04/15 13:14:00			6.6	0.1	11.4	1.0	0	0	2.8			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. 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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH542	24/03/15 12:44:00												Dry	0 litres purged, base depth 16.00m.	
BH542	31/03/15 12:44:00												Dry	0 litres purged, base depth 16.00m.	
BH542	16/04/15 13:14:00												Dry	0 litres purged, base depth 16.00m.	
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 30238	CHECKED EC

Appendix 3

Tabulated Soil Laboratory Data

M4CAN
Soil Sample Analysis & Screening Assessment
CL-30
16/06/2016

Geological Formation Legend

Made Ground	MG
River Terrace Deposits	RTD

Sample Reference	Units	WSM4CANOA010	WSM4CANOA011
Specimen Depth (m)		0.4-0.6	0.8-1
OD Level (m)			
Sample Type		ES	ES
Geology Code		RTD	MG
Cluster Code		2016 GI	2016 GI
Metals			
Arsenic	mg/kg	10.4	42.1
Cadmium	mg/kg	0.46	3.02
Chromium	mg/kg	16.5	33.8
Copper	mg/kg	21	208
Lead	mg/kg	49	718
Mercury	mg/kg	<0.14	2.21
Nickel	mg/kg	16.8	78.5
Selenium	mg/kg	<1	<0.1
Vanadium	mg/kg	24.7	38
Zinc	mg/kg	104	1780
Non-Metal Inorganics			
Cyanide (free)	mg/kg		<0.5
Asbestos Screen	None	NAD	NAD
Other			
pH Value	pH Units	7.77	7.74
PCBs			
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg		<0.003
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg		<0.003
Pcb-118 2,3,4,4',5 - Pentachlorobiphenyl	mg/kg		0.00747
Pcb-123 2,3,4,4',5'-Pentachlorobiphenyl	mg/kg		<0.003
Pcb-126 3,3',4,4',5'-Pentachlorobiphenyl	mg/kg		<0.003
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg		<0.003
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg		<0.003
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg		<0.003
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg		<0.003
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg		<0.003
PCB 77	mg/kg		<0.003
PCB 81	mg/kg		<0.003
Sum of detected WHO 12 PCBs	mg/kg		<0.036
Phenols			
Phenols Monohydric	mg/kg		<0.035
Phenol	mg/kg		<0.01
Cresols	mg/kg		<0.01
BTEX			
GRO TOT (Moisture Corrected)	mg/kg	<0.044	<0.044
MTBE	mg/kg	<0.005	<0.005

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NED = No Fibres Detected

NAD = No Asbestos Detected

Chromium VI criteria used

Elemental Mercury criteria used

Screening criterion for lead is C4SL in the absence of a S4UL

[illegible]

M4CAN
Soil Sample Analysis & Screening Assessment
CL-30
16/06/2016

Made Ground	MG
River Terrace Deposits	RTD

Sample Reference	Units	WSM4ACNA010	WSM4ACNA011
Specimen Depth (m)		0.4-0.6	0.8-1
OD Level (m)			
Sample Type		ES	ES
Geology Code		RTD	MG
Cluster Code		2016 GI	2016 GI
Benzene	mg/kg	<0.01	<0.01
Toluene	mg/kg	<0.002	<0.002
Ethyl benzene	mg/kg	<0.003	<0.003
m & p Xylene	mg/kg	<0.006	<0.006
o Xylene	mg/kg	<0.003	<0.003
Sum of Detected BTEX	mg/kg	<0.024	<0.024
Sum of Detected Xylenes	mg/kg	<0.009	<0.009
TPH			
Aliphatics C5-C6	mg/kg	<0.01	<0.01
Aliphatics >C6-C8	mg/kg	<0.01	<0.01
Aliphatics >C8-C10	mg/kg	<0.01	<0.01
Aliphatics >C10-C12	mg/kg	<0.01	<0.01
Aliphatics >C12-C16	mg/kg	<0.1	1.91
Aliphatics >C16-C21	mg/kg	0.439	12.7
Aliphatics >C21-C35	mg/kg	1.83	103
Aliphatics >C35-C44	mg/kg	<0.1	56.1
Total Aliphatics >C12-C44	mg/kg	2.27	174
Aromatics >C5-C7	mg/kg	<0.01	<0.01
Aromatics >C7-C8	mg/kg	<0.01	<0.01
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01
Aromatics >EC12-EC16	mg/kg	<0.1	8.72
Aromatics >EC16-EC21	mg/kg	0.975	119
Aromatics >EC21-EC35	mg/kg	7.23	378
Aromatics >EC35-EC44	mg/kg	1.73	144
Aromatics >EC40-EC44	mg/kg	0.552	56.8
Total Aromatics >EC12-EC44	mg/kg	9.94	649
TPH (Aliphatics and Aromatics C5-C44)	mg/kg	12.2	822
PAH			
Acenaphthene	mg/kg	<0.008	0.737
Acenaphthylene	mg/kg	<0.012	0.535
Anthracene	mg/kg	<0.016	3.66
Benz(a)anthracene	mg/kg	<0.014	11.4
Benzo(a)pyrene	mg/kg	<0.015	9.57
Benzo(b)fluoranthene	mg/kg	0.0202	13.4
Benzo(ghi)perylene	mg/kg	<0.024	5.74
Benzo(k)fluoranthene	mg/kg	<0.014	5.03

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
2	0	None > LOD	None > LOD		27	0
2	0	None > LOD	None > LOD		56000	0
2	0	None > LOD	None > LOD		5700	0
2	0	None > LOD	None > LOD		5900	0
2	0	None > LOD	None > LOD		6600	0
2	0	None > LOD	None > LOD			
2	0	None > LOD	None > LOD			
2	0	None > LOD	None > LOD		3200	0
2	0	None > LOD	None > LOD		7800	0
2	0	None > LOD	None > LOD		2000	0
2	0	None > LOD	None > LOD		9700	0
2	1	1.91	1.91	WSM4CANA011 @ 0.8-1mbGL	25000	0
2	2	12.7	0.439	WSM4CANA011 @ 0.8-1mbGL	450000	0
2	2	103	1.83	WSM4CANA011 @ 0.8-1mbGL	450000	0
2	1	56.1	56.1	WSM4CANA011 @ 0.8-1mbGL	450000	0
2	2	174	2.27	WSM4CANA011 @ 0.8-1mbGL	25000	0
2	0	None > LOD	None > LOD		26000	0
2	0	None > LOD	None > LOD		56000	0
2	0	None > LOD	None > LOD		3500	0
2	0	None > LOD	None > LOD		9200	0
2	1	8.72	8.72	WSM4CANA011 @ 0.8-1mbGL	10000	0
2	2	119	0.975	WSM4CANA011 @ 0.8-1mbGL	7600	0
2	2	378	7.23	WSM4CANA011 @ 0.8-1mbGL	7800	0
2	2	144	1.73	WSM4CANA011 @ 0.8-1mbGL	7800	0
2	2	56.8	0.552	WSM4CANA011 @ 0.8-1mbGL	7800	0
2	2	649	9.94	WSM4CANA011 @ 0.8-1mbGL	7600	0
2	2	822	12.2	WSM4CANA011 @ 0.8-1mbGL	2000	0
2	1	0.737	0.737	WSM4CANA011 @ 0.8-1mbGL	29000	0
2	1	0.535	0.535	WSM4CANA011 @ 0.8-1mbGL	29000	0
2	1	3.66	3.66	WSM4CANA011 @ 0.8-1mbGL	150000	0
2	1	11.4	11.4	WSM4CANA011 @ 0.8-1mbGL	#N/A	#N/A
2	1	9.57	9.57	WSM4CANA011 @ 0.8-1mbGL	11	0
2	2	13.4	0.0202	WSM4CANA011 @ 0.8-1mbGL	13	1
2	1	5.74	5.74	WSM4CANA011 @ 0.8-1mbGL	1400	0
2	1	5.03	5.03	WSM4CANA011 @ 0.8-1mbGL	370	0

M4CAN
Soil Sample Analysis & Screening Assessment
CL-30
16/06/2016

Geological Formation Legend

Made Ground	MG
River Terrace Deposits	RTD

Sample Reference	Units	WSM4CANA010	WSM4CANA011
Specimen Depth (m)		0.4-0.6	0.8-1
OD Level (m)			
Sample Type		ES	ES
Geology Code		RTD	MG
Cluster Code		2016 GI	2016 GI
Chrysene	mg/kg	<0.01	9.06
Dibenzo(ah)anthracene	mg/kg	<0.023	2.16
Fluoranthene	mg/kg	<0.017	23.1
Fluorene	mg/kg	<0.01	1.7
Indeno(123cd)pyrene	mg/kg	<0.018	5.15
Naphthalene	mg/kg	<0.009	0.279
Phenanthrene	mg/kg	<0.015	8.61
Pyrene	mg/kg	<0.015	16.1
Coronene	mg/kg		
PAH 16 Total	mg/kg	<0.118	116
SVOCs			
Phenols			
2,3,4,5-tetrachlorophenol.	mg/kg		
2,3,4,6-Tetrachlorophenol	mg/kg		
2,3,4-trichlorophenol.	mg/kg		
2,3,5,6-Tetrachlorophenol	mg/kg		
2,3,5-Trichlorophenol	mg/kg		
2,3,6-Trichlorophenol	mg/kg		
2,6-Dichlorophenol	mg/kg		
2-sec-Butyl-4,6-dinitrophenol	mg/kg		
3,4,5-Trichlorophenol	mg/kg		
3-methylphenol	mg/kg		
2-Chlorophenol	mg/kg		<0.5
2-Methylphenol	mg/kg		<0.5
2-Nitrophenol	mg/kg		<0.5
2-Methyl-4,6 Dinitrophenol	mg/kg		
2,4-Dichlorophenol	mg/kg		<0.5
2,4-Dimethylphenol	mg/kg		<0.5
2,4,5-Trichlorophenol	mg/kg		<0.5
2,4,6-Trichlorophenol	mg/kg		<0.5
4-Chloro-3-methylphenol	mg/kg		<0.5
4-Methylphenol	mg/kg		<0.5
4-Nitrophenol	mg/kg		<0.5
Pentachlorophenol	mg/kg		<0.5
1-naphthol	mg/kg		
Methylphenols	mg/kg		
Resorcinol	mg/kg		

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
2	1	9.06	9.06	WSM4CANA011 @ 0.8-1mbGL	93	0
2	1	2.16	2.16	WSM4CANA011 @ 0.8-1mbGL	1.1	1
2	1	23.1	23.1	WSM4CANA011 @ 0.8-1mbGL	6300	0
2	1	1.7	1.7	WSM4CANA011 @ 0.8-1mbGL	20000	0
2	1	5.15	5.15	WSM4CANA011 @ 0.8-1mbGL	150	0
2	1	0.279	0.279	WSM4CANA011 @ 0.8-1mbGL	190	0
2	1	8.61	8.61	WSM4CANA011 @ 0.8-1mbGL	6200	0
2	1	16.1	16.1	WSM4CANA011 @ 0.8-1mbGL	15000	0
0	0	None > LOD	None > LOD			
2	1	116	116	WSM4CANA011 @ 0.8-1mbGL		
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			

M4CAN
Soil Sample Analysis & Screening Assessment
CL-30
16/06/2016

Geological Formation Legend	
Made Ground	MG
River Terrace Deposits	RTD

Sample Reference	Units	WSM4CAN010	WSM4CAN011
Specimen Depth (m)		0.4-0.6	0.8-1
OD Level (m)			
Sample Type		ES	ES
Geology Code		RTD	MG
Cluster Code		2016 GI	2016 GI
Trimethylphenol	mg/kg		
Xylenols	mg/kg		<0.08
Phenol	mg/kg		<0.5
Phenols	mg/kg		
PAHs			
2-Chloronaphthalene	mg/kg		<0.5
2-Methylnaphthalene	mg/kg		<0.5
Acenaphthene	mg/kg		0.784
Acenaphthylene	mg/kg		0.804
Anthracene	mg/kg		6.6
Benzo(a)anthracene	mg/kg		22
Benzo(a)pyrene	mg/kg		16.2
Benzo(b)fluoranthene	mg/kg		18.8
Benzo(ghi)perylene	mg/kg		7.51
Benzo(k)fluoranthene	mg/kg		8.26
Chrysene	mg/kg		17.7
Dibenzo(ah)anthracene	mg/kg		2.32
Fluoranthene	mg/kg		46.4
Fluorene	mg/kg		2.14
Indeno(1,2,3-cd)pyrene	mg/kg		10.7
Naphthalene	mg/kg		<0.5
Phenanthrene	mg/kg		16.8
Pyrene	mg/kg		32.8
Pthalates			
Bis(2-ethylhexyl) phthalate	mg/kg		<0.5
Butylbenzyl phthalate	mg/kg		<0.5
Di-n-butyl phthalate	mg/kg		<0.5
Di-n-Octyl phthalate	mg/kg		<0.5
Diethyl phthalate	mg/kg		<0.5
Dimethyl phthalate	mg/kg		<0.5
Other Semi-Volatiles			
1,2-Dichlorobenzene	mg/kg		<0.5
1,2,4-Trichlorobenzene	mg/kg		<0.5
1,3-Dichlorobenzene	mg/kg		<0.5
1,4-Dichlorobenzene	mg/kg		<0.5
2-Nitroaniline	mg/kg		<0.5
2,4-Dinitrotoluene	mg/kg		<0.5

Screening Values and Assessment	
	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected

NAD = No Asbestos Detected

Chromium VI criteria used

Elemental Mercury criteria used

Screening criterion for lead is C4SL in the absence of a S4UL

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
0	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD		440	0
0	0	None > LOD	None > LOD		440	0
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	1	0.784	0.784	WSM4CANA011 @ 0.8-1mbGL	29000	0
1	1	0.804	0.804	WSM4CANA011 @ 0.8-1mbGL	29000	0
1	1	6.6	6.6	WSM4CANA011 @ 0.8-1mbGL	150000	0
1	1	22	22	WSM4CANA011 @ 0.8-1mbGL	49	0
1	1	16.2	16.2	WSM4CANA011 @ 0.8-1mbGL	11	1
1	1	18.8	18.8	WSM4CANA011 @ 0.8-1mbGL	13	1
1	1	7.51	7.51	WSM4CANA011 @ 0.8-1mbGL	1400	0
1	1	8.26	8.26	WSM4CANA011 @ 0.8-1mbGL	370	0
1	1	17.7	17.7	WSM4CANA011 @ 0.8-1mbGL	93	0
1	1	2.32	2.32	WSM4CANA011 @ 0.8-1mbGL	1.1	1
1	1	46.4	46.4	WSM4CANA011 @ 0.8-1mbGL	6300	0
1	1	2.14	2.14	WSM4CANA011 @ 0.8-1mbGL	20000	0
1	1	10.7	10.7	WSM4CANA011 @ 0.8-1mbGL		
1	0	None > LOD	None > LOD		190	0
1	1	16.8	16.8	WSM4CANA011 @ 0.8-1mbGL	6200	0
1	1	32.8	32.8	WSM4CANA011 @ 0.8-1mbGL	15000	0
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD		220	0
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			

M4CAN
Soil Sample Analysis & Screening Assessment
CL-30
16/06/2016

Geological Formation Legend

Made Ground	MG
River Terrace Deposits	RTD

Sample Reference	Units	WSM4CANA010	WSM4CANA011
Specimen Depth (m)		0.4-0.6	0.8-1
OD Level (m)			
Sample Type		ES	ES
Geology Code		RTD	MG
Cluster Code		2016 GI	2016 GI
2,6-Dinitrotoluene	mg/kg		<0.5
3-Nitroaniline	mg/kg		<0.5
4-Bromophenylphenylether	mg/kg		<0.5
4-Chloroaniline	mg/kg		<0.5
4-Chlorophenylphenylether	mg/kg		<0.5
4-Nitroaniline	mg/kg		<0.5
Azobenzene	mg/kg		<0.5
Bis(2-chloroethoxy)methane	mg/kg		<0.5
Bis(2-chloroethyl)ether	mg/kg		<0.5
Carbazole	mg/kg		1.64
Dibenzofuran	mg/kg		0.69
Hexachlorobenzene	mg/kg		<0.5
Hexachlorobutadiene	mg/kg		<0.5
Hexachlorocyclopentadiene	mg/kg		<0.5
Hexachloroethane	mg/kg		<0.5
Isophorone	mg/kg		<0.5
N-nitrosodi-n-propylamine	mg/kg		<0.5
Nitrobenzene	mg/kg		<0.5
VOCs			
Methyl Tertiary Butyl Ether	ug/kg		<200
Benzene	ug/kg		<180
Toluene	ug/kg		<140
Ethylbenzene	ug/kg		<80
p/m-Xylene	ug/kg		<200
o-Xylene	ug/kg		<200
Naphthalene	ug/kg		<260
Hexachlorobutadiene	ug/kg		<400
1,2,4-Trichlorobenzene	ug/kg		<400
1,2-Dichlorobenzene	ug/kg		<200
1,3-Dichlorobenzene	ug/kg		<160
1,4-Dichlorobenzene	ug/kg		<100
1,1,1,2-Tetrachloroethane	ug/kg		<200
1,1,1,1-Trichloroethane	ug/kg		<140
1,1,2,2-Tetrachloroethane	ug/kg		<200
1,1,2-Trichloroethane	ug/kg		<200
1,1-Dichloropropene	ug/kg		<200
1,1-Dichloroethane	ug/kg		<160

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NED = No Fibres Detected

NAD = No Asbestos Detected

Chromium VI criteria used

Elemental Mercury criteria used

Screening criterion for lead is C4SL in the absence of a S4UL

[illegible]

M4CAN Soil Sample Analysis & Screening Assessment CL-30 16/06/2016

Geological Formation Legend

Made Ground	MG
River Terrace Deposits	RTD

Sample Reference	Units	WSM4CANA010	WSM4CANA011
Specimen Depth (m)		0.4-0.6	0.8-1
OD Level (m)			
Sample Type		ES	ES
Geology Code		RTD	MG
Cluster Code		2016 GI	2016 GI
trans-1-2-Dichloroethene	ug/kg		<200
trans-1-3-Dichloropropene	ug/kg		<200
Trichlorofluoromethane	ug/kg		<120
tert-Butylbenzene	ug/kg		<280
Tetrachloroethene	ug/kg		<100
Trichloroethene	ug/kg		<180
Vinyl Chloride	ug/kg		<120

Screening Values and Assessment

	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Notes

NFD = No Fibres Detected
 NAD = No Asbestos Detected
 Chromium VI criteria used
 Elemental Mercury criteria used
 Screening criterion for lead is C4SL in the absence of a S4UL

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD		19	0
1	0	None > LOD	None > LOD		1.2	0
1	0	None > LOD	None > LOD		0.059	0

Appendix 4

Tabulated Groundwater Laboratory Data

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-30
04/08/2015

Monitoring Round	Units	Screening Criteria	
Location		EQS	DWS
Depth			
Response Zone Details (RZ)			
Drainage Area			
Installation Details			
Date Sampled			
Metals			
Arsenic Dissolved	ug/l	50	10
Boron Dissolved	ug/l	2000	1000
Chromium Dissolved	ug/l		50
Copper Dissolved	ug/l	10	2000
Lead Dissolved	ug/l	1.2	10
Nickel Dissolved	ug/l	4	20
Selenium Dissolved	ug/l		10
Cadmium Dissolved	ug/l	0.15	5
Zinc Dissolved	ug/l	75	
Mercury Dissolved	ug/l	0.07	1
Non-Metal Inorganics			
Total Alkalinity as CaCO3	mg/l		
Chloride	mg/l	250	250
Ammoniacal Nitrogen as N	mg/l	0.6	
Total Cyanide	mg/l	0.001	0.05
Free Cyanide	mg/l		
pH Value	pH units	6-9	6.5-10
Phenols			
2-Chlorophenol	ug/l		
2 - Methyl-4,6-Dinitrophenol	ug/l		
2-Methylphenol	ug/l		
2-Nitrophenol	ug/l		
2,4-Dichlorophenol	ug/l		
2,4-Dimethylphenol	ug/l		
2,4,5-Trichlorophenol	ug/l		
2,4,6-Trichlorophenol	ug/l		
4-Chloro-3-methylphenol	ug/l		
4-Methylphenol	ug/l		
Pentachlorophenol	ug/l		
Phenol	ug/l	7.7	
Phenols	mg/l	0.0077	
BTEX			
MTBE	ug/l		
Benzene	ug/l	10	1
Toluene	ug/l	50	
Ethyl benzene	ug/l	20	
m & p Xylene	ug/l	30	
o Xylene	ug/l	30	
TPH			
Aliphatics C5-C6	ug/l		
Aliphatics >C6-C8	ug/l		
Aliphatics >C8-C10	ug/l		
Aliphatics >C10-C12	ug/l		
Aliphatics >C12-C16 Aqueous	ug/l		
Aliphatics >C16-C21 Aqueous	ug/l		
Aliphatics >C21-C35 Aqueous	ug/l		
Aliphatics >C35-44	ug/l		
Aromatics >C5-C7	ug/l		
Aromatics >C7-C8	ug/l		
Aromatics >EC8-EC10	ug/l		
Aromatics >EC10-EC12	ug/l		
Aromatics >EC12-EC16 Aqueous	ug/l		
Aromatics >EC16-EC21 Aqueous	ug/l		
Aromatics >EC21-EC35 Aqueous	ug/l		
Aromatics >C35-44	ug/l		
Total Aliphatic TPH	ug/l		
Total Aromatic TPH	ug/l		
Total petroleum hydrocarbons	ug/l		
PAHs			
2-Chloronaphthalene	ug/l		
2-Methylnaphthalene	ug/l		
Acenaphthene	ug/l		
Acenaphthylene	ug/l		
Anthracene	ug/l	0.1	
Benzo(a)anthracene	ug/l		
Benzo(a)pyrene	ug/l	0.00017	0.01
Benzo(b)fluoranthene	ug/l	0.017	0.1
Benzo(k)fluoranthene	ug/l	0.017	0.1
Chrysene	ug/l		
Dibenzo(a,h)anthracene	ug/l		
Fluoranthene	ug/l	0.0063	
Fluorene	ug/l		
Benzo(ghi)perylene	ug/l	0.0082	0.1
Indeno(1,2,3-cd)pyrene	ug/l		0.1
Naphthalene	ug/l	2	
Phenanthrene	ug/l		
Pyrene	ug/l		
Total PAHs (USEPA 16)	ug/l		
Phthalates			
Bis(2-ethylhexyl) phthalate	ug/l		
Butylbenzyl phthalate	ug/l		
Di-n-butyl phthalate	ug/l		
Di-n-Octyl phthalate	ug/l		
Diethyl phthalate	ug/l		
Dimethyl phthalate	ug/l		
VOCs			
1,1,1,2-Tetrachloroethane	ug/l		
1,1,1-Trichloroethane	ug/l	100	
1,1,2-Trichloroethane	ug/l	400	
1,1-Dichloroethane	ug/l		
1,1-Dichloroethene	ug/l		
1,1-Dichloropropene	ug/l		

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

X	Offsite borehole location

[illegible]

M4CAN Groundwater Analysis Results & Screening Assessment CL-30 04/08/2015

Monitoring Round	Units	Screening Criteria	
Location		EQS	DWS
Depth			
Response Zone Details (RZ)			
Drainage Area			
Installation Details			
Date Sampled			
1,2,3-Trichlorobenzene	ug/l	0.4	
1,2,3-Trichloropropane	ug/l		
1,2,4-Trichlorobenzene	ug/l	0.4	
1,2,4-Trimethylbenzene	ug/l		
1,2-Dibromo-3-Chloropropane	ug/l		
1,2-Dibromoethane	ug/l		
1,2-Dichlorobenzene	ug/l	20	
1,2-Dichloroethane	ug/l	10	3
1,2-Dichloropropane	ug/l		
1,3,5-Trimethylbenzene	ug/l		
1,3-Dichloropropane	ug/l		
1,4-Dichlorobenzene	ug/l	20	
2-Chlorotoluene	ug/l		
4-Chlorotoluene	ug/l		
4-Isopropyltoluene	ug/l		
Benzene	ug/l	10	1
Bromobenzene	ug/l		
Bromochloromethane	ug/l		100
Bromodichloromethane	ug/l		
Bromomethane	ug/l		
Chlorobenzene	ug/l		
Chloroethane	ug/l		
Chloroethene	ug/l		
Chloroform	ug/l	2.5	100
Chloromethane	ug/l		
cis-1,2-Dichloroethene	ug/l		
cis-1,3-Dichloropropene	ug/l		
Dibromochloromethane	ug/l		100
Dibromomethane	ug/l		
Dichlorodifluoromethane	ug/l		
Ethylbenzene	ug/l	20	
Hexachlorobutadiene (HCBD)	ug/l	0.6	
Isopropylbenzene	ug/l		
m,p xylenes	ug/l	30	
Methyl tert-butyl ether (MTBE)	ug/l		
n-Butylbenzene	ug/l		
n-propylbenzene	ug/l		
O-Xylene	ug/l	30	
Sec-Butylbenzene	ug/l		
Styrene	ug/l	50	
Tert-Butylbenzene	ug/l		
Tetrachloroethene	ug/l	10	10
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3
Toluene	ug/l	50	
trans-1,2-Dichloroethene	ug/l		
trans-1,3-Dichloropropene	ug/l		
Tribromomethane	ug/l		100
Trichloroethene	ug/l	10	10
Trichlorofluoromethane	ug/l		
SVOCs			
1,3-Dichlorobenzene	ug/l	20	
2,4,5-Trichlorophenol	ug/l		
2,4,6-Trichlorophenol	ug/l		
2,4-Dichlorophenol	ug/l	20	
2,4-Dimethylphenol	ug/l		
2,4-Dinitrotoluene	ug/l		
2,6-Dinitrotoluene	ug/l		
2-Chloronaphthalene	ug/l		
2-Chlorophenol	ug/l	50	
2-Methyl-4,6-Dinitrophenol	ug/l		
2-Methylnaphthalene	ug/l		
2-Methylphenol	ug/l	100	
2-Nitroaniline	ug/l		
2-Nitrophenol	ug/l		
3-Nitroaniline	ug/l		
4-Bromophenyl Phenyl Ether	ug/l		
4-Chloro-3-Methylphenol	ug/l	40	
4-Chloroaniline	ug/l		
4-Chlorophenyl Phenyl Ether	ug/l		
4-Methylphenol	ug/l	100	
4-Nitroaniline	ug/l		
4-Nitrophenol			
Azobenzene	ug/l		
Bis(2-chloroethoxy)methane	ug/l		
Bis(2-chloroethyl)ether	ug/l		
Bis(2-chloroisopropyl)ether	ug/l		
Bis(2-ethylhexyl)phthalate	ug/l	1.3	
Butylbenzylphthalate	ug/l	20	
Carbazole	ug/l		
Dibenzofuran	ug/l		
Diethylphthalate	ug/l	200	
Dimethylphthalate	ug/l	800	
Di-N-Butyl Phthalate	ug/l	8	
Di-N-Octyl Phthalate	ug/l	20	
Hexachlorobenzene (HCB)	ug/l	0.05	
Hexachlorocyclopentadiene	ug/l		
Hexachloroethane	ug/l		
Isophorone	ug/l		
Nitrobenzene	ug/l		
n-nitrosodimethylamine	ug/l		
N-Nitroso-Di-N-Propylamine	ug/l		
Pentachlorophenol (PCP)	ug/l	0.4	
PCBs			
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0

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

X	Offsite borehole location

[illegible]

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-30
04/08/2015

Monitoring Round	Units	Screening Criteria	
Location		EQS	DWS
Depth			
Response Zone Details (RZ)			
Drainage Area			
Installation Details			
Date Sampled			
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0
Pcb-28 2,4,4' - Trichlorobiphenyl	ug/l	0	0
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0

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

X	Offsite borehole location

[illegible]

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-30
04/08/2015

Geological Formation Legend

Tintern Sandstone Group	TSG
Head Deposits	HD

Notes

Offsite borehole location	X

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Monitoring Round	Units	Screening Criteria		1	2	3	1		2		3	
Location		EQS	DWS	BH541			BH539					
Depth				6.67	6.73	6.72	1.97	3.57	2.84	2.1	1.49	3.04
Response Zone Details (RZ)				TSG			HD	TSG	HD	TSG	HD	TSG
Drainage Area				Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				2-11.5	2-11.5	2-11.5	1-3	5-14.2	1-3	5-14.2	1-3	5-14.2
Date Sampled							Shallow	Deep	Shallow	Deep	Shallow	Deep
				31/03/2015	16/04/2015	21/04/2015	24/03/2015	24/03/2015	31/03/2015	31/03/2015	16/04/2015	16/04/2015
Metals												
Arsenic Dissolved	ug/l	50	10	1.9	<1	25	2	<1	3.4	3.2	1.9	<1
Boron Dissolved	ug/l	2000	1000	800	1000	140	820	760	78	160	1000	960
Chromium Dissolved	ug/l		50	26	2.3	14	3.3	6.6	33	25	1.8	2.4
Copper Dissolved	ug/l	10	2000	9.9	<1	8.1	<1	1.9	21	16	<1	<1
Lead Dissolved	ug/l	1.2	10	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nickel Dissolved	ug/l	4	20	1.4	<1	2.6	7	6.2	2.3	6.3	3.3	1.3
Selenium Dissolved	ug/l		10	1.3	1.4	3.9	1.5	4	3.1	2.9	1	2.7
Cadmium Dissolved	ug/l	0.15	5	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Zinc Dissolved	ug/l	75		3.3	<1	2.9	1.4	1.1	7.6	5.9	2.5	3.4
Mercury Dissolved	ug/l	0.07	1	<0.5	<0.5	<0.5	0.65	1.3	<0.5	<0.5	<0.5	<0.5
Non-Metal Inorganics												
Total Alkalinity as CaCO3	mg/l			210	240	800	510	460	280	230	330	250
Chloride	mg/l	250	250	13	14	620	32	70	73	31	25	70
Ammoniacal Nitrogen as N	mg/l	0.6		<0.01	0.054	1.4	0.45	0.23	0.17	0.78	0.41	0.041
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
Free Cyanide	mg/l			<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	8.1	8.6	8.3	7.7	7.8	7.9	7.8	8.4	8.6
Phenols												
2-Chlorophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2 - Methyl-4,6-Dinitrophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Methylphenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Nitrophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,4-Dimethylphenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,4,5-Trichlorophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
4-Chloro-3-methylphenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
4-Methylphenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Phenol	ug/l	7.7		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Phenols	mg/l	0.0077		<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	<0.03
BTEX												
MTBE	ug/l			<1	<1				<1	<1	<1	<1
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethyl benzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1
m & p Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1	<1
o Xylene	ug/l	30		<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
Aliphatics >C6-C8	ug/l			<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
Aliphatics >C10-C12	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C12-C16 Aqueous	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C16-C21 Aqueous	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatics >C21-C35 Aqueous	ug/l			<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
Aromatics >C5-C7	ug/l			<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
Aromatics >EC8-EC10	ug/l			<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
Aromatics >EC12-EC16 Aqueous	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC16-EC21 Aqueous	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatics >EC21-EC35 Aqueous	ug/l			<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
Total Aliphatic TPH	ug/l			<5	<5	<5	<5	<5	<5	<5	<5	<5
Total Aromatic TPH	ug/l			<5	<5	<5	<5	<5	<5	<5	<5	<5
Total petroleum hydrocarbons	ug/l			<10	<10	<10	<10	<10	<10	<10	<10	<10
PAHs												
2-Chloronaphthalene	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Methylnaphthalene	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Acenaphthene	ug/l			<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
Anthracene	ug/l	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	ug/l			<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
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
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
Chrysene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	ug/l			<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
Fluorene	ug/l			<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
Indeno(1,2,3-cd)pyrene	ug/l		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
Phenanthrene	ug/l			<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
Total PAHs (USEPA 16)	ug/l			<2	<2	<2	<2	<2	<2	<2	<2	<2
Phthalates												
Bis(2-ethylhexyl) phthalate	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Butylbenzyl phthalate	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5

M4CAN
Groundwater Analysis Results & Screening Assessment
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Geological Formation Legend

Tintern Sandstone Group	TSG
Head Deposits	HD

Notes

Offsite borehole location	X

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Monitoring Round	Units	Screening Criteria		1	2	3	1		2		3	
Location		EQS	DWS	BH541			BH539					
Depth				6.67	6.73	6.72	1.97	3.57	2.84	2.1	1.49	3.04
Response Zone Details (RZ)				TSG			HD	TSG	HD	TSG	HD	TSG
Drainage Area				Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				2-11.5	2-11.5	2-11.5	1-3	5-14.2	1-3	5-14.2	1-3	5-14.2
Date Sampled							Shallow	Deep	Shallow	Deep	Shallow	Deep
				31/03/2015	16/04/2015	21/04/2015	24/03/2015	24/03/2015	31/03/2015	31/03/2015	16/04/2015	16/04/2015
Di-n-butyl phthalate	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Di-n-Octyl phthalate	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Diethyl phthalate	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Dimethyl phthalate	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
VOCs												
1,1,1,2-Tetrachloroethane	ug/l			<2	<2				<2	<2	<2	<2
1,1,1-Trichloroethane	ug/l	100		<1	<1				<1	<1	<1	<1
1,1,2-Trichloroethane	ug/l	400		<10	<10				<10	<10	<10	<10
1,1-Dichloroethane	ug/l			<1	<1				<1	<1	<1	<1
1,1-Dichloroethene	ug/l			<1	<1				<1	<1	<1	<1
1,1-Dichloropropene	ug/l			<1	<1				<1	<1	<1	<1
1,2,3-Trichlorobenzene	ug/l	0.4		<2	<2				<2	<2	<2	<2
1,2,3-Trichloropropane	ug/l			<50	<50				<50	<50	<50	<50
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1				<1	<1	<1	<1
1,2,4-Trimethylbenzene	ug/l			<1	<1				<1	<1	<1	<1
1,2-Dibromo-3-Chloropropane	ug/l			<50	<50				<50	<50	<50	<50
1,2-Dibromoethane	ug/l			<5	<5				<5	<5	<5	<5
1,2-Dichlorobenzene	ug/l	20		<1	<1				<1	<1	<1	<1
1,2-Dichloroethane	ug/l	10	3	<2	<2				<2	<2	<2	<2
1,2-Dichloropropane	ug/l			<1	<1				<1	<1	<1	<1
1,3,5-Trimethylbenzene	ug/l			<1	<1				<1	<1	<1	<1
1,3-Dichloropropane	ug/l			<2	<2				<2	<2	<2	<2
1,4-Dichlorobenzene	ug/l	20		<1	<1				<1	<1	<1	<1
2-Chlorotoluene	ug/l			<1	<1				<1	<1	<1	<1
4-Chlorotoluene	ug/l			<1	<1				<1	<1	<1	<1
4-Isopropyltoluene	ug/l			<1	<1				<1	<1	<1	<1
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bromobenzene	ug/l			<1	<1				<1	<1	<1	<1
Bromochloromethane	ug/l		100	<5	<5				<5	<5	<5	<5
Bromodichloromethane	ug/l			<5	<5				<5	<5	<5	<5
Bromomethane	ug/l			<5	<5				<5	<5	<5	<5
Chlorobenzene	ug/l			<1	<1				<1	<1	<1	<1
Chloroethane	ug/l			<1	<1				<1	<1	<1	<1
Chloroethene	ug/l			<1	<1				<1	<1	<1	<1
Chloroform	ug/l	2.5	100	<1	<1				<1	<1	<1	<1
Chloromethane	ug/l			<1	<1				<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/l			<1	<1				<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/l			<10	<10				<10	<10	<10	<10
Dibromochloromethane	ug/l		100	<10	<10				<10	<10	<10	<10
Dibromomethane	ug/l			<10	<10				<10	<10	<10	<10
Dichlorodifluoromethane	ug/l			<1	<1				<1	<1	<1	<1
Ethylbenzene	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene (HCBD)	ug/l	0.6		<1	<1				<1	<1	<1	<1
Isopropylbenzene	ug/l			<1	<1				<1	<1	<1	<1
m,p xylenes	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	ug/l			<1	<1				<1	<1	<1	<1
n-Butylbenzene	ug/l			<1	<1				<1	<1	<1	<1
n-propylbenzene	ug/l			<1	<1				<1	<1	<1	<1
O-Xylene	ug/l	30		<1	<1	<1	<1	<1	<1	<1	<1	<1
Sec-Butylbenzene	ug/l			<1	<1				<1	<1	<1	<1
Styrene	ug/l	50		<1	<1				<1	<1	<1	<1
Tert-Butylbenzene	ug/l			<1	<1				<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10	<1	<1				<1	<1	<1	<1
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3	<1	<1				<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/l			<1	<1				<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/l			<10	<10				<10	<10	<10	<10
Tribromomethane	ug/l		100	<1	<1				<1	<1	<1	<1
Trichloroethene	ug/l	10	10	<1	<1				<1	<1	<1	<1
Trichlorofluoromethane	ug/l			<1	<1				<1	<1	<1	<1
SVOCs												
1,3-Dichlorobenzene	ug/l	20		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,4,5-Trichlorophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,4-Dichlorophenol	ug/l	20		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,4-Dimethylphenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,4-Dinitrotoluene	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2,6-Dinitrotoluene	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Chloronaphthalene	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	ug/l	50		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Methyl-4,6-Dinitrophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Methylnaphthalene	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Methylphenol	ug/l	100		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Nitroaniline	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
2-Nitrophenol	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
3-Nitroaniline	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
4-Bromophenyl Phenyl Ether	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
4-Chloro-3-Methylphenol	ug/l	40		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
4-Chloroaniline	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
4-Chlorophenyl Phenyl Ether	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
4-Methylphenol	ug/l	100		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
4-Nitroaniline	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-30
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Geological Formation Legend

Tintern Sandstone Group	TSG
Head Deposits	HD

Notes

Offsite borehole location	X

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Monitoring Round	Units	Screening Criteria		1	2	3	1		2		3	
Location		EQS	DWS	BH541			BH539					
Depth				6.67	6.73	6.72	1.97	3.57	2.84	2.1	1.49	3.04
Response Zone Details (RZ)				TSG			HD	TSG	HD	TSG	HD	TSG
Drainage Area				Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				2-11.5	2-11.5	2-11.5	1-3	5-14.2	1-3	5-14.2	1-3	5-14.2
Date Sampled							Shallow	Deep	Shallow	Deep	Shallow	Deep
				31/03/2015	16/04/2015	21/04/2015	24/03/2015	24/03/2015	31/03/2015	31/03/2015	16/04/2015	16/04/2015
4-Nitrophenol				<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Azobenzene	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethoxy)methane	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethyl)ether	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Bis(2-chloroisopropyl)ether	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Bis(2-ethylhexyl)phthalate	ug/l	1.3		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Butylbenzylphthalate	ug/l	20		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Carbazole	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Dibenzofuran	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Diethylphthalate	ug/l	200		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Dimethylphthalate	ug/l	800		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Di-N-Butyl Phthalate	ug/l	8		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Di-N-Octyl Phthalate	ug/l	20		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	ug/l	0.05		<0.5	<0.5	ug/l			<0.5	<0.5	<0.5	<0.5
Hexachlorocyclopentadiene	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Hexachloroethane	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Isophorone	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Nitrobenzene	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
n-nitrosodimethylamine	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
N-Nitroso-Di-N-Propylamine	ug/l			<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
Pentachlorophenol (PCP)	ug/l	0.4		<0.5	<0.5				<0.5	<0.5	<0.5	<0.5
PCBs												
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0	<0.01	<0.01						<0.01	<0.01
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	<0.01	<0.01						<0.01	<0.01
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0	<0.01	<0.01						<0.01	<0.01
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0	<0.01	<0.01						<0.01	<0.01
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0	<0.01	<0.01						<0.01	<0.01
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0	<0.01	<0.01						<0.01	<0.01
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0	<0.01	<0.01						<0.01	<0.01

Appendix 5

Tabulated Soil Leachate Laboratory Data

16/06/2016

MG

Made Ground

Exceeds EQS

Exceeds DWS

Laboratory detection level higher than screening criterion

Not Available

X

X

N/A

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

No. Data Exceeding EQS	No. Data Exceeding DWS
0	0
0	0
	0
0	0
0	0
0	0
0	0
	0
0	
0	
0	0
0	
0	0
0	
0	
0	
0	
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
1	
0	0
0	0
0	0
0	0
1	

16/06/2016

MG

Made Ground

Exceeds EQS

Exceeds DWS

Laboratory detection level higher than screening criterion

Not Available

X

X

N/A

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		WSM4CANA011
Specimen Depth (m)		EQS	DWS	0.8-1
OD Level (m)				
Sample Type				ES
Geology Code				MG
Cluster Code				2016 GI
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.014
Naphthalene	ug/l	2		<0.1
Phenanthrene	ug/l			0.992
Pyrene	ug/l			0.713
PAH 16 Total	ug/l			4.08
SVOCs				
Phenols				
2-Chlorophenol	ug/l	50		<1
2-Methylphenol	ug/l	100		<1
2-Nitrophenol	ug/l			<1
2,4-Dichlorophenol	ug/l	20		<1
2,4-Dimethylphenol	ug/l			<1
2,4,5-Trichlorophenol	ug/l			<1
2,4,6-Trichlorophenol	ug/l			<1
4-Chloro-3-methylphenol	ug/l	40		<1
4-Methylphenol	ug/l	100		<1
4-Nitrophenol	ug/l			<1
Pentachlorophenol	ug/l	0.4		<1
Phenol	ug/l	7.7		<1
PAHs				
2-Chloronaphthalene	ug/l			<1
2-Methylnaphthalene	ug/l			<1
Acenaphthene	ug/l			<1
Acenaphthylene	ug/l			<1
Anthracene	ug/l	0.1		<1
Benzo(a)anthracene	ug/l			<1
Benzo(a)pyrene	ug/l	0.00017	0.01	<1
Benzo(b)fluoranthene	ug/l	0.017	0.1	<1
Benzo(ghi)perylene	ug/l	0.0082	0.1	<1
Benzo(k)fluoranthene	ug/l	0.017	0.1	<1
Chrysene	ug/l			<1
Dibenzo(a,h)anthracene	ug/l			<1
Fluoranthene	ug/l	0.0063		<1
Fluorene	ug/l			<1
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<1
Naphthalene	ug/l	2		<1
Phenanthrene	ug/l			<1
Pyrene	ug/l			<1
Pthalates				
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<2
Butylbenzyl phthalate	ug/l	20		<1
Di-n-butyl phthalate	ug/l	8		<1
Di-n-Octyl phthalate	ug/l	20		<5
Diethyl phthalate	ug/l	200		<1
Dimethyl phthalate	ug/l	800		<1
Other Semi-Volatiles				
1,4-Dichlorobenzene	ug/l	20		<1
2-Nitroaniline	ug/l			<1
2,4-Dinitrotoluene	ug/l			<1
2,6-Dinitrotoluene	ug/l			<1
3-Nitroaniline	ug/l			<1

[illegible]

16/06/2016

MG

Made Ground

Exceeds EQS

Exceeds DWS

Laboratory detection level higher than screening criterion

Not Available

X

X

N/A

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

No. Data Exceeding EQS	No. Data Exceeding DWS
0	
0	
0	0
0	
0	
0	
0	
0	
0	
0	
0	
0	
0	
0	
0	0
	0

M4CAN
Leachate Sample Analysis & Screening Assessment
CL-30
16/06/2016

Geological Formation Legend
MG Made Ground

Screening Values & Assessment

Exceeds EQS	X
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X
Not Available	N/A

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn

Sample Reference	Units	Screening Criteria		WSM4CANA011
Specimen Depth (m)		EQS	DWS	0.8-1
OD Level (m)				
Sample Type				ES
Geology Code				MG
Cluster Code				2016 GI
4-Isopropyltoluene	ug/l			<1
Bromobenzene	ug/l			<1
Bromochloromethane	ug/l		100	<1
Bromoform	ug/l			<1
Bromomethane	ug/l			<1
Bromodichloromethane	ug/l			<1
Chlorobenzene	ug/l			<1
Carbon Disulphide	ug/l			<1
Chloroethane	ug/l			<1
Chloroform	ug/l	2.5	100	<1
Chloromethane	ug/l			<1
Carbontetrachloride	ug/l	12	3	<1
Dibromomethane	ug/l			<1
Dichlorodifluoromethane	ug/l			<1
Dibromochloromethane	ug/l		100	<1
Dichloromethane	ug/l	20		<3
Isopropylbenzene	ug/l			<1
n-Butylbenzene	ug/l			<1
Propylbenzene	ug/l			<1
sec-Butylbenzene	ug/l			<1
Styrene	ug/l	50		<1
Tert-amyl methyl ether	ug/l			<1
trans-1-2-Dichloroethene	ug/l			<1
trans-1-3-Dichloropropene	ug/l			<1
Trichlorofluoromethane	ug/l			<1
tert-Butylbenzene	ug/l			<1
Tetrachloroethene	ug/l	10	10	<1
Trichloroethene	ug/l	10	10	<1
Vinyl Chloride	ug/l	0	0.5	<1

No. Data Exceeding EQS	No. Data Exceeding DWS
	0
0	0
0	0
	0
0	
0	0
0	0
0	0

Appendix 6

Site Walkover Photographs



Plate 01: CL33 ĩ View Looking West Across Site. 3rd June 2015



Plate 02: CL33 ĩ View Looking North Across Site. 3rd June 2015

Client: Welsh Government

Project: M4CaN

Job Ref: JER6591 Checked By:

Date: July 2016

Appendix 7

Relevant Extract of Additional Mapping

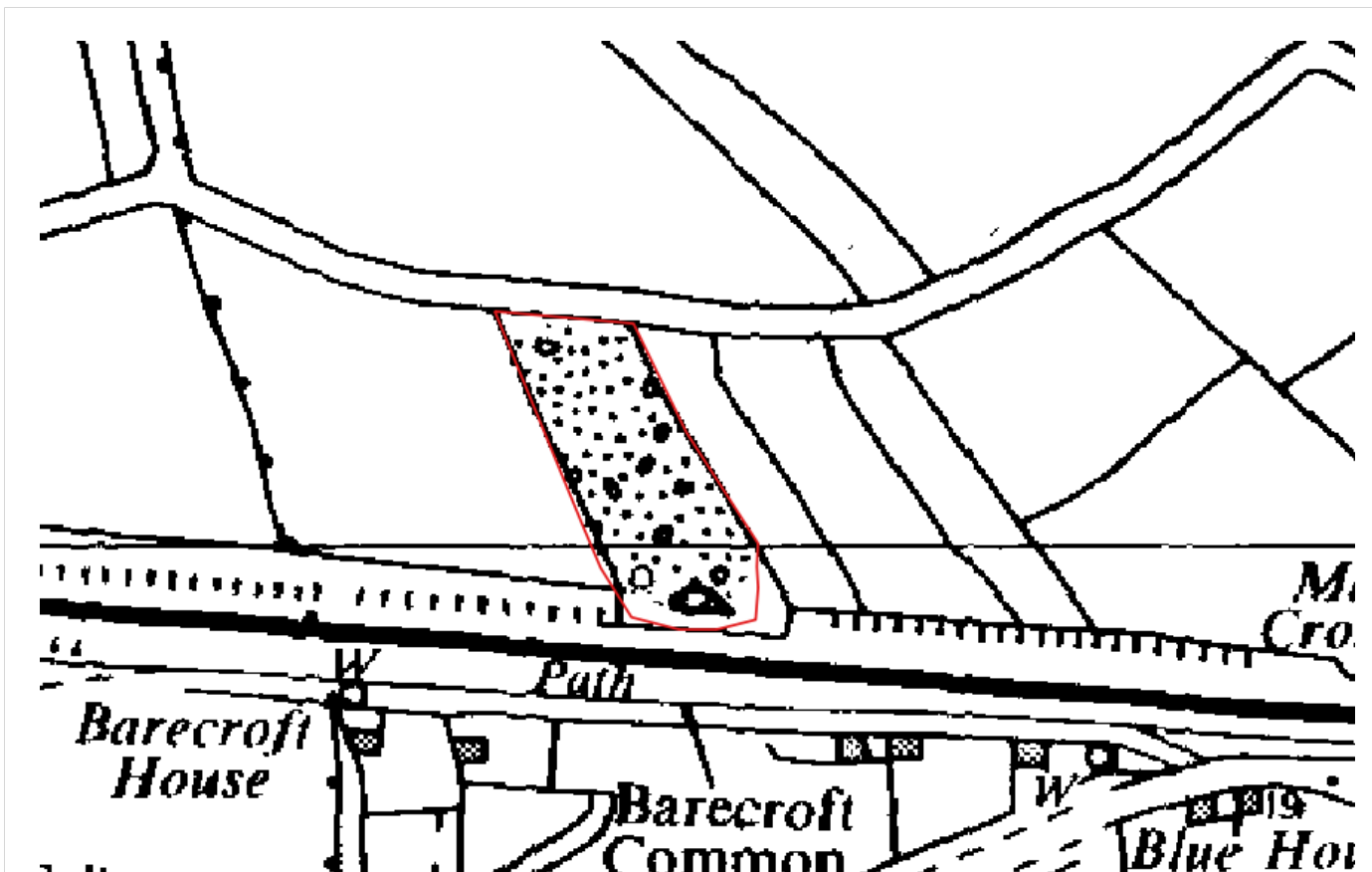


Plate 03: Extract of 1969-1971 historic map showing the position of the Old Quarry.

Client: Welsh Government

Project: M4CaN

Job Ref: JER6591 Checked By:

Date: July 2016

Welsh Government

M4 Corridor around Newport

Land Contamination Assessment
Report Annex D
CL-33 B4245 Quarry

M4CaN-DJV-EGT-ZG_GEN-RP-EN-0022

At Issue | September 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-33) known as the “B4245 Quarry” hereinafter referred to as the Site.

1.1.2 The Site is located between chainage 20,800 and 20,900, upon a partially backfilled quarry, within the grounds of a former vicarage (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) published in March 2016 and the Land Contamination Assessment Reports formed an annex to Appendix 11.1 of the chapter on Geology and Soils.

1.2.2 A subsequent phase of investigation has been undertaken since the publication of the March 2016 ES. The additional data, herein referred to as the 2016 Additional Ground Investigation, have been incorporated into the summary tables, risk assessment, conceptual site model and associated text of this report where relevant. The conclusions and recommendations have also been refined to reflect the improved understanding of status of the site and associated risk. Therefore this report replaces the original CL-33 report published in Appendix 11.1 of the March 2016 ES.

1.2.3 In 2014, a Preliminary Sources Study Report (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) and the 2016 Additional Ground Investigation. This report relates to the area defined on the Site Plan Figure 1.

1.2.4 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 March 2016 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 the information 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 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 in the eastern part of the study area approximately 500 m north west of Magor town centre and approximately 300 m south of the existing M4 Junction 23A. The Site is centred at National Grid Reference ST 420 876 and covers an area of approximately 0.35 hectares (ha). The location of the Site is shown on Figure 1.
- 2.1.2** The Site comprises a partially backfilled quarry within the grounds of a vicarage, Woodland House, and is surrounded by agricultural fields to the north, residential development to the east and bounded by the B4245 to the south.
- 2.1.3** Previous walkover surveys undertaken in September 1995, January 2014 and more recently in June 2015 found the quarry to be overgrown with trees and rough vegetation. The uneven and undulating topography indicates partial backfilling with a quarry face existing on the north eastern boundary. Details of the infill could not be defined by the walkover surveys. Photographs taken during the 2015 walkover survey are presented in Appendix 6.
- 2.1.4** Ground elevations within the Site range between approximately 17.5 m Above Ordnance Datum (AOD) and 21.0 m AOD.
- 2.1.5** The Site layout is shown in Figure 1.

3 The Scheme

- 3.1.1** The Site is located on the alignment of the new section of motorway at the Magor Junction, at chainage 20,800 to 20,900. Refer to Figure 1 for the Site location in relation to the Scheme.
- 3.1.2** The proposed alignment of the new section of motorway is positioned within a shallow cut at the Site location (depth currently not confirmed).
- 3.1.3** The depth of cut is anticipated to be up to 5 m and some, if not all, of the quarry in-fill material may be removed from its current location and either disposed of off site or, if suitable, reused within the Scheme. Any remaining in-fill materials below cutting level may be left *in situ*.
- 3.1.4** A new 5 m high embankment associated with the overbridge of the B4245 is to be constructed over part of the Site footprint. Here, infill material may be left *in situ* beneath the new embankment.

4 Site History

- 4.1.1** The 2014 PSSR historical searches have been based on Ordnance Survey (OS) plans, literature reviews, information provided by British Steel, Natural Resources Wales (NRW) (formerly Environment Agency Wales), Newport City Council and interpretation of aerial photography.
- 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. A summary of the Sites history is presented in Table 1 below.

Table 1: Site History

Date	Use	Source of Information
1843 - 1893	The Site comprises an <u>Old Quarry with an Old Limekiln</u> in the south western corner. Adjacent to the east is a Vicarage and the Site is bound to the south by a road running northwest-southeast. Agricultural fields surround the Site to the north, west and south. Two other old quarries are located approximately 125 m to the southeast.	1:10,560 Historical Mapping
1882	No significant change.	OS map (2014 PSSR)_
1891 - 1912	A few residential properties are located to the east.	1:10,560 Historical Mapping
1904 - 1939	No significant change.	1:10,560 Historical Mapping
1964 – 1965	Residential development to the east has increased.	1:10,560 Historical Mapping
1969	Site area overgrown with trees. Western area of the Site appears to be <u>broken ground</u> .	Aerial Photography
1969 - 1971	Old Quarries no longer identified on the map, however cuttings remain. The town of Magor is spreading to the east. An industrial building / depot has been developed approximately 50 m to the south. The M4 motorway and Junction 23A have been constructed approximately 125 m to the north.	1:10,560 Historical Mapping
1981	Site area marked as cutting.	1:2,500 Historical Mapping
1985	Area of broken ground appears vegetated.	Aerial Photography
1985 - 1996	The north of the Site is marked as wooded. Magor is now 100 m to the east and a brewery has been constructed 200 m to the west. A police station is located 50m to the west.	1 : 10,000 Historical Mapping
2006	The Site is completely wooded, though a depression is still evident.	Aerial Photography
2009 - 2010	No significant change.	Aerial Photography
2013 - 2014	No significant change.	Aerial Photography
2015	The quarry has been partially <u>backfilled</u> with fill of unknown origin and is heavily overgrown with mature vegetation.	Site walkover

*Notes. Potential sources of contamination are underlined. Those within the temporary and permanent land take are shown in bold.

- 4.1.3** The sources of information presented above supplement those used in the 2014 PSSR, in particular broken ground identified in aerial photographs from 1969 - 1981. Relevant extract of the photographs are presented in Appendix 6.
- 4.1.4** The review of historical plans indicated that the Site has been occupied by a disused quarry and a limekiln that were active prior to the 1880s.
- 4.1.5** The quarry is considered to relate to extraction principally of the Avon Group bedrock.
- 4.1.6** The historical evidence suggests no change of land use post-quarry closure; the Site has remained derelict.
- 4.1.7** The extent of the Site has been revised from that identified in the March 2016 ES based on historical mapping (supported by the historical map in Plate 1 of Appendix 6) and previous ground investigation data. As such the extent of the infilled quarry has been revised as shown on Figure 1.
- 4.1.8** 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** British Geological Survey (BGS) data indicates that superficial deposits are only present to the north of the Site, comprising River Terrace Deposits. The entire Site is underlain by bedrock of the Avon Group Carboniferous Limestones.

5.2 Hydrology

- 5.2.1** There are no surface water features within the Site boundary or in the near vicinity.
- 5.2.2** The nearest surface water body is St Brides Brook, located 560 m to the east, which flows in a north-south direction.

5.3 Hydrogeology

- 5.3.1** NRW classifies the adjacent River Terrace Deposits as a Secondary A Aquifer and the bedrock as a Principal Aquifer.
- 5.3.2** The Site does not lie within a groundwater source protection zone. However it lies within a groundwater vulnerability zone classified as a major aquifer, with intermediate leaching potential.

5.4 Environmental Information

- 5.4.1** NRW have no records of pollution incidents, sewage discharge, abstraction licences, landfills or waste management facilities within the Site area.
- 5.4.2** A record of one pollution incident is however shown within a 300 m radius of the Site. It had no impact on either land or water and the pollutant was not identified.
- 5.4.3** A discharge consent is marked some 130 m to the west of the Site. This discharge outlet is likely to be associated with the Magor Services and located on the St Bride's Brook, some 560 m to the east.
- 5.4.4** The Gwent Levels - Redwick & Llandeenny SSSI is located approximately 700 m to the south.
- 5.4.5** The presence of any residual contamination at the Site associated with the off site pollution incident is considered highly unlikely.

6 Scope of Investigations

6.1 General

6.1.1 A number of intrusive ground investigations have been undertaken within and in close vicinity to the Site. The information is 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) (Highway Agency, 2008), the historical data used to support the 2014 PSSR have been differentiated from the 2016 Additional Ground Investigation

6.2 Scope of Works

6.2.1 The 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	Southeast	SBHN01RC	-	STPN03, STPN04	Soil, leachate
2015	Geotechnical Engineering	Southeast	BH545	-	TP522	Groundwater level, sampling Ground gas
2016	RPS	South	-	WSM4CANA007, WSM4CANA008	-	Groundwater level, Ground gas

6.2.2 A number of holes were advanced within 65 m of the Site. These have been considered in order to support understanding of ground conditions beneath the Site and the groundwater quality and gas regime if relevant.

Table 3: Investigation Summary (Off Site)

Date	Contractor	Location from Site	Boreholes	Sampling
2008	Norwest Holst	10 m south		Groundwater level
2015	Geotechnical Engineering	65m southeast	BH549	Groundwater level, sampling Ground gas
2016	RPS	North and east of site	WSM4CANA006, WSM4CANA009	Groundwater level, Ground gas

6.2.3 The 2016 Additional Ground Investigation undertaken by RPS was unable to target the central footprint of the backfilled quarry due to access constraints however the scope included investigation of the following.

- Made Ground previously identified in the south potentially associated with the quarry backfill.
- The ground gas regime in and around the Site.

6.2.4 The construction details of the above onsite and off site boreholes are summarised in Table 4 below.

Table 4: 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
SBHN01ARC	19 mm	15	14.4	15	Avon Group (Siltstone / Mudstone)
BH545	50 mm	13.0	3	13	Avon Group (Sandstone / Mudstone)
BH549*	35 mm	12	2	4	Avon Group (Sandstone)
	50 mm		8	12	Avon Group (Mudstone)
WSM4CANA006*	50 mm	1.6	0.2	1.6	River Terrace Deposits
WSM4CANA007	50 mm	4.6	1.5	4.6	River Terrace Deposits
WSM4CANA008	50 mm	2.2	0.2	2.2	River Terrace Deposits
WSM4CANA009*	50 mm	1.3	0.3	1.3	Avon Group (Sandstone)

* Denotes off-site borehole location

6.3 Surface Water Quality Sampling

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 (Photo Ionisation Detector) monitoring for VOCs was undertaken on two soil samples on Site at 0.3 m and 1 m in STPN03 and STPN04 respectively.

6.5 Groundwater Monitoring

6.5.1 A summary of the groundwater sampling, groundwater / monitoring and ground gas monitoring rounds undertaken at the onsite and off site boreholes are summarised in Table 5.

Table 5: Summary of Monitoring Rounds

Location Ref.	Number of rounds (date of sampling)	Monitoring details
SBHN01ARC	6 no.	Groundwater - level
BH545	4 no. (17 th April 2015, 24 th April 2015, 1 st May 2015, 11 th May 2015)	Groundwater - level and sampling Ground gas
BH549 (35mm)*	No data	
BH549 (50mm)*	4 no. (17 th April 2015, 24 th April 2015, 1 st May 2015, 11 th May 2015)	Groundwater – level and sampling Ground gas
WSM4CANA006 (50mm)*	3 no. (11 th May 2016, 25 th May 2016, 3 rd June 2016)	Groundwater – level Ground gas
WSM4CANA007 (50mm)	3 no. (11 th May 2016, 25 th May 2016, 3 rd June 2016)	Groundwater – level Ground gas
WSM4CANA008 (50mm)	3 no. (11 th May 2016, 25 th May 2016, 3 rd June 2016)	Groundwater – level Ground gas
WSM4CANA009 (50mm)*	2 no. (11 th May 2016, 3 rd June 2016)	Groundwater – level Ground gas

* Denotes offsite borehole location

6.6 Laboratory Chemical Testing

6.6.1 A summary of the laboratory analysis undertaken on soil, groundwater, leachate and surface water, onsite and off site is shown below. The results are presented in Appendix 5.

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	4	2	-	Heavy metals, pH, sulphate, asbestos, cyanide, phenol, MTBE, BTEX, speciated TPH, speciated PAH, PCBs
2015	2	1	6*	Metals, inorganics, phenols, BTEX, TPH, PAH, VOCs, SVOCs, PCBs, asbestos
2016	4	1	-	Metals, inorganics, pH, phenols, BTEX, speciated TPH, speciated PAH, VOCs, SVOCs, speciated PCBs, asbestos

Notes. *includes 3 samples from off site borehole location

6.7 Review of Available Data

6.7.1 The investigation data available for the site are considered limited both in relation to Site coverage and in the laboratory analysis.

6.7.2 It is also noted that the intrusive investigation undertaken within the central area of the backfilled quarry relates to two shallow hand dug trial pits dated 2008 (STPN03 and STPN04).

7 Ground Conditions

7.1 Geology

7.1.1 The geological logs for all available exploratory logs 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) and 2016 Additional Ground Investigation has also been used.

Topsoil

7.1.2 Topsoil was encountered in both exploratory holes located on site (STPN03 and STPN04) locations to 0.3 m bGL. Topsoil was encountered in off-site boreholes to a maximum thickness of 0.4 m bGL.

Made Ground

7.1.3 Made Ground was encountered directly beneath the topsoil in both locations advanced within the central part of the site (STPN03 and STPN04). It generally comprised a clay/silt with gravel and occasional cobbles of limestone and brick. The basal depth of the Made Ground has not been proven.

7.1.4 Made Ground was also identified in the southern part of the Site up to 0.4 m bGL in WSM4CANA008, 0.8 m bGL in SBHN01, 1.65 m bGL in BH545 and to 2.5 m bGL in WSM4CANA007.

7.1.5 Due to access constraints during the previous investigations a full characterisation of the materials within the quarry has not been possible. However Made Ground was proven to 2.5 m bGL in WSM4CANA007 and comprised a gravelly clay with gravel of brick, coal, sandstone overlying a gravelly clay with occasional cobbles of brick, slate, plastic and glass. A large amount of glass was noted at 2.4 m bGL.

7.1.6 It is currently unclear if this material encountered in the south of the Site is associated with the partial infill of the Quarry Site.

Superficial Deposits

7.1.7 River Terrace Deposits were encountered on the eastern edge of the Site within WSM4CANA006 beneath a topsoil horizon and comprised a soft clay with frequent plant fibres and organic matter. An upper horizon of coarse sand of 0.25 m thickness was encountered.

7.1.8 In the southern part of the Site it is unclear whether fine and coarse materials encountered beneath Made Ground represent the River Terrace Deposits or highly weathered bedrock.

Bedrock

7.1.9 On and off site boreholes have encountered sandstone and mudstones of the Avon group formation at shallow depth.

Geological Sequence Summary

7.1.10 The general geological sequence identified during the previous ground investigations is summarised in Table 7.

Table 7: Summary of Geological Sequence

Unit	Description	Thickness Range (m)	Basal depth (m bGL)
Topsoil	Clayey topsoil.	0.05 - 0.4	0.05 – 0.4
Made Ground	Slightly sandy, slightly gravelly silt / clay with low cobble content. Gravel/cobbles of limestone, coal and brick.	>1.0 - >1.2	unproven
River Terrace Deposits	Sandy clay with occasional gravels, organic matter. Locally upper horizon of coarse sand and basal layer with horizon of sandstone cobbles.	1.0 - >2.1	1.4 - >4.6
Transition Zone	Stiff yellowish brown sandy clay with gravels of sandstone.	0.5	0.9
Avon Group (sandstone)	Yellowish brown sandstone.	>0.4	unproven

7.1.11 The conceptual ground model included within the 2014 PSSR report has been revised in light of the 2015/2016 information and is presented within Figure 2.

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 investigation is summarised in Table 8.

Table 8: Visual and Olfactory Evidence of Potential Contamination Summary

Location ID	Depth (m bGL)	Strata	Evidence of Potential Contamination
STPN03 and 04	0.3 - 1 / 1.2	Made Ground	Brick cobbles and gravels
WSM4CANA008	0.0 - 0.4	Made Ground	Coal and brick gravel
WSM4CANA007	0.05 – 2.5	Made Ground	Brick, coal, slate, plastic, glass, slag and clinker.
East of the quarry	Surface	Black bound macadam	Visual observation during the 2008 ground investigation works

7.2.2 No visual or olfactory evidence of hydrocarbon contamination was identified during the trial pitting or window sampling. The PID meter recorded zero VOC levels.

7.2.3 Full details and observations noted during the 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 at the on and off site boreholes are summarised on the field data sheets provided in Appendix 2. The maximum gas concentrations are presented in Table 9.

Table 9: Summary of Gas Monitoring Data

Location ID	Flow (l/hr)	VOCs (ppm)	CH ₄ (%/vol)	Peak LEL (%)	CO ₂ (%/vol)	O ₂ (%/vol)	CO (ppm)	H ₂ S (ppm)
	Max	Max	Max	Max	Max	Min	Max	Max
BH545	0.0	6.3	0.1	1	2.9	17.0	0.0	0.0
BH549 (50 mm)*	0.4	9.2	0.1	1	1.3	18.0	3.0	0.0
WSM4CA NA006 (50 mm)*	0.5	-	0.3	-	3.6	12.4	1.0	0.0
WSM4CA NA007 (50 mm)	0.4	-	0.3	-	3.3	14.9	1.0	0.0
WSM4CA NA008 (50 mm)	0.5	-	0.4	-	2.7	18.0	1.0	0.0
WSM4CA NA009 (50 mm)*	0.5	-	0.3	-	2.1	18.4	1.0	0.0

* Denotes offsite borehole location

7.4 Groundwater

Groundwater Encountered During Investigation

7.4.1 Groundwater was encountered within WSM4CANA006 only at 1.5 m bGL within the River Terrace Deposits.

Groundwater Level Dataset

7.4.2 The groundwater level dataset gathered from the selected boreholes off site is provided in Appendix 2 and summarised in Table 10.

Table 10: Summary of Groundwater Level During Monitoring Rounds

Location	Installation #1	Depth of response zone (m bGL) and Geological Formation	No. Measurements	Min. Depth (m bGL)	Max. Depth (m bGL)	Comments
SBHN01 RC	19 mm	14.4-15 (Avon Group – Siltstone & Mudstone)	6	8.49	13.27	
BH549*	(S) 35 mm	2 - 4 (Avon Group - Sandstone)	0			No data
	(D) 50 mm	8 - 12 (Avon Group - Mudstone)	4	7.68	9.12	
BH545	50 mm	3 - 13 (Avon Group - Sandstone & Mudstone)	4	6.35	7.82	
WSM4CA NA006*	50 mm	0.2 – 1.6 (River Terrace Deposits)	3	1.56	1.56	Dry on 2 occasions
WSM4CA NA007	50 mm	1.5 – 4.6 (River Terrace Deposits)	3	4.40	4.40	Dry on 1 occasion
WSM4CA NA008	50 mm	0.2 – 2.2 (River Terrace Deposits)	3	Dry	Dry	
WSM4CA NA009*	50 mm	0.3 – 1.3 (Avon Group - Sandstone)	2	Dry	Dry	

Notes. #1: S denotes a shallow installation and D denotes deep installation.

*: denotes offsite borehole location

Groundwater Summary

7.4.3 Notable groundwater beneath the Site is present within the sandstone and mudstone lithology of the Avon Group Bedrock.

7.4.4 Ground levels at each of the above borehole locations are similar. The maximum resting groundwater as recorded in the 2008 borehole (SBHN01) is much deeper than other recorded levels. The reason for this is uncertain.

7.4.5 The 2015 data indicates the groundwater level in BH549 to be deeper than those seen in borehole BH545 which is likely to be a reflection of the general south eastwards flow.

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 2016 Additional Ground Investigation. The main alterations to the 2014 PSSR model are summarised as follows.

- Addition of an embankment on Site as well as the proposed cutting.
- Addition of ground, groundwater and gas dataset from boreholes on site and in the near vicinity.
- Revision of the source/pathway/receptor linkages.

8.2 Preliminary Risk Assessments

Potential Sources

8.2.1 The backfill of the quarry on the Site has been identified as the only potential source of contamination existing at the Site. The majority of the fill materials are likely to be removed as a result of the Scheme; however some may remain beneath the road or exposed as part of the cutting and could pose a risk to human health and underlying groundwater.

Potential Receptors

8.2.2 Receptors during the construction and the operational stages of the Scheme have been considered.

Construction

- Construction workers during Site development works.
- General public adjacent to construction works including residents located 150 m away from the Site.
- Groundwater (principal aquifer), excavations are unlikely to extend below groundwater level however any ground improvement works undertaken on the residual materials (if left in place) may affect the groundwater quality.

Operational

- General public end users.
- General public adjacent to permanent land take including residents located 150 m away from the Site.
- Maintenance workers.
- Groundwater (principal aquifer) within the bedrock.

Potential Pathways

8.2.3 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 development works and maintenance works.
- Dermal contact, ingestion, inhalation pathways possible for general public end users and general public including residents located 150 m away from the Site.
- Leaching of contaminants from the backfill material into underlying groundwater aquifer.
- Vertical or lateral migration of potential ground gas associated with backfill material.

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 subject to unregulated backfilling of soils and man-made materials.
- Proposed cut associated with the Scheme will remove a proportion of the infill material and that left *in situ* is likely to be engineered for stability or encapsulated by proposed embankment.
- Superficial Deposits to the north are classified as a Secondary A Aquifer. Bedrock directly beneath the Site is classified as a Principal Aquifer.
- Hardstanding cover proposed in some areas of the new section of motorway is likely to limit infiltration thus reducing the leaching potential from any contamination present at the Site.
- There are no nearby surface water receptors and infill material is confined within a below ground quarry feature. Risks to surface water are not therefore considered further for the purpose of this report.
- 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 of the March 2016 ES). Soil chemical analysis results and the findings of the generic Tier 2 human health risk assessment are presented in Appendix 3 of this report. There were no exceedances to the relevant generic risk assessment criteria with the exception of chromium.

8.4.2 The total chromium concentrations marginally exceed the screening criteria of 33 mg/kg in 2 samples of the Made Ground. The screening criterion is based upon the more toxic and anthropogenic chromium and thus the criteria is very

conservative. Chromium concentrations are considered to be within normal background data range (<95 mg/kg) and are not therefore considered to represent a contaminant of concern. Further consideration of chromium is also provided in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES).

8.4.3 All phenols and BTEX (Benzene, Toluene, Ethylbenzene and Xylene) were at levels below the laboratory limit of detection. PAHs and TPH were identified at low levels at all locations (total PAHs ranging from <0.118 to 1.7 mg/kg and total TPH from <0.1 to 17.3 mg/kg). From the four PCB test results (as Aroclor 1254), one was marginally above Limit of Detection (LOD) but remained below screening criteria. These are considered unlikely to pose a risk to human health. Speciated PCB analysis of three further samples did not identify concentrations above the LOD.

8.4.4 No other exceedances of the applied assessment criteria have been identified and no asbestos fibres were detected visually or in samples analysed in the laboratory.

8.5 Controlled Waters Screening Assessment

8.5.1 The rationale and approach for the controlled water (Tier 1) screening assessment is detailed in the Land Contamination Assessment Report (Appendix 11.1 of the March 2016 ES) and the groundwater chemical results are presented in Appendix 4 of this report. All exceedances to the relevant generic criteria are summarised in Table 11 and Table 12 for soil leachate and groundwater, respectively.

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 March 2016 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 Four soil samples were subjected to leaching analysis the results of which are presented in Appendix 5. The majority of the soil leaching results were all below the applied screening criteria, with the exception of the following contaminants.

Table 11: Controlled Waters screening exceedances – soil leaching

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	<1 – 27.2	50	10	0 (4)	-	1 (4)	WSM4CANA007 (Made Ground)
Lead	µg/l	<1 - 6	1.2	10	2 (4)	STPN03 (Made Ground) WSM4CANA007 (Made Ground)	0 (4)	-
Benzo(a)pyrene	µg/l	<0.1 - 0.0162	0.00017	0.01	1 (2)	WSM4CANA007 (Made Ground)	0 (2)	-
Benzo(b)fluoranthene	µg/l	<0.1 - 0.0303	0.017	0.1	1 (2)	WSM4CANA007 (Made Ground)	0 (2)	-
Benzo(ghi)perylene	µg/l	<0.1 - 0.0237	0.0082	0.1	1 (2)	WSM4CANA007 (Made Ground)	0 (2)	-
Benzo(k)fluoranthene	µg/l	<0.1 - <0.027	0.017	0.1	1 (2)	WSM4CANA007 (Made Ground)	0 (2)	-
Fluoranthene	µg/l	<0.1 - 0.035	0.0063	-	1 (2)	WSM4CANA007 (Made Ground)	0 (2)	-

Note: DWS – Drinking Water Standards

8.5.4 There are no surface watercourses identified in the near vicinity, therefore, the identified exceedances of the stringent EQSs for lead and certain PAHs are considered to be minor and unlikely to pose a risk to Controlled Waters.

8.5.5 A single occurrence exceedance of the DWS for arsenic has been identified.

8.5.6 Certain laboratory detection levels in samples used in the previous ground investigation for cadmium and cyanide are higher than screening criteria. However, this is considered unlikely to pose a risk to controlled waters.

Groundwater Results

8.5.7 As only one onsite location has provided data for the purpose of this report, nearby available groundwater analytical data have been considered. This aims to identify the local groundwater quality within the vicinity of the Site in order to identify any obvious contamination fingerprint that could be associated with any potential contamination from the Site itself.

8.5.8 The groundwater analysis results include data from three rounds of groundwater monitoring results from onsite BH545 and off site BH549 undertaken in 2015. The groundwater samples were taken from the aquifer body beneath the Site within the Avon Group bedrock.

8.5.9 A summary of the exceedances of the screening criteria from all available results relating to this Site is presented in Table 12 and discussed below.

Table 12: Groundwater screening exceedances

Determinant	Units	Range	EQS	DWS	No. exceeded Screening Criteria (Total number of results) against EQS	Location	No. exceeded Screening Criteria (Total number of results) against DWS	Location
Aquifer (Avon Group)								
Mercury	µg/l	<0.5 - 0.55	0.07	1	2 (6)	BH545, BH549	0 (6)	-
Nickel	µg/l	<1 - 7	4	20	1 (6)	BH545	0 (6)	-
Chloride	mg/l	190 - 290	250	250	1 (6)	BH549	1 (6)	BH549

8.5.10 The review of the groundwater chemical testing results indicated that the deep groundwater beneath the Site has elevated levels of mercury, nickel and chloride when compared to Environmental Quality Standards criteria.

8.5.11 Against Drinking Water Standards, only chloride is identified in marginal exceedance within the Aquifer.

8.5.12 All TPH, PAH, VOCs, SVOCs, BTEX, phenols and PCB results were found below the limit of detection.

8.5.13 It is noted the laboratory detection levels for some metals, PAH compounds, VOCs and SVOCs are higher than applied screening criteria. This is considered unlikely to pose a risk to controlled waters.

8.5.14 The groundwater quality status is in general keeping with the baseline quality seen within this area of Newport (Appendix 16.2 of the March 2016 ES). The current information indicates no obvious effect to groundwater from the land use of CL-33.

8.6 Ground Gas Risk Assessment

8.6.1 Ground gas data available relate to three onsite boreholes WSM4CANA007, WSM4CANA008 and BH545. To further inform the ground gas conditions at the site data from the off-site boreholes WSM4CANA006, WSM4CANA009, and BH549 have also been considered. WSM4CANA006, WSM4CANA007 and WSM4CANA008 have response zones within the River Terrace Deposits, WSM4CANA009, BH545 and BH549 have response zones within the bedrock of the Avon Group. No data have been made available from the shallow installation of BH549 (2-4 m bgl). Of the 3 to 4 no rounds available, the following may be observed.

- No monitoring was undertaken during low barometric pressure (less than 1000 mb where recorded), although the lowest pressure conditions were 1002 mb. As such, the worst case atmospheric conditions for potential ground gas generation may have not been monitored.
- Gas flow was generally recorded as low flow up to 0.5 l/hr.
- Methane has been recorded as nil or up to 0.4 % during all monitoring rounds, which is well below the screening criteria of 1 %. The Lower Explosion Limit recorded was up to 1 %.
- Carbon dioxide is identified between 0.1-3.6 %. The data is below the Work Place exposure limit of 5 %.
- Trace of Volatile Organic Compounds of up to 9.2 ppm has been recorded.
- Hydrogen sulphide was recorded as zero throughout.
- Carbon monoxide was recorded absent on all rounds for BH545. However, in BH549 carbon monoxide was recorded of up to 3 ppm for the first two rounds reducing to zero for the following two. The remaining boreholes recorded a maximum of 1 ppm. Maximum concentration remains well below the Work Place exposure limit of 30 ppm.
- Oxygen has been recorded to be depleted to ambient with concentrations of 12.4-21.1 %.

8.6.2 The available data do not identify obvious gas sources (trace levels of VOCs are considered to be naturally occurring) and is consistent with the expected gas regime given the ground conditions.

8.7 Summary

8.7.1 The onsite Made Ground analysed has not identified exceedances of potential concern and is therefore considered to pose a low risk to human health.

8.7.2 Very limited leachability has been identified from the Made Ground with marginal exceedances limited to lead, arsenic and certain PAHs.

8.7.3 The off-site aquifer has been identified to have elevated metals or chloride when compared to the Environment Quality Standards. Chloride is the only contaminant in exceedance of the Drinking Water Standards.

8.7.4 The off-site groundwater quality status is in general keeping with the baseline quality seen within this area of Newport (Appendix 16.2 of the March 2016 ES). The current limited information indicates no obvious effect to groundwater from the land use of CL-33.

8.7.5 The lack of contaminant linkage between the soil and groundwater data is identified.

8.7.6 The absence of an abnormal gas regime is indicated by gas monitoring data obtained for on and off site boreholes.

9 Refined Conceptual Site Model

- 9.1.1** The incorporation of data from the 2015 Supplementary Ground Investigation and 2016 Additional Ground Investigation has enabled the original CSM presented in the 2014 PSSR to be updated. All 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) is presented in Figure 2 and is described in Table 13.

Table 13: Conceptual Site Model

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Quarry in-fill materials	Construction					
	Construction Workers (B)	Direct dermal (1)	Unlikely	Moderate	Low	Construction workers will be exposed to the infill materials during Site construction works; however exposure duration will be short term only. Use of PPE and good hygiene practice throughout earthworks and construction phase is considered sufficient to mitigate risks presented. Current data set identify limited exceedances to the selected screening criteria. Current contamination status is not foreseen to represent abnormal constraints to construction workers health & safety over and above those typical of a brownfield site. Additional investigation and soil testing required to confirm the characteristic of Made Ground and associated risks. Dust suppression measures are recommended during construction works.
		Ingestion (2)	Unlikely	Moderate	Low	
		Inhalation of soil derived dust (3)	Unlikely	Moderate	Low	
		Inhalation of soil gas or vapour (3)	Unlikely	Moderate	Low	Construction workers may be exposed to ground gas potentially generated by the quarry in-fill materials during the excavation and potential ground improvement works. Gas monitoring available from on and nearby off site boreholes indicates presence of low concentrations of VOCs and carbon dioxide. However the data does not present evidence of gas source. Additional investigation and soil testing required to confirm the characteristic of the Made Ground and associated risks.
	Site neighbours/ general public during construction works (C)	Dermal contact with soil derived dust (1)	Low	Low	Low	During construction there is the possibility of Site neighbours/general public inhaling soil derived dust, short term exposure only. However, considering the distance to the
		Ingestion of soil derived dust (2)	Low	Low	Low	

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
On Site		Inhalation of soil derived dust (3)	Low	Low	Low	receptor (150m) the occurrence of the exposure is considered to be of low likelihood.
		Inhalation of soil gas or vapour (3)	Low	Low	Low	Dust suppression measures will be used during construction works. Additional soil testing required to confirm the characteristics of the Made Ground to assess its suitability for reuse within the Scheme. Gas monitoring data available for on site and nearby off site boreholes indicates presence of low concentrations of VOCs and carbon dioxide. The data does not present evidence of any significant gas source.
	Groundwater (Principal Aquifer) (Da)	Leaching / migration of contaminants from backfill materials to groundwater (4)	Low	Moderate	Moderate to low	The elevation of the quarry base in relation to the water table is unknown and therefore there is a risk of the infill materials being infiltrated by the groundwater during any ground improvement works and resulting in potential contaminants mobilisation and migration to groundwater. Confirmation of the vertical extent of the infill materials in relation to the underlying groundwater is required prior to any ground improvement works. Should ground improvement works be implemented this may create new / increase vertical pathways. Foundation works risk assessment would be required on confirmation of ground improvement method.
On Site	Operational					

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
Quarry in-fill materials	Maintenance Workers (B)	Direct dermal contact (1)	Unlikely	Low	Very low	Made Ground to be largely encapsulated by the embankment (or removed during construction) and therefore the exposure to contamination will be limited outside the motorway embankment.
		Ingestion (3)	Unlikely	Low	Very low	Areas outside the motorway hardstanding are likely to receive topsoil cover and vegetation establishment, reducing potential of exposure. In areas of cutting, exposed Made Ground may receive retaining structure for stability improvement.
		Inhalation of soil derived dust (2)	Unlikely	Low	Very low	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. Additional investigation and soil testing required to confirm the characteristic of the Made Ground and associated risks.
		Inhalation of soil gas or vapours (2)	Low	Moderate	Moderate to low	Current contamination status is not foreseen to represent abnormal constraints to maintenance workers health & safety over and above those typical of a brownfield site. Maintenance workers may be exposed to ground gas potentially generated by the quarry in-fill materials. Gas monitoring data available for on site and nearby off site boreholes indicates presence of low concentrations of VOCs and carbon dioxide. The data does not present evidence of any significant gas source. Additional investigation and soil testing required to confirm the characteristic of the Made Ground and associated risks.

Potential Source	Potential Receptor	Possible Pathway	Likelihood	Severity	Risk	Comment
	Future Motorway users (A)	Direct Dermal contact (1)	Unlikely	Low	Very low	Made Ground to be largely encapsulated by the embankment (or removed during construction) and therefore the exposure to contamination will be limited outside the motorway embankment. Dermal and ingestion pathways associated to soil derived dust only.
		Ingestion (2)	Unlikely	Low	Very low	Areas outside the motorway hardstanding are likely to receive topsoil cover and vegetation establishment, reducing potential of exposure. In areas of cutting, exposed Made Ground may receive retaining structure for stability improvement.
		Inhalation of soil derived dust (2)	Unlikely	Low	Very low	Made Ground to be removed or encapsulated by the proposed embankment (subject to passing re-use criteria). End users to be within open space. Additional investigation required to confirm the characteristic of the Made Ground and associated risks.
		Inhalation of soil gas or vapours (2)	Low	Low	Low	Gas monitoring available from on and nearby off site boreholes indicates presence of low concentrations of VOCs and carbon dioxide.
	Off site users (C)	Direct Dermal contact of soil derived dust (1)	Unlikely	Low	Very low	As per Future Motorway Users (A) but off site receptors some 150 m from proposed earthworks.
		Ingestion of soil (2)	Unlikely	Low	Very low	
		Inhalation of soil derived 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
	Groundwater - Aquifer (Da) from the Glaciofluvial Deposits and/or Avon Group bedrock	Leaching/migration (4) if contamination in Made Ground	Low	Moderate	Moderate to low	The elevation of the quarry base in relation to the water table is unknown and therefore, there is a risk of the infill materials being infiltrated by the groundwater resulting in potential contaminant mobilisation and migration to groundwater. –Should ground improvement works be implemented this may create new / increase vertical pathways. Confirmation of the vertical extent of the infill materials in relation to the underlying groundwater is required prior to any ground improvement works. Foundation works risk assessment would be required on confirmation of ground improvement method.

10 Conclusions and Recommendations

10.1 Conclusions

- 10.1.1** The proposed earthworks include a shallow cut (depth currently unknown) through the south eastern end of the Site. The construction of an embankment is also considered, running over the Site on an east to west trend and bridging over the cutting section.
- 10.1.2** Limited ground investigations have been undertaken to enable the Site to be assessed for the risks of contamination on the Scheme including human health and controlled waters.
- 10.1.3** Due to access constraints the full nature and extent of the infilled materials within the quarry have not been confirmed, however further evaluation of available data including that derived from the 2016 Additional Ground Investigation has led to an improved understanding of the Site. The Made Ground encountered at the Site it is considered unlikely to pose a risk to the Scheme. Infill materials excavated during construction may be suitable for reuse within the Scheme subject to compliance with suitability for reuse criteria.

10.2 Recommendations

- 10.2.1** The likelihood of any contamination at the Site impacting future site users and controlled waters is considered relatively low. However, due to the site's history, localised contamination may have occurred that has not yet been identified as such it is recommended that a remedial strategy be developed for the Scheme, which should include the following.
- Monitoring and risk assessment of any contamination in perched water if identified to be present within the backfilled quarry during construction and the underlying aquifer.
 - Dealing with unexpected contamination.
 - Verification sampling strategy to confirm suitability for soils for retention / re-use.
 - Control measures (over and above good practice 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 supported by a Scheme wide Material Management Plan prepared in accordance with CL:AIRE Code of Practice (CL:AIRE, 2011).

11 References

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

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 & Partners (2014) M4 Corridor Around Newport, Preliminary Sources Study Report, 14/9197

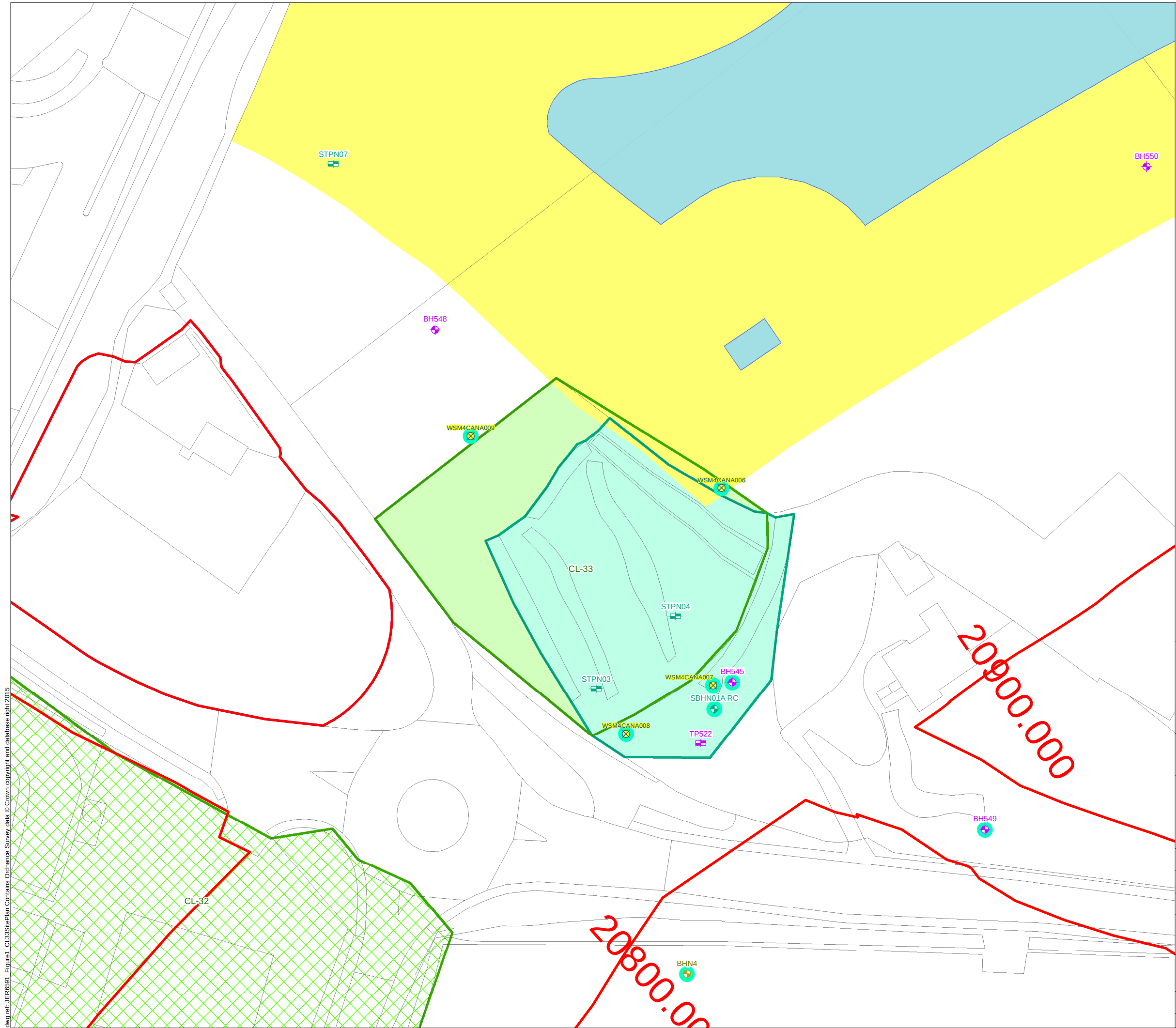
12 Glossary

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
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
PSSR	Preliminary Sources Study Report
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_CL33SitePlan 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
- 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

2015-2016 (RPS)

- Window Sample

2015 (Geotechnical Engineering)

- Borehole
- Trial Pit

2007 (Norwest Holst)

- Borehole
- Trial Pit

1997 (Norwest Holst)

- Borehole
- Monitoring Well Installation

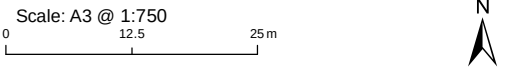


Llywodraeth Cymru
Welsh Government

Appendix R11.1 Annex D CL-33

Site Plan for CL-33

Figure: 1	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB



Legend

- Made Ground (Infill Material)
- River Terrace Deposits - RTD
- Avon Group (Mudstone/Sandstone - AG)
- Proposed Embankment
- Proposed Cutting
- Groundwater (AG)
- Possible Ground Improvement to Improve Bearing Capacity of Made Ground
- Gas Migration Pathway

Potential Receptors

- Humans On-Site (M4 User)
- Humans On-Site (Construction/Maintenance)
- Groundwater (Aquifer)

Potential Pathways

- Dermal Contact
- Inhalation
- Ingestion
- Leaching / Migration

Potential Sources of Contamination

Possible contamination present on site associated with :

- On-Site
- Quarry infill materials

NOTE
Drawing refined from PSSR Drawing Reference
M4-OA-17-00DR-Z-XX-0153 (April 2014)



Appendix R11.1 Annex D CL-33

Conceptual Site Model for CL-33

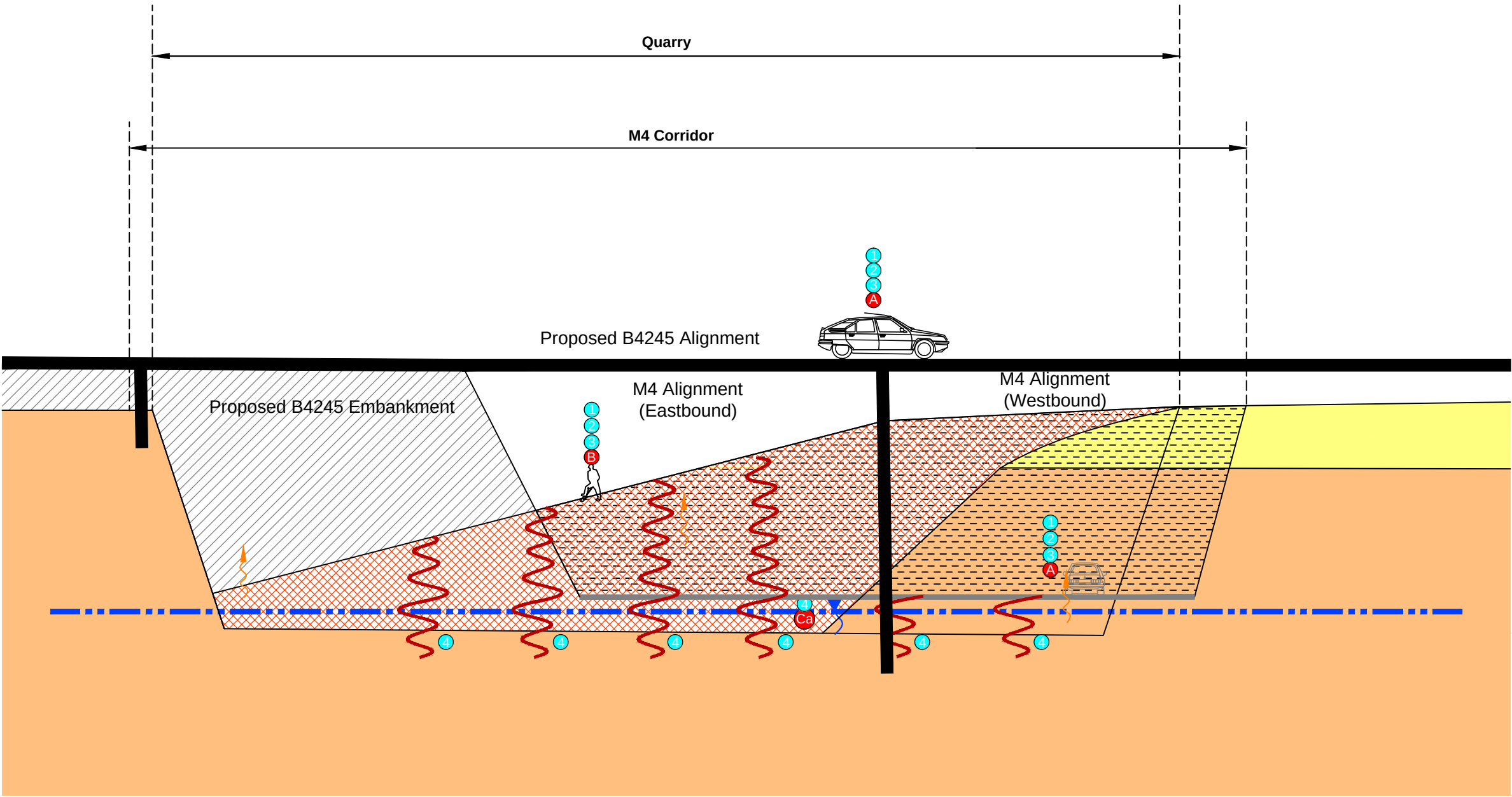
Figure: 2	Revision: 1
Date: September 2016	Status: At Issue
Drawn: RJJ	Checked: FB

Not to Scale

Ground conditions based
on available information

dwg ref: JER6591_Figure2_CL33ConceptualSiteModel

CL- 33 B4245 Quarry



Appendices

Appendix 1

Exploratory Records

Contract No.	F15056	Method	Hand Excavated	Coordinates	341975.28 E
Project	New M4 - Second Preliminary Ground Investigation	Equipment	Hand Tools	Ground Level	187629.53 N
Client	Transport Wales, Welsh Assembly Government	Logged by	WA	Date Started	20.69m AOD
Consultant	Ove Arup & Partners Ltd			Date Completed	06/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
Brown clayey TOPSOIL.		0.30	20.39	ES1 D2 B3	0.30 0.30 0.30	
MADEGROUND: light brown slightly clayey slightly sandy slightly gravelly SILT with low cobble content. Gravel is angular to subrounded fine to coarse of limestone. Cobbles are subangular of limestone and brick. (Head Deposits)		1.20	19.49	ES4 D5 B6 ES4	1.00 1.00 1.00 1.00	
Trial pit complete at 1.20 m.						

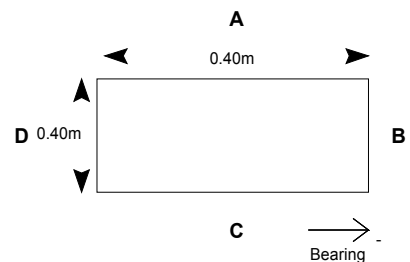
Stability All faces stable

Shoring None used

Groundwater None encountered during excavation

Remarks 1.Hand excavated trial pit complete at 1.20m.

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

Contract No.	F15056	Method	Hand Excavated	Coordinates	341991.56 E
Project	New M4 - Second Preliminary Ground Investigation	Equipment	Hand Tools	Ground Level	187644.33 N
Client	Transport Wales, Welsh Assembly Government	Logged by	WA	Date Started	06/12/2007
Consultant	Ove Arup & Partners Ltd			Date Completed	06/12/2007

Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling		Remarks
Brown clayey TOPSOIL.		0.30	17.33	ES1 D2 B3	0.30 0.30 0.30	Unable to penetrate large limestone cobble/boulder
MADEGROUND: light brown silty slightly sandy slightly gravelly CLAY with low cobble content. Gravel is angular to subrounded fine to coarse of limestone and brick. Cobbles are subangular of limestone. (Head Deposits)		1.00	16.63	ES4 D5 B6	1.00 1.00 1.00	
Trial pit complete at 1.00 m.						

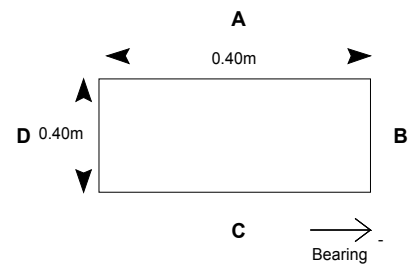
Stability All faces stable

Shoring None used

Groundwater None encountered during excavation

Remarks 1.Hand excavated trial pit terminated at 1.00m 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

BOREHOLE LOG



CLIENT WELSH GOVERNMENT

BH545

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 1 of 2

Start Date 2 March 2015 Easting 342003.2

Scale 1 : 50

End Date 3 March 2015 Northing 187630.8 Ground level 19.15mOD Depth 13.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru- ment	description	depth (m)	reduced level (m)	legend
02/03/15 0930hrs	1B	0.20 - 0.50					✓	Grass over stiff reddish brown mottled light grey and pale yellow slightly sandy silty CLAY with low subrounded quartzite cobble content and frequent roots (up to 5mm) and rootlets (up to 1mm). (MG)	0.50	18.65	
	2D*	0.20 - 0.50		Vo 0.0							
	3B	0.50 - 1.00									
	4D*	0.50 - 0.70		Vo 0.0							
	5B	1.00 - 1.20									
	6D*	1.00 - 1.20		Vo 0.0				Stiff dark greyish brown slightly sandy gravelly silty CLAY with frequent roots (up to 4mm) and rootlets (up to 1mm). Gravel is subangular fine to coarse red brick and quartzite. (MG)	1.00	18.15	
	7D*	1.20 - 1.30							1.20	17.95	
	8D	1.20 - 1.65	Nil	S 9							
	9X	1.20 - 2.00						Firm locally soft friable dark greyish brown slightly sandy gravelly silty CLAY. Gravel is subangular fine to coarse quartzite. (MG)	1.65	17.50	
	10D*	1.80 - 2.00									
	11D	2.00 - 2.25	Nil	S*150				Stiff to very stiff dark greyish brown slightly sandy slightly gravelly silty CLAY. Gravel is subangular to rounded fine and medium sandstone. (MG)	2.20	16.95	
	12X	2.00 - 2.20							2.35	16.80	
	13C	2.20 - 3.00	2.10		75 68 58	NI 190 260		1.60 - 1.65m: Light greenish pink clayey gravel. Gravel is angular fine to coarse sandstone.			
	14C	3.00 - 3.11 3.00 - 4.50	2.10	C*333	98 83 68			Very stiff reddish brown mottled purplish red and yellow slightly sandy gravelly silty CLAY with rare rootlets (up to 1mm) and gypsum crystals (up to 1mm). Gravel is subrounded fine to coarse sandstone. 1.90 - 1.95m: Roots (up to 15mm diam).			
								Light grey to dark brownish grey clayey subangular and subrounded fine to coarse quartz and sandstone GRAVEL.			
	15C	4.50 - 5.50	2.10		100 50 24			Medium strong to very strong bluish grey fine to coarse SANDSTONE. Fractures are subhorizontal to 20° extremely closely to medium spaced undulating rough stained orangish brown infilled (up to 2mm) with reddish brown clay.			
	16C	5.50 - 7.00	2.10		80 22 15	NI		3.25 - 3.30m: Subhorizontal quartz vein (up to 1mm). 3.40 - 3.45m: Subhorizontal quartz vein (up to 1mm). 3.50 - 5.75m: Frequently infilled with quartz crystals (up to 2mm). 3.95 - 4.00m: Subhorizontal quartz vein (up to 1mm).	5.75	13.40	
						NA		Drilling disturbed. Reddish brown SANDSTONE recovered non intact as subangular fine to coarse sandstone gravel.	6.00	13.15	
								Stiff to very stiff reddish brown sandy silty CLAY locally tending to extremely weak mudstone.			
	17C	7.00 - 8.50	2.10		86			Stiff to very stiff fissured brownish red mottled dark grey sandy silty CLAY with rare very thin and thin beds of mudstone. Frequent thick laminae of black organic clay with strong organic odour and frequent light greenish grey reduction spots (up to 20mm).	7.00	12.15	
								Continued Next Page	{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (128mm) 1.20-2.00m and (113mm) 2.00-2.20m. Waterflush rotary core drilled (116mm) 2.20-13.00m.

CASING: 140mm diam to 2.10m.

BACKFILL: On completion, a slotted standpipe (50mm) was installed to 12.50m, granular response zone 13.00-3.00m, bentonite seal 3.00-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: Driller notes loss of flush returns 3.00-13.00m.

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.

CONTRACT
30238CHECKED
EC

BOREHOLE LOG

CLIENT WELSH GOVERNMENT

BH545

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 2 of 2

Start Date 2 March 2015

Easting 342003.2

Scale 1 : 50

End Date 3 March 2015

Northing 187630.8 Ground level 19.15mOD

Depth 13.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru- ment	description	depth (m)	reduced level (m)	legend
02/03/15 1645hrs 5.40m	18C	8.50 - 10.00	2.10		100 0 0		NI NA	Reddish brown SANDSTONE recovered non intact as slightly sandy clayey angular and subangular fine to coarse sandstone gravel. Very stiff locally stiff thinly laminated to thickly bedded reddish brown mottled light grey and purplish red slightly sandy silty CLAY with frequent very thin and thin beds of strong thickly laminated reddish brown and light grey fine sandstone. Frequent subhorizontal undulating rough fissures.	8.50 8.60	10.65 10.55	
	19C	10.00 - 11.50	2.10		100						
03/03/15 0830hrs 6.90m	20C	11.50 - 13.00	2.10		100 57 52		NI 140 340	Stiff fissured thinly laminated dark grey slightly sandy silty CLAY. Fissures are subhorizontal extremely closely spaced planar smooth.	11.35 11.75	7.80 7.40	
03/03/15 1020hrs 5.45m								Weak thinly laminated reddish brown light grey SANDSTONE. Fractures are subhorizontal closely to medium spaced locally not intact planar rough with a veneer of reddish brown clay.	13.00	6.15	
								Borehole completed at 13.00m.	{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											

BOREHOLE LOG

CLIENT WELSH GOVERNMENT

BH549

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 1 of 2

Start Date 3 March 2015

Easting 342054.9

Scale 1 : 50

End Date 4 March 2015

Northing 187600.6 Ground level 18.95mOD

Depth 12.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru- ment	description	depth (m)	reduced level (m)	legend
03/03/15 1315hrs	1B	0.20 - 0.30		Vo 0.0				Soft dark brown sandy CLAY with rare roots (up to 2mm diam). (MG)	0.30	18.65	
	2D*	0.20 - 0.30									
	3B	0.50 - 0.60		Vo 0.0				Firm reddish brown slightly sandy slightly gravelly CLAY with rare roots (up to 2mm diam). Gravel is subrounded fine to coarse siliceous.			
	4D*	0.50 - 0.60									
	5B	1.00 - 1.20		Vo 0.0							
	6D*	1.00 - 1.10									
	7D	1.20 - 1.65	Nil	S 12				Firm reddish brown mottled yellow gravelly silty CLAY. Gravel is subangular fine sandstone.	1.20	17.75	
	8X	1.20 - 2.00									
03/03/15 1645hrs 3.20m	9D	2.00 - 2.07	Nil	S*375							
	10X	2.00 - 2.10									
	11C	2.10 - 3.00	2.10		100 57 41	NI 130 220		Weak reddish brown mottled grey fine SANDSTONE with rare quartz veins. Fractures are subhorizontal to 15° closely to medium spaced undulating rough infilled (up to 2mm) with clay. 2.60m: Incipient fracture. 2.65m: Incipient fracture.	2.10	16.85	
	9C	3.00 - 3.20	2.10	C*300	100 100 85	NI 130 190					
		3.00 - 3.50						Weak and medium strong reddish brown and grey fine SANDSTONE with rare quartz veins. Fractures are subhorizontal to 20° and 65° to subvertical closely spaced undulating rough infilled (up to 2mm) with clay.			
	10C	3.50 - 4.00	2.10		100 89 89						
	11C	4.00 - 5.50	2.10		87 78 70						
	12C	5.50 - 7.00	2.10		80 51 51	NI 140 280		5.30 - 5.80m: Limited recovery. Medium strong and strong reddish brown and grey fine SANDSTONE. Fractures are subhorizontal to 20° and 55° to subvertical closely and medium spaced undulating rough infilled (up to 2mm) with clay. 5.80 - 6.20m: Recovered non intact.	5.50	13.45	
04/03/15 0825hrs Dry	13C	7.00 - 7.50	2.10		100 100 86						
	14C	7.50 - 9.00	2.10		80 54 30						
Continued Next Page									{8.00}		

EQUIPMENT: Geotechnical Pioneer rig.

METHOD: Hand dug inspection pit 0.00-1.20m. Dynamic sampled (128mm) 1.20-2.00m and (113mm) 2.00-2.10m. Waterflush rotary core drilled (116mm) 2.10-12.00m.

CASING: 140mm diam to 2.10m.

BACKFILL: On completion, a slotted standpipe (50mm) was installed to 12.00m, granular response zone 12.00-8.00m and bentonite seal 8.00-4.00m. A second slotted standpipe (35mm) was installed to 4.00m, granular response zone 4.00-2.00m, bentonite seal 2.00-0.20m, concrete and stopcock cover 0.20-0.00m.

REMARKS: Driller notes reduced flush returns 2.10-3.50m (90% returned) and loss of flush 3.50-12.00m.

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.

CONTRACT
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BOREHOLE LOG



CLIENT WELSH GOVERNMENT

BH549

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 2 of 2

Start Date 3 March 2015 Easting 342054.9

Scale 1 : 50

End Date 4 March 2015 Northing 187600.6 Ground level 18.95mOD

Depth 12.00 m

progress date/time water depth	sample no & type	depth (m) from to	casing depth (m)	test type & value	samp. /core range	lf	instru- -ment	description	depth (m)	reduced level (m)	legend	
04/03/15 1550hrs 8.20m	15C	9.00 - 10.50	2.10		100 71 9	NI 85 165		Extremely weak and very weak thinly laminated to very thinly bedded grey and reddish brown MUDSTONE locally tending to claybound tabular fine to coarse gravel sized lithorelicts. Fractures are subhorizontal to 20° very closely and closely spaced planar smooth.	8.30	10.65		
		16C	10.50 - 12.00	2.10		100 78 66	NI 115 230		Weak thinly laminated to very thinly bedded reddish brown and grey MUDSTONE. Fractures are subhorizontal to 20° closely and medium spaced planar smooth infilled (2mm) with clay. Locally disintegrated to fine to coarse gravel.	11.60		7.35
								Borehole completed at 12.00m.	12.00	6.95		
									{18.00}			
water strike (m) casing (m) rose to (m) time to rise (m) remarks									AGS		CONTRACT	CHECKED
Groundwater not encountered prior to use of water flush.									30238		EC	

TRIAL PIT LOG



TP522

CLIENT WELSH GOVERNMENT

SITE M4 CORRIDOR AROUND NEWPORT

Sheet 1 of 1

Start Date 3 March 2015 Easting 341996.7

Scale 1 : 25

End Date 3 March 2015 Northing 187618.3 Ground level 19.80mOD

Depth 2.10 m

water record	sample/test			description	depth (m)	level (m)	legend
	no/type	result	depth (m)				
Dry.	1B	Vo 0.00	0.00- 0.10	Rough vegetation over firm dark brown slightly sandy slightly gravelly silty CLAY. Gravel is sub angular to rounded fine to coarse sandstone and quartzite. (MG)	0.20	19.60	
	2D*		0.00- 0.10	Firm reddish brown slightly sandy slightly gravelly silty CLAY with rare subangular sandstone cobbles. Gravel is subangular to rounded fine to coarse sandstone and quartzite. (MG)	0.60	19.20	
	3B	Vo 0.00	0.50- 0.60	Stiff reddish brown slightly sandy slightly gravelly silty CLAY. Gravel is subangular to well rounded fine and medium quartzite and sandstone.			
	4D*		0.50- 0.60				
	5B	Vo 0.00	1.00- 1.10	Reddish brown and yellowish grey subangular sandstone COBBLES and BOULDERS with much reddish brown clayey sandy fine to coarse sandstone gravel.	1.40	18.40	
	6D*		1.00- 1.10				
	7B		2.00- 2.10	Trial pit completed at 2.10m.	2.10	17.70	

Notes

Trial pit excavated by tracked 8 tonne mechanical excavator.
 Groundwater not encountered.
 Trial pit sides remained stable and vertical.
 Trial pit dimensions 3.00x0.80x2.10m.
 On completion, the trial pit was backfilled with materials arising.

Sketch of Foundation - Not to scale. All dimensions in metres.



CONTRACT

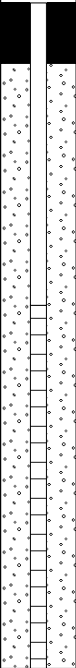
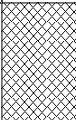
30238

CHECKED

EC

RPS		WINDOW SAMPLE LOG						Borehole No. WSM4CANA006		
Project Name: M4 CaN Additional GI		Co-ordinates:		Date(s): 23/03/2016				Sheet 1 of 1		
Project No: JFR8703		Easting: 342001		Drilling Method:		Pipe Diameter: 50mm		Final Depth: 1.60m		
Location: Newport		Northing: 187671		Dando Terrier		Casing Diameter (mm)		Casing Depth (m)		
Client: Costain Vinci Joint Venture		Ground Level (mAOD): 23.76		Logged By: ERH				Scale: 1:25		
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		Depth (m)	Type	Results						
					0.00		23.76		Dark brown slightly sandy CLAY with frequent rootlets (TOPSOIL)	
					(0.40)					
	0.45	ES		0.40	(0.25)	23.36		Orangey brown clayey coarse SAND. (RIVER TERRACE DEPOSITS)		
	0.65					23.11		Soft orange mottled brown and light yellow CLAY with frequent plant fibres and black organic matter. (RIVER TERRACE DEPOSITS)		
	1.00	ES		(0.75)				Soft orange mottled brown and light yellow CLAY with frequent plant fibres and black organic matter. (RIVER TERRACE DEPOSITS)		
		1.20 - 1.60	Core	10% Recovery					Becoming very sandy below 1m.	
		1.50	ES		1.40	(0.20)	22.36		Stiff grey sandy laminated CLAY. (RIVER TERRACE DEPOSITS)	
									End of Borehole at 1.60m	
Remarks: METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 1.6m. Terminated due to refusal on bedrock. BACKFILL: On completion hole backfilled with gravel 1.6 - 0.2m, bentonite 0.2 - 0.1m and concrete 0.1 - 0.0m. One standpipe (50mm) with gas tap installed with slotted section 1.0 - 1.6m. REMARKS: Installed with flush cover.										
				Groundwater			Chiselling			
Depth Strike (m)		Depth Casing (m)		Level After 20 Mins		Duration (hh:mm)		Top Depth (m)		
1.50										

RPS		WINDOW SAMPLE LOG						Borehole No. WSM4CANA007		
Project Name: M4 CaN Additional GI		Co-ordinates:		Date(s): 23/03/2016				Sheet 1 of 1		
Project No: JFR8703		Easting: 341999		Drilling Method:		Pipe Diameter: 50mm		Final Depth: 4.60m		
Location: Newport		Northing: 187630		Dando Terrier		Casing Diameter (mm)		Casing Depth (m)		
Client: Costain Vinci Joint Venture		Ground Level (mAOD): 20.44		Logged By: ERH				Scale: 1:25		
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale
		Depth (m)	Type	Results						
		0.00 - 1.00	Core	100% Recovery	0.00	(0.05)	20.44		Dark brown sandy slightly gravelly CLAY with frequent rootlets. (TOPSOIL)	1
	0.10 - 0.30	ES		0.05		20.39	Firm orangish brown mottled yellow and grey slightly sandy gravelly CLAY with frequent plant fibres . Gravels are , sub-angular to subrounded of brick, sandstone, coal and other various lithologies. (MADE GROUND)			
						(0.95)				
	1.00 - 2.00	Core	70% Recovery	1.00		19.44		Firm dark brown sandy, gravelly CLAY with occasional cobbles of brick, slate, plastic, glass and other lithologies. (MADE GROUND)	2	
	1.40 - 1.90	ES								
						(1.50)				
	2.00 - 3.00	Core	80% Recovery					Black solid cobble of slag and clinker. between 1.8 - 2.0m.	3	
								Large amounts of glass at 2.4m.		
	3.00 - 3.30	ES					17.94		Firm orange brown mottled yellow in places, sandy CLAY with occasional gravels. Gravels are medium to coarse, sub-rounded of sandstone and become larger with depth. (RIVER TERRACE DEPOSITS)	4
	3.00 - 4.00	Core	10% Recovery					No recovery between 3-3.4m.		
					(2.10)					
4.00 - 4.60	Core	50% Recovery						Coarse gravels of pinkish yellow medium grained sandstone at 4m.	5	
								End of Borehole at 4.60m		
Remarks: METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 4.6m. Terminated due to refusal at 4.5m on bedrock. BACKFILL: On completion hole backfilled with gravel 4.6 - 1.5m, bentonite 1.5 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) with gas tap installed with slotted section 1.5 - 4.6m. REMARKS: Installed with flush cover. Borehole collapsing at 4m. No groundwater encountered.										
Groundwater						Chiselling				
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)					
						AGS				

		WINDOW SAMPLE LOG					Borehole No. WSM4CANA008																					
Project Name: M4 CaN Additional GI		Co-ordinates:		Date(s): 23/03/2016			Sheet 1 of 1																					
Project No: JFR8703		Easting: 341981		Drilling Method:		Pipe Diameter: 50mm		Final Depth: 2.20m																				
Location: Newport		Northing: 187620		Dando Terrier		Casing Diameter (mm) 100	Casing Depth (m) 2.20	Scale: 1:25																				
Client: Costain Vinci Joint Venture		Ground Level (mAOD): 20.07		Logged By: ERH																								
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale																		
		Depth (m)	Type	Results																								
		0.10 - 0.30	ES		0.00	(0.40)	20.07		Dark brown slightly sandy gravelly CLAY with roots. Gravels are fine to medium, rounded to sub-angular of coal and brick (MADE GROUND)	1																		
		0.60 - 0.90	ES		0.40	(1.10)	19.67		Firm orange brown sandy slightly gravelly CLAY with frequent pockets of black organic matter. Gravels are rounded to angular of various lithologies. (RIVER TERRACE DEPOSITS)																			
		1.20 - 2.00	Core	100% Recovery	1.50	(0.50)	18.57		Light orange brown very sandy CLAY with rounded cobbles of sandstone. (RIVER TERRACE DEPOSITS)																			
		1.60 - 1.90	ES		2.00	(0.20)	18.07		Recovered as gravels of coarse yellowish brown SANDSTONE (AVON GROUP)		2																	
		2.00 - 2.20	Core	20% Recovery					End of Borehole at 2.20m		3																	
										4																		
										5																		
Remarks: METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 2.2m. Terminated due to refusal on bedrock at 2.2m. BACKFILL: On completion hole backfilled with gravel 2.2 - 0.2m, bentonite 0.2 - 0.1m and concrete 0.1 - 0.0m. One standpipe (50mm) with gas tap installed with slotted section 1.0 - 2.2m. REMARKS: Installed with flush cover. No groundwater encountered.																												
<table><tr><th colspan="3">Groundwater</th><th colspan="3">Chiselling</th></tr><tr><td>Depth Strike (m)</td><td>Depth Casing (m)</td><td>Level After 20 Mins</td><td>Duration (hh:mm)</td><td>Top Depth (m)</td><td>Base Depth (m)</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>						Groundwater			Chiselling			Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)											
Groundwater			Chiselling																									
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins	Duration (hh:mm)	Top Depth (m)	Base Depth (m)																							

RPS		WINDOW SAMPLE LOG						Borehole No. WSM4CANA009													
Project Name: M4 CaN Additional GI		Co-ordinates:		Date(s): 23/03/2016				Sheet 1 of 1													
Project No: JFR8703		Easting: 341950		Drilling Method:		Pipe Diameter: 50mm		Final Depth: 1.30m													
Location: Newport		Northing: 187681		Dando Terrier		Casing Diameter (mm) Casing Depth (m)		Scale:													
Client: Costain Vinci Joint Venture		Ground Level (mAOD): 23.45		Logged By: ERH				1:25													
Well	Water Strike(s)	Samples & In Situ Testing			Depth (mbGL)	Thickness (m)	Level (mAOD)	Legend	Stratum Description	Scale											
		Depth (m)	Type	Results																	
		0.20	ES		0.00 (0.40)	23.44		Dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)													
				0.40 (0.50)	23.04		Stiff light yellowish brown sandy CLAY with gravels of yellow sandstone. (TRANSITION ZONE)														
		0.90	ES		0.90 (0.40)	22.54		Yellowish brown SANDSTONE. (AVON GROUP)													
								End of Borehole at 1.30m													
Remarks: METHOD: Hand dug inspection pit 0.0 - 1.2m. Window sampled 1.2 - 1.3m. Terminated due to refusal on bedrock at 1.3m. BACKFILL: On completion hole backfilled with gravel 1.3 - 0.3m, bentonite 0.3 - 0.2m and concrete 0.2 - 0.0m. One standpipe (50mm) with gas tap installed with slotted section 0.3 - 1.3m. REMARKS: Installed with flush cover. No groundwater encountered.																					
Groundwater <table><tr><td>Depth Strike (m)</td><td>Depth Casing (m)</td><td>Level After 20 Mins</td></tr><tr><td></td><td></td><td></td></tr></table>						Depth Strike (m)	Depth Casing (m)	Level After 20 Mins				Chiselling <table><tr><td>Duration (hh:mm)</td><td>Top Depth (m)</td><td>Base Depth (m)</td></tr><tr><td></td><td></td><td></td></tr></table>			Duration (hh:mm)	Top Depth (m)	Base Depth (m)				AGS
Depth Strike (m)	Depth Casing (m)	Level After 20 Mins																			
Duration (hh:mm)	Top Depth (m)	Base Depth (m)																			

Contract No.	F15056	Method	Rotary Coring	Coordinates	341960.35 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Site Master		187619.31 N
		Driller	BB	Ground Level	18.90m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	PWF	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	18/12/2007

PROGRESS						DRILLING DETAILS				
Date	Time	Hole depth	Casing depth	Water depth	Remarks	From depth	To depth	Flush type	Flush return	Core diameter
17/12/2007	1730	8.00	3.50	5.10	End of Shift	0.00	2.00	Air/Mist	100%	0.00*
18/01/2008	0730	8.00	3.50	1.80	Start of Shift	2.00	9.30	Air/Mist	100%	92.0
18/01/2008	1730	9.30	3.50	NR	End of Hole					

CASING				WATER STRIKES							
Hole diam.	Max depth of hole at dia.	Casing diameter	Max depth of casing of dia.	Date	Time	Strike at depth	Rise to depth	Time taken to rise	Flow	Casing depth at strike time	Casing depth to seal flow
121	9.30	121	3.50	17/12/2007	1100	3.45	3.20	20	Seepage	NR	NR

GENERAL NOTES				SPT DETAILS				
1.Rotary Openhole from GL to 2.00m. 2.Rotary Coring from 2.00m to 9.30m. 3.Rotary coring terminated at 9.30m, refer to SBHN01A for redrill. 4.Borehole grouted upon completion. 5.0.00* indicates openhole drilling.				Depth	Type	Incremental blow count/penetration	Casing	Water Depth
				1.20	S	N=8 (1,1,2,2,2,2)	0.00	DRY
				2.00	S	N=24 (2,2,4,6,6,8)	0.00	DRY
				3.00	S	N=26 (2,3,3,6,7,10)	2.00	DRY
				4.00	S	N=24 (14,7,5,4,5,10)	3.50	1.20
				5.00	S	N=93 (3,22,18,25,25,25)	3.50	1.70
				6.00	S	90/160mm (25,74,16)	3.50	1.90
				7.00	S	100/30mm (25,100)	3.50	1.50

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

Contract No.	F15056	Method	Rotary Coring	Coordinates	341960.35 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Site Master		187619.31 N
		Driller	BB	Ground Level	18.90m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
Consultant	Ove Arup & Partners Ltd	Core barrel	PWF	Date Started	17/12/2007
		Core bit	TC	Date Completed	18/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TOR	SCR	ROD	IF	SPT N & depth	Installation
Turf over firm brown TOPSOIL. (Driller's description)		0.20	18.70							
MADE GROUND: Very dense brick/boulder fill. (Driller's description)		0.80	18.10							
Stiff red brown mottled yellowish brown silty CLAY. (Driller's description)		2.00	16.90						1.20 S8 1.65	
Zone of core loss. Stiff red brown mottled yellowish brown silty CLAY. (Driller's description)		3.00	15.90	2.00 3.00	NA	NA			2.00 S24 2.45	
Very weak to extremely weak greyish brown MUDSTONE. (Mercia Mudstone Group (Marginal Facies)) ---from 3.00m to 3.34m recovered as non intact core (gravelly clay. Gravel is angular fine to medium sized fragments) ---from 3.38m to 4.00m assumed zone of core loss		4.00	14.20	3.00 4.00	38	4	0	NI NI NI	3.00 S26 3.45	
---from 4.00m to 4.28m recovered as non intact core (gravelly clay. Gravel is angular fine to medium sized fragments)		4.70	14.20	4.00 4.70	87	43	24		4.00 S24 4.45	
---from 4.57m to 4.61m recovered as non intact core (gravelly clay. Gravel is angular fine to medium sized fragments)		5.00	13.90	4.70 5.00	NA	NA				
---from 4.61m to 4.70m assumed zone of core loss		6.00	12.90	5.00 6.00	55	35	35	NI NI 310	5.00 S93 5.45	
Zone of core loss		7.00	7.05	6.00 7.00	75	75	44		6.00 S90/160mm 6.21	
Very weak to extremely weak greyish brown MUDSTONE (Mercia Mudstone Group (Marginal Facies)) ---from 5.00m to 5.19m recovered as non intact core (gravelly clay. Gravel is angular fine to medium sized fragments) ---from 5.35m to 5.55m occasional thick laminations of weak reddish brown mudstone. Highly weathered ---from 5.55m to 6.00m assumed zone of core loss		8.00	9.60	7.00 8.00	96	92	47	NI 110 220	7.00 S100/30mm 7.05	
Very weak to weak thinly laminated reddish brown MUDSTONE. Discontinuities 1) 0 -10 deg extremely closely to medium spaced undulating rough. (Mercia Mudstone Group (Marginal Facies)) ---from 7.00m to 7.53m with many extremely closely spaced laminations of weak grey mudstone and weak grey siltstone. Highly weathered ---from 7.53m to 7.89m some very closely spaced laminations of weak to medium strong light grey siltstone. Moderately weathered ---from 7.68m to 7.72m recovered as non intact core (angular to subangular fine to coarse gravel sized fragments of mudstone) ---from 7.89m to 8.19m many very closely spaced thick laminations of weak to medium strong light greyish brown siltstone. Moderately weathered ---at 8.21m 1 No thick discontinuous lamination of very weak grey mudstone. Highly weathered ---at 8.24m 1 No thick discontinuous lamination of very				8.00 9.30	90	67	55			

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

Contract No.	F15056	Method	Rotary Coring	Coordinates	341960.35 E
Project	New M4 - Second Preliminary Ground Investigation	Drilling Rig	Site Master		187619.31 N
		Driller	BB	Ground Level	18.90m AOD
Client	Transport Wales, Welsh Assembly Government	Logged by	DH	Orientation	Vertical
		Core barrel	PWF	Date Started	17/12/2007
Consultant	Ove Arup & Partners Ltd	Core bit	TC	Date Completed	18/12/2007

Description of Strata	Legend	Drilled Length	Datum Level	Coring and Sampling	TCR	SCR	ROD	IF	SPT N & depth	Installation
Remaining Detail : 8.24m - 8.24m : weak grey mudstone. Highly weathered;;; 8.26m - 8.27m : ---from 8.26m to 8.27m recovered as non intact core (angular fine to medium gravel sized fragments);;; 8.30m - 8.36m : ---from 8.30m to 8.36m many extremely closely spaced thin laminations of weak grey siltstone. Moderately weathered;;; 8.36m - 8.50m : ---from 8.36m to 8.50m 1 No medium bed of medium strong light grey siltstone. Moderately weathered;;; 8.50m - 8.69m : ---from 8.50m to 8.69m recovered as non intact core (angular fine to coarse gravel sized fragments of mudstone);;; 9.15m - 9.17m : ---from 9.15m to 9.17m 1 No thin bed of weak to medium strong grey siltstone. Moderately weathered;;; 9.17m - 9.30m : ---from 9.17m to 9.30m assumed zone of core loss Rotary drilling complete at 9.30 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.

Form	ARIAL ROTARY LOG
Version	3.09
Revised	17/12/2007

Appendix 2

Gas and Groundwater Monitoring 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						

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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						

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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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH545	17/04/15 09:00:00	1022	-1.05								0.0	8		36 litres purged, base depth 12.50m.	
BH545	17/04/15 09:01:00										0.0				
BH545	17/04/15 09:02:00										0.0				
BH545	17/04/15 09:03:00										0.0				
BH545	17/04/15 09:04:00										0.0				
BH545	17/04/15 09:05:00			2.8	0.1	18.0	1.0	0	0	5.4					
BH545	17/04/15 09:06:00			2.8	0.1	17.9	1.0	0	0	5.1					
BH545	17/04/15 09:07:00			2.8	0.1	17.9	1.0	0	0	6.3					
BH545	17/04/15 09:08:00			2.8	0.1	17.9	1.0	0	0	6.1					
BH545	17/04/15 09:09:00			2.8	0.1	17.9	1.0	0	0	5.8					
BH545	17/04/15 09:10:00			2.8	0.1	17.9	1.0	0	0	5.5					
BH545	17/04/15 09:11:00			2.8	0.1	17.9	1.0	0	0	5.3					
BH545	17/04/15 09:12:00			2.8	0.1	17.9	1.0	0	0	4.9					
BH545	17/04/15 09:13:00			2.8	0.1	17.9	1.0	0	0	4.6					
BH545	17/04/15 09:14:00			2.7	0.1	17.9	1.0	0	0	4.4			6.35		
BH545	24/04/15 10:00:00	1015	-1.1								0.0	12		35 litres purged, base depth 12.50m.	
BH545	24/04/15 10:01:00										0.0				
BH545	24/04/15 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 30238	CHECKED EC

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH545	24/04/15 10:03:00										0.0			
BH545	24/04/15 10:04:00										0.0			
BH545	24/04/15 10:05:00			0.1	0.1	20.6	1.0	0	0	2.5				
BH545	24/04/15 10:06:00			1.1	0.1	19.4	1.0	0	0	4.3				
BH545	24/04/15 10:07:00			1.9	0.1	18.3	1.0	0	0	5.0				
BH545	24/04/15 10:08:00			2.3	0.1	17.6	1.0	0	0	4.9				
BH545	24/04/15 10:09:00			2.4	0.1	17.4	1.0	0	0	4.8				
BH545	24/04/15 10:10:00			2.4	0.1	17.4	1.0	0	0	4.6				
BH545	24/04/15 10:11:00			2.5	0.1	17.3	1.0	0	0	4.5				
BH545	24/04/15 10:12:00			2.6	0.1	17.2	1.0	0	0	4.2				
BH545	24/04/15 10:13:00			2.7	0.1	17.1	1.0	0	0	4.0				
BH545	24/04/15 10:14:00			2.7	0.1	17.0	1.0	0	0	3.9			6.65	
BH545	01/05/15 08:30:00	1014	-0.51								0.0	8		33 litres purged, base depth 12.50m.
BH545	01/05/15 08:31:00										0.0			
BH545	01/05/15 08:32:00										0.0			
BH545	01/05/15 08:33:00										0.0			
BH545	01/05/15 08:34:00										0.0			
BH545	01/05/15 08:35:00			2.7	0.0	18.3	0.0	0	0	3.4				
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.													CONTRACT 30238	CHECKED EC

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks		
BH545	01/05/15 08:36:00	1021	0	2.7	0.0	18.2	0.0	0	0	3.8	0.0	16	6.85			
BH545	01/05/15 08:37:00			2.7	0.0	18.2	1.0	0	0	3.8						
BH545	01/05/15 08:38:00			2.7	0.0	18.2	1.0	0	0	3.8						
BH545	01/05/15 08:39:00			2.8	0.0	18.2	1.0	0	0	3.7						
BH545	01/05/15 08:40:00			2.8	0.0	18.2	1.0	0	0	3.6						
BH545	01/05/15 08:41:00			2.9	0.0	18.3	1.0	0	0	3.3						
BH545	01/05/15 08:42:00			2.9	0.0	18.3	1.0	0	0	3.2						
BH545	01/05/15 08:43:00			2.9	0.0	18.3	1.0	0	0	2.9						
BH545	01/05/15 08:44:00			2.9	0.0	18.3	1.0	0	0	2.7						
BH545	11/05/15 11:37:00															
BH545	11/05/15 11:38:00															
BH545	11/05/15 11:39:00															
BH545	11/05/15 11:40:00															
BH545	11/05/15 11:41:00															
BH545	11/05/15 11:42:00					0.1	0.0	19.3	0.0	0					0	0.4
BH545	11/05/15 11:43:00					0.1	0.0	19.2	0.0	0					0	0.5
BH545	11/05/15 11:44:00					0.2	0.0	19.2	0.0	0					0	0.6
BH545	11/05/15 11:45:00					0.2	0.0	19.1	0.0	0					0	0.7
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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH545	11/05/15 11:46:00			0.3	0.0	19.0	0.0	0	0	0.8				
BH545	11/05/15 11:47:00			0.4	0.0	19.0	0.0	0	0	0.9				
BH545	11/05/15 11:48:00			0.5	0.0	18.9	0.0	0	0	1.0				
BH545	11/05/15 11:49:00			0.6	0.0	18.9	0.0	0	0	1.0				
BH545	11/05/15 11:50:00			0.7	0.0	18.7	0.0	0	0	1.0				
BH545	11/05/15 11:51:00			0.8	0.0	18.7	0.0	0	0	1.1				
BH545	11/05/15 11:52:00												7.82	
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

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks	
BH549	17/04/15 10:00:00	1021	-0.73								0.0	12		25 litres purged, base depth 12.00m.	
BH549	17/04/15 10:01:00										0.0				
BH549	17/04/15 10:02:00										0.0				
BH549	17/04/15 10:03:00										0.0				
BH549	17/04/15 10:04:00										0.0				
BH549	17/04/15 10:05:00			1.3	0.1	18.0	1.0	0	3	9.2					
BH549	17/04/15 10:06:00			1.3	0.1	18.1	1.0	0	3	8.6					
BH549	17/04/15 10:07:00			1.3	0.1	18.1	1.0	0	3	7.9					
BH549	17/04/15 10:08:00			1.3	0.1	18.1	1.0	0	3	7.4					
BH549	17/04/15 10:09:00			1.3	0.1	18.1	1.0	0	3	7.2					
BH549	17/04/15 10:10:00			1.3	0.1	18.1	1.0	0	3	7.1					
BH549	17/04/15 10:11:00			1.3	0.1	18.1	1.0	0	3	6.9					
BH549	17/04/15 10:12:00			1.3	0.1	18.2	1.0	0	3	6.9					
BH549	17/04/15 10:13:00			1.3	0.1	18.2	1.0	0	2	6.9					
BH549	17/04/15 10:14:00			1.3	0.1	18.2	1.0	0	2	6.9			7.68		
BH549	24/04/15 11:00:00	1011	0								0.0	13		17 litres purged, base depth 12.00m.	
BH549	24/04/15 11:01:00										0.0				
BH549	24/04/15 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. Deep install.														CONTRACT 30238	CHECKED EC

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH549	24/04/15 11:03:00										0.0			
BH549	24/04/15 11:04:00										0.0			
BH549	24/04/15 11:05:00			0.8	0.1	19.8	1.0	0	2	4.7				
BH549	24/04/15 11:06:00			0.8	0.1	19.8	1.0	0	1	4.6				
BH549	24/04/15 11:07:00			0.8	0.1	19.8	1.0	0	1	4.5				
BH549	24/04/15 11:08:00			0.7	0.1	19.8	1.0	0	1	4.5				
BH549	24/04/15 11:09:00			0.7	0.1	19.8	1.0	0	1	4.4				
BH549	24/04/15 11:10:00			0.7	0.1	19.8	1.0	0	1	4.3				
BH549	24/04/15 11:11:00			0.7	0.1	19.8	1.0	0	1	4.3				
BH549	24/04/15 11:12:00			0.7	0.1	19.8	1.0	0	0	4.2				
BH549	24/04/15 11:13:00			0.7	0.1	19.8	1.0	0	0	4.2				
BH549	24/04/15 11:14:00			0.7	0.1	19.7	1.0	0	0	4.2			9.12	
BH549	01/05/15 09:30:00	1013	-1.09								0.0	8		24 litres purged, base depth 12.00m.
BH549	01/05/15 09:31:00										0.0			
BH549	01/05/15 09:32:00										0.0			
BH549	01/05/15 09:33:00										0.0			
BH549	01/05/15 09:34:00										0.0			
BH549	01/05/15 09:35:00			0.9	0.0	19.6	0.0	0	0	3.7				
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

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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks		
BH549	01/05/15 09:36:00	1020	2	0.8	0.0	19.7	0.0	0	0	3.4	0.4	16	7.89			
BH549	01/05/15 09:37:00			0.8	0.0	19.8	1.0	0	0	3.3						
BH549	01/05/15 09:38:00			0.8	0.0	19.8	1.0	0	0	3.3						
BH549	01/05/15 09:39:00			0.8	0.0	19.8	1.0	0	0	3.3						
BH549	01/05/15 09:40:00			0.8	0.0	19.8	1.0	0	0	3.2						
BH549	01/05/15 09:41:00			0.8	0.0	19.8	1.0	0	0	3.2						
BH549	01/05/15 09:42:00			0.8	0.0	19.8	1.0	0	0	3.1						
BH549	01/05/15 09:43:00			0.8	0.0	19.8	1.0	0	0	3.1						
BH549	01/05/15 09:44:00			0.8	0.0	19.8	1.0	0	0	3.1						
BH549	11/05/15 13:38:00															
BH549	11/05/15 13:39:00															
BH549	11/05/15 13:40:00															
BH549	11/05/15 13:41:00															
BH549	11/05/15 13:42:00															
BH549	11/05/15 13:43:00					0.9	0.0	18.5	0.0	0					0	1.2
BH549	11/05/15 13:44:00					0.6	0.0	19.1	0.0	0					0	0.7
BH549	11/05/15 13:45:00					0.3	0.0	19.4	0.0	0					0	0.4
BH549	11/05/15 13:46:00					0.2	0.0	19.6	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. Deep install.														CONTRACT 30238	CHECKED EC	

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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 ₂ O)	carbon dioxide (%)	methane (%)	oxygen (%)	LEL (%)	hydrogen sulphide (ppm)	carbon monoxide (ppm)	VOC (ppm)	gas flow (ltr/hr)	temperature (°C)	water level (m - bgl)	remarks
BH549	11/05/15 13:47:00			0.2	0.0	19.5	0.0	0	0	0.5				
BH549	11/05/15 13:48:00			0.2	0.0	19.6	0.0	0	0	0.4				
BH549	11/05/15 13:49:00			0.2	0.0	19.6	0.0	0	0	0.6				
BH549	11/05/15 13:50:00			0.2	0.0	19.6	0.0	0	0	0.7				
BH549	11/05/15 13:51:00			0.2	0.0	19.6	0.0	0	0	0.7				
BH549	11/05/15 13:52:00			0.2	0.0	19.6	0.0	0	0	0.7				
BH549	11/05/15 13:53:00												8.95	
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

Project Name New M4 Preliminary Ground Investigation						Groundwater Readings For Installations			Fig no. 01			
Project No. F15056												
Engineer Ove Arup & Partners Ltd												
Client Transport Wales, Welsh Assembly Government												
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						

[illegible]

Project Name New M4 Preliminary Ground Investigation						Groundwater Readings For Installations			Fig no. 03			
Project No. F15056												
Engineer Ove Arup & Partners Ltd												
Client Transport Wales, Welsh Assembly Government												
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						

[illegible]

M4CAN
Gas Monitoring
CL-33

Loc. Ref.	Install Ref. *1	Reading Ref. *2	Location Notes	Gas Monitoring															Additional Notes / Comments		
				Date	Time	Min	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak LEL	Flow Rate (l/hr)	Differential Pressure (pa)		Air Pressure (mb)	Air Temperature (°C)
						Oxygen (O ₂) %	Carbon Dioxide (CO ₂) %	Carbon Monoxide (CO) ppm	Hydrogen Sulphide (H ₂ S) ppm	Methane (CH ₄) %											
WSM4CANA007	1	1		11/05/16	10:00 AM	14.90	17.30	2.20	2.20	0.00	0.00	0.00	0.00	0.20	0.00		0.40	-1.22	1002.00		
WSM4CANA007	1	2		25/05/16	01:40 PM	17.10	17.10	2.20	2.20	0.00	0.00	0.00	0.00	0.30	0.30	0.00	0.40	-0.47			
WSM4CANA007	1	3		03/06/16	12:30 PM	15.30	15.30	3.30	3.30	1.00	1.00	0.00	0.00	0.30	0.30	0.00	0.20				
WSM4CANA008	1	1		11/05/16	10:15 AM	18.00	18.00	2.30	2.30	0.00	0.00	0.00	0.00	0.20	0.20		0.40	-1.75	1012.00		
WSM4CANA008	1	2		25/05/16	01:30 PM	18.50	18.50	2.70	2.70	0.00	0.00	0.00	0.00	0.30	0.30	0.00	0.50	-1.20			
WSM4CANA008	1	3		03/06/16		19.30	19.30	1.90	1.90	1.00	1.00	0.00	0.00	0.40	0.30	0.00	0.20				
WSM4CANA009*	1	1		11/05/16	09:30 AM	18.40	18.50	2.10	2.10	0.00	0.00	0.00	0.00	0.20	0.20		0.50	0.07	1002.00		
WSM4CANA009*	1	3		03/06/16		19.70	19.70	0.90	0.90	1.00	0.00	0.00	0.00	0.30	0.30	0.00	0.30				
WSM4CANA006*	1	1		11/05/16	09:45 AM	12.40	12.40	1.60	1.60	0.00	0.00	0.00	0.00	0.20	0.20		0.40	-0.01	1013.00		
WSM4CANA006*	1	2		25/05/16	01:00 PM	12.40	12.40	3.60	3.60	0.00	0.00	0.00	0.00	0.30	0.30	0.00	0.50	-0.59			
WSM4CANA006*	1	3		03/06/16		19.30	19.30	1.30	1.30	1.00	1.00	0.00	0.00	0.30	0.30	0.00	0.30				

* Denotes offsite location

Appendix 3

Soil Laboratory Data

M4CAN
Soil Analysis Results & Screening Assessment
CL-33
06/05/2016

Sample Reference	Units
Specimen Depth (m)	
OD Level (m)	
Sample Type	
Geology Code	
Cluster Code	
Metals	
Antimony	mg/kg
Arsenic	mg/kg
Barium	mg/kg
Boron Water Soluble	mg/kg
Cadmium	mg/kg
Chromium	mg/kg
Copper	mg/kg
Lead	mg/kg
Mercury	mg/kg
Molybdenum	mg/kg
Nickel	mg/kg
Selenium	mg/kg
Vanadium	mg/kg
Zinc	mg/kg
Cyanide (total)	mg/kg
Cyanide (free)	mg/kg
Sulphate (soluble)	g/l
Other	
Asbestos Presence Screen	None
Loss on Ignition	%
Total Organic Carbon	%
pH Value	pH Units
Material >2mm	%
Organics	
PCBs (vs Aroclor 1254)	mg/kg
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg
Pcb-118 2,3',4,4',5- Pentachlorobiphenyl	mg/kg
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg
Sum of detected WHO 12 PCBs	mg/kg
Phenols (total)	mg/kg
BTEX	
GRO (C4-C12)	mg/kg
MTBE	mg/kg
Benzene	mg/kg
Toluene	mg/kg
Ethyl benzene	mg/kg
m & p Xylene	mg/kg
o Xylene	mg/kg
Sum of detected BTEX by GC	mg/kg
Sum of detected mpo xylene by GC	mg/kg
TPH	
TPH >C6-C8.	mg/kg
TPH >C8-C10.	mg/kg
TPH >C10-C12.	mg/kg
TPH >C12-C16.	mg/kg
TPH >C16-C21.	mg/kg
TPH >C21-C35.	mg/kg
Aliphatics C5-C6	mg/kg
Aliphatics >C6-C8	mg/kg
Aliphatics >C8-C10	mg/kg
Aliphatics >C10-C12	mg/kg
Aliphatics >C12-C16	mg/kg
Aliphatics >C16-C21	mg/kg
Aliphatics >C21-C35	mg/kg
Total Aliphatics C5-C35	mg/kg
Aliphatics >C35-44	mg/kg
Aromatics >C5-C7	mg/kg
Aromatics C6-C7	mg/kg
Aromatics >C7-C8	mg/kg
Aromatics >EC8-EC10	mg/kg
Aromatics >EC10-EC12	mg/kg
Aromatics >EC12-EC16	mg/kg
Aromatics >EC16-EC21	mg/kg
Aromatics >EC21-EC35	mg/kg
Total Aromatics C6-C35	mg/kg
Aromatics >C35-44	mg/kg
Aromatics >E40-EC44	mg/kg
Total Aliphatic TPH	mg/kg
Total Aromatic TPH	mg/kg
Total Aliphatics & Aromatics >C5-C44	mg/kg
TPH (Aliphatics and Aromatics C5-C35)	mg/kg
Total petroleum hydrocarbons	ug/kg
PAH	
Acenaphthene	mg/kg
Acenaphthylene	mg/kg
Anthracene	mg/kg
Benzo(a)anthracene	mg/kg
Benzo(a)pyrene	mg/kg
Benzo(b)fluoranthene	mg/kg
Benzo(ghi)perylene	mg/kg
Benzo(k)fluoranthene	mg/kg
Chrysene	mg/kg
Dibenzo(ah)anthracene	mg/kg

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
Offsite borehole location

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
4	4	2.4	1.8	STPN04 @ 0.3mbGL		
10	9	34	7	TP522 @ 0.0 - 0.1mbGL	170	0
4	4	83	63	STPN04 @ 1mbGL		
6	2	1.4	0.91	TP522 @ 0.0 - 0.1mbGL		
10	7	0.92	0.29	WSM4CANA009 @ 0.2mbGL	190	0
10	10	35	21.1	STPN03 @ 1mbGL	33	2
10	10	50	13	STPN04 @ 0.3mbGL	44000	0
10	10	105	15.2	WSM4CANA007 @ 1.4 - 1.9mbGL	1300	0
10	1	0.24	0.24	TP522 @ 0.0 - 0.1mbGL	30	0
4	0	None > LOD	None > LOD			
10	10	33	19	TP522 @ 0.0 - 0.1mbGL	980	0
10	0	None > LOD	None > LOD		1800	0
4	4	46.7	28.2	WSM4CANA009 @ 0.2mbGL	5000	0
10	10	144	57.9	WSM4CANA007 @ 1.4 - 1.9mbGL	170000	0
6	0	None > LOD	None > LOD			
3	0	None > LOD	None > LOD			
4	4	0.046	0.005	STPN04 @ 1mbGL		
10	0	None > LOD	None > LOD			
3	3	3.4	2	STPN03 @ 0.3mbGL		
3	3	3.2	0.5	STPN03 @ 0.3mbGL		
10	10	8.72	7.8	WSM4CANA007 @ 1.4 - 1.9mbGL	6-9	0
0	0	None > LOD	None > LOD			
4	1	0.046	0.046	STPN04 @ 0.3mbGL	0.24	0
3	0	None > LOD	None > LOD		0.24	0
3	0	None > LOD	None > LOD		0.24	0
3	0	None > LOD	None > LOD		0.24	0
3	0	None > LOD	None > LOD		0.24	0
3	0	None > LOD	None > LOD		0.24	0
3	0	None > LOD	None > LOD		0.24	0
3	0	None > LOD	None > LOD		0.24	0
3	0	None > LOD	None > LOD		0.24	0
3	0	None > LOD	None > LOD		0.24	0
3	0	None > LOD	None > LOD		0.24	0
3	0	None > LOD	None > LOD		0.24	0
3	0	None > LOD	None > LOD		0.24	0
6	0	None > LOD	None > LOD		440	0
7	0	None > LOD	None > LOD			
7	0	None > LOD	None > LOD			
7	0	None > LOD	None > LOD		27	0
7	0	None > LOD	None > LOD		56000	0
7	0	None > LOD	None > LOD		5700	0
7	0	None > LOD	None > LOD		5900	0
7	0	None > LOD	None > LOD		6600	0
3	0	None > LOD	None > LOD			
3	0	None > LOD	None > LOD			
6	0	None > LOD	None > LOD		7800	0
2	0	None > LOD	None > LOD		2000	0
2	0	None > LOD	None > LOD		9200	0
2	0	None > LOD	None > LOD		10000	0
2	0	None > LOD	None > LOD		7600	0
2	0	None > LOD	None > LOD		7800	0
3	0	None > LOD	None > LOD		3200	0
7	0	None > LOD	None > LOD		7800	0
7	0	None > LOD	None > LOD		2000	0
7	0	None > LOD	None > LOD		9700	0
7	3	2.37	1.05	WSM4CANA009 @ 0.2mbGL	25000	0
7	3	1.65	1.51	WSM4CANA008 @ 0.6 - 0.9mbGL	450000	0
7	5	4.57	1.9	WSM4CANA009 @ 0.2mbGL	450000	0
4	2	2	1.9	STPN04 @ 1mbGL	2000	0
3	2	0.117	0.1	WSM4CANA008 @ 0.6 - 0.9mbGL	450000	0
3	0	None > LOD	None > LOD		26000	0
4	0	None > LOD	None > LOD		7800	0
7	0	None > LOD	None > LOD		56000	0
7	0	None > LOD	None > LOD		3500	0
7	0	None > LOD	None > LOD		9200	0
7	3	2.31	0.105	WSM4CANA009 @ 0.2mbGL	10000	0
7	3	0.93	0.26	STPN03 @ 0.3mbGL	7600	0
7	6	16	1.11	STPN03 @ 0.3mbGL	7800	0
7	6	17	1.32	STPN03 @ 0.3mbGL	3500	0
3	3	1.16	0.1	WSM4CANA009 @ 0.2mbGL	7800	0
3	0	None > LOD	None > LOD		7800	0
3	3	8.51	5.88	WSM4CANA009 @ 0.2mbGL	2000	0
3	3	8.79	1.32	WSM4CANA009 @ 0.2mbGL	3500	0
3	3	17.3	7.45	WSM4CANA009 @ 0.2mbGL	2000	0
6	3	17	6.4	STPN03 @ 0.3mbGL	2000	0
0	0	None > LOD	None > LOD		2000	0
10	2	0.02	0.014	STPN04 @ 0.3mbGL	29000	0
10	2	0.009	0.007	STPN03 @ 1mbGL	29000	0
10	3	0.044	0.017	STPN04 @ 0.3mbGL	150000	0
10	6	0.12	0.034	STPN03 @ 0.3mbGL	49	0
10	6	0.13	0.018	STPN03 @ 0.3mbGL	11	0
10	6	0.16	0.036	STPN03 @ 0.3mbGL	13	0
10	6	0.11	0.018	STPN03 @ 0.3mbGL	1400	0
10	5	0.1	0.0267	STPN03 @ 0.3mbGL	370	0
10	6	0.21	0.022	STPN03 @ 0.3mbGL	93	0
10	3	0.023	0.015	STPN03 @ 0.3mbGL	1.1	0

M4CAN
Soil Analysis Results & Screening Assessment
CL-33
06/05/2016

Geological Formation Legend	
MG	Made Ground
RTD	River Terrace Deposits
TS	Topsoil

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

Offsite borehole location

Screening Values and Assessment	
	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Sample Reference	Units	STPN03	STPN03	STPN04	STPN04	TP522	TP522	WSM4CANA006	WSM4CANA007	WSM4CANA008	WSM4CANA009
Specimen Depth (m)		0.3	1	0.3	1	0.0 - 0.1	0.5 - 0.6	0.45	1.4 - 1.9	0.6 - 0.9	0.2
OD Level (m)		20.39	19.69	17.33	16.63	19.8 - 19.7	19.3 - 19.2	23.76	20.44	20.07	23.45
Sample Type		B	ES	D	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	RTD	MG	RTD	TS
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI	2016 GI
Metals											
Antimony	mg/kg	1.8	2.2	2.4	1.8						
Arsenic	mg/kg	8	8	7	<3	34	13	10.4	17.7	12	19
Barium	mg/kg	66	77	63	83						
Boron Water Soluble	mg/kg	<3.5	<3.5	<3.5	<3.5	1.4	0.91				
Cadmium	mg/kg	0.4	<0.3	<0.3	<0.3	0.64	0.29	0.355	0.642	0.505	0.92
Chromium	mg/kg	30	35	35	29	30	32	24.4	21.1	23	29.3
Copper	mg/kg	13	14	50	22	28	19	15.4	28.8	15	30.6
Lead	mg/kg	40	21	17	20	76	35	15.2	105	28.6	80.7
Mercury	mg/kg	<0.6	<0.6	<0.6	<0.6	0.24	<0.1	<0.14	<0.14	<0.14	<0.14
Molybdenum	mg/kg	<0.6	<0.6	<0.6	<0.6						
Nickel	mg/kg	22	30	21	19	33	33	24	23.3	25.5	32.8
Selenium	mg/kg	<3	<3	<3	<3	<0.2	<0.2	<1	<1	<1	<1
Vanadium	mg/kg							35.7	28.2	32.7	46.7
Zinc	mg/kg	110	96	83	81	120	73	57.9	144	64.9	134
Cyanide (total)	mg/kg	<1	<1	<1	<1	<0.5	<0.5				
Cyanide (free)	mg/kg					<0.5	<0.5			<1	
Sulphate (soluble)	g/l	0.005	0.013	0.009	0.046						
Other											
Asbestos Presence Screen	None	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD	NFD
Loss on Ignition	%	3.4		3	2						
Total Organic Carbon	%	3.2		0.5	0.6						
pH Value	pH Units	8.29	8.27	7.86	7.97	8	7.8	7.9	8.72	8.32	8.1
Material >2mm	%										
Organics											
PCBs (vs Aroclor 1254)	mg/kg	<0.02	<0.02	0.046	<0.035						
Pcb-105 2,3,3',4,4'-Pentachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-114 2,3,4,4',5-Pentachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-123 2,3',4,4',5'-Pentachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-126 3,3',4,4',5-Pentachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-156 2,3,3,4,4,5 - Hexachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-157 2,3,3',4,4',5'-Hexachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-167 2,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-169 3,3',4,4',5,5'-Hexachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-189 2,3,3',4,4',5,5'-Heptachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-77 3,3',4,4'-Tetrachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Pcb-81 3,4,4',5-Tetrachlorobiphenyl	mg/kg					<0.01	<0.01			<0.003	
Sum of detected WHO 12 PCBs	mg/kg					<0.01	<0.01			<0.036	
Phenols (total)	mg/kg	<0.15	<0.15	<0.15	<0.15	<0.3	<0.3				
BTEX											
GRO (C4-C12)	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.044		<0.044	<0.044
MTBE	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.005		<0.005	<0.005
Benzene	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01	<0.01
Toluene	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.002		<0.002	<0.002
Ethyl benzene	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01	<0.01
m & p Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.006		<0.006	<0.006
o Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.003		<0.003	<0.003
Sum of detected BTEX by GC	mg/kg							<0.024		<0.024	<0.024
Sum of detected mpo xylene by GC	mg/kg							<0.009		<0.009	<0.009
TPH											
TPH >C6-C8.	mg/kg	<0.01	<0.01	<0.01	<0.01	<1	<1				
TPH >C8-C10.	mg/kg					<1	<1				
TPH >C10-C12.	mg/kg					<1	<1				
TPH >C12-C16.	mg/kg					<1	<1				
TPH >C16-C21.	mg/kg					<1	<1				
TPH >C21-C35.	mg/kg					<1	<1				
Aliphatics C5-C6	mg/kg							<0.01		<0.01	<0.01
Aliphatics >C6-C8	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01	<0.01
Aliphatics >C8-C10	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01	<0.01
Aliphatics >C10-C12	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01	<0.01
Aliphatics >C12-C16	mg/kg	<0.1	<0.1	<0.1	<0.1			1.05		1.32	2.37
Aliphatics >C16-C21	mg/kg	<0.1	<0.1	<0.1	<0.1			1.51		1.65	1.57
Aliphatics >C21-C35	mg/kg	<0.1	<0.1	1.9	2			3.23		3.4	4.57
Total Aliphatics C5-C35	mg/kg	<0.1	<0.1	1.9	2						
Aliphatics >C35-44	mg/kg							0.1		0.117	<0.1
Aromatics >C5-C7	mg/kg							<0.01		<0.01	<0.01
Aromatics C6-C7	mg/kg	<0.01	<0.01	<0.01	<0.01						
Aromatics >C7-C8	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01	<0.01
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01	<0.01
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.01		<0.01	<0.01
Aromatics >EC12-EC16	mg/kg	0.23	<0.1	<0.1	<0.1			<0.1		0.105	2.31
Aromatics >EC16-EC21	mg/kg	0.93	<0.1	0.26	<0.1			<0.1		<0.1	0.793
Aromatics >EC21-EC35	mg/kg	16	<0.1	12	4.5			1.23		1.11	6.61
Total Aromatics C6-C35	mg/kg	17	<0.1	12	4.5			1.56		1.32	8.79
Aromatics >C35-44	mg/kg							0.331		0.1	1.16
Aromatics >E40-EC44	mg/kg							<0.1		<0.1	<0.1
Total Aliphatic TPH	mg/kg							5.88		6.49	8.51
Total Aromatic TPH	mg/kg							1.56		1.32	8.79
Total Aliphatics & Aromatics >C5-C44	mg/kg							7.45		7.81	17.3
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	17	<0.1	14	6.4	<1	<1				
Total petroleum hydrocarbons	ug/kg										
PAH											
Acenaphthene	mg/kg	<0.014	0.014	0.02	<0.014	<0.1	<0.1	<0.008	<0.008	<0.008	<0.008
Acenaphthylene	mg/kg	0.007	0.009	<0.005	<0.005	<0.1	<0.1	<0.012	<0.012	<0.012	<0.012
Anthracene	mg/kg	0.022	0.017	0.044	<0.009	<0.1	<0.1	<0.016	<0.016	<0.016	<0.016
Benzo(a)anthracene	mg/kg	0.12	0.087	0.086	0.034	<0.1	<0.1	<0.014	0.0677	<0.014	0.079
Benzo(a)pyrene	mg/kg	0.13	0.091	0.072	0.018	<0.1	<0.1	<0.015	0.055	<0.015	0.0827
Benzo(b)fluoranthene	mg/kg	0.16	0.15	0.091	0.036	<0.1	<0.1	<0.015	0.0965	<0.015	0.144
Benzo(ghi)perylene	mg/kg	0.11	0.065	0.058	0.018	<0.1	<0.1	<0.024	0.0447	<0.024	0.0657
Benzo(k)fluoranthene	mg/kg	0.1	0.06	0.035	<0.025	<0.1	<0.1	<0.014	0.0267	<0.014	0.0464
Chrysene	mg/kg	0.21	0.11	0.083	0.022	<0.1	<0.1	<0.01	0.0494	<0.01	0.0864
Dibenzo(ah)anthracene	mg/kg	0.023	0.017	0.015	<0.008	<0.1	<0.1	<0.023	<0.023	<0.023	<0.023

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CL-33
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Geological Formation Legend	
MG	Made Ground
RTD	River Terrace Deposits
TS	Topsoil

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

Offsite borehole location

Screening Values and Assessment	
	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Sample Reference	Units	STPN03	STPN03	STPN04	STPN04	TP522	TP522	WSM4CANA006	WSM4CANA007	WSM4CANA008	WSM4CANA009
Specimen Depth (m)		0.3	1	0.3	1	0.0 - 0.1	0.5 - 0.6	0.45	1.4 - 1.9	0.6 - 0.9	0.2
OD Level (m)		20.39	19.69	17.33	16.63	19.8 - 19.7	19.3 - 19.2	23.76	20.44	20.07	23.45
Sample Type		B	ES	D	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	RTD	MG	RTD	TS
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI	2016 GI
Fluoranthene	mg/kg	0.26	0.16	0.19	0.035	0.34	<0.1	<0.017	0.0796	<0.017	0.122
Fluorene	mg/kg	0.021	0.019	0.019	<0.012	<0.1	<0.1	<0.01	0.0137	<0.01	<0.01
Indeno(123cd)pyrene	mg/kg	0.083	0.06	0.047	0.014	<0.1	<0.1	<0.018	0.0366	<0.018	0.0559
Naphthalene	mg/kg	0.058	0.021	0.027	<0.01	<0.1	<0.1	<0.009	<0.009	<0.009	0.0122
Phenanthrene	mg/kg	0.2	0.11	0.17	<0.021	0.11	<0.1	<0.015	0.0425	<0.015	0.063
Pyrene	mg/kg	0.2	0.11	0.15	0.028	0.3	<0.1	<0.015	0.0603	<0.015	0.0947
PAH 16 Total	mg/kg	1.7	1.1	1.1	0.21	<2	<2	<0.118	0.573	<0.118	0.851
BTEX											
Methyl Tertiary Butyl Ether	ug/kg	<11	<11	<11	<11			<5		<5	<5
Benzene	ug/kg	<9	<9	<9	<9			<10		<10	<10
Toluene	ug/kg	<5	<5	<5	<5			<2		<2	<2
Ethylbenzene	ug/kg	<4	<4	<4	<4			<3		<3	<3
m and p-Xylene	ug/kg	<14	<14	<14	<14			<6		<6	<6
o-Xylene	ug/kg	<10	<10	<10	<10			<3		<3	<3
VOCs											
1,1,1,2-Tetrachloroethane	ug/kg					<10	<10			<10	
1,1,2,2-Tetrachloroethane	ug/kg					<2	<2			<10	
1,1,1-Trichloroethane	ug/kg					<1	<1			<7	
1,1,2-Trichloroethane	ug/kg					<1	<1			<10	
1,1-Dichloroethane	ug/kg					<1	<1			<8	
1,1-Dichloroethene	ug/kg					<1	<1			<10	
1,1-Dichloropropene	ug/kg					<1	<1			<10	
1,2,3-Trichlorobenzene	ug/kg					<2	<2			<20	
1,2,3-Trichloropropane	ug/kg					<50	<50			<16	
1,2,4-Trichlorobenzene	ug/kg					<1	<1			<20	
1,2,4-Trimethylbenzene	ug/kg					<1	<1			<9	
1,2-Dibromo-3-Chloropropane	ug/kg					<50	<50			<14	
1,2-Dibromoethane	ug/kg					<5	<5			<10	
1,2-Dichlorobenzene	ug/kg					<1	<1			<10	
1,2-Dichloroethane	ug/kg					<2	<2			<5	
1,2-Dichloropropane	ug/kg					<1	<1			<10	
1,3,5-Trimethylbenzene	ug/kg					<1	<1			<8	
1,3-Dichlorobenzene	ug/kg					<1	<1			<8	
1,3-Dichloropropane	ug/kg					<2	<2			<7	
1,4-Dichlorobenzene	ug/kg					<1	<1			<5	
2,2-Dichloropropane	ug/kg					<1	<1			<10	
2-Chlorotoluene	ug/kg					<1	<1			<9	
4-Chlorotoluene	ug/kg					<1	<1			<10	
4-Isopropyltoluene	ug/kg					<1	<1			<10	
Benzene	ug/kg					<1	<1			<9	
Bromobenzene	ug/kg					<1	<1			<10	
Bromochloromethane	ug/kg					<5	<5			<10	
Bromodichloromethane	ug/kg					<5	<5			<7	
Bromoform	ug/kg					<1	<1			<10	
Bromomethane	ug/kg					<20	<20			<10	
Carbon Disulphide	ug/kg					<1	<1			<7	
Carbontetrachloride	ug/kg					<1	<1			<10	
Chlorobenzene	ug/kg					<1	<1			<5	
Chloroethane	ug/kg					<2	<2			<10	
Chloroethene	ug/kg					<1	<1				
Chloroform	ug/kg					<1	<1			<8	
Chloromethane	ug/kg					<1	<1			<7	
cis-1,2-Dichloroethene	ug/kg					<1	<1			<6	
cis-1,3-Dichloropropene	ug/kg					<10	<10			<10	
Dibromochloromethane	ug/kg					<10	<10			<10	
Dibromomethane	ug/kg					<1	<1			<9	
Dichlorodifluoromethane	ug/kg					<1	<1			<6	
Dichloromethane	ug/kg					<1	<1			<10	
Ethylbenzene	ug/kg					<1	<1			<4	
Hexachlorobutadiene (HCBd)	ug/kg					<1	<1			<20	
Isopropylbenzene	ug/kg					<1	<1			<5	
m,p xylenes	ug/kg					<1	<1				
Methyl tert-butyl ether (MTBE)	ug/kg					<1	<1			<10	
Naphthalene	ug/kg					<1	<1			<13	
n-Butylbenzene	ug/kg					<1	<1			<11	
n-propylbenzene	ug/kg					<1	<1				
O-Xylene	ug/kg					<1	<1			<10	
p/m-Xylene	ug/kg					<1	<1			<10	
Propylbenzene	ug/kg					<1	<1			<10	
Sec-Butylbenzene	ug/kg					<1	<1			<10	
Styrene	ug/kg					<1	<1			<10	
Tert-amyl methyl ether	ug/kg					<1	<1			<10	
Tert-Butylbenzene	ug/kg					<1	<1			<14	
Tetrachloroethene	ug/kg					<1	<1			<5	
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg					<1	<1				
Toluene	ug/kg					<1	<1			<7	
trans-1,2-Dichloroethene	ug/kg					<1	<1			<10	
trans-1,3-Dichloropropene	ug/kg					<10	<10			<10	
Tribromomethane	ug/kg					<1	<1				
Trichloroethene	ug/kg					<1	<1			<9	
Trichlorofluoromethane	ug/kg					<1	<1			<6	
Vinyl Chloride	ug/kg					<1	<1			<6	
SVOCs											
1,2,4-Trichlorobenzene	mg/kg					<50	<50			<0.1	
1,2-Dichlorobenzene	mg/kg					<50	<50			<0.1	
1,3-Dichlorobenzene	mg/kg					<50	<50			<0.1	
1,4-Dichlorobenzene	mg/kg					<50	<50			<0.1	
2,4,5-Trichlorophenol	mg/kg					<50	<50			<0.1	
2,4,6-Trichlorophenol	mg/kg					<50	<50			<0.1	
2,4-Dichlorophenol	mg/kg					<50	<50			<0.1	
2,4-Dimethylphenol	mg/kg					<50	<50			<0.1	
2,4-Dinitrotoluene	mg/kg					<50	<50			<0.1	
2,6-Dinitrotoluene	mg/kg					<50	<50			<0.1	

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Geological Formation Legend	
MG	Made Ground
RTD	River Terrace Deposits
TS	Topsoil

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
Offsite borehole location

Screening Values and Assessment	
	Exceeds S4ULs criteria
X	Laboratory detection level higher than screening criterion

Sample Reference	Units	STPN03	STPN03	STPN04	STPN04	TP522	TP522	WSM4CANA006	WSM4CANA007	WSM4CANA008	WSM4CANA009
Specimen Depth (m)		0.3	1	0.3	1	0.0 - 0.1	0.5 - 0.6	0.45	1.4 - 1.9	0.6 - 0.9	0.2
OD Level (m)		20.39	19.69	17.33	16.63	19.8 - 19.7	19.3 - 19.2	23.76	20.44	20.07	23.45
Sample Type		B	ES	D	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	MG	MG	MG	MG	RTD	MG	RTD	TS
Cluster Code		2007 GI	2007 GI	2007 GI	2007 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI	2016 GI
2-Chloronaphthalene	mg/kg					<50	<50			<0.1	
2-Chlorophenol	mg/kg					<50	<50			<0.1	
2-Methyl-4,6-Dinitrophenol	mg/kg					<50	<50				
2-Methylnaphthalene	mg/kg					<50	<50			<0.1	
2-Methylphenol	mg/kg					<50	<50			<0.1	
2-Nitroaniline	mg/kg					<50	<50			<0.1	
2-Nitrophenol	mg/kg					<50	<50			<0.1	
3-Nitroaniline	mg/kg					<50	<50			<0.1	
4-Bromophenyl Phenyl Ether	mg/kg					<50	<50			<0.1	
4-Chloro-3-Methylphenol	mg/kg					<50	<50			<0.1	
4-Chloroaniline	mg/kg					<50	<50			<0.1	
4-Chlorophenyl Phenyl Ether	mg/kg					<50	<50			<0.1	
4-Methylphenol	mg/kg					<50	<50			<0.1	
4-Nitroaniline	mg/kg					<50	<50			<0.1	
4-Nitrophenol	mg/kg					<50	<50			<0.1	
Acenaphthene	mg/kg					<50	<50			<0.1	
Acenaphthylene	mg/kg					<50	<50			<0.1	
Anthracene	mg/kg					<50	<50			<0.1	
Azobenzene	mg/kg					<50	<50			<0.1	
Benzo(a)anthracene	mg/kg					<50	<50			<0.1	
Benzo(a)pyrene	mg/kg					<50	<50			<0.1	
Benzo(b)fluoranthene	mg/kg					<50	<50			<0.1	
Benzo(g,h,i)perylene	mg/kg					<50	<50			<0.1	
Benzo(k)fluoranthene	mg/kg					<50	<50			<0.1	
Bis(2-chloroethoxy)methane	mg/kg					<50	<50			<0.1	
Bis(2-chloroethyl)ether	mg/kg					<50	<50			<0.1	
Bis(2-chloroisopropyl)ether	mg/kg					<50	<50				
Bis(2-ethylhexyl)phthalate	mg/kg					<50	<50			<0.1	
Butylbenzylphthalate	mg/kg					<50	<50			<0.1	
Carbazole	mg/kg					<50	<50			<0.1	
Cresols	mg/kg					<50	<50			<0.01	
Dibenzo(a,h)anthracene	mg/kg					<50	<50			<0.1	
Dibenzofuran	mg/kg					<50	<50			<0.1	
Diethylphthalate	mg/kg					<50	<50			<0.1	
Dimethylphthalate	mg/kg					<50	<50			<0.1	
Di-N-Butyl Phthalate	mg/kg					<50	<50				
Di-N-Octyl Phthalate	mg/kg					<50	<50				
Hexachlorobenzene (HCB)	mg/kg					<50	<50			<0.1	
Hexachlorobutadiene (HCBd)	mg/kg					<50	<50			<0.1	
Hexachlorocyclopentadiene	mg/kg					<50	<50			<0.1	
Hexachloroethane	mg/kg					<50	<50			<0.1	
Isophorone	mg/kg					<50	<50			<0.1	
n-Dibutyl phthalate	mg/kg					<50	<50			<0.1	
n-Dioctyl phthalate	mg/kg					<50	<50			<0.1	
Nitrobenzene	mg/kg					<50	<50			<0.1	
n-nitrosodimethylamine	mg/kg					<50	<50				
N-Nitroso-Di-N-Propylamine	mg/kg					<50	<50			<0.1	
Pentachlorophenol (PCP)	mg/kg					<50	<50			<0.1	
Phenanthrene	mg/kg					<50	<50			<0.1	
Phenol	mg/kg					<50	<50			<0.01	
Phenols, Total Detected monohydric	mg/kg					<50	<50			<0.035	
Xylenols	mg/kg					<50	<50			<0.015	

Appendix 4

Groundwater Laboratory Data

M4CAN
Groundwater Analysis Results & Screening Assessment
CL-33
08/07/2015

Notes

Offsite borehole location	
EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	

Geological Formation Legend

Avon Group	AG

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Monitoring Round	Units	Screening Criteria		1	2	3	1	2	6
Location		EQS	DWS	BH545	BH545	BH545	BH549	BH549	BH549
Location Type				BH			BH		
Response Zone (RZ) Details				AG	AG	AG	AG	AG	AG
Depth				6.75	7.16	7.34	9.37	11.51	10.18
Date Sampled				17/04/2015	24/04/2015	01/05/2015	17/04/2015	24/04/2015	01/05/2015
Metals									
Arsenic	ug/l	50	10	1	<1	3.4	<1	<1	1.6
Boron	ug/l	2000	1000	<20	43	160	<20	40	47
Cadmium	ug/l	0.15	5	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Chromium	ug/l		50	11	<1	2.5	6.1	<1	<1
Copper	ug/l	10	2000	<1	<1	1.6	<1	<1	<1
Lead	ug/l	1.2	10	<1	<1	<1	<1	<1	<1
Mercury	ug/l	0.07	1	0.55	<0.5	<0.5	0.51	<0.5	<0.5
Nickel	ug/l	4	20	<1	<1	7	2.1	1.4	1.8
Selenium	ug/l		10	1.6	2.2	3.6	1.3	<1	2.1
Zinc	ug/l	75		3.1	4.7	9.4	1.9	1.5	<1
Non-Metal Inorganics									
Total Alkalinity as CaCO3	mg/l			460	240	440	480	310	500
Chloride	mg/l	250	250	220	250	210	190	250	290
Ammoniacal Nitrogen as N	mg/l	0.6		0.023	0.047	0.032	0.028	0.046	0.056
Total Cyanide	mg/l	0.001	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
pH Value	pH units	6-9	6.5-10	7.5	8.3	8	7.5	8.3	7.9
Phenols									
Phenol	ug/l	7.7		<0.5		<0.5	<0.5	<0.5	<0.5
Phenols	mg/l	0.0077		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
BTEX									
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1
Ethyl benzene	ug/l	20		<1	<1	<1	<1	<1	<1
m & p Xylene	ug/l	30		<1	<1	<1	<1	<1	<1
o Xylene	ug/l	30		<1	<1	<1	<1	<1	<1
TPH									
Aliphatics C5-C6	ug/l			<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
Aliphatics >C8-C10	ug/l			<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
Aliphatics >C12-C16	ug/l			<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
Aliphatics >C21-C35	ug/l			<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
Aromatics >C5-C7	ug/l			<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
Aromatics >EC8-EC10	ug/l			<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
Aromatics >EC12-EC16	ug/l			<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
Aromatics >EC21-EC35	ug/l			<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
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			<10	<10	<10	<10	<10	<10
PAH									
Acenaphthene	ug/l			<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
Anthracene	ug/l	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	ug/l			<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
Benzo(b)fluoranthene	ug/l	0.017	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
Benzo(k)fluoranthene	ug/l	0.017	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
Dibenzo(ah)anthracene	ug/l			<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
Fluorene	ug/l			<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

M4CAN
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CL-33
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Notes

Offsite borehole location	
EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	

Geological Formation Legend

Avon Group	AG

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Monitoring Round	Units	Screening Criteria		1	2	3	1	2	6
Location		EQS	DWS	BH545	BH545	BH545	BH549	BH549	BH549
Location Type				BH			BH		
Response Zone (RZ) Details				AG	AG	AG	AG	AG	AG
Depth				6.75	7.16	7.34	9.37	11.51	10.18
Date Sampled				17/04/2015	24/04/2015	01/05/2015	17/04/2015	24/04/2015	01/05/2015
Naphthalene	ug/l	2		<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
Pyrene	ug/l			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAH 16 Total	ug/l			<2	<2	<2	<2	<2	<2
VOCs									
1,1,1,2-Tetrachloroethane	ug/l			<2		<2	<2	<2	<2
1,1,1-Trichloroethane	ug/l	100		<1		<1	<1	<1	<1
1,1,2-Trichloroethane	ug/l	400		<10		<10	<10	<10	<10
1,1-Dichloroethane	ug/l			<1		<1	<1	<1	<1
1,1-Dichloroethene	ug/l			<1		<1	<1	<1	<1
1,1-Dichloropropene	ug/l			<1		<1	<1	<1	<1
1,2,3-Trichlorobenzene	ug/l	0.4		<2		<2	<2	<2	<2
1,2,3-Trichloropropane	ug/l			<50		<50	<50	<50	<50
1,2,4-Trichlorobenzene	ug/l	0.4		<1		<1	<1	<1	<1
1,2,4-Trimethylbenzene	ug/l			<1		<1	<1	<1	<1
1,2-Dibromo-3-Chloropropane	ug/l			<50		<50	<50	<50	<50
1,2-Dibromoethane	ug/l			<5		<5	<5	<5	<5
1,2-Dichlorobenzene	ug/l	20		<1		<1	<1	<1	<1
1,2-Dichloroethane	ug/l	10	3	<2		<2	<2	<2	<2
1,2-Dichloropropane	ug/l			<1		<1	<1	<1	<1
1,3,5-Trimethylbenzene	ug/l			<1		<1	<1	<1	<1
1,3-Dichloropropane	ug/l			<2		<2	<2	<2	<2
1,4-Dichlorobenzene	ug/l	20		<1		<1	<1	<1	<1
2-Chlorotoluene	ug/l			<1		<1	<1	<1	<1
4-Chlorotoluene	ug/l			<1		<1	<1	<1	<1
4-Isopropyltoluene	ug/l			<1		<1	<1	<1	<1
Benzene	ug/l	10	1	<1	<1	<1	<1	<1	<1
Bromobenzene	ug/l			<1		<1	<1	<1	<1
Bromochloromethane	ug/l		100	<5		<5	<5	<5	<5
Bromodichloromethane	ug/l			<5		<5	<5	<5	<5
Bromomethane	ug/l			<5		<5	<5	<5	<5
Chlorobenzene	ug/l			<1		<1	<1	<1	<1
Chloroethane	ug/l			<1		<1	<1	<1	<1
Chloroethene	ug/l			<1		<1	<1	<1	<1
Chloroform	ug/l	2.5	100	<1		<1	<1	<1	<1
Chloromethane	ug/l			<1		<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/l			<1		<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/l			<10		<10	<10	<10	<10
Dibromochloromethane	ug/l		100	<10		<10	<10	<10	<10
Dibromomethane	ug/l			<10		<10	<10	<10	<10
Dichlorodifluoromethane	ug/l			<1		<1	<1	<1	<1
Ethylbenzene	ug/l	20		<1	<1	<1	<1	<1	<1
Hexachlorobutadiene (HCBD)	ug/l	0.6		<1		<1	<1	<1	<1
Isopropylbenzene	ug/l			<1		<1	<1	<1	<1
m,p xylenes	ug/l	30		<1	<1	<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	ug/l			<1		<1	<1	<1	<1
n-Butylbenzene	ug/l			<1		<1	<1	<1	<1
n-propylbenzene	ug/l			<1		<1	<1	<1	<1
O-Xylene	ug/l	30		<1	<1	<1	<1	<1	<1
Sec-Butylbenzene	ug/l			<1		<1	<1	<1	<1
Styrene	ug/l	50		<1		<1	<1	<1	<1
Tert-Butylbenzene	ug/l			<1		<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10	<1		<1	<1	<1	<1
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3	<1		<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/l			<1		<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/l			<10		<10	<10	<10	<10
Tribromomethane	ug/l		100	<1		<1	<1	<1	<1
Trichloroethene	ug/l	10	10	<1		<1	<1	<1	<1
Trichlorofluoromethane	ug/l			<1		<1	<1	<1	<1
SVOCs									

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Notes

Offsite borehole location	
EQS calcium carbonate 100 - 150mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	

Geological Formation Legend

Avon Group	AG

Screening Values & Assessment

EQS	Environmental Quality Standards
DWS	Drinking Water Standard
	Exceeds EQS
X	Exceeds DWS
X	Laboratory detection level higher than screening criterion

Monitoring Round	Units	Screening Criteria		1	2	3	1	2	6
Location		EQS	DWS	BH545	BH545	BH545	BH549	BH549	BH549
Location Type				BH			BH		
Response Zone (RZ) Details				AG	AG	AG	AG	AG	AG
Depth				6.75	7.16	7.34	9.37	11.51	10.18
Date Sampled				17/04/2015	24/04/2015	01/05/2015	17/04/2015	24/04/2015	01/05/2015
1,3-Dichlorobenzene	ug/l	20		<0.5		<0.5	<0.5	<0.5	<0.5
2,4,5-Trichlorophenol	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
2,4,6-Trichlorophenol	ug/l			<0.5		<0.5	<0.5	<0.5	0.64
2,4-Dichlorophenol	ug/l	20		<0.5		<0.5	<0.5	<0.5	0.68
2,4-Dimethylphenol	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
2,4-Dinitrotoluene	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
2,6-Dinitrotoluene	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
2-Chloronaphthalene	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
2-Chlorophenol	ug/l	50		<0.5		<0.5	<0.5	<0.5	<0.5
2-Methyl-4,6-Dinitrophenol	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
2-Methylnaphthalene	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
2-Methylphenol	ug/l	100		<0.5		<0.5	<0.5	<0.5	<0.5
2-Nitroaniline	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
2-Nitrophenol	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
3-Nitroaniline	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
4-Bromophenyl Phenyl Ether	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
4-Chloro-3-Methylphenol	ug/l	40		<0.5		<0.5	<0.5	<0.5	<0.5
4-Chloroaniline	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
4-Chlorophenyl Phenyl Ether	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
4-Methylphenol	ug/l	100		<0.5		<0.5	<0.5	<0.5	<0.5
4-Nitroaniline	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Azobenzene	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethoxy)methane	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Bis(2-chloroethyl)ether	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Bis(2-chloroisopropyl)ether	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Bis(2-ethylhexyl)phthalate	ug/l	1.3		<0.5		<0.5	<0.5	<0.5	<0.5
Butylbenzylphthalate	ug/l	20		<0.5		<0.5	<0.5	<0.5	<0.5
Carbazole	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Dibenzofuran	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Diethylphthalate	ug/l	200		<0.5		<0.5	<0.5	<0.5	<0.5
Dimethylphthalate	ug/l	800		<0.5		<0.5	<0.5	<0.5	<0.5
Di-N-Butyl Phthalate	ug/l	8		<0.5		<0.5	<0.5	<0.5	<0.5
Di-N-Octyl Phthalate	ug/l	20		<0.5		<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene (HCB)	ug/l	0.05		<0.5		<0.5	<0.5	<0.5	<0.5
Hexachlorocyclopentadiene	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Hexachloroethane	ug/l			<0.5		0.98	<0.5	<0.5	<0.5
Isophorone	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Nitrobenzene	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
n-nitrosodimethylamine	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
N-Nitroso-Di-N-Propylamine	ug/l			<0.5		<0.5	<0.5	<0.5	<0.5
Pentachlorophenol (PCP)	ug/l	0.4		<0.5		<0.5	<0.5	<0.5	<0.5
Phenol	ug/l	7.7		<0.5		<0.5	<0.5	<0.5	<0.5
PCBs									
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l	0	0	<0.1	<0.1	<0.1			
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l	0	0	<0.1	<0.1	<0.1			
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l	0	0	<0.1	<0.1	<0.1			
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l	0	0	<0.1	<0.1	<0.1			
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l	0	0	<0.1	<0.1	<0.1			
Pcb-28 2,4,4' - Trichlororbiphenyl	ug/l	0	0	<0.1	<0.1	<0.1			
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l	0	0	<0.1	<0.1	<0.1			

Appendix 5

Soil Leachate Laboratory Data

M4CAN
Leachate Analysis Results & Screening Assessment
CL-33
06/05/2016

Geological Formation Legend

MG Made Ground

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		STPN03	STPN04	TP522	WSM4CANA007
Specimen Depth		EQS	DWS	0.3	0.3	0.5 - 0.6	1.4-1.9
Level				20.39	17.33	19.3 - 19.2	
Sample Type				D	B	ES	ES
Geology Code				MG	MG	MG	MG
Cluster Code				2007 GI	2007 GI	2015 GI	2016 GI
2:1 Leachate Results							
Arsenic Dissolved	ug/l	50	10	2	<1	<1	27.2
Boron Dissolved	ug/l	2000	1000	50	150	<20	
Barium Dissolved	ug/l			24	18		
Cadmium Dissolved	ug/l	0.15	5	<0.4	<0.4	<0.08	<0.1
Chromium Dissolved	ug/l		50	2	4	<1	2.68
Copper Dissolved	ug/l	10	2000	3	3	<1	6.67
Mercury Dissolved	ug/l	0.07	1			<0.5	<0.01
Molybdenum Dissolved	ug/l			2	<1		
Nickel Dissolved	ug/l	4	20	2	2	<1	1.61
Lead Dissolved	ug/l	1.2	10	6	<1	<1	2.02
Antimony Dissolved	ug/l		5	<5	<5		
Selenium Dissolved	ug/l		10	<1	<1	<1	1.45
Vanadium Dissolved	ug/l						15.5
Zinc Dissolved	ug/l	75		<3	<3	1.4	4.03
Total Cyanide	mg/l	0.001	0.05	<0.05	<0.05	<0.05	
Conductivity	us/cm						122
pH	pH units	6-9	6.5-10			8.5	7.92
PAH							
Acenaphthene	ug/l					<0.1	<0.015
Acenaphthylene	ug/l					<0.1	<0.011
Anthracene	ug/l	0.1				<0.1	<0.015
Benzo(a)anthracene	ug/l					<0.1	<0.017
Benzo(a)pyrene	ug/l	0.00017	0.01			<0.1	0.0162
Benzo(b)fluoranthene	ug/l	0.017	0.1			<0.1	0.0303
Benzo(ghi)perylene	ug/l	0.0082	0.1			<0.1	0.0237
Benzo(k)fluoranthene	ug/l	0.017	0.1			<0.1	<0.027
Chrysene	ug/l					<0.1	0.0188
Dibenzo(ah)anthracene	ug/l					<0.1	<0.016
Fluoranthene	ug/l	0.0063				<0.1	0.035
Fluorene	ug/l					<0.1	<0.014
Indeno(123cd)pyrene	ug/l	N/A	0.1			<0.1	<0.014
Naphthalene	ug/l	2				<0.1	<0.1
Phenanthrene	ug/l					<0.1	0.0269
Pyrene	ug/l					<0.1	0.0303
PAH 16 Total	ug/l					<2	<0.344
TPH							
Aliphatic TPH >C5-C6	ug/l					<0.1	
Aliphatic TPH >C6-C8	ug/l					<0.1	
Aliphatic TPH >C8-C10	ug/l					<0.1	
Aliphatic TPH >C10-C12	ug/l					<0.1	
Aliphatic TPH >C12-C16	ug/l					<0.1	
Aliphatic TPH >C16-C21	ug/l					<0.1	
Aliphatic TPH >C21-C35	ug/l					<0.1	
Aliphatic TPH >C35-C44	ug/l					<0.1	
Total Aliphatic Hydrocarbons	ug/l					<5	
Aromatic TPH >C5-C7	ug/l					<0.1	
Aromatic TPH >C7-C8	ug/l					<0.1	
Aromatic TPH >C8-C10	ug/l					<0.1	
Aromatic TPH >C10-C12	ug/l					<0.1	
Aromatic TPH >C12-C16	ug/l					<0.1	
Aromatic TPH >C16-C21	ug/l					<0.1	

M4CAN
Leachate Analysis Results & Screening Assessment
CL-33
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Geological Formation Legend	
MG	Made Ground

Screening Values & Assessment

Environmental Quality Standards	EQS
Drinking Water Standard	DWS
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Notes

EQS calcium carbonate 100 - 150mg/l for heavy metals: chromium, copper, lead, nickel and zinc

Sample Reference	Units	Screening Criteria		STPN03	STPN04	TP522	WSM4CANA007
Specimen Depth		EQS	DWS	0.3	0.3	0.5 - 0.6	1.4-1.9
Level				20.39	17.33	19.3 - 19.2	
Sample Type				D	B	ES	ES
Geology Code				MG	MG	MG	MG
Cluster Code				2007 GI	2007 GI	2015 GI	2016 GI
Aromatic TPH >C21-C35	ug/l					<0.1	
Aromatic TPH >C35-C44	ug/l					<0.1	
Total Aromatic Hydrocarbons	ug/l					<5	
Total Petroleum Hydrocarbons	ug/l					<10	

WAC

Location	Units	STPN03	STPN04
Depth		0.3	0.3
Antimony Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0	0
Arsenic Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0.02	0
Barium Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0.05	0.14
Boron Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0	0.4
Cadmium Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0	0
Chromium Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0	0
Copper Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0	0.23
Lead Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0	0.02
Molybdenum Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0.02	0
Nickel Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0.02	0.02
Selenium Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0.03	0
Total Cyanide (CEN 10:1C)	mg/kg	0	0
Zinc Dissolved (CEN 10:1C) (ICP-MS)	mg/kg	0	0.22

Appendix 6

Site Walkover Photographs



Plate 01: CL33 ĩ View Looking West Across Site. June 2015



Plate 02: CL33 ĩ View Looking North Across Site. June 2015

Client: Welsh Government

Project: M4CaN

Job Ref: JER6591 Checked By:

Date: June 2015

Appendix 7

Relevant Extract of Additional Environmental Data

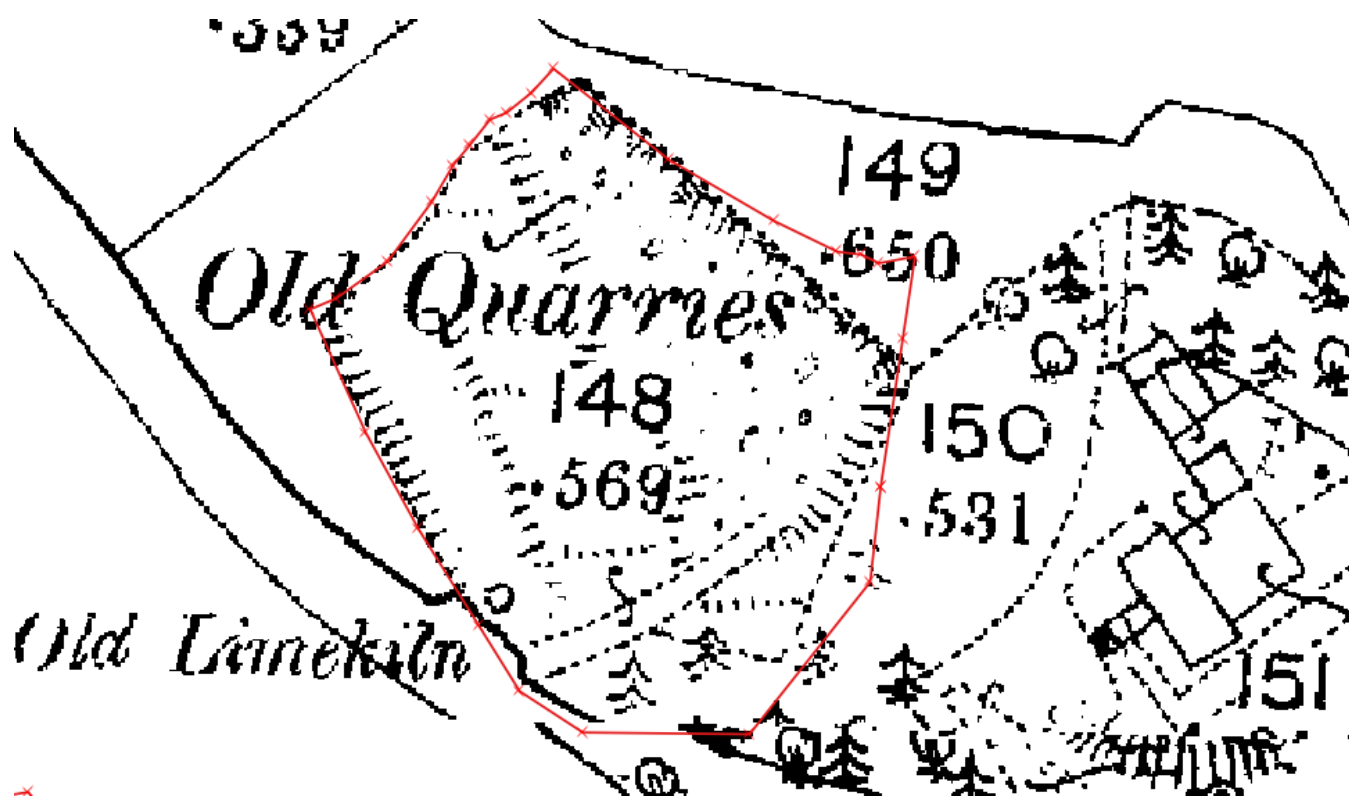


Plate 01: Extract of 1843 – 1893 historical map showing the Old Quarry on the Site.



Plate 02: Extract of 1981 infra red image highlighting broken ground on the Site.

Client: Welsh Government

Project: M4CaN

Job Ref: JER6591 Checked By:

Date: Oct 2015



Plate 03: Extract of 2014 High Resolution Aerial Photograph.

Plate 04:

Annex D26

Data Set Outside Individual Land Contamination Assessment Reports

M4CAN Soil Analysis Results & Screening Assessment Alignment outside of CL sites - chainage 0 to +6,600 10/08/2016

Sample Reference	Units
Specimen Depth (m)	
OD Level (m)	
Sample Type	
Geology Code	
Cluster Code	
Inorganics	
Antimony	mg/kg
Arsenic	mg/kg
Barium	mg/kg
Beryllium	mg/kg
Boron	mg/kg
Boron Water Soluble	mg/kg
Cadmium	mg/kg
Chromium	mg/kg
Copper	mg/kg
Iron	mg/kg
Lead	mg/kg
Mercury	mg/kg
Molybdenum	mg/kg
Nickel	mg/kg
Selenium	mg/kg
Vanadium	mg/kg
Zinc	mg/kg
Cyanide (total)	mg/kg
Cyanide (free)	mg/kg
Ammoniacal Nitrogen as N	mg/kg
Other	
Asbestos Presence Screen	None
Asbestos Identification	%
Loss on Ignition	%
Total Organic Carbon	%
pH Value	pH Units
Material >2mm	%
Sulphate (soluble)	g/l
Calorific Value	MJ/kg
Organics	
PCBs (vs Aroclor 1254)	mg/kg
Phenols Monohydric	mg/kg
Phenol	mg/kg
Cresols	mg/kg
Xylenols	mg/kg
Phenols (total)	mg/kg
BTEX	
GRO (C4-C12)	mg/kg
MTBE	mg/kg
Benzene	mg/kg
Toluene	mg/kg
Ethyl benzene	mg/kg
m & p Xylene	mg/kg
o Xylene	mg/kg
Sum of BTEX	mg/kg
Sum of Xylenes	mg/kg
TPH	
TPH >C6-C8.	mg/kg
TPH >C8-C10.	mg/kg
TPH >C10-C12.	mg/kg
TPH >C12-C16.	mg/kg
TPH >C16-C21.	mg/kg
TPH >C21-C35.	mg/kg
Aliphatics C5-C6	mg/kg
Aliphatics >C6-C8	mg/kg
Aliphatics >C8-C10	mg/kg
Aliphatics >C10-C12	mg/kg
Aliphatics >C12-C16	mg/kg
Aliphatics >C16-C21	mg/kg
Aliphatics >C21-C35	mg/kg
Total Aliphatics C5-C35	mg/kg
Aliphatics >C35-44	mg/kg
Aromatics >C5-C7	mg/kg
Aromatics C6-C7	mg/kg
Aromatics >C7-C8	mg/kg
Aromatics >EC8-EC10	mg/kg
Aromatics >EC10-EC12	mg/kg
Aromatics >EC12-EC16	mg/kg
Aromatics >EC16-EC21	mg/kg
Aromatics >EC21-EC35	mg/kg
Total Aromatics C6-C35	mg/kg
Aromatics >C35-44	mg/kg
Aromatics >C40-44	mg/kg
Total Aliphatic TPH	mg/kg
Total Aromatic TPH	mg/kg
TPH (Aliphatics and Aromatics C5-C35)	mg/kg
Total petroleum hydrocarbons	ug/kg
PAH	
Acenaphthene	mg/kg
Acenaphthylene	mg/kg
Anthracene	mg/kg
Benz(a)anthracene	mg/kg
Benzo(a)pyrene	mg/kg

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
0	0	None > LOD	None > LOD			
46	43	200	1.1	BH304 @ 48.85mbGL	170	1
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD		12	0
44	18	4.5	0.49	BH308 @ 68.15mbGL	46000	0
0	0	None > LOD	None > LOD			
46	33	81	0.11	BH318 @ 17.45mbGL	190	0
46	46	720	7.1	BH304 @ 48.85mbGL	33	27
46	46	76	3.1	BH304 @ 47.85mbGL	44000	0
0	0	None > LOD	None > LOD			
46	46	980	6.7	BH302 @ 50.7mbGL	1300	0
46	14	0.57	0.11	BH318 @ 17.45mbGL	30	0
0	0	None > LOD	None > LOD			
46	46	650	3.9	BH304 @ 48.85mbGL	980	0
46	13	1.34	0.26	BHM4CAN005 @ 39.63 - 39.43mbGL	1800	0
2	2	36	29.3	BHM4CAN005 @ 39.03 - 38.63mbGL	5000	0
46	45	3100	35	BH318 @ 17.45mbGL	170000	0
44	0	None > LOD	None > LOD			
45	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
19	0	None > LOD	None > LOD			
19	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
11	11	4.4	0	BH310 @ 56.4mbGL		
45	45	12	6.5	BH304 @ 48.85mbGL	6-9	0
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD		0.24	0
1	0	None > LOD	None > LOD		440	0
1	0	None > LOD	None > LOD		440	0
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
13	0	None > LOD	None > LOD		440	0
3	1	0.0955	0.0955	BHM4CAN005 @ 39.63 - 39.43mbGL		
3	0	None > LOD	None > LOD			
15	0	None > LOD	None > LOD		27	0
15	1	0.0113	0.0113	BHM4CAN005 @ 39.03 - 38.63mbGL	56000	0
15	0	None > LOD	None > LOD		5700	0
15	0	None > LOD	None > LOD		5900	0
15	0	None > LOD	None > LOD		6600	0
3	0	None > LOD	None > LOD			
3	0	None > LOD	None > LOD			
15	0	None > LOD	None > LOD		7800	0
15	0	None > LOD	None > LOD		2000	0
15	0	None > LOD	None > LOD		9200	0
15	0	None > LOD	None > LOD		10000	0
15	0	None > LOD	None > LOD		7600	0
15	1	43	43	BH318 @ 18.05mbGL	7800	0
15	0	None > LOD	None > LOD		3200	0
15	1	0.0189	0.0189	BHM4CAN005 @ 39.63 - 39.43mbGL	7800	0
15	1	0.0178	0.0178	BHM4CAN005 @ 39.63 - 39.43mbGL	2000	0
15	1	0.0178	0.0178	BHM4CAN005 @ 39.63 - 39.43mbGL	9700	0
15	2	3.8	0.669	BHM4CAN005 @ 39.63 - 39.43mbGL	25000	0
15	3	22.8	1.07	BHM4CAN005 @ 39.63 - 39.43mbGL	450000	0
15	3	553	1.73	BHM4CAN005 @ 39.63 - 39.43mbGL	450000	0
0	0	None > LOD	None > LOD		2000	0
15	2	519	32.5	BHM4CAN005 @ 39.63 - 39.43mbGL	450000	0
15	0	None > LOD	None > LOD		26000	0
0	0	None > LOD	None > LOD		7800	0
15	1	0.0113	0.0113	BHM4CAN005 @ 39.03 - 38.63mbGL	56000	0
15	1	0.0178	0.0178	BHM4CAN005 @ 39.63 - 39.43mbGL	3500	0
15	1	0.0122	0.0122	BHM4CAN005 @ 39.63 - 39.43mbGL	9200	0
15	1	3.41	3.41	BHM4CAN005 @ 39.63 - 39.43mbGL	10000	0
15	2	21.1	1.26	BHM4CAN005 @ 39.63 - 39.43mbGL	7600	0
15	2	891	82.6	BHM4CAN005 @ 39.63 - 39.43mbGL	7800	0
0	0	None > LOD	None > LOD		3500	0
15	2	1210	90.5	BHM4CAN005 @ 39.63 - 39.43mbGL	7800	0
3	2	559	42.8	BHM4CAN005 @ 39.63 - 39.43mbGL		
15	3	1100	3.88	BHM4CAN005 @ 39.63 - 39.43mbGL	2000	0
15	2	2120	174	BHM4CAN005 @ 39.63 - 39.43mbGL	3500	0
3	3	3220	38.9	BHM4CAN005 @ 39.63 - 39.43mbGL	2000	1
12	0	None > LOD	None > LOD		2000000	0
47	0	None > LOD	None > LOD		29000	0
47	0	None > LOD	None > LOD		29000	0
47	4	0.31	0.13	BH320 @ 13.55mbGL	150000	0
47	4	0.97	0.0762	BH316 @ 24.75mbGL		
47	5	1.3	0.0789	BHM4CAN005 @ 39.63 - 39.43mbGL	11	0

M4CAN
Soil Analysis Results & Screening Assessment
Alignment outside of CL sites - chainage 0 to +6,600
10/08/2016

Geological Formation Legend	
MG	Made Ground
MMG	Mercia Mudstone Group

Screening Values and Assessment

Exceeds S4ULs Criteria
Laboratory detection level higher than screening
criterion

Notes

NAD = No Asbestos Detected

Chromium VI criteria used

Elemental Mercury criteria used

Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	BH301	BH302	BH302	BH304	BH304	BH304	BH305	BH305	BH305	BH307	BH307	BH308	BH308	BH309	BH309	BH310	BH310	BH310	BH311	BH311	BH312	BH313	BH314	BH314	BH315	BH315		
Specimen Depth (m)		0.4 - 0.5	0.4 - 0.5	1 - 1.1	0.4 - 0.5	1 - 1.2	1.4 - 1.5	0.4 - 0.5	1 - 1.2	3.4 - 3.6	0.4 - 0.5	0.8 - 0.9	0 - 0.5	0.8 - 0.9	0.4 - 0.5	1 - 1.2	0.4 - 0.7	1 - 1.2	1.5 - 1.7	0.4 - 0.5	0.8 - 0.9	0.3	0.1 - 0.3	0.6 - 0.7	1 - 1.2	1	2.9		
OD Level (m)		51.95	51.3	50.7	48.85	48.25	47.85	48.65	48.05	45.65	53.25	52.85	68.15	67.35	66.7	66.1	56.4	55.8	55.3	74.75	74.35	74.85	79.7	61.6	61.2	61.2	59.3		
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	
Geology Code		MG	MG	MG	MG	CLAY	CLAY	MG	CLAY	CLAY	MG	MG	MG	SAND	MG	MG	MG	CLAY	CLAY	MG	MG	CLAY	GRAVEL	MG	MG	SILT	SILT		
Cluster Code		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	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI		
Inorganics																													
Antimony	mg/kg																												
Arsenic	mg/kg	17	48	39	200	10	5.8	30	3.1	2.4	32	5.8	27	8.5	11	5.9	43	3.4	4	48	36	3	2.6	33	32	2.2	1.5		
Barium	mg/kg																												
Beryllium	mg/kg																												
Boron	mg/kg	0.49	<0.4	<0.4	1.2	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	4.5	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	1	<0.4	<0.4	1	0.88	<0.4	<0.4		
Boron Water Soluble	mg/kg																												
Cadmium	mg/kg	0.36	0.58	4.4	1.2	0.43	<0.1	0.39	<0.1	<0.1	3.2	0.2	0.7	0.21	0.58	0.24	0.71	0.12	0.15	0.24	0.85	1.3	0.19	10	4.8	0.15	<0.1		
Chromium	mg/kg	9.7	45	27	720	58	37	11	45	39	16	38	16	39	37	44	7.1	27	32	15	21	44	58	8.8	16	48	58		
Copper	mg/kg	4.3	11	12	63	13	76	3.7	11	10	3.3	11	7.1	11	8.1	14	3.1	5.6	9.4	9.6	11	12	9.7	17	12	15	11		
Iron	mg/kg																												
Lead	mg/kg	14	37	980	26	18	6.7	58	10	8.9	110	15	44	24	21	31	25	13	20	10	46	20	13	130	95	29	23		
Mercury	mg/kg	<0.1	0.2	<0.1	0.45	0.15	<0.1	0.2	<0.1	<0.1	0.19	<0.1	<0.1	<0.1	<0.1	<0.1	0.18	<0.1	<0.1	<0.1	0.14	0.17	<0.1	0.23	0.17	0.13	<0.1		
Molybdenum	mg/kg																												
Nickel	mg/kg	3.9	11	12	650	44	44	6.3	59	52	6.8	51	14	33	32	61	6.4	39	45	8	19	45	57	7.5	10	44	68		
Selenium	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.44	0.6	<0.2	0.26	0.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		
Vanadium	mg/kg																												
Zinc	mg/kg	<0.5	37	130	140	48	41	73	68	59	200	68	64	82	86	97	60	51	63	35	95	77	140	510	220	81	83		
Cyanide (total)	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	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
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	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		
Ammoniacal Nitrogen as N	mg/kg																												
Other																													
Asbestos Presence Screen	None				NAD	NAD		NAD	NAD		NAD	NAD	NAD		NAD		NAD	NAD		NAD	NAD			NAD					
Asbestos Identification	%				<0.001	<0.001		<0.001	<0.001		<0.001	<0.001	<0.001		<0.001		<0.001	<0.001		<0.001	<0.001			<0.001					
Loss on Ignition	%																												
Total Organic Carbon	%				2.1								3		0.58		4.4						3.9						
pH Value	pH Units	9.1	9.5	9.5	12	10.3	8.9	9.7	9.1	8.8	9.7	8.8	9.2	8.1	10.7	9.4	9.3	8.5	8	10.1	9.6	7.1	7.8	9.6	9.6	7	7.4		
Material >2mm	%																												
Sulphate (soluble)	g/l																												
Calorific Value	MJ/kg																												
Organics																													
PCBs (vs Aroclor 1254)	mg/kg																												
Phenols Monohydric	mg/kg																												
Phenol	mg/kg																												
Cresols	mg/kg																												
Xylenols	mg/kg																												
Phenols (total)	mg/kg				<0.3			<0.3			<0.3	<0.3	<0.3				<0.3	<0.3	<0.3				<0.3	<0.3					
BTEX																													
GRO (C4-C12)	mg/kg																												
MTBE	mg/kg																												
Benzene	mg/kg				<0.001						<0.001	<0.001		<0.001	<0.001		<0.001	<0.001					<0.001	<0.001					
Toluene	mg/kg				<0.001						<0.001	<0.001		<0.001	<0.001		<0.001	<0.001					<0.001	<0.001					
Ethyl benzene	mg/kg				<0.001						<0.001	<0.001		<0.001	<0.001		<0.001	<0.001					<0.001	<0.001					
m & p Xylene	mg/kg				<0.001						<0.001	<0.001		<0.001	<0.001		<0.001	<0.001					<0.001	<0.001					
o Xylene	mg/kg				<0.001						<0.001	<0.001		<0.001	<0.001		<0.001	<0.001					<0.001	<0.001					
Sum of BTEX	mg/kg																												
Sum of Xylenes	mg/kg																												
TPH																													

M4CAN
Soil Analysis Results & Screening Assessment
Alignment outside of CL sites - chainage 0 to +6,600
10/08/2016

Exceeds S4ULs Criteria

X

NAD =

Table 1

Screening criterion for lead is C4

screening criterion for lead is 5152 in the absence of a 5152

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

[illegible]

M4CAN
Soil Analysis Results & Screening Assessment
Alignment outside of CL sites - chainage 0 to +6,600
10/08/2016

Screening Values and Assessment

Exceeds S4ULs Criteria Laboratory detection level higher than screening criterion	X

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used

Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	Units	BH316	BH316	BH317	BH318	BH318	BH318	BH319	BH320	BH321	BH322	BH327	BH401	BH401	BH402	BH403	TP312	TP312	TP318	BHM4CAN005	BHM4CAN005	BHM4CAN005
Specimen Depth (m)		0.7 - 0.8	1.5 - 1.6	0 - 0.3	0.4 - 0.5	1 - 1.2	1.5 - 1.6	0.5 - 1	0 - 0.5	0.5 - 0.7	0.7 - 1	0.4 - 0.5	0 - 0.4	1.3 - 1.4	0.7 - 0.8	1 - 1.2	1	2.7	1	0 - 0.2	0.6 - 1	2.5 - 2.6
OD Level (m)		24.75	23.95	25.45	18.05	17.45	16.95	17.95	13.55	15.4	10.25	5.4	5.95	4.65	5.2	4.9	10.85	9.15	5.85	39.63 - 39.43	39.03 - 38.63	37.13 - 37.03
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	CLAY	MG	MG	MG	SILT	GRAVEL	CLAY	GRAVEL	CLAY	CLAY	CLAY	CLAY	CLAY	CLAY	GRAVEL	CLAY	MG	MG	MMG
Cluster Code		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	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI
TPH >C6-C8.	mg/kg		<1		<1					<1			<1		<1		<1	<1				
TPH >C8-C10.	mg/kg		<1		<1					<1			<1		<1		<1	<1				
TPH >C10-C12.	mg/kg		<1		<1					<1			<1		<1		<1	<1				
TPH >C12-C16.	mg/kg		<1		<1					<1			<1		<1		<1	<1				
TPH >C16-C21.	mg/kg		<1		<1					<1			<1		<1		<1	<1				
TPH >C21-C35.	mg/kg		<1		43					<1			<1		<1		<1	<1				
Aliphatics C5-C6	mg/kg	<0.1				<0.1	<0.1													<0.01	<0.01	<0.01
Aliphatics >C6-C8	mg/kg	<0.1				<0.1	<0.1													0.0189	<0.01	<0.01
Aliphatics >C8-C10	mg/kg	<0.1				<0.1	<0.1													0.0178	<0.01	<0.01
Aliphatics >C10-C12	mg/kg	<1				<1	<1													0.0178	<0.01	<0.01
Aliphatics >C12-C16	mg/kg	<1				<1	<1													3.8	<0.01	0.669
Aliphatics >C16-C21	mg/kg	<1				<1	<1													22.8	1.07	1.48
Aliphatics >C21-C35	mg/kg	<1				<1	<1													553	36	1.73
Total Aliphatics C5-C35	mg/kg																					
Aliphatics >C35-44	mg/kg	<1				<1	<1													519	32.5	<0.01
Aromatics >C5-C7	mg/kg	<0.1				<0.1	<0.1													<0.01	<0.01	<0.01
Aromatics C6-C7	mg/kg																					
Aromatics >C7-C8	mg/kg	<0.1				<0.1	<0.1													<0.01	0.0113	<0.01
Aromatics >EC8-EC10	mg/kg	<0.1				<0.1	<0.1													0.0178	<0.01	<0.01
Aromatics >EC10-EC12	mg/kg	<1				<1	<1													0.0122	<0.01	<0.01
Aromatics >EC12-EC16	mg/kg	<1				<1	<1													3.41	<0.01	<0.01
Aromatics >EC16-EC21	mg/kg	<1				<1	<1													21.1	1.26	<0.01
Aromatics >EC21-EC35	mg/kg	<1				<1	<1													891	82.6	<0.01
Total Aromatics C6-C35	mg/kg																					
Aromatics >C35-44	mg/kg	<1				<1	<1													1210	90.5	<0.01
Aromatics >C40-44	mg/kg																			559	42.8	<0.01
Total Aliphatic TPH	mg/kg	<5				<5	<5													1100	69.5	3.88
Total Aromatic TPH	mg/kg	<5				<5	<5													2120	174	<0.01
TPH (Aliphatics and Aromatics C5-C35)	mg/kg																			3220	244	38.9
Total petroleum hydrocarbons	ug/kg	<10				<10	<10															
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	<0.1	<0.1	<0.1	<0.08	<0.008	<0.008
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	<0.1	<0.1	<0.1	<0.12	<0.012	<0.012
Anthracene	mg/kg	0.13	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.31	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.254	<0.016	<0.016
Benz(a)anthracene	mg/kg	0.97	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.59	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.79	0.0762	<0.014
Benzo(a)pyrene	mg/kg	0.34	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.63	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.3	0.0789	<0.015
Benzo(b)fluoranthene	mg/kg	0.26	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.56	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.46	0.118	<0.015
Benzo(ghi)perylene	mg/kg	0.29	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.79	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.37	0.0749	<0.024
Benzo(k)fluoranthene	mg/kg	0.28	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.14	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.794	0.0337	<0.014
Chrysene	mg/kg	0.46	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.77	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.867	0.063	<0.01
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	<0.1	<0.1	<0.1	0.539	<0.023	<0.023
Fluoranthene	mg/kg	0.74	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.881	0.0904	<0.017
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	<0.1	<0.1	<0.1	<0.1	<0.01	<0.01
Indeno(123cd)pyrene	mg/kg	0.65	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.51	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.986	0.0545	<0.018
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	<0.1	<0.1	<0.1	<0.09	<0.009	<0.009
Phenanthrene	mg/kg	0.79	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.415	0.0418	<0.015
Pyrene	mg/kg	0.81	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2	<0.1	<0.1	0.784	0.0743	<0.015
PAH 16 Total	mg/kg	5.7	<2	<2	<2	<2	<2	<2	8.6	<2	<2	<2	<2	<2	<2	<2	2	<2	<2	10.5	0.705	<0.118
VOCs																						
1,1,1,2-Tetrachloroethane	ug/kg																			<100	<100	

M4CAN
Soil Analysis Results & Screening Assessment
Alignment outside of CL sites - chainage 0 to +6,600
10/08/2016

Screening Values and Assessment

Exceeds S4ULs Criteria Laboratory detection level higher than screening criterion	X

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used

Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	Units	BH316	BH316	BH317	BH318	BH318	BH318	BH319	BH320	BH321	BH322	BH327	BH401	BH401	BH402	BH403	TP312	TP312	TP318	BHM4CAN005	BHM4CAN005	BHM4CAN005
Specimen Depth (m)		0.7 - 0.8	1.5 - 1.6	0 - 0.3	0.4 - 0.5	1 - 1.2	1.5 - 1.6	0.5 - 1	0 - 0.5	0.5 - 0.7	0.7 - 1	0.4 - 0.5	0 - 0.4	1.3 - 1.4	0.7 - 0.8	1 - 1.2	1	2.7	1	0 - 0.2	0.6 - 1	2.5 - 2.6
OD Level (m)		24.75	23.95	25.45	18.05	17.45	16.95	17.95	13.55	15.4	10.25	5.4	5.95	4.65	5.2	4.9	10.85	9.15	5.85	39.63 - 39.43	39.03 - 38.63	37.13 - 37.03
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	CLAY	MG	MG	MG	SILT	GRAVEL	CLAY	GRAVEL	CLAY	CLAY	CLAY	CLAY	CLAY	CLAY	GRAVEL	CLAY	MG	MG	MMG
Cluster Code		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	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI
1,1,2,2-Tetrachloroethane	ug/kg																			<100	<100	
1,1,1-Trichloroethane	ug/kg																			<70	<70	
1,1,2-Trichloroethane	ug/kg																			<100	<100	
1,1-Dichloroethane	ug/kg																			<100	<100	
1,1-Dichloroethene	ug/kg																			<80	<80	
1,1-Dichloropropene	ug/kg																			<100	<100	
1,2,3-Trichlorobenzene	ug/kg																			<200	<200	
1,2,3-Trichloropropane	ug/kg																			<160	<160	
1,2,4-Trichlorobenzene	ug/kg																			<200	<200	
1,2,4-Trimethylbenzene	ug/kg																			<90	<90	
1,2-Dibromo-3-Chloropropane	ug/kg																			<140	<140	
1,2-Dibromoethane	ug/kg																			<100	<100	
1,2-Dichlorobenzene	ug/kg																			<100	<100	
1,2-Dichloroethane	ug/kg																			<50	<50	
1,2-Dichloropropane	ug/kg																			<100	<100	
1,3,5-Trimethylbenzene	ug/kg																			<80	<80	
1,3-Dichlorobenzene	ug/kg																			<80	<80	
1,3-Dichloropropane	ug/kg																			<70	<70	
1,4-Dichlorobenzene	ug/kg																			<50	<50	
2,2-Dichloropropane	ug/kg																			<100	<100	
2-Chlorotoluene	ug/kg																			<90	<90	
4-Chlorotoluene	ug/kg																			<100	<100	
4-Isopropyltoluene	ug/kg																			<100	<100	
Bromobenzene	ug/kg																			<100	<100	
Bromochloromethane	ug/kg																			<100	<100	
Bromodichloromethane	ug/kg																			<70	<70	
Bromoform	ug/kg																			<100	<100	
Bromomethane	ug/kg																			<100	<100	
Carbon Disulphide	ug/kg																			<70	<70	
Chlorobenzene	ug/kg																			<50	<50	
Chloroethane	ug/kg																			<100	<100	
Chloroethene	ug/kg																					
Chloroform	ug/kg																			<80	<80	
Chloromethane	ug/kg																			<70	<70	
cis-1,2-Dichloroethene	ug/kg																			<60	<60	
cis-1,3-Dichloropropene	ug/kg																			<100	<100	
Dibromochloromethane	ug/kg																			<100	<100	
Dibromomethane	ug/kg																			<90	<90	
Dichlorodifluoromethane	ug/kg																			<60	<60	
Dichloromethane	ug/kg																			<90	<90	
Hexachlorobutadiene (HCBD)	ug/kg																			<200	<200	
Isopropylbenzene	ug/kg																			<50	<50	
n-Butylbenzene	ug/kg																			<110	<110	
n-propylbenzene	ug/kg																			<100	<100	
Sec-Butylbenzene	ug/kg																			<100	<100	
Styrene	ug/kg																			<100	<100	
Tert-Butylbenzene	ug/kg																			<140	<140	
Tetrachloroethene	ug/kg																			<50	<50	
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg																			<100	<100	
trans-1,2-Dichloroethene	ug/kg																			<100	<100	

M4CAN
Soil Analysis Results & Screening Assessment
Alignment outside of CL sites - chainage 0 to +6,600
10/08/2016

Screening Values and Assessment

Exceeds S4ULs Criteria Laboratory detection level higher than screening criterion	X

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used

Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	Units	BH316	BH316	BH317	BH318	BH318	BH318	BH319	BH320	BH321	BH322	BH327	BH401	BH401	BH402	BH403	TP312	TP312	TP318	BHM4CAN005	BHM4CAN005	BHM4CAN005
Specimen Depth (m)		0.7 - 0.8	1.5 - 1.6	0 - 0.3	0.4 - 0.5	1 - 1.2	1.5 - 1.6	0.5 - 1	0 - 0.5	0.5 - 0.7	0.7 - 1	0.4 - 0.5	0 - 0.4	1.3 - 1.4	0.7 - 0.8	1 - 1.2	1	2.7	1	0 - 0.2	0.6 - 1	2.5 - 2.6
OD Level (m)		24.75	23.95	25.45	18.05	17.45	16.95	17.95	13.55	15.4	10.25	5.4	5.95	4.65	5.2	4.9	10.85	9.15	5.85	39.63 - 39.43	39.03 - 38.63	37.13 - 37.03
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	CLAY	MG	MG	MG	SILT	GRAVEL	CLAY	GRAVEL	CLAY	CLAY	CLAY	CLAY	CLAY	CLAY	GRAVEL	CLAY	MG	MG	MMG
Cluster Code		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	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI
trans-1,3-Dichloropropene	ug/kg																			<100	<100	
Tribromomethane	ug/kg																					
Trichloroethene	ug/kg																					
Trichlorofluoromethane	ug/kg																			<60	<60	
Vinyl Chloride	ug/kg																			<60	<60	
SVOCs																						
1,2-Dichlorobenzene	mg/kg																			<0.1	<0.1	
1,2,4-Trichlorobenzene	mg/kg																			<0.1	<0.1	
1,3-Dichlorobenzene	mg/kg																			<0.1	<0.1	
1,4-Dichlorobenzene	mg/kg																			<0.1	<0.1	
2,4,5-Trichlorophenol	mg/kg																			<0.1	<0.1	
2,4,6-Trichlorophenol	mg/kg																			<0.1	<0.1	
2,4-Dichlorophenol	mg/kg																			<0.1	<0.1	
2,4-Dimethylphenol	mg/kg																			<0.1	<0.1	
2,4-Dinitrotoluene	mg/kg																			<0.1	<0.1	
2,6-Dinitrotoluene	mg/kg																			<0.1	<0.1	
2-Chloronaphthalene	mg/kg																			<0.1	<0.1	
2-Chlorophenol	mg/kg																			<0.1	<0.1	
2-Methyl-4,6-Dinitrophenol	mg/kg																			<0.1	<0.1	
2-Methylnaphthalene	mg/kg																			<0.1	<0.1	
2-Methylphenol	mg/kg																			<0.1	<0.1	
2-Nitroaniline	mg/kg																			<0.1	<0.1	
2-Nitrophenol	mg/kg																			<0.1	<0.1	
3-Nitroaniline	mg/kg																			<0.1	<0.1	
4-Bromophenyl Phenyl Ether	mg/kg																			<0.1	<0.1	
4-Chloro-3-Methylphenol	mg/kg																			<0.1	<0.1	
4-Chloroaniline	mg/kg																			<0.1	<0.1	
4-Chlorophenyl Phenyl Ether	mg/kg																			<0.1	<0.1	
4-Methylphenol	mg/kg																			<0.1	<0.1	
4-Nitroaniline	mg/kg																			<0.1	<0.1	
4-Nitrophenol	mg/kg																			<0.1	<0.1	
Azobenzene	mg/kg																			<0.1	<0.1	
Bis(2-chloroethoxy)methane	mg/kg																			<0.1	<0.1	
Bis(2-chloroethyl)ether	mg/kg																			<0.1	<0.1	
Bis(2-chloroisopropyl)ether	mg/kg																			<0.1	<0.1	
Bis(2-ethylhexyl)phthalate	mg/kg																			<0.1	<0.1	
Butylbenzylphthalate	mg/kg																			<0.1	<0.1	
Carbazole	mg/kg																			<0.1	<0.1	
Dibenzofuran	mg/kg																			<0.1	<0.1	
Diethylphthalate	mg/kg																			<0.1	<0.1	
Dimethylphthalate	mg/kg																			<0.1	<0.1	
Di-N-Butyl Phthalate	mg/kg																			<0.1	<0.1	
Di-N-Octyl Phthalate	mg/kg																			<0.1	<0.1	
Hexachlorobenzene (HCB)	mg/kg																			<0.1	<0.1	
Hexachlorocyclopentadiene	mg/kg																			<0.1	<0.1	
Hexachloroethane	mg/kg																			<0.1	<0.1	
Isophorone	mg/kg																			<0.1	<0.1	
Nitrobenzene	mg/kg																			<0.1	<0.1	
N-Nitroso-Di-N-Propylamine	mg/kg																			<0.1	<0.1	
Pentachlorophenol (PCP)	mg/kg																			<0.1	<0.1	

M4CAN
Soil Analysis Results & Screening Assessment
Alignment outside of CL sites - chainage 0 to +6,600
10/08/2016

Screening Values and Assessment

Exceeds S4ULs Criteria Laboratory detection level higher than screening criterion	X

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used

Screening criterion for lead is C4SL in the absence of a S4UL

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	Units	BH316	BH316	BH317	BH318	BH318	BH318	BH319	BH320	BH321	BH322	BH327	BH401	BH401	BH402	BH403	TP312	TP312	TP318	BHM4CAN005	BHM4CAN005	BHM4CAN005
Specimen Depth (m)		0.7 - 0.8	1.5 - 1.6	0 - 0.3	0.4 - 0.5	1 - 1.2	1.5 - 1.6	0.5 - 1	0 - 0.5	0.5 - 0.7	0.7 - 1	0.4 - 0.5	0 - 0.4	1.3 - 1.4	0.7 - 0.8	1 - 1.2	1	2.7	1	0 - 0.2	0.6 - 1	2.5 - 2.6
OD Level (m)		24.75	23.95	25.45	18.05	17.45	16.95	17.95	13.55	15.4	10.25	5.4	5.95	4.65	5.2	4.9	10.85	9.15	5.85	39.63 - 39.43	39.03 - 38.63	37.13 - 37.03
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		MG	MG	CLAY	MG	MG	MG	SILT	GRAVEL	CLAY	GRAVEL	CLAY	CLAY	CLAY	CLAY	CLAY	CLAY	GRAVEL	CLAY	MG	MG	MMG
Cluster Code		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	2015 GI	2015 GI	2015 GI	2016 GI	2016 GI	2016 GI
PAHs																						
Acenaphthene	ug/kg																			<100	<100	
Acenaphthylene	ug/kg																			<100	<100	
Anthracene	ug/kg																			<100	<100	
Benz(a)anthracene	ug/kg																			309	<100	
Benzo(a)pyrene	ug/kg																			458	<100	
Benzo(b)fluoranthene	ug/kg																			<100	<100	
Benzo(ghi)perylene	ug/kg																			501	<100	
Benzo(k)fluoranthene	ug/kg																			289	<100	
Chrysene	ug/kg																			471	<100	
Dibenzo(ah)anthracene	ug/kg																			139	<100	
Fluoranthene	ug/kg																			466	<100	
Fluorene	ug/kg																			<100	<100	
Indeno(123cd)pyrene	ug/kg																			464	<100	
Naphthalene	ug/kg																			<100	<100	
Phenanthrene	ug/kg																			262	<100	
Pyrene	ug/kg																			388	<100	
PCBs																						
PCB congener 189	mg/kg																			<0.003		
PCB congener 105	mg/kg																			<0.003		
PCB congener 81	mg/kg																			<0.003		
PCB congener 167	mg/kg																			<0.003		
PCB congener 157	mg/kg																			<0.003		
PCB congener 169	mg/kg																			<0.003		
PCB congener 156	mg/kg																			<0.003		
PCB congener 118	mg/kg																			<0.003		
PCB congener 123	mg/kg																			<0.003		
PCB congener 114	mg/kg																			<0.003		
PCB congener 77	mg/kg																			<0.003		
PCB congener 126	mg/kg																			<0.003		
Sum of detected WHO 12 PCBs	mg/kg																			<0.036		

M4CAN
Soil Analysis Results & Screening Assessment
Alignment outside of CL sites - chainage +6,600 to +8,900
16/07/2015

Sample Reference	Units
Specimen Depth (m)	
OD Level (m)	
Sample Type	
Geology Code	
Cluster Code	
Inorganics	
Antimony	mg/kg
Arsenic	mg/kg
Barium	mg/kg
Beryllium	mg/kg
Boron	mg/kg
Boron Water Soluble	mg/kg
Cadmium	mg/kg
Chromium	mg/kg
Copper	mg/kg
Iron	mg/kg
Lead	mg/kg
Mercury	mg/kg
Molybdenum	mg/kg
Nickel	mg/kg
Selenium	mg/kg
Vanadium	mg/kg
Zinc	mg/kg
Cyanide (total)	mg/kg
Cyanide (free)	mg/kg
Ammoniacal Nitrogen as N	mg/kg
Other	
Asbestos Presence Screen	None
Asbestos Identification	%
Loss on Ignition	%
Total Organic Carbon	%
pH Value	pH Units
Material >2mm	%
Sulphate (soluble)	g/l
Calorific Value	MJ/kg
Organics	
PCBs (vs Aroclor 1254)	mg/kg
Phenols Monohydric	mg/kg
Cresols	mg/kg
Xylenols	mg/kg
Phenol	mg/kg
Phenols (total)	mg/kg
BTEX	
GRO (C4-C12)	mg/kg
MTBE	mg/kg
Benzene	mg/kg
Toluene	mg/kg
Ethyl benzene	mg/kg
m & p Xylene	mg/kg
o Xylene	mg/kg
Sum of Xylenes	
Sum of BTEX	
TPH	
TPH >C6-C8	mg/kg
TPH >C8-C10	mg/kg
TPH >C10-C12	mg/kg
TPH >C12-C16	mg/kg
TPH >C16-C21	mg/kg
TPH >C21-C35	mg/kg
Aliphatics C5-C6	mg/kg
Aliphatics >C6-C8	mg/kg
Aliphatics >C8-C10	mg/kg
Aliphatics >C10-C12	mg/kg
Aliphatics >C12-C16	mg/kg
Aliphatics >C16-C21	mg/kg
Aliphatics >C21-C35	mg/kg
Total Aliphatics C5-C35	mg/kg
Aliphatics >C35-44	mg/kg
Aromatics >C5-C7	mg/kg
Aromatics C6-C7	mg/kg
Aromatics >C7-C8	mg/kg
Aromatics >EC8-EC10	mg/kg
Aromatics >EC10-EC12	mg/kg
Aromatics >EC12-EC16	mg/kg
Aromatics >EC16-EC21	mg/kg
Aromatics >EC21-EC35	mg/kg
Total Aromatics C6-C35	mg/kg
Aromatics >C35-44	mg/kg
Total Aliphatic TPH	mg/kg
Total Aromatic TPH	mg/kg
TPH (Aliphatics and Aromatics C5-C35)	mg/kg
Total petroleum hydrocarbons	ug/kg
PAH	
Acenaphthene	mg/kg
Acenaphthylene	mg/kg
Anthracene	mg/kg
Benzo(a)anthracene	mg/kg
Benzo(a)pyrene	mg/kg
Benzo(b)fluoranthene	mg/kg
Benzo(ghi)perylene	mg/kg
Benzo(k)fluoranthene	mg/kg
Chrysene	mg/kg

Screening Values and Assessment

	Exceeds S4ULs Criteria
X	Laboratory detection level higher than screening criterion

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
16	16	24	11	BH411 @ 1.55mbGL	170	0
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD		12	0
15	15	6	0.44	BH411 @ 1.55mbGL	46000	0
0	0	None > LOD	None > LOD			
16	6	0.84	0.11	BH411 @ 6.05mbGL	190	0
16	16	120	31	BH411 @ 6.05mbGL	33	14
16	16	88	6.7	BH411 @ 6.05mbGL	44000	0
0	0	None > LOD	None > LOD			
16	16	110	14	BH411 @ 5.55mbGL	1300	0
16	3	0.54	0.27	BH410 @ 6.15mbGL	30	0
0	0	None > LOD	None > LOD			
16	16	52	31	BH410 @ 6.15mbGL	980	0
16	1	0.24	0.24	BH411 @ 6.05mbGL	1800	0
1	1	56.1	56.1	TPM4CANAD019 @ 5.93mbGL	5000	0
16	16	220	70	BH405 @ 5.9mbGL	170000	0
16	0	None > LOD	None > LOD			
15	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
5	5	0	0	BH411 @ 6.05mbGL		
5	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
3	3	3	0.92	BH411 @ 5.55mbGL		
16	16	9.2	7.2	BH411 @ 6.05mbGL	6-9	0
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
1	1	1.1	1.1	BH411 @ 6.05mbGL		
0	0	None > LOD	None > LOD		0.24	0
1	0	None > LOD	None > LOD		440	0
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD		440	0
5	0	None > LOD	None > LOD		440	0
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
4	0	None > LOD	None > LOD		27	0
4	0	None > LOD	None > LOD		56000	0
4	0	None > LOD	None > LOD		5700	0
4	0	None > LOD	None > LOD		5900	0
4	0	None > LOD	None > LOD		6600	0
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
4	0	None > LOD	None > LOD		7800	0
4	0	None > LOD	None > LOD		2000	0
4	0	None > LOD	None > LOD		9200	0
4	0	None > LOD	None > LOD		10000	0
4	0	None > LOD	None > LOD		7600	0
4	0	None > LOD	None > LOD		7800	0
4	0	None > LOD	None > LOD		3200	0
4	0	None > LOD	None > LOD		7800	0
4	0	None > LOD	None > LOD		2000	0
4	0	None > LOD	None > LOD		9700	0
3	0	None > LOD	None > LOD		25000	0
3	0	None > LOD	None > LOD		450000	0
3	0	None > LOD	None > LOD		450000	0
0	0	None > LOD	None > LOD		2000	0
3	0	None > LOD	None > LOD		450000	0
4	0	None > LOD	None > LOD		26000	0
0	0	None > LOD	None > LOD		7800	0
4	0	None > LOD	None > LOD		56000	0
4	0	None > LOD	None > LOD		3500	0
4	0	None > LOD	None > LOD		9200	0
3	0	None > LOD	None > LOD		10000	0
3	0	None > LOD	None > LOD		7600	0
3	0	None > LOD	None > LOD		7800	0
0	0	None > LOD	None > LOD		3500	0
3	0	None > LOD	None > LOD		7800	0
3	0	None > LOD	None > LOD		2000	0
3	0	None > LOD	None > LOD		3500	0
0	0	None > LOD	None > LOD		2000	0
3	0	None > LOD	None > LOD		2000	0
15	2	2.6	1.9	BH411 @ 5.55mbGL	29000	0
15	2	0.83	0.56	BH411 @ 5.55mbGL	29000	0
15	2	1.4	0.99	BH411 @ 6.05mbGL	150000	0
15	3	2.9	0.43	BH411 @ 6.05mbGL		
15	3	2.4	0.54	BH411 @ 6.05mbGL	11	0
15	3	4.5	0.84	BH411 @ 6.05mbGL	13	0
15	3	1.9	0.49	BH411 @ 6.05mbGL	1400	0
15	3	1.6	0.28	BH411 @ 6.05mbGL	370	0
15	3	3.6	0.8	BH411 @ 6.05mbGL	93	0

16/07/2015

Sample Reference	Units
Specimen Depth (m)	
OD Level (m)	
Sample Type	
Geology Code	
Cluster Code	
Azobenzene	mg/kg
Bis(2-chloroethoxy)methane	mg/kg
Bis(2-chloroethyl)ether	mg/kg
Bis(2-chloroisopropyl)ether	mg/kg
Bis(2-ethylhexyl)phthalate	mg/kg
Butylbenzylphthalate	mg/kg
Carbazole	mg/kg
Dibenzofuran	mg/kg
Diethylphthalate	mg/kg
Dimethylphthalate	mg/kg
Di-N-Butyl Phthalate	mg/kg
Di-N-Octyl Phthalate	mg/kg
Hexachlorobenzene (HCB)	mg/kg
Hexachlorocyclopentadiene	mg/kg
Hexachloroethane	mg/kg
Isophorone	mg/kg
Nitrobenzene	mg/kg
N-Nitroso-Di-N-Propylamine	mg/kg
Pentachlorophenol (PCP)	mg/kg

[illegible]

M4CAN
Soil Analysis Results & Screening Assessment
Alignment outside of CL sites - chainage +6,600 to +8,900
16/07/2015

Notes

Screening Values and Assessment

Sample Reference	Units	BH405	BH406	BH407	BH409	BH410	BH410	BH411	BH411	BH411	BH411	BH411	BH411	TP402	TP403	TP404	TPM4/CANA019
Specimen Depth (m)		0.3 - 0.5	0.3 - 0.7	0.8 - 1.2	0.5 - 0.7	0.3 - 0.7	1 - 1.2	0.5 - 0.6	1 - 1.1	2 - 2.1	3 - 3.1	4 - 4.1	5 - 5.1	1	1	1	0.5
OD Level (m)		5.9	5.85	5.6	5.9	6.15	5.45	6.05	5.55	4.55	3.55	2.55	1.55	5.15	5.35	5.35	5.93
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		CLAY	CLAY	CLAY	CLAY	CLAY	CLAY	MG	MG	CLAY	CLAY	SILT	CLAY	CLAY	CLAY	CLAY	TFD
Cluster Code		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	2016 GI
Inorganics																	
Antimony	mg/kg																
Arsenic	mg/kg	15	12	15	13	23	15	20	19	21	12	18	24	15	11	11	15.3
Barium	mg/kg																
Beryllium	mg/kg																
Boron	mg/kg	1.4	1.7	1.5	1.7	1.4	0.44	3.1	3.2	3.3	2.4	4.1	6	1.5	1.7	2.4	
Boron Water Soluble	mg/kg																
Cadmium	mg/kg	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	0.84	0.64	0.12	<0.1	<0.1	<0.1	0.11	<0.1	<0.1	0.286
Chromium	mg/kg	93	35	50	49	55	43	120	77	46	32	46	38	41	31	37	41.4
Copper	mg/kg	15	11	14	12	40	14	88	36	11	6.7	9.2	9.9	11	9.9	10	8.26
Iron	mg/kg																
Lead	mg/kg	72	26	36	31	100	27	100	110	25	14	15	17	29	22	23	27.5
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	0.54	<0.1	0.32	0.27	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.14
Molybdenum	mg/kg																
Nickel	mg/kg	50	31	41	41	52	38	44	36	45	32	36	37	42	34	32	35.3
Selenium	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.24	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1
Vanadium	mg/kg																56.1
Zinc	mg/kg	220	79	120	120	170	90	160	160	96	70	82	91	100	86	98	113
Cyanide (total)	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	<0.5	<1
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	<0.5	<0.5
Ammoniacal Nitrogen as N	mg/kg																
Other																	
Asbestos Presence Screen	None							0	0	0	0	0					
Asbestos Identification	%							<0.001	<0.001	<0.001	<0.001	<0.001					
Loss on Ignition	%																
Total Organic Carbon		0.92			0.93				3								
pH Value	pH Units	7.2	8	7.5	7.2	7.6	8.2	9.2	9.1	8.5	9.1	8.4	8.5	8	8.2	8.3	7.5
Material >2mm	%																
Sulphate (soluble)	g/l																
Calorific Value	MJ/kg							1.1									
Organics																	
PCBs (vs Aroclor 1254)	mg/kg																
Phenols Monohydric	mg/kg																<0.035
Cresols	mg/kg																<0.01
Xylenols	mg/kg																<0.015
Phenol	mg/kg																<0.01
Phenols (total)	mg/kg							<0.3	<0.3	<0.3		<0.3	<0.3				
BTEx																	
GRO (C4-C12)	mg/kg																<0.044
MTBE	mg/kg																<0.005
Benzene	mg/kg							<0.001				<0.001	<0.001				<0.01
Toluene	mg/kg							<0.001				<0.001	<0.001				<0.002
Ethyl benzene	mg/kg							<0.001				<0.001	<0.001				<0.003
m & p Xylene	mg/kg							<0.001				<0.001	<0.001				<0.006
o Xylene	mg/kg							<0.001				<0.001	<0.001				<0.003
Sum of Xylenes																	<0.009
Sum of BTEx																	<0.024
TPH																	

M4CAN Soil Analysis Results & Screening Assessment Alignment outside of CL sites - chainage +6,600 to +8,900 16/07/2015 Geological Formation Legend	
Made Ground	MG
Tidal Flat Deposits	TFD

Notes
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Screening Values and Assessment	
	Exceeds S4ULs Criteria
X	Laboratory detection level higher than screening criterion

Sample Reference	Units	BH405	BH406	BH407	BH409	BH410	BH410	BH411	BH411	BH411	BH411	BH411	BH411	TP402	TP403	TP404	TPM4CANA019
Specimen Depth (m)		0.3 - 0.5	0.3 - 0.7	0.8 - 1.2	0.5 - 0.7	0.3 - 0.7	1 - 1.2	0.5 - 0.6	1 - 1.1	2 - 2.1	3 - 3.1	4 - 4.1	5 - 5.1	1	1	1	0.5
OD Level (m)		5.9	5.85	5.6	5.9	6.15	5.45	6.05	5.55	4.55	3.55	2.55	1.55	5.15	5.35	5.35	5.93
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		CLAY	CLAY	CLAY	CLAY	CLAY	CLAY	MG	MG	CLAY	CLAY	SILT	CLAY	CLAY	CLAY	CLAY	CLAY
Cluster Code		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	2016 GI
TPH >C6-C8.	mg/kg				<1	<1			<1	<1							
TPH >C8-C10.	mg/kg				<1	<1			<1	<1							
TPH >C10-C12.	mg/kg				<1	<1			<1	<1							
TPH >C12-C16.	mg/kg				<1	<1			<1	<1							
TPH >C16-C21.	mg/kg				<1	<1			<1	<1							
TPH >C21-C35.	mg/kg				<1	<1			<1	<1							
Aliphatics C5-C6	mg/kg							<0.1				<0.1	<0.1				<0.01
Aliphatics >C6-C8	mg/kg							<0.1				<0.1	<0.1				<0.01
Aliphatics >C8-C10	mg/kg							<0.1				<0.1	<0.1				<0.01
Aliphatics >C10-C12	mg/kg							<1				<1	<1				<0.01
Aliphatics >C12-C16	mg/kg							<1				<1	<1				
Aliphatics >C16-C21	mg/kg							<1				<1	<1				
Aliphatics >C21-C35	mg/kg							<1				<1	<1				
Total Aliphatics C5-C35	mg/kg																
Aliphatics >C35-44	mg/kg							<1				<1	<1				
Aromatics >C5-C7	mg/kg							<0.1				<0.1	<0.1				<0.01
Aromatics C6-C7	mg/kg																
Aromatics >C7-C8	mg/kg							<0.1				<0.1	<0.1				<0.01
Aromatics >EC8-EC10	mg/kg							<0.1				<0.1	<0.1				<0.01
Aromatics >EC10-EC12	mg/kg							<1				<1	<1				<0.01
Aromatics >EC12-EC16	mg/kg							<1				<1	<1				
Aromatics >EC16-EC21	mg/kg							<1				<1	<1				
Aromatics >EC21-EC35	mg/kg							<1				<1	<1				
Total Aromatics C6-C35	mg/kg																
Aromatics >C35-44	mg/kg							<1				<1	<1				
Total Aliphatic TPH	mg/kg							<5				<5	<5				
Total Aromatic TPH	mg/kg							<5				<5	<5				
TPH (Aliphatics and Aromatics C5-C35)	mg/kg																
Total petroleum hydrocarbons	ug/kg							<10				<10	<10				
PAH																	
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.9	2.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.56	0.83	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	0.99	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Benz(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.43	<0.1	2.9	1.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Benzo(a)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.54	<0.1	2.4	1.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Benzo(b)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.84	<0.1	4.5	2.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Benzo(ghi)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.49	<0.1	1.9	1.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Benzo(k)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.28	<0.1	1.6	0.44	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.8	<0.1	3.6	1.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Dibenz(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.49	0.25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.82	<0.1	6.1	4.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2.1	2.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Indeno(123cd)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.48	<0.1	1.4	0.71	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.7	1.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4.1	4.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.87	<0.1	4.7	3.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
PAH 16 Total	mg/kg	<2	<2	<2	<2	5.6	<2	41	32	<2	<2	<2	<2	<2	<2	<2	
VOCs																	

M4CAN
Soil Analysis Results & Screening Assessment
Alignment outside of CL sites - chainage +8,900 to +11,850
16/07/2015

Sample Reference	Units
Specimen Depth (m)	
OD Level (m)	
Sample Type	
Geology Code	
Cluster Code	
Inorganics	
Antimony	mg/kg
Arsenic	mg/kg
Barium	mg/kg
Beryllium	mg/kg
Boron	mg/kg
Boron Water Soluble	mg/kg
Cadmium	mg/kg
Chromium	mg/kg
Copper	mg/kg
Iron	mg/kg
Lead	mg/kg
Mercury	mg/kg
Molybdenum	mg/kg
Nickel	mg/kg
Selenium	mg/kg
Vanadium	mg/kg
Zinc	mg/kg
Cyanide (total)	mg/kg
Cyanide (free)	mg/kg
Ammoniacal Nitrogen as N	mg/kg
Other	
Asbestos Presence Screen	None
Asbestos Identification	%
Loss on Ignition	%
Total Organic Carbon	%
pH Value	pH Units
Material >2mm	%
Sulphate (soluble)	g/l
Calorific Value	MJ/kg
Organics	
PCBs (vs Aroclor 1254)	mg/kg
Phenols Monohydric	mg/kg
Phenol	mg/kg
Phenols (total)	mg/kg
BTEX	
GRO (C4-C12)	mg/kg
MTBE	mg/kg
Benzene	mg/kg
Toluene	mg/kg
Ethyl benzene	mg/kg
m & p Xylene	mg/kg
o Xylene	mg/kg
TPH	
TPH >C6-C8.	mg/kg
TPH >C8-C10.	mg/kg
TPH >C10-C12.	mg/kg
TPH >C12-C16.	mg/kg
TPH >C16-C21.	mg/kg
TPH >C21-C35.	mg/kg
Aliphatics C5-C6	mg/kg
Aliphatics >C6-C8	mg/kg
Aliphatics >C8-C10	mg/kg
Aliphatics >C10-C12	mg/kg
Aliphatics >C12-C16	mg/kg
Aliphatics >C16-C21	mg/kg
Aliphatics >C21-C35	mg/kg
Total Aliphatics C5-C35	mg/kg
Aliphatics >C35-44	mg/kg
Aromatics >C5-C7	mg/kg
Aromatics C6-C7	mg/kg
Aromatics >C7-C8	mg/kg
Aromatics >EC8-EC10	mg/kg
Aromatics >EC10-EC12	mg/kg
Aromatics >EC12-EC16	mg/kg
Aromatics >EC16-EC21	mg/kg
Aromatics >EC21-EC35	mg/kg
Total Aromatics C6-C35	mg/kg
Aromatics >C35-44	mg/kg
Total Aliphatic TPH	mg/kg
Total Aromatic TPH	mg/kg

Screening Values and Assessment

Exceeds S4ULs Criteria
Laboratory detection level higher than screening criterion

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration
8	7	5	2.7	WSRU01 @ 1.36mbGL
8	7	28	10	WSRU01 @ 1.36mbGL
8	8	120	26	WSRU01 @ 1.36mbGL
8	7	0.9	0.7	WSRU02 @ 1.17mbGL
0	0	None > LOD	None > LOD	
8	7	12	7	WSRU01 @ 2.35mbGL
8	3	2	0.3	WSRU01 @ 1.36mbGL
8	8	48	13	WSRU02 @ 1.17mbGL
8	8	40	7	WSRU01 @ 1.36mbGL
8	8	35000	12000	WSRU01 @ 0.36mbGL / WSRU02 @ 0.17mbGL
8	8	82	7	WSRU02 @ 1.17mbGL
8	1	0.8	0.8	WSRU01 @ 1.36mbGL
8	3	1.1	0.6	WSRU01 @ 0.36mbGL
8	8	38	12	WSRU02 @ -0.83mbGL
8	0	None > LOD	None > LOD	
8	8	51	16	WSRU02 @ 1.17mbGL
8	8	300	43	WSRU02 @ 1.17mbGL
8	0	None > LOD	None > LOD	
8	7	110	35	WSRU02 @ 1.17mbGL
8	8	0	0	WSRU01 @ 2.35mbGL
0	0	None > LOD	None > LOD	
8	8	7.2	1.4	WSRU02 @ 1.17mbGL
8	8	6.2	0.4	WSRU01 @ 1.36mbGL
8	8	8.54	8.19	WSRU02 @ 0.17mbGL
0	0	None > LOD	None > LOD	
0	0	None > LOD	None > LOD	
0	0	None > LOD	None > LOD	
8	4	2.2	0.18	WSRU01 @ 1.36mbGL
8	1	0.74	0.74	WSRU02 @ 1.17mbGL
8	0	None > LOD	None > LOD	
0	0	None > LOD	None > LOD	
8	0	None > LOD	None > LOD	
8	0	None > LOD	None > LOD	
8	0	0.006	0.006	WSRU01 @ -0.64mbGL
8	0	None > LOD	None > LOD	
8	0	None > LOD	None > LOD	
8	0	None > LOD	None > LOD	
8	0	None > LOD	None > LOD	
8	0	None > LOD	None > LOD	
8	3	7.6	1.9	WSRU01 @ 1.36mbGL
8	6	49	3.9	WSRU01 @ 1.36mbGL
8	7	210	8.1	WSRU01 @ 1.36mbGL
8	7	260	8.1	WSRU01 @ 1.36mbGL
0	0	None > LOD	None > LOD	
0	0	None > LOD	None > LOD	
8	0	None > LOD	None > LOD	
8	0	None > LOD	None > LOD	
0	0	None > LOD	None > LOD	
8	0	None > LOD	None > LOD	
8	0	None > LOD	None > LOD	
8	4	9.6	0.13	WSRU01 @ 1.36mbGL
8	6	26	0.19	WSRU01 @ 1.36mbGL
8	7	190	14	WSRU01 @ 1.36mbGL
8	7	220	14	WSRU01 @ 1.36mbGL
0	0	None > LOD	None > LOD	
0	0	None > LOD	None > LOD	
0	0	None > LOD	None > LOD	

M4CAN
Soil Analysis Results & Screening Assessment
Alignment outside of CL sites - chainage +8,900 to +11,850
16/07/2015

Sample Reference	Units
Specimen Depth (m)	
OD Level (m)	
Sample Type	
Geology Code	
Cluster Code	
TPH (Aliphatics and Aromatics C5-C35)	mg/kg
Total petroleum hydrocarbons	mg/kg
PAH	
Acenaphthene	mg/kg
Acenaphthylene	mg/kg
Anthracene	mg/kg
Benz(a)anthracene	mg/kg
Benzo(a)pyrene	mg/kg
Benzo(b)fluoranthene	mg/kg
Benzo(ghi)perylene	mg/kg
Benzo(k)fluoranthene	mg/kg
Chrysene	mg/kg
Dibenzo(ah)anthracene	mg/kg
Fluoranthene	mg/kg
Fluorene	mg/kg
Indeno(123cd)pyrene	mg/kg
Naphthalene	mg/kg
Phenanthrene	mg/kg
Pyrene	mg/kg
PAH 16 Total	mg/kg
VOCs	
1,1,1,2-Tetrachloroethane	ug/kg
1,1,2,2-Tetrachloroethane	ug/kg
1,1,1-Trichloroethane	ug/kg
1,1,2-Trichloroethane	ug/kg
1,1-Dichloroethane	ug/kg
1,1-Dichloroethene	ug/kg
1,1-Dichloropropene	ug/kg
1,2,3-Trichlorobenzene	ug/kg
1,2,3-Trichloropropane	ug/kg
1,2,4-Trichlorobenzene	ug/kg
1,2,4-Trimethylbenzene	ug/kg
1,2-Dibromo-3-Chloropropane	ug/kg
1,2-Dibromoethane	ug/kg
1,2-Dichlorobenzene	ug/kg
1,2-Dichloroethane	ug/kg
1,2-Dichloropropane	ug/kg
1,3,5-Trimethylbenzene	ug/kg
1,3-Dichlorobenzene	ug/kg
1,3-Dichloropropane	ug/kg
1,4-Dichlorobenzene	ug/kg
2,2-Dichloropropane	ug/kg
2-Chlorotoluene	ug/kg
4-Chlorotoluene	ug/kg
4-Isopropyltoluene	ug/kg
Bromobenzene	ug/kg
Bromochloromethane	ug/kg
Bromodichloromethane	ug/kg
Bromoform	ug/kg
Bromomethane	ug/kg
Carbon Disulphide	ug/kg
Chlorobenzene	ug/kg
Chloroethane	ug/kg
Chloroethene	ug/kg
Chloroform	ug/kg
Chloromethane	ug/kg
cis-1,2-Dichloroethene	ug/kg
cis-1,3-Dichloropropene	ug/kg
Dibromochloromethane	ug/kg
Dibromomethane	ug/kg
Dichlorodifluoromethane	ug/kg
Dichloromethane	ug/kg
Hexachlorobutadiene (HCBD)	ug/kg
Isopropylbenzene	ug/kg
n-Butylbenzene	ug/kg
n-propylbenzene	ug/kg
Sec-Butylbenzene	ug/kg
Styrene	ug/kg
Tert-Butylbenzene	ug/kg
Tetrachloroethene	ug/kg
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg
trans-1,2-Dichloroethene	ug/kg

Screening Values and Assessment

	Exceeds S4ULs Criteria
Green	Laboratory detection level higher than screening criterion

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

[illegible]

M4CAN
Soil Analysis Results & Screening Assessment
Alignment outside of CL sites - chainage +8,900 to +11,850
16/07/2015

Screening Values and Assessment

Exceeds S4ULs Criteria

Laboratory detection level higher than screening criterion

Green

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Sample Reference	Units	WSRU01	WSRU01	WSRU01	WSRU01	WSRU02	WSRU02	WSRU02	WSRU02
Specimen Depth (m)		0.31 - 0.6	1.3 - 1.6	2.3 - 2.6	3.3 - 3.6	0.31 - 0.6	1.3 - 1.6	2.3 - 2.6	3.3 - 3.6
OD Level (m)		2.35	1.36	0.36	-0.64	2.16	1.17	0.17	-0.83
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		ALUV	ALUV	ALUV	ALUV	ALUV	ALUV	ALUV	ALUV
Cluster Code		2008	2008	2008	2008	2008	2008	2008	2008
Inorganics									
Antimony	mg/kg	4.1	5	2.7	<1.5	3.1	3.3	2.7	4.7
Arsenic	mg/kg	22	28	13	<3	10	12	10	26
Barium	mg/kg	92	120	64	26	81	83	55	66
Beryllium	mg/kg	0.8	0.7	0.8	<0.4	0.7	0.9	0.8	0.7
Boron	mg/kg								
Boron Water Soluble	mg/kg	12	8.4	9.1	<3.5	9.5	11	7	8.4
Cadmium	mg/kg	0.3	2	<0.3	<0.3	<0.3	0.3	<0.3	<0.3
Chromium	mg/kg	40	46	36	13	38	48	34	35
Copper	mg/kg	31	40	21	7	30	38	20	15
Iron	mg/kg	29000	30000	35000	12000	30000	34000	35000	31000
Lead	mg/kg	51	78	27	7	63	82	25	14
Mercury	mg/kg	<0.6	0.8	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6
Molybdenum	mg/kg	<0.6	<0.6	1.1	<0.6	<0.6	<0.6	0.9	0.6
Nickel	mg/kg	33	36	32	12	28	33	33	38
Selenium	mg/kg	<3	<3	<3	<3	<3	<3	<3	<3
Vanadium	mg/kg	41	41	48	16	44	51	46	43
Zinc	mg/kg	240	290	140	43	240	300	130	120
Cyanide (total)	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1
Cyanide (free)	mg/kg								
Ammoniacal Nitrogen as N	mg/kg	75	70	40	<15	99	110	35	37
Other									
Asbestos Presence Screen	None	0	0	0	0	0	0	0	0
Asbestos Identification	%								
Loss on Ignition	%	6.8	6.4	3.7	1.4	6.7	7.2	3.6	4.3
Total Organic Carbon	%	1.9	6.2	2.1	0.4	2.7	2.9	1.5	2.4
pH Value	pH Units	8.19	8.3	8.52	8.28	8.2	8.34	8.54	8.44
Material >2mm	%								
Sulphate (soluble)	g/l								
Calorific Value	MJ/kg								
Organics									
PCBs (vs Aroclor 1254)	mg/kg	0.18	2.2	<0.035	<0.035	0.21	0.44	<0.035	<0.035
Phenols Monohydric	mg/kg	<0.15	<0.15	<0.15	<0.15	<0.15	0.74	<0.15	<0.15
Phenol	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenols (total)	mg/kg								
BTEX									
GRO (C4-C12)	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MTBE	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzene	mg/kg	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
Toluene	mg/kg	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005
Ethyl benzene	mg/kg	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
m & p Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
o Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH									
TPH >C6-C8.	mg/kg								
TPH >C8-C10.	mg/kg								
TPH >C10-C12.	mg/kg								
TPH >C12-C16.	mg/kg								
TPH >C16-C21.	mg/kg								
TPH >C21-C35.	mg/kg								
Aliphatics C5-C6	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C6-C8	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C8-C10	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C10-C12	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aliphatics >C12-C16	mg/kg	<0.1	7.6	1.9	<0.1	<0.1	5.2	<0.1	<0.1
Aliphatics >C16-C21	mg/kg	5.2	49	3.9	7.8	13	20	<0.1	<0.1
Aliphatics >C21-C35	mg/kg	69	210	16	15	88	130	8.1	<0.1
Total Aliphatics C5-C35	mg/kg	74	260	22	23	100	160	8.1	<0.1
Aliphatics >C35-44	mg/kg								
Aromatics >C5-C7	mg/kg								

Sample Reference	Units	WSRU01	WSRU01	WSRU01	WSRU01	WSRU02	WSRU02	WSRU02	WSRU02
Specimen Depth (m)		0.31 - 0.6	1.3 - 1.6	2.3 - 2.6	3.3 - 3.6	0.31 - 0.6	1.3 - 1.6	2.3 - 2.6	3.3 - 3.6
OD Level (m)		2.35	1.36	0.36	-0.64	2.16	1.17	0.17	-0.83
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		ALUV	ALUV	ALUV	ALUV	ALUV	ALUV	ALUV	ALUV
Cluster Code		2008	2008	2008	2008	2008	2008	2008	2008
Aromatics C6-C7	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >C7-C8	mg/kg								
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatics >EC12-EC16	mg/kg	0.41	9.6	<0.1	<0.1	<0.1	0.72	<0.1	0.13
Aromatics >EC16-EC21	mg/kg	3.3	26	<0.1	<0.1	4.4	7.5	1.9	0.19
Aromatics >EC21-EC35	mg/kg	80	190	14	<0.1	44	73	17	38
Total Aromatics C6-C35	mg/kg	83	220	14	<0.1	49	81	18	38
Aromatics >C35-44	mg/kg								
Total Aliphatic TPH	mg/kg								
Total Aromatic TPH	mg/kg								
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	160	490	36	23	150	240	27	38
Total petroleum hydrocarbons	mg/kg								
PAH									
Acenaphthene	mg/kg	0.073	0.26	0.021	<0.014	0.075	0.097	0.029	0.021
Acenaphthylene	mg/kg	0.058	0.18	0.009	<0.005	0.054	0.065	0.008	0.008
Anthracene	mg/kg	0.16	0.68	0.039	<0.009	0.19	0.2	0.062	0.052
Benz(a)anthracene	mg/kg	0.5	1.6	0.1	0.026	0.59	0.61	0.12	0.18
Benzo(a)pyrene	mg/kg	0.5	1.4	0.072	<0.012	0.57	0.62	0.09	0.12
Benzo(b)fluoranthene	mg/kg	0.61	1.6	0.095	0.018	1.1	1.1	0.13	0.15
Benzo(ghi)perylene	mg/kg	0.38	0.99	0.048	<0.01	0.35	0.43	0.048	0.062
Benzo(k)fluoranthene	mg/kg	0.49	1.1	0.057	<0.025	0.4	0.48	0.077	0.071
Chrysene	mg/kg	0.6	1.7	0.11	0.018	0.73	0.73	0.13	0.15
Dibenzo(ah)anthracene	mg/kg	0.13	0.43	0.013	<0.008	0.097	0.12	0.017	0.025
Fluoranthene	mg/kg	0.88	2.8	0.17	<0.025	1	1.1	0.23	0.24
Fluorene	mg/kg	0.16	0.6	0.038	<0.012	0.16	0.21	0.044	0.035
Indeno(123cd)pyrene	mg/kg	0.36	0.86	0.031	<0.011	0.31	0.41	0.04	0.057
Naphthalene	mg/kg	0.22	0.85	0.065	0.016	0.22	0.28	0.084	0.05
Phenanthrene	mg/kg	6.3	19	1.1	0.13	7.2	7.9	1.4	1.5
Pyrene	mg/kg	0.55	1.8	0.12	0.031	0.61	0.66	0.15	0.11
PAH 16 Total	mg/kg	0.65	2.1	0.13	0.024	0.76	0.81	0.17	0.18
VOCs									
1,1,1,2-Tetrachloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10
1,1,2,2-Tetrachloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10
1,1,1-Trichloroethane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7
1,1,2-Trichloroethane	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloroethane	ug/kg	<8	<8	<8	<8	<8	<8	<8	<8
1,1-Dichloroethene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10
1,1-Dichloropropene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11
1,2,3-Trichlorobenzene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11
1,2,3-Trichloropropane	ug/kg	<17	<17	<17	<17	<17	<17	<17	<17
1,2,4-Trichlorobenzene	ug/kg	<6	<6	<6	<6	<6	<6	<6	<6
1,2,4-Trimethylbenzene	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9
1,2-Dibromo-3-Chloropropane	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14
1,2-Dibromoethane	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12
1,2-Dichlorobenzene	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12
1,2-Dichloroethane	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloropropane	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12
1,3,5-Trimethylbenzene	ug/kg	<8	<8	<8	<8	<8	<8	<8	<8
1,3-Dichlorobenzene	ug/kg	<6	<6	<6	<6	<6	<6	<6	<6
1,3-Dichloropropane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7
1,4-Dichlorobenzene	ug/kg	<5	<5	<5	<5	<5	<5	<5	<5
2,2-Dichloropropane	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12
2-Chlorotoluene	ug/kg	<9	<9	<9	<9	<9	<9	<9	<9
4-Chlorotoluene	ug/kg	<12	<12	<12	<12	<12	<12	<12	<12
4-Isopropyltoluene	ug/kg	<11	<11	<11	<11	<11	<11	<11	<11
Bromobenzene	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10
Bromochloromethane	ug/kg	<14	<14	<14	<14	<14	<14	<14	<14
Bromodichloromethane	ug/kg	<7	<7	<7	<7	<7	<7	<7	<7
Bromoform	ug/kg	<10	<10	<10	<10	<10	<10	<10	<10

Screening Values and Assessment

Exceeds S4ULs Criteria
Laboratory detection level higher than screening criterion

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

Green

[illegible]

M4CAN
Soil Analysis Results & Screening Assessment
Alignment outside of CL sites - chainage
+11,850 to +19,650
16/07/2015

Sample Reference	Units
Specimen Depth (m)	
OD Level (m)	
Sample Type	
Geology Code	
Cluster Code	
Inorganics	
Antimony	mg/kg
Arsenic	mg/kg
Barium	mg/kg
Beryllium	mg/kg
Boron	mg/kg
Boron Water Soluble	mg/kg
Cadmium	mg/kg
Chromium	mg/kg
Copper	mg/kg
Iron	mg/kg
Lead	mg/kg
Mercury	mg/kg
Molybdenum	mg/kg
Nickel	mg/kg
Selenium	mg/kg
Vanadium	mg/kg
Zinc	mg/kg
Cyanide (total)	mg/kg
Cyanide (free)	mg/kg
Ammoniacal Nitrogen as N	mg/kg
Other	
Asbestos Presence Screen	None
Asbestos Identification	%
Loss on Ignition	%
Total Organic Carbon	%
pH Value	pH Units
Material >2mm	%
Sulphate (soluble)	g/l
Calorific Value	MJ/kg
Organics	
PCBs (vs Aroclor 1254)	mg/kg
Phenols Monohydric	mg/kg
Cresols	mg/kg
Xylenols	mg/kg
Phenol	mg/kg
Phenols	mg/kg
BTEX	
GRO (C4-C12)	mg/kg
MTBE	mg/kg
Benzene	mg/kg
Toluene	mg/kg
Ethyl benzene	mg/kg
m & p Xylene	mg/kg
o Xylene	mg/kg
TPH	
TPH >C6-C8.	mg/kg
TPH >C8-C10.	mg/kg
TPH >C10-C12.	mg/kg
TPH >C12-C16.	mg/kg
TPH >C16-C21.	mg/kg
TPH >C21-C35.	mg/kg
Aliphatics C5-C6	mg/kg
Aliphatics >C6-C8	mg/kg
Aliphatics >C8-C10	mg/kg
Aliphatics >C10-C12	mg/kg
Aliphatics >C12-C16	mg/kg
Aliphatics >C16-C21	mg/kg
Aliphatics >C21-C35	mg/kg
Total Aliphatics C5-C35	mg/kg
Aliphatics >C35-44	mg/kg
Aromatics >C5-7	mg/kg
Aromatics C6-C7	mg/kg
Aromatics >C7-8	mg/kg
Aromatics >EC8-EC10	mg/kg
Aromatics >EC10-EC12	mg/kg
Aromatics >EC12-EC16	mg/kg
Aromatics >EC16-EC21	mg/kg
Aromatics >EC21-EC35	mg/kg
Total Aromatics C6-C35	mg/kg
Aromatics >C35-44	mg/kg
Total Aliphatic TPH	mg/kg
Total Aromatic TPH	mg/kg
TPH (Aliphatics and Aromatics C5-C35)	mg/kg
Total petroleum hydrocarbons	mg/kg
PAH	
Acenaphthene	mg/kg
Acenaphthylene	mg/kg
Anthracene	mg/kg
Benz(a)anthracene	mg/kg
Benzo(a)pyrene	mg/kg

Screening Values and Assessment

Exceeds S4ULs Criteria
Green Laboratory detection level higher than screening criterion

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
4	3	2.6	2.4	SBHJ03 CP @ 5.07mbGL		
23	21	33	2.7	TP503 @ 4.6mbGL	170	0
4	3	190	53	SBHJ02 CP @ 5.03mbGL		
4	3	1.3	0.7	SBHJ03 CP @ 5.07mbGL	12	0
18	18	2.8	0.52	BH510 @ 5.45mbGL	46000	0
4	1	37	37	SBHJ02 CP @ 0.33mbGL		
23	10	2.5	0.15	TP517 @ 3.75mbGL	190	0
23	22	110	3.8	TP503 @ 4.6mbGL	33	15
23	22	49	4.6	TP517 @ 3.75mbGL	44000	0
4	4	35000	950	SBHJ03 CP @ 5.07mbGL		
23	22	120	8	TP517 @ 3.75mbGL	1300	0
23	4	0.35	0.1	TP517 @ 3.75mbGL	30	0
4	0	None > LOD	None > LOD			
23	22	56	1.9	TP503 @ 4.6mbGL	980	0
23	5	0.56	0.21	TP516 @ 5.15mbGL	1800	0
5	5	59	1.6	TPM4CANA010 @ 5.38mbGL	5000	0
23	23	260	4.7	TP517 @ 3.75mbGL	170000	0
22	1	0.5	0.5	BH503 @ 5.95mbGL		
19	0	None > LOD	None > LOD			
4	2	30	21	SBHJ02 CP @ 0.33mbGL		
12	12	0	0	SBHJ02 CP @ 5.03mbGL		
8	0	None > LOD	None > LOD			
3	3	59	2.8	SBHJ02 CP @ 0.33mbGL		
5	5	37	4	SBHJ02 CP @ 0.33mbGL		
23	23	8.9	6.2	BH503 @ 5.95mbGL	6-9	0
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
4	0	None > LOD	None > LOD		0.24	0
5	0	None > LOD	None > LOD		440	0
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
6	1	0	0	SBHJ02 CP @ 5.03mbGL	440	0
9	0	None > LOD	None > LOD		440	0
5	0	None > LOD	None > LOD			
7	0	None > LOD	None > LOD			
9	0	None > LOD	None > LOD		27	0
9	0	None > LOD	None > LOD		56000	0
9	0	None > LOD	None > LOD		5700	0
9	0	None > LOD	None > LOD		5900	0
9	0	None > LOD	None > LOD		6600	0
9	0	None > LOD	None > LOD		7800	0
9	0	None > LOD	None > LOD		2000	0
9	0	None > LOD	None > LOD		9200	0
9	1	5.6	5.6	BH507 @ 5.25mbGL	10000	0
9	1	27	27	BH507 @ 5.25mbGL	7600	0
9	1	72	72	BH507 @ 5.25mbGL	7800	0
7	0	None > LOD	None > LOD		3200	0
7	0	None > LOD	None > LOD		7800	0
7	0	None > LOD	None > LOD		2000	0
7	0	None > LOD	None > LOD		9700	0
7	3	0.78	0.14	SBHJ03 CP @ 5.07mbGL	25000	0
7	3	7	1	SBHJ03 CP @ 5.07mbGL	450000	0
7	4	27	2.1	SBHJ03 CP @ 5.07mbGL	450000	0
4	4	35	4.5	SBHJ03 CP @ 5.07mbGL	2000	0
3	0	None > LOD	None > LOD		450000	0
3	0	None > LOD	None > LOD		26000	0
4	0	None > LOD	None > LOD		7800	0
3	0	None > LOD	None > LOD		56000	0
7	0	None > LOD	None > LOD		3500	0
7	0	None > LOD	None > LOD		9200	0
7	4	0.6	0.262	SBHJ03 CP @ 5.07mbGL	10000	0
7	3	3.1	0.7	SBHJ03 CP @ 5.07mbGL	7600	0
7	5	110	2.48	SBHJ02 CP @ 0.33mbGL	7800	0
4	4	110	12	SBHJ02 CP @ 0.33mbGL	3500	0
3	1	0.541	0.541	TPM4CANA010 @ 5.38mbGL	7800	0
3	0	None > LOD	None > LOD		2000	0
3	1	3.28	3.28	TPM4CANA010 @ 5.38mbGL	3500	0
5	5	110	3.28	SBHJ02 CP @ 0.33mbGL	2000	0
2	0	None > LOD	None > LOD		2000	0
23	4	0.41	0.056	BH502 @ 6mbGL	29000	0
23	3	0.28	0.008	BH502 @ 6mbGL	29000	0
23	5	0.95	0.021	BH502 @ 6mbGL	150000	0
23	6	2.2	0.022	BH502 @ 6mbGL		
23	4	1.5	0.034	BH502 @ 6mbGL	11	0

Sample Reference	Units
Specimen Depth (m)	
OD Level (m)	
Sample Type	
Geology Code	
Cluster Code	
Benzo(b)fluoranthene	mg/kg
Benzo(ghi)perylene	mg/kg
Benzo(k)fluoranthene	mg/kg
Chrysene	mg/kg
Dibenzo(ah)anthracene	mg/kg
Fluoranthene	mg/kg
Fluorene	mg/kg
Indeno(123cd)pyrene	mg/kg
Naphthalene	mg/kg
Phenanthrene	mg/kg
Pyrene	mg/kg
PAH 16 Total	mg/kg
VOCs	
1,1,1,2-Tetrachloroethane	ug/kg
1,1,1,2,2-Tetrachloroethane	ug/kg
1,1,1-Trichloroethane	ug/kg
1,1,2-Trichloroethane	ug/kg
1,1-Dichloroethane	ug/kg
1,1-Dichloroethene	ug/kg
1,1-Dichloropropene	ug/kg
1,2,3-Trichlorobenzene	ug/kg
1,2,3-Trichloropropane	ug/kg
1,2,4-Trichlorobenzene	ug/kg
1,2,4-Trimethylbenzene	ug/kg
1,2-Dibromo-3-Chloropropane	ug/kg
1,2-Dibromoethane	ug/kg
1,2-Dichlorobenzene	ug/kg
1,2-Dichloroethane	ug/kg
1,2-Dichloropropene	ug/kg
1,3,5-Trimethylbenzene	ug/kg
1,3-Dichlorobenzene	ug/kg
1,3-Dichloropropane	ug/kg
1,4-Dichlorobenzene	ug/kg
2,2-Dichloropropane	ug/kg
2-Chlorotoluene	ug/kg
4-Chlorotoluene	ug/kg
4-Isopropyltoluene	ug/kg
Bromobenzene	ug/kg
Bromochloromethane	ug/kg
Bromodichloromethane	ug/kg
Bromoform	ug/kg
Bromomethane	ug/kg
Carbon Disulphide	ug/kg
Chlorobenzene	ug/kg
Chloroethane	ug/kg
Chloroethene	ug/kg
Chloroform	ug/kg
Chloromethane	ug/kg
cis-1,2-Dichloroethene	ug/kg
cis-1,3-Dichloropropene	ug/kg
Dibromochloromethane	ug/kg
Dibromomethane	ug/kg
Dichlorodifluoromethane	ug/kg
Dichloromethane	ug/kg
Hexachlorobutadiene (HCBD)	ug/kg
Isopropylbenzene	ug/kg
n-Butylbenzene	ug/kg
n-propylbenzene	ug/kg
Sec-Butylbenzene	ug/kg
Styrene	ug/kg
Tert-Butylbenzene	ug/kg
Tetrachloroethene	ug/kg
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg
trans-1,2-Dichloroethene	ug/kg
trans-1,3-Dichloropropene	ug/kg
Tribromomethane	ug/kg
Trichloroethene	ug/kg
Trichlorofluoromethane	ug/kg
Vinyl Chloride	ug/kg
SVOCs	
1,2,4-Trichlorobenzene	mg/kg
1,2-Dichlorobenzene	mg/kg
1,3-Dichlorobenzene	mg/kg
1,4-Dichlorobenzene	mg/kg
2,4,5-Trichlorophenol	mg/kg
2,4,6-Trichlorophenol	mg/kg
2,4-Dichlorophenol	mg/kg
2,4-Dimethylphenol	mg/kg
2,4-Dinitrotoluene	mg/kg
2,6-Dinitrotoluene	mg/kg
2-Chloronaphthalene	mg/kg
2-Chlorophenol	mg/kg

Green	Exceeds S4ULs Criteria Laboratory detection level higher than screening criterion

Notes
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

[illegible]

M4CAN
Soil Analysis Results & Screening Assessment
Allignment outside of CL sites - chainage
+11,850 to +19,650
16/07/2015

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the
absence of a S4UL

MG	Made Ground
TFD	Tidal Flat Deposits

Sample Reference	Units	SBHJ02 CP	SBHJ02 CP	SBHJ03 CP	SBHJ03 CP	BH502	BH502	BH503	BH503	BH503	BH507	BH507	BH510	BH534	BH535
Specimen Depth (m)		0.3	5	0.3	1	0.2 - 0.5	0.5 - 1	0.2 - 0.3	0.5 - 0.7	0.9 - 1.1	0.2 - 0.3	0.6 - 0.8	0 - 0.3	0.3 - 0.5	0.3 - 0.5
OD Level (m)		5.03	0.33	5.07	4.37	6	5.7	5.95	5.65	5.25	4.85	5.45	4.95	4.85	
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		ALLUV	PEAT	TOPSOIL	ALLUV	CLAY	CLAY	MG	MG	CLAY	MG	MG	CLAY	CLAY	CLAY
Cluster Code		2008 GI	2008 GI	2008 GI	2008 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
Inorganics															
Antimony	mg/kg	2.4	<1.5	2.6	2.4										
Arsenic	mg/kg	5	<3	6	5	19	21	22	10	19	19	17	14	11	20
Barium	mg/kg	190	<6	100	53										
Beryllium	mg/kg	0.9	<0.4	1.3	0.7										
Boron	mg/kg					1.5	1.2	2.1	1.8	1.7	0.82	1.1	2.8	1.9	1.8
Boron Water Soluble	mg/kg	<3.5	37	<3.5	<3.5										
Cadmium	mg/kg	<0.3	<0.3	<0.3	<0.3	0.17	0.15	0.43	<0.1	<0.1	0.39	<0.1	0.48	<0.1	<0.1
Chromium	mg/kg	37	<4.5	44	31	54	56	49	30	45	42	35	54	40	52
Copper	mg/kg	14	<6	16	7	27	15	46	12	14	15	6.5	20	11	22
Iron	mg/kg	31000	950	35000	32000										
Lead	mg/kg	46	<2	42	25	46	38	100	28	40	35	16	52	27	46
Mercury	mg/kg	<0.6	<0.6	<0.6	<0.6	<0.1	<0.1	0.12	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	mg/kg	<0.6	<0.6	<0.6	<0.6										
Nickel	mg/kg	32	<0.9	31	29	36	33	43	29	37	35	34	34	25	34
Selenium	mg/kg	<3	<3	<3	<3	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.21	0.44
Vanadium	mg/kg	49	1.6	54	43										
Zinc	mg/kg	130	4.7	110	110	110	99	160	76	100	130	72	150	100	180
Cyanide (total)	mg/kg	<1	<1	<1	<1	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cyanide (free)	mg/kg					<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ammoniacal Nitrogen as N	mg/kg	<15	30	<15	21										
Other															
Asbestos Presence Screen	None	0	0	0	0	0	0	0	0	0	0	0			0
Asbestos Identification	%					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			<0.001
Loss on Ignition	%	3.6	59		2.8										
Total Organic Carbon	%	4	37		4.9										
pH Value	pH Units	8.29	8.13	7.8	8.1	8.1	8	8.9	8	8	7.8	8.1	7.8	7.6	7.6
Material >2mm	%														
Sulphate (soluble)	g/l														
Calorific Value	MJ/kg														
Organics															
PCBs (vs Aroclor 1254)	mg/kg	<0.035	<0.035	<0.035	<0.035										
Phenols Monohydric	mg/kg	<0.15	<0.15	<0.15	<0.15										
Cresols	mg/kg														
Xylenols	mg/kg														
Phenol	mg/kg	0		<0.1	<0.1			<0.5	<0.5						
Phenols	mg/kg							<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	
BTEx															
GRO (C4-C12)	mg/kg	<0.01	<0.01	<0.01	<0.01										
MTBE	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.001	<0.001						
Benzene	mg/kg	<0.009	<0.009	<0.009	<0.009			<0.001	<0.001						
Toluene	mg/kg	<0.005	<0.005	<0.005	<0.005			<0.001	<0.001						
Ethyl benzene	mg/kg	<0.004	<0.004	<0.004	<0.004			<0.001	<0.001						
m & p Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.001	<0.001						
o Xylene	mg/kg	<0.01	<0.01	<0.01	<0.01			<0.001	<0.001						
TPH															
TPH >C6-C8.	mg/kg					<1	<1	<1	<1	<1	<1	<1			<1
TPH >C8-C10.	mg/kg					<1	<1	<1	<1	<1	<1	<1			<1
TPH >C10-C12.	mg/kg					<1	<1	<1	<1	<1	<1	<1			<1
TPH >C12-C16.	mg/kg					<1	<1	<1	<1	<1	5.6	<1			<1
TPH >C16-C21.	mg/kg					<1	<1	<1	<1	<1	27	<1			<1
TPH >C21-C35.	mg/kg					<1	<1	<1	<1	<1	72	<1			<1
Aliphatics C5-C6	mg/kg	<0.01	<0.01	<0.01	<0.01										
Aliphatics >C6-C8	mg/kg	<0.01	<0.01	<0.01	<0.01										
Aliphatics >C8-C10	mg/kg	<0.01	<0.01	<0.01	<0.01										
Aliphatics >C10-C12	mg/kg	<0.01	<0.01	<0.01	<0.01										
Aliphatics >C12-C16	mg/kg	0.55	<0.1	0.78	0.14										
Aliphatics >C16-C21	mg/kg	1.9	<0.1	7	1										
Aliphatics >C21-C35	mg/kg	2.1	6.1	27	6										
Total Aliphatics C5-C35	mg/kg	4.5	6.1	35	7.2										
Aliphatics >C35-44	mg/kg														
Aromatics >C5-7	mg/kg														
Aromatics C6-C7	mg/kg	<0.01	<0.01	<0.01	<0.01										
Aromatics >C7-8	mg/kg														
Aromatics >EC8-EC10	mg/kg	<0.01	<0.01	<0.01	<0.01										
Aromatics >EC10-EC12	mg/kg	<0.01	<0.01	<0.01	<0.01										
Aromatics >EC12-EC16	mg/kg	0.35	<0.1	0.6	0.31										
Aromatics >EC16-EC21	mg/kg	0.71	<0.1	3.1	0.7										
Aromatics >EC21-EC35	mg/kg	43	110	31	11										
Total Aromatics C6-C35	mg/kg	44	110	35	12										
Aromatics >C35-44	mg/kg														
Total Aliphatic TPH	mg/kg														
Total Aromatic TPH	mg/kg														
TPH (Aliphatics and Aromatics C5-C35)	mg/kg	48	110	69	20										
Total petroleum hydrocarbons	mg/kg														
PAH															
Acenaphthene	mg/kg	0.056	<0.014	0.11	<0.014	0.41	0.18	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.008	<0.005	0.024	<0.005	0.28	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	0.035	<0.009	0.2	0.021	0.95	0.13	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benz(a)anthracene	mg/kg	0.087	0.022	0.42	0.053	2.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.25	<0.012	0.32	0.034	1.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	mg/kg	0.23		0.57	0.061	2.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

M4CAN
Soil Analysis Results & Screening Assessment
Alignment outside of CL sites - chainage
+11,850 to +19,650
16/07/2015

Notes
NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the
absence of a S4UL

Screening Values and Assessment
Exceeds S4ULs Criteria
Laboratory detection level higher than
screening criterion

Green

Geological Formation Legend	
MG	Made Ground
TFD	Tidal Flat Deposits

Sample Reference	Units	SBHJ02 CP	SBHJ02 CP	SBHJ03 CP	SBHJ03 CP	BH502	BH502	BH503	BH503	BH503	BH507	BH507	BH510	BH534	BH535
Specimen Depth (m)		0.3	5	0.3	1	0.2 - 0.5	0.5 - 1	0.2 - 0.3	0.5 - 0.7	0.9 - 1.1	0.2 - 0.3	0.6 - 0.8	0 - 0.3	0.3 - 0.5	0.3 - 0.5
OD Level (m)		5.03	0.33	5.07	4.37	6	5.7	5.95	5.65	5.25	5.25	4.85	5.45	4.95	4.85
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		ALLUV	PEAT	TOPSOIL	ALLUV	CLAY	CLAY	MG	MG	CLAY	MG	MG	CLAY	CLAY	CLAY
Cluster Code		2008 GI	2008 GI	2008 GI	2008 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
Benzo(ghi)perylene	mg/kg	0.62	<0.01	0.22	0.032	0.91	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.095	<0.025	0.12	0.026	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	0.12	<0.01	0.42	0.051	3.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)anthracene	mg/kg	0.022	<0.008	0.056	<0.008	0.18	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.14	<0.025	1.1	0.11	5	0.27	0.42	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.15
Fluorene	mg/kg	0.046	<0.012	0.15	0.02	0.5	0.11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123cd)pyrene	mg/kg	0.21	0.062	0.19	0.023	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	mg/kg	0.26	<0.01	0.12	0.092	0.47	0.44	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.15	<0.021	0.91	0.093	5.3	0.27	0.39	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.31
Pyrene	mg/kg	0.13	<0.022	0.81	0.089	4.6	0.39	0.36	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
PAH 16 Total	mg/kg	2.5	0.084	5.7	0.71	29	<2	<2	<2	<2	<2	<2	<2	<2	<2
VOCs															
1,1,1,2-Tetrachloroethane	ug/kg	<10	<10	<10	<10			<2	<2						
1,1,2,2-Tetrachloroethane	ug/kg	<10	<10	<10	<10										
1,1,1-Trichloroethane	ug/kg	<7	<7	<7	<7			<1	<1						
1,1,2-Trichloroethane	ug/kg	<10	<10	<10	<10			<10	<10						
1,1-Dichloroethane	ug/kg	<8	<8	<8	<8			<1	<1						
1,1-Dichloroethene	ug/kg	<10	<10	<10	<10			<1	<1						
1,1-Dichloropropene	ug/kg	<11	<11	<11	<11			<1	<1						
1,2,3-Trichlorobenzene	ug/kg	<11	<11	<11	<11			<2	<2						
1,2,3-Trichloropropane	ug/kg	<17	<17	<17	<17			<50	<50						
1,2,4-Trichlorobenzene	ug/kg	<6	<6	<6	<6			<2	<2						
1,2,4-Trimethylbenzene	ug/kg	<9	<9	<9	<9			<1	<1						
1,2-Dibromo-3-Chloropropane	ug/kg	<14	<14	<14	<14			<50	<50						
1,2-Dibromoethane	ug/kg	<12	<12	<12	<12			<5	<5						
1,2-Dichlorobenzene	ug/kg	<12	<12	<12	<12			<1	<1						
1,2-Dichloroethane	ug/kg	<5	<5	<5	<5			<2	<2						
1,2-Dichloropropane	ug/kg	<12	<12	<12	<12			<1	<1						
1,3,5-Trimethylbenzene	ug/kg	<8	<8	<8	<8			<1	<1						
1,3-Dichlorobenzene	ug/kg	<6	<6	<6	<6			<1	<1						
1,3-Dichloropropane	ug/kg	<7	<7	<7	<7			<1	<1						
1,4-Dichlorobenzene	ug/kg	<5	<5	<5	<5			<1	<1						
2,2-Dichloropropane	ug/kg	<12	<12	<12	<12										
2-Chlorotoluene	ug/kg	<9	<9	<9	<9			<1	<1						
4-Chlorotoluene	ug/kg	<12	<12	<12	<12			<1	<1						
4-Isopropyltoluene	ug/kg	<11	<11	<11	<11			<1	<1						
Bromobenzene	ug/kg	<10	<10	<10	<10			<1	<1						
Bromochloromethane	ug/kg	<14	<14	<14	<14			<5	<5						
Bromodichloromethane	ug/kg	<7	<7	<7	<7			<5	<5						
Bromoform	ug/kg	<10	<10	<10	<10										
Bromomethane	ug/kg	<13	<13	<13	<13			<20	<20						
Carbon Disulphide	ug/kg	<7	<7	<7	<7										
Chlorobenzene	ug/kg	<5	<5	<5	<5			<1	<1						
Chloroethane	ug/kg	<14	<14	<14	<14			<2	<2						
Chloroethene	ug/kg							<1	<1						
Chloroform	ug/kg	<8	<8	<8	<8			<1	<1						
Chloromethane	ug/kg	<7	<7	<7	<7			<1	<1						
cis-1,2-Dichloroethene	ug/kg	<5	<5	<5	<5			<1	<1						
cis-1,3-Dichloropropene	ug/kg	<14	<14	<14	<14			<10	<10						
Dibromochloromethane	ug/kg	<13	<13	<13	<13			<10	<10						
Dibromomethane	ug/kg	<9	<9	<9	<9			<1	<1						
Dichlorodifluoromethane	ug/kg	<4	<4	<4	<4			<1	<1						
Dichloromethane	ug/kg	<10	<10	<10	<10										
Hexachlorobutadiene (HCBD)	ug/kg	<12	<12	<12	<12			<1	<1						
Isopropylbenzene	ug/kg	<5	<5	<5	<5			<1	<1						
n-Butylbenzene	ug/kg	<10	<10	<10	<10			<1	<1						
n-propylbenzene	ug/kg	<11	<11	<11	<11			<1	<1						
Sec-Butylbenzene	ug/kg	<10	<10	<10	<10			<1	<1						
Styrene	ug/kg	<10	<10	<10	<10			<1	<1						
Tert-Butylbenzene	ug/kg	<12	<12	<12	<12			<1	<1						
Tetrachloroethene	ug/kg	<5	<5	<5	<5			<1	<1						
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg	<14	<14	<14	<14			<1	<1						
trans-1,2-Dichloroethene	ug/kg	<11	<11	<11	<11			<1	<1						
trans-1,3-Dichloropropene	ug/kg	<14	<14	<14	<14			<10	<10						
Tribromomethane	ug/kg							<1	<1						
Trichloroethene	ug/kg	<9	<9	<9	<9			<1	<1						
Trichlorofluoromethane	ug/kg	<6	<6	<6	<6			<1	<1						
Vinyl Chloride	ug/kg	<10	<10	<10	<10										
SVOCs															
1,2,4-Trichlorobenzene	mg/kg														
1,2-Dichlorobenzene	mg/kg														
1,3-Dichlorobenzene	mg/kg														
1,4-Dichlorobenzene	mg/kg														
2,4,5-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2,4,6-Trichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2,4-Dichlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2,4-Dimethylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2,4-Dinitrotoluene	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2,6-Dinitrotoluene	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2-Chloronaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2-Chlorophenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2-Methyl-4,6-Dinitrophenol	mg/kg							<0.5	<0.5						

M4CAN
Soil Analysis Results & Screening Assessment
Alignment outside of CL sites - chainage
+11,850 to +19,650
16/07/2015

Notes

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Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the
absence of a S4UL

Screening Values and Assessment

Exceeds S4ULs Criteria
Laboratory detection level higher than screening criterion

Green

Geological Formation Legend

MG	Made Ground
TFD	Tidal Flat Deposits

Sample Reference	Units	SBHJ02 CP	SBHJ02 CP	SBHJ03 CP	SBHJ03 CP	BH502	BH502	BH503	BH503	BH503	BH507	BH507	BH510	BH534	BH535
Specimen Depth (m)		0.3	5	0.3	1	0.2 - 0.5	0.5 - 1	0.2 - 0.3	0.5 - 0.7	0.9 - 1.1	0.2 - 0.3	0.6 - 0.8	0 - 0.3	0.3 - 0.5	0.3 - 0.5
OD Level (m)		5.03	0.33	5.07	4.37	6	5.7	5.95	5.65	5.25	5.25	4.85	5.45	4.95	4.85
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		ALLUV	PEAT	TOPSOIL	ALLUV	CLAY	CLAY	MG	MG	CLAY	MG	MG	CLAY	CLAY	CLAY
Cluster Code		2008 GI	2008 GI	2008 GI	2008 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
2-Methylnaphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
2-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
3-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
4-Bromophenyl Phenyl Ether	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
4-Chloro-3-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
4-Chloroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
4-Chlorophenyl Phenyl Ether	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
4-Methylphenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
4-Nitroaniline	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
4-Nitrophenol	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Azobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Bis(2-chloroethoxy)methane	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Bis(2-chloroethyl)ether	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Bis(2-chloroisopropyl)ether	mg/kg							<0.5	<0.5						
Bis(2-ethylhexyl)phthalate	mg/kg	<0.1	<0.1	0.54	<0.1			<0.5	<0.5						
Butylbenzylphthalate	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Carbazole	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Dibenzofuran	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Diethylphthalate	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Dimethylphthalate	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Di-N-Butyl Phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Di-N-Octyl Phthalate	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Hexachlorobenzene (HCB)	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Hexachlorocyclopentadiene	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Hexachloroethane	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Isophorone	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Nitrobenzene	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
n-nitrosodimethylamine	mg/kg							<0.5	<0.5						
N-Nitroso-Di-N-Propylamine	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
Pentachlorophenol (PCP)	mg/kg	<0.1	<0.1	<0.1	<0.1			<0.5	<0.5						
PCBs															
PCB congener 167	ug/kg														
PCB congener 81	ug/kg														
PCB congener 189	ug/kg														
PCB congener 105	ug/kg														
PCB congener 114	ug/kg														
PCB congener 126	ug/kg														
PCB congener 123	ug/kg														
PCB congener 118	ug/kg														
PCB congener 156	ug/kg														
PCB congener 169	ug/kg														
PCB congener 157	ug/kg														
PCB congener 77	ug/kg														
Sum of detected WHO 12 PCBs	ug/kg														

M4CAN
Soil Analysis Results & Screening Assessment
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+11,850 to +19,650
16/07/2015

Notes

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absence of a S4UL

MG	Made Ground
TFD	Tidal Flat Deposits

Sample Reference	Units	BH535	BH536A	TP503	TP515	TP516	TP516	TP517	TP517	TPM4CANA010
Specimen Depth (m)		0.5 - 0.9	0.4 - 0.6	1	1	0 - 0.2	0.2 - 0.4	0 - 0.1	0.7 - 0.9	0.5
OD Level (m)		4.65	4.15	4.6	4.25	5.15	4.95	4.45	3.75	5.38
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		CLAY	MG	CLAY	CLAY	CLAY	CLAY	MG	CLAY	TFD
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI
Inorganics										
Antimony	mg/kg									
Arsenic	mg/kg	19	24	33	10	8.3	11	<1	2.7	16.7
Barium	mg/kg									
Beryllium	mg/kg									
Boron	mg/kg	1.2	1.1	1	0.52	2.1	0.86	2	0.89	
Boron Water Soluble	mg/kg									
Cadmium	mg/kg	<0.1	0.52	0.24	<0.1	<0.1	<0.1	0.19	2.5	0.354
Chromium	mg/kg	55	20	110	18	27	32	3.8	51	40.9
Copper	mg/kg	16	11	16	6.3	12	7.5	4.6	49	9.36
Iron	mg/kg									
Lead	mg/kg	27	33	89	12	39	21	8	120	28
Mercury	mg/kg	<0.1	<0.1	0.11	<0.1	<0.1	<0.1	<0.1	0.35	<0.14
Molybdenum	mg/kg									
Nickel	mg/kg	44	13	56	19	20	26	1.9	28	40.5
Selenium	mg/kg	0.24	<0.2	<0.2	<0.2	0.56	<0.2	<0.2	0.5	<1
Vanadium	mg/kg									59
Zinc	mg/kg	150	43	170	45	100	70	28	260	106
Cyanide (total)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Cyanide (free)	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ammoniacal Nitrogen as N	mg/kg									
Other										
Asbestos Presence Screen	None									
Asbestos Identification	%									
Loss on Ignition	%									
Total Organic Carbon	%		4.8						14	
pH Value	pH Units	7.7	8.4	8	8.3	6.2	8.2	7.4	6.9	8.25
Material >2mm	%									
Sulphate (soluble)	g/l									
Calorific Value	MJ/kg									
Organics										
PCBs (vs Aroclor 1254)	mg/kg									
Phenols Monohydric	mg/kg									<0.035
Cresols	mg/kg									<0.01
Xylenols	mg/kg									<0.015
Phenol	mg/kg									<0.01
Phenols	mg/kg		<0.3					<0.3		
BTEX										
GRO (C4-C12)	mg/kg									<0.5
MTBE	mg/kg									<0.03
Benzene	mg/kg							<0.001	<0.001	<0.07
Toluene	mg/kg							<0.001	<0.001	<0.04
Ethyl Benzene	mg/kg							<0.001	<0.001	<0.05
m & p Xylene	mg/kg							<0.001	<0.001	<0.08
o Xylene	mg/kg							<0.001	<0.001	<0.03
TPH										
TPH >C6-C8.	mg/kg	<1								
TPH >C8-C10.	mg/kg	<1								
TPH >C10-C12.	mg/kg	<1								
TPH >C12-C16.	mg/kg	<1								
TPH >C16-C21.	mg/kg	<1								
TPH >C21-C35.	mg/kg	<1								
Aliphatics C5- C6	mg/kg							<0.1	<0.1	<0.1
Aliphatics >C6-C8	mg/kg							<0.1	<0.1	<0.1
Aliphatics >C8-C10	mg/kg							<0.1	<0.1	<0.1
Aliphatics >C10-C12	mg/kg							<1	<1	<0.1
Aliphatics >C12-C16	mg/kg							<1	<1	<0.1
Aliphatics >C16-C21	mg/kg							<1	<1	<0.1
Aliphatics >C21-C35	mg/kg							<1	<1	<0.1
Total Aliphatics C5-C35	mg/kg									
Aliphatics >C35-44	mg/kg							<1	<1	<0.1
Aromatics >C5-7	mg/kg							<0.1	<0.1	<0.1
Aromatics C6-C7	mg/kg									
Aromatics >C7-8	mg/kg							<0.1	<0.1	<0.1
Aromatics >EC8-EC10	mg/kg							<0.1	<0.1	<0.1
Aromatics >EC10-EC12	mg/kg							<1	<1	<0.1
Aromatics >EC12-EC16	mg/kg							<1	<1	0.262
Aromatics >EC16-EC21	mg/kg							<1	<1	<0.1
Aromatics >EC21-EC35	mg/kg							<1	<1	2.48
Total Aromatics C6-C35	mg/kg									
Aromatics >C35-44	mg/kg							<1	<1	0.541
Total Aliphatic TPH	mg/kg							<5	<5	<0.1
Total Aromatic TPH	mg/kg							<5	<5	3.28
TPH (Aliphatics and Aromatics C5-C35)	mg/kg									3.28
Total petroleum hydrocarbons	mg/kg							<10	<10	
PAH										
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.008
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.012
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.016
Benz(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.55	<0.1	<0.1	<0.1	<0.014
Benzo(a)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015
Benzo(b)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.015

M4CAN
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Specimen Depth (m)		0.5 - 0.9	0.4 - 0.6	1	1	0 - 0.2	0.2 - 0.4	0 - 0.1	0.7 - 0.9	0.5
OD Level (m)		4.65	4.15	4.6	4.25	5.15	4.95	4.45	3.75	5.38
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		CLAY	MG	CLAY	CLAY	CLAY	CLAY	MG	CLAY	TFD
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI
Benzo(ghi)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.024
Benzo(k)fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.014
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1	0.44	<0.1	<0.1	<0.1	<0.01
Dibenzo(ah)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.023
Fluoranthene	mg/kg	<0.1	0.17	0.29	<0.1	0.11	<0.1	<0.1	<0.1	<0.017
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01
Indeno(123cd)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.018
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.009
Phenanthrene	mg/kg	<0.1	<0.1	0.35	<0.1	0.21	<0.1	<0.1	<0.1	<0.015
Pyrene	mg/kg	<0.1	0.21	0.31	<0.1	0.13	<0.1	<0.1	<0.1	<0.015
PAH 16 Total	mg/kg	<2	<2	<2	<2	<2	<2	<2	<2	<0.118
VOCs										
1,1,1,2-Tetrachloroethane	ug/kg									<10
1,1,2,2-Tetrachloroethane	ug/kg									<10
1,1,1-Trichloroethane	ug/kg									<7
1,1,2-Trichloroethane	ug/kg									<10
1,1-Dichloroethane	ug/kg									<8
1,1-Dichloroethene	ug/kg									<10
1,1-Dichloropropene	ug/kg									<10
1,2,3-Trichlorobenzene	ug/kg									<20
1,2,3-Trichloropropane	ug/kg									<16
1,2,4-Trichlorobenzene	ug/kg									<20
1,2,4-Trimethylbenzene	ug/kg									<9
1,2-Dibromo-3-Chloropropane	ug/kg									<14
1,2-Dibromoethane	ug/kg									<10
1,2-Dichlorobenzene	ug/kg									<10
1,2-Dichloroethane	ug/kg									<5
1,2-Dichloropropane	ug/kg									<10
1,3,5-Trimethylbenzene	ug/kg									<8
1,3-Dichlorobenzene	ug/kg									<8
1,3-Dichloropropane	ug/kg									<7
1,4-Dichlorobenzene	ug/kg									<5
2,2-Dichloropropane	ug/kg									<10
2-Chlorotoluene	ug/kg									<9
4-Chlorotoluene	ug/kg									<10
4-Isopropyltoluene	ug/kg									<10
Bromobenzene	ug/kg									<10
Bromochloromethane	ug/kg									<10
Bromodichloromethane	ug/kg									<7
Bromoform	ug/kg									<10
Bromomethane	ug/kg									<10
Carbon Disulphide	ug/kg									<7
Chlorobenzene	ug/kg									<5
Chloroethane	ug/kg									<10
Chloroethene	ug/kg									<8
Chloroform	ug/kg									<7
Chloromethane	ug/kg									<6
cis-1,2-Dichloroethene	ug/kg									<10
cis-1,3-Dichloropropene	ug/kg									<10
Dibromochloromethane	ug/kg									<10
Dibromomethane	ug/kg									<9
Dichlorodifluoromethane	ug/kg									<6
Dichloromethane	ug/kg									<10
Hexachlorobutadiene (HCBD)	ug/kg									<20
Isopropylbenzene	ug/kg									<5
n-Butylbenzene	ug/kg									<11
n-propylbenzene	ug/kg									<10
Sec-Butylbenzene	ug/kg									<10
Styrene	ug/kg									<10
Tert-Butylbenzene	ug/kg									<14
Tetrachloroethene	ug/kg									<5
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg									<10
trans-1,2-Dichloroethene	ug/kg									<10
trans-1,3-Dichloropropene	ug/kg									<10
Tribromomethane	ug/kg									
Trichloroethene	ug/kg									<9
Trichlorofluoromethane	ug/kg									<6
Vinyl Chloride	ug/kg									<6
SVOCs										
1,2,4-Trichlorobenzene	mg/kg									<0.1
1,2-Dichlorobenzene	mg/kg									<0.1
1,3-Dichlorobenzene	mg/kg									<0.1
1,4-Dichlorobenzene	mg/kg									<0.1
2,4,5-Trichlorophenol	mg/kg									<0.1
2,4,6-Trichlorophenol	mg/kg									<0.1
2,4-Dichlorophenol	mg/kg									<0.1
2,4-Dimethylphenol	mg/kg									<0.1
2,4-Dinitrotoluene	mg/kg									<0.1
2,6-Dinitrotoluene	mg/kg									<0.1
2-Chloronaphthalene	mg/kg									<0.1
2-Chlorophenol	mg/kg									<0.1
2-Methyl-4,6-Dinitrophenol	mg/kg									<0.1

M4CAN
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Elemental Mercury criteria used
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Screening Values and Assessment

Exceeds S4ULs Criteria Laboratory detection level higher than screening criterion

Green

Geological Formation Legend

MG

Made Ground	

Tidal Flat Deposits

[illegible]

M4CAN
Soil Analysis Results & Screening Assessment
Alignment outside of CL sites - chainage +19,650 to +24,000
16/07/2015

Sample Reference	Units
Specimen Depth (m)	
OD Level (m)	
Sample Type	
Geology Code	
Cluster Code	
Inorganics	
Antimony	mg/kg
Arsenic	mg/kg
Barium	mg/kg
Beryllium	mg/kg
Boron	mg/kg
Boron Water Soluble	mg/kg
Cadmium	mg/kg
Chromium	mg/kg
Copper	mg/kg
Iron	mg/kg
Lead	mg/kg
Mercury	mg/kg
Molybdenum	mg/kg
Nickel	mg/kg
Selenium	mg/kg
Vanadium	mg/kg
Zinc	mg/kg
Cyanide (total)	mg/kg
Cyanide (free)	mg/kg
Ammoniacal Nitrogen as N	mg/kg
Other	
Asbestos Presence Screen	None
Asbestos Identification	%
Loss on Ignition	%
Total Organic Carbon	%
pH Value	pH Units
Material >2mm	%
Sulphate (soluble)	g/l
Calorific Value	MJ/kg
Organics	
PCBs (vs Aroclor 1254)	mg/kg
Phenols Monohydric	mg/kg
Phenol	mg/kg
Phenols	mg/kg
BTEX	
GRO (C4-C12)	mg/kg
MTBE	mg/kg
Benzene	mg/kg
Toluene	mg/kg
Ethyl benzene	mg/kg
m & p Xylene	mg/kg
o Xylene	mg/kg
TPH	
TPH >C6-C8.	mg/kg
TPH >C8-C10.	mg/kg
TPH >C10-C12.	mg/kg
TPH >C12-C16.	mg/kg
TPH >C16-C21.	mg/kg
TPH >C21-C35.	mg/kg
Aliphatics C5-C6	mg/kg
Aliphatics >C6-C8	mg/kg
Aliphatics >C8-C10	mg/kg
Aliphatics >C10-C12	mg/kg
Aliphatics >C12-C16	mg/kg
Aliphatics >C16-C21	mg/kg
Aliphatics >C21-C35	mg/kg
Total Aliphatics C5-C35	mg/kg
Aliphatics >C35-44	mg/kg
Aromatics >C5-7	mg/kg
Aromatics C6-C7	mg/kg
Aromatics >C7-8	mg/kg
Aromatics >EC8-EC10	mg/kg
Aromatics >EC10-EC12	mg/kg
Aromatics >EC12-EC16	mg/kg
Aromatics >EC16-EC21	mg/kg
Aromatics >EC21-EC35	mg/kg
Total Aromatics C6-C35	mg/kg
Aromatics >C35-44	mg/kg
Total Aliphatic TPH	mg/kg
Total Aromatic TPH	mg/kg
TPH (Aliphatics and Aromatics C5-C35)	mg/kg
Total petroleum hydrocarbons	mg/kg
PAH	
Acenaphthene	mg/kg
Acenaphthylene	mg/kg
Anthracene	mg/kg
Benz(a)anthracene	mg/kg
Benzo(a)pyrene	mg/kg
Benzo(b)fluoranthene	mg/kg
Benzo(ghi)perylene	mg/kg
Benzo(k)fluoranthene	mg/kg
Chrysene	mg/kg
Dibenzo(ah)anthracene	mg/kg
Fluoranthene	mg/kg
Fluorene	mg/kg

Screening Values and Assessment

	Exceeds S4ULs Criteria
Green	Laboratory detection level higher than screening criterion

Notes

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for lead is C4SL in the absence of a S4UL

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	Selected S4ULs Criteria	No. Data Exceeding S4ULs Criteria
0	0	None > LOD	None > LOD			
49	48	74	4	BH566C @ 19.55mbGL	170	0
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD		12	0
48	29	9.1	0.4	BH537 @ 4.25mbGL	46000	0
0	0	None > LOD	None > LOD			
49	42	1.9	0.13	BH561 @ 26.8mbGL	190	0
49	48	76	6.7	BH557 @ 35.4mbGL	33	16
49	46	93	2.8	BH541 @ 11.15mbGL	44000	0
0	0	None > LOD	None > LOD			
49	48	120	3.9	BH561 @ 26.8mbGL	1300	0
49	11	0.38	0.1	BH561 @ 25.9mbGL	30	0
0	0	None > LOD	None > LOD			
49	48	66	5.3	BH557 @ 35.4mbGL	980	0
49	23	1.1	0.2	TP518 @ 4.3mbGL	1800	0
1	1	31.8	31.8	TPM4CAN026 @ 37.28mbGL	5000	0
49	49	330	1.6	TP536 @ 31.75mbGL	170000	0
48	1	1.3	1.3	TP536 @ 31.75mbGL		
48	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
20	20	0	0	BH538 @ 6.55mbGL		
20	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
4	4	7.4	0.56	BH561 @ 25.9mbGL		
49	49	9.9	5.7	BH555 @ 22.65mbGL	6-9	0
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD			
0	0	None > LOD	None > LOD		0.24	0
0	0	None > LOD	None > LOD		440	0
3	0	None > LOD	None > LOD		440	0
21	0	None > LOD	None > LOD		440	0
1	0	None > LOD	None > LOD			
4	0	None > LOD	None > LOD			
14	0	None > LOD	None > LOD		27	0
14	0	None > LOD	None > LOD		56000	0
14	0	None > LOD	None > LOD		5700	0
14	0	None > LOD	None > LOD		5900	0
14	0	None > LOD	None > LOD		6600	0
14	0	None > LOD	None > LOD		7800	0
14	0	None > LOD	None > LOD		2000	0
14	0	None > LOD	None > LOD		9200	0
14	0	None > LOD	None > LOD		10000	0
14	1	1.6	1.6	BH566B @ 19.75mbGL	7600	0
14	0	None > LOD	None > LOD		7800	0
13	0	None > LOD	None > LOD		3200	0
13	0	None > LOD	None > LOD		7800	0
13	0	None > LOD	None > LOD		2000	0
13	0	None > LOD	None > LOD		9700	0
13	0	None > LOD	None > LOD		25000	0
13	0	None > LOD	None > LOD		450000	0
13	0	None > LOD	None > LOD		450000	0
1	0	None > LOD	None > LOD		2000	0
13	0	None > LOD	None > LOD		450000	0
13	0	None > LOD	None > LOD		26000	0
0	0	None > LOD	None > LOD		7800	0
13	0	None > LOD	None > LOD		56000	0
13	0	None > LOD	None > LOD		3500	0
13	0	None > LOD	None > LOD		9200	0
13	0	None > LOD	None > LOD		10000	0
13	0	None > LOD	None > LOD		7600	0
13	0	None > LOD	None > LOD		7800	0
1	0	None > LOD	None > LOD		3500	0
13	0	None > LOD	None > LOD		7800	0
12	0	None > LOD	None > LOD		2000	0
12	0	None > LOD	None > LOD		3500	0
1	0	None > LOD	None > LOD		2000	0
12	0	None > LOD	None > LOD		2000	0
49	2	0.26	0.15	BH537 @ 4.25mbGL	29000	0
49	1	0.29	0.29	BH537 @ 4.25mbGL	29000	0
49	2	0.17	0.1	BH538 @ 6.55mbGL	150000	0
49	1	4.8	4.8	TP518 @ 4.3mbGL		
49	0	None > LOD	None > LOD		11	0
49	0	None > LOD	None > LOD		13	0
49	0	None > LOD	None > LOD		1400	0
49	0	None > LOD	None > LOD		370	0
49	1	1.6	1.6	TP518 @ 4.3mbGL	93	0
49	0	None > LOD	None > LOD		1.1	0
49	11	18	0.12	BH537 @ 4.25mbGL	6300	0
49	2	0.17	0.16	BH537 @ 4.25mbGL	20000	0

M4CAN Soil Analysis Results & Screening Assessment Alignment outside of CL sites - chainage +19,650 to +24,000 16/07/2015 Screening Values and Assessment	
NAD = No Asbestos Detected Chromium VI criteria used Elemental Mercury criteria used Screening criterion for Pb is C4SL in the absence of a S4UL	
Notes	
Exceeds S4ULs Criteria Laboratory detection level higher than screening criterion	Green

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	Units	BH537	BH538	BH539	BH539	BH539	BH540	BH541	BH541	BH543	BH543	BH543	BH543
Specimen Depth (m)		0.3 - 0.5	0.2 - 0.4	0 - 0.2	0.5 - 0.7	1 - 1.2	0.2 - 0.5	0.2 - 0.4	0.6 - 0.8	0.3 - 0.5	0.8 - 1	1.5 - 1.6	3.5 - 3.6
OD Level (m)		4.25	6.55	6.35	5.85	5.35	10.65	11.15	10.75	28.05	27.55	26.85	24.85
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		PEAT	CLAY	CLAY	CLAY	CLAY	SILT	SAND	SAND	SAND/MG?	CLAY/MG?	GRAVEL/MG?	CLAY
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
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
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
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
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
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
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
Fluoranthene	mg/kg	18	0.26	0.38	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.17	<0.1	0.16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
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
Naphthalene	mg/kg	0.94	<0.1	0.16	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.24	0.24	0.25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	23	0.24	0.24	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAH 16 Total	mg/kg	43	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
VOCs													
1,1,1,2-Tetrachloroethane	ug/kg								<2				
1,1,2,2-Tetrachloroethane	ug/kg												
1,1,1-Trichloroethane	ug/kg								<1				
1,1,2-Trichloroethane	ug/kg								<10				
1,1-Dichloroethane	ug/kg								<1				
1,1-Dichloroethene	ug/kg								<1				
1,1-Dichloropropene	ug/kg								<1				
1,2,3-Trichlorobenzene	ug/kg								<2				
1,2,3-Trichloropropane	ug/kg								<50				
1,2,4-Trichlorobenzene	ug/kg								<2				
1,2,4-Trimethylbenzene	ug/kg								<1				
1,2-Dibromo-3-Chloropropane	ug/kg								<50				
1,2-Dibromoethane	ug/kg								<5				
1,2-Dichlorobenzene	ug/kg								<1				
1,2-Dichloroethane	ug/kg								<2				
1,2-Dichloropropane	ug/kg								<1				
1,3,5-Trimethylbenzene	ug/kg								<1				
1,3-Dichlorobenzene	ug/kg								<1				
1,3-Dichloropropane	ug/kg								<1				
1,4-Dichlorobenzene	ug/kg								<1				
2,2-Dichloropropane	ug/kg												
2-Chlorotoluene	ug/kg								<1				
4-Chlorotoluene	ug/kg								<1				
4-Isopropyltoluene	ug/kg								<1				
Bromobenzene	ug/kg								<1				
Bromochloromethane	ug/kg								<5				
Bromodichloromethane	ug/kg								<5				
Bromoform	ug/kg												
Bromomethane	ug/kg								<20				
Carbon Disulphide	ug/kg												
Chlorobenzene	ug/kg								<1				
Chloroethane	ug/kg								<2				
Chloroethene	ug/kg								<1				
Chloroform	ug/kg								<1				
Chloromethane	ug/kg								<1				
cis-1,2-Dichloroethene	ug/kg								<1				
cis-1,3-Dichloropropene	ug/kg								<10				
Dibromochloromethane	ug/kg								<10				
Dibromomethane	ug/kg								<1				
Dichlorodifluoromethane	ug/kg								<1				
Dichloromethane	ug/kg												
Hexachlorobutadiene (HCBD)	ug/kg								<1				
Isopropylbenzene	ug/kg								<1				
n-Butylbenzene	ug/kg								<1				
n-propylbenzene	ug/kg								<1				
Sec-Butylbenzene	ug/kg								<1				
Styrene	ug/kg								<1				
Tert-Butylbenzene	ug/kg								<1				
Tetrachloroethene	ug/kg								<1				
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg								<1				
trans-1,2-Dichloroethene	ug/kg								<1				
trans-1,3-Dichloropropene	ug/kg								<10				
Tribromomethane	ug/kg								<1				
Trichloroethene	ug/kg								<1				
Trichlorofluoromethane	ug/kg								<1				
Vinyl Chloride	ug/kg												
SVOCs													
2,4,5-Trichlorophenol	mg/kg								<0.5				
2,4,6-Trichlorophenol	mg/kg								<0.5				
2,4-Dichlorophenol	mg/kg								<0.5				
2,4-Dimethylphenol	mg/kg								<0.5				
2,4-Dinitrotoluene	mg/kg								<0.5				
2,6-Dinitrotoluene	mg/kg								<0.5				
2-Chloronaphthalene	mg/kg								<0.5				

M4CAN	
Soil Analysis Results & Screening Assessment	
Alignment outside of CL sites - chainage +19,650 to +24,000	
16/07/2015	
Screening Values and Assessment	
NAD = No Asbestos Detected	
Chromium VI criteria used	
Elemental Mercury criteria used	
Screening criterion for Pb is C4SL in the absence of a S4UL	
Notes	
Exceeds S4ULs Criteria	Green
Laboratory detection level higher than screening criterion	

Geological Formation Legend	
MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	Units	BH537	BH538	BH539	BH539	BH539	BH540	BH541	BH541	BH543	BH543	BH543	BH543
Specimen Depth (m)		0.3 - 0.5	0.2 - 0.4	0 - 0.2	0.5 - 0.7	1 - 1.2	0.2 - 0.5	0.2 - 0.4	0.6 - 0.8	0.3 - 0.5	0.8 - 1	1.5 - 1.6	3.5 - 3.6
OD Level (m)		4.25	6.55	6.35	5.85	5.35	10.65	11.15	10.75	28.05	27.55	26.85	24.85
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		PEAT	CLAY	CLAY	CLAY	CLAY	SILT	SAND	SAND	SAND/MG?	CLAY/MG?	GRAVEL/MG?	CLAY
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI
2-Chlorophenol	mg/kg								<0.5				
2-Methyl-4,6-Dinitrophenol	mg/kg								<0.5				
2-Methylnaphthalene	mg/kg								<0.5				
2-Methylphenol	mg/kg								<0.5				
2-Nitroaniline	mg/kg								<0.5				
2-Nitrophenol	mg/kg								<0.5				
3-Nitroaniline	mg/kg								<0.5				
4-Bromophenyl Phenyl Ether	mg/kg								<0.5				
4-Chloro-3-Methylphenol	mg/kg								<0.5				
4-Chloroaniline	mg/kg								<0.5				
4-Chlorophenyl Phenyl Ether	mg/kg								<0.5				
4-Methylphenol	mg/kg								<0.5				
4-Nitroaniline	mg/kg								<0.5				
4-Nitrophenol	mg/kg								<0.5				
Azobenzene	mg/kg								<0.5				
Bis(2-chloroethoxy)methane	mg/kg								<0.5				
Bis(2-chloroethyl)ether	mg/kg								<0.5				
Bis(2-chloroisopropyl)ether	mg/kg								<0.5				
Bis(2-ethylhexyl)phthalate	mg/kg								<0.5				
Butylbenzylphthalate	mg/kg								<0.5				
Carbazole	mg/kg								<0.5				
Dibenzofuran	mg/kg								<0.5				
Diethylphthalate	mg/kg								<0.5				
Dimethylphthalate	mg/kg								<0.5				
Di-N-Butyl Phthalate	mg/kg								<0.5				
Di-N-Octyl Phthalate	mg/kg								<0.5				
Hexachlorobenzene (HCB)	mg/kg								<0.5				
Hexachlorocyclopentadiene	mg/kg								<0.5				
Hexachloroethane	mg/kg								<0.5				
Isophorone	mg/kg								<0.5				
Nitrobenzene	mg/kg								<0.5				
n-nitrosodimethylamine	mg/kg								<0.5				
N-Nitroso-Di-N-Propylamine	mg/kg								<0.5				
Pentachlorophenol (PCP)	mg/kg								<0.5				

M4CAN Soil Analysis Results & Screening Assessment Alignment outside of CL sites - chainage +19,650 to +24,000 16/07/2015	
Screening Values and Assessment	
NAD = No Asbestos Detected Chromium VI criteria used Elemental Mercury criteria used Screening criterion for Pb is C4SL in the absence of a S4UL	
Notes Exceeds S4ULs Criteria Laboratory detection level higher than screening criterion	Green

Geological Formation Legend	
MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	Units	BH537	BH548	BH550	BH555	BH555	BH555A	BH556	BH556	BH557	BH557	BH558	BH561	BH561	BH562
Specimen Depth (m)		0.3 - 0.5	0 - 0.3	0 - 0.5	0.4 - 0.5	1 - 1.1	0.7 - 0.8	0 - 0.2	0.4 - 0.6	0 - 0.2	0.4 - 1	0.2 - 0.5	0.1 - 0.2	1 - 1.2	0.1 - 0.2
OD Level (m)		4.25	24.05	23	22.65	22.05	28.9	29.6	29.2	35.4	35	37.1	26.8	25.9	26.3
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		PEAT	CLAY	CLAY	MG	MG	MG	CLAY	CLAY	CLAY	CLAY	MG	CLAY	SAND /BRE	CLAY
Cluster Code		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															
Antimony	mg/kg														
Arsenic	mg/kg	<1	15	18	43	64	26	24	35	46	18	16	65	44	10
Barium	mg/kg														
Beryllium	mg/kg														
Boron	mg/kg	9.1	0.48	0.64	<0.4	<0.4	0.46	1.1	0.73	<0.4	1.6	0.61	0.8	<0.4	5.3
Boron Water Soluble	mg/kg														
Cadmium	mg/kg	<0.1	0.26	0.64	0.24	0.41	0.22	0.38	0.26	0.85	0.43	0.49	1.9	0.41	0.66
Chromium	mg/kg	<1	25	30	13	13	26	22	22	76	34	33	57	25	20
Copper	mg/kg	2.8	27	31	4.1	5.8	19	9.8	8.4	28	18	21	19	2.9	7.1
Iron	mg/kg														
Lead	mg/kg	<0.5	36	67	8	16	26	17	11	26	32	39	120	11	16
Mercury	mg/kg	<0.1	<0.1	0.13	<0.1	<0.1	<0.1	<0.1	<0.1	0.11	<0.1	<0.1	0.13	0.38	<0.1
Molybdenum	mg/kg														
Nickel	mg/kg	<0.5	32	23	9.9	10	12	21	20	66	27	23	42	12	14
Selenium	mg/kg	0.35	<0.2	0.22	<0.2	<0.2	<0.2	0.28	<0.2	0.68	0.24	<0.2	0.78	<0.2	0.48
Vanadium	mg/kg														
Zinc	mg/kg	1.6	71	300	25	38	71	67	57	190	100	110	300	62	150
Cyanide (total)	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
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
Ammoniacal Nitrogen as N	mg/kg														
Other															
Asbestos Presence Screen	None				0	0		0	0	0	0		0		
Asbestos Identification	%				<0.001	<0.001		<0.001	<0.001	<0.001	<0.001		<0.001		
Loss on Ignition	%														
Total Organic Carbon	%	5.8												7.4	
pH Value	pH Units	6.2	6.7	8.1	9.9	9.8	8.5	7.9	8.4	7.4	7.2	7.6	7.5	9.1	8.5
Material >2mm	%														
Sulphate (soluble)	g/l														
Calorific Value	MJ/kg														
Organics															
PCBs (vs Aroclor 1254)	mg/kg														
Phenols Monohydric	mg/kg														
Phenol	mg/kg										<0.5		<0.5		

M4CAN	
Soil Analysis Results & Screening Assessment	
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16/07/2015	
Screening Values and Assessment	
NAD = No Asbestos Detected	
Chromium VI criteria used	
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Screening criterion for Pb is C4SL in the absence of a S4UL	
Notes	
Exceeds S4ULs Criteria	Green
Laboratory detection level higher than screening criterion	

Geological Formation Legend	
MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	Units	BH537	BH548	BH550	BH555	BH555	BH555A	BH556	BH556	BH557	BH557	BH558	BH561	BH561	BH562
Specimen Depth (m)		0.3 - 0.5	0 - 0.3	0 - 0.5	0.4 - 0.5	1 - 1.1	0.7 - 0.8	0 - 0.2	0.4 - 0.6	0 - 0.2	0.4 - 1	0.2 - 0.5	0.1 - 0.2	1 - 1.2	0.1 - 0.2
OD Level (m)		4.25	24.05	23	22.65	22.05	28.9	29.6	29.2	35.4	35	37.1	26.8	25.9	26.3
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		PEAT	CLAY	CLAY	MG	MG	MG	CLAY	CLAY	CLAY	CLAY	MG	CLAY	SAND /BR	CLAY
Cluster Code		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
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
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
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
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
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
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
Fluoranthene	mg/kg	18	<0.1	<0.1	0.28	<0.1	0.35	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	0.17	<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
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
Naphthalene	mg/kg	0.94	<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
Phenanthrene	mg/kg	0.24	<0.1	<0.1	0.17	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	23	<0.1	<0.1	0.32	<0.1	0.25	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PAH 16 Total	mg/kg	43	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
VOCs															
1,1,1,2-Tetrachloroethane	ug/kg										<2		<2		
1,1,2,2-Tetrachloroethane	ug/kg														
1,1,1-Trichloroethane	ug/kg										<1		<1		
1,1,2-Trichloroethane	ug/kg										<10		<10		
1,1-Dichloroethane	ug/kg										<1		<1		
1,1-Dichloroethene	ug/kg										<1		<1		
1,1-Dichloropropene	ug/kg										<1		<1		
1,2,3-Trichlorobenzene	ug/kg										<2		<2		
1,2,3-Trichloropropane	ug/kg										<50		<50		
1,2,4-Trichlorobenzene	ug/kg										<2		<2		
1,2,4-Trimethylbenzene	ug/kg										<1		<1		
1,2-Dibromo-3-Chloropropane	ug/kg										<50		<50		
1,2-Dibromoethane	ug/kg										<5		<5		
1,2-Dichlorobenzene	ug/kg										<1		<1		
1,2-Dichloroethane	ug/kg										<2		<2		
1,2-Dichloropropane	ug/kg										<1		<1		
1,3,5-Trimethylbenzene	ug/kg										<1		<1		
1,3-Dichlorobenzene	ug/kg										<1		<1		
1,3-Dichloropropane	ug/kg										<1		<1		
1,4-Dichlorobenzene	ug/kg										<1		<1		
2,2-Dichloropropane	ug/kg														
2-Chlorotoluene	ug/kg										<1		<1		
4-Chlorotoluene	ug/kg										<1		<1		
4-Isopropyltoluene	ug/kg										<1		<1		
Bromobenzene	ug/kg										<1		<1		
Bromochloromethane	ug/kg										<5		<5		
Bromodichloromethane	ug/kg										<5		<5		
Bromoform	ug/kg														
Bromomethane	ug/kg										<20		<20		
Carbon Disulphide	ug/kg														
Chlorobenzene	ug/kg										<1		<1		
Chloroethane	ug/kg										<2		<2		
Chloroethene	ug/kg										<1		<1		
Chloroform	ug/kg										<1		<1		
Chloromethane	ug/kg										<1		<1		
cis-1,2-Dichloroethene	ug/kg										<1		<1		
cis-1,3-Dichloropropene	ug/kg										<10		<10		
Dibromochloromethane	ug/kg										<10		<10		
Dibromomethane	ug/kg										<1		<1		
Dichlorodifluoromethane	ug/kg										<1		<1		
Dichloromethane	ug/kg														
Hexachlorobutadiene (HCBd)	ug/kg										<1		<1		
Isopropylbenzene	ug/kg										<1		<1		
n-Butylbenzene	ug/kg										<1		<1		
n-propylbenzene	ug/kg										<1		<1		
Sec-Butylbenzene	ug/kg										<1		<1		
Styrene	ug/kg										<1		<1		
Tert-Butylbenzene	ug/kg										<1		<1		
Tetrachloroethene	ug/kg										<1		<1		
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg										<1		<1		
trans-1,2-Dichloroethene	ug/kg										<1		<1		
trans-1,3-Dichloropropene	ug/kg										<10		<10		
Tribromomethane	ug/kg										<1		<1		
Trichloroethene	ug/kg										<1		<1		
Trichlorofluoromethane	ug/kg										<1		<1		
Vinyl Chloride	ug/kg														
SVOCs															
2,4,5-Trichlorophenol	mg/kg										<0.5		<0.5		
2,4,6-Trichlorophenol	mg/kg										<0.5		<0.5		
2,4-Dichlorophenol	mg/kg										<0.5		<0.5		
2,4-Dimethylphenol	mg/kg										<0.5		<0.5		
2,4-Dinitrotoluene	mg/kg										<0.5		<0.5		
2,6-Dinitrotoluene	mg/kg										<0.5		<0.5		
2-Chloronaphthalene	mg/kg										<0.5		<0.5		

M4CAN	
Soil Analysis Results & Screening Assessment	
Alignment outside of CL sites - chainage +19,650 to +24,000	
16/07/2015	
Screening Values and Assessment	
NAD = No Asbestos Detected	
Chromium VI criteria used	
Elemental Mercury criteria used	
Screening criterion for Pb is C4SL in the absence of a S4UL	
Notes	
Exceeds S4ULs Criteria	Green
Laboratory detection level higher than screening criterion	

Geological Formation Legend	
MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	Units	BH537	BH548	BH550	BH555	BH555	BH555A	BH556	BH556	BH557	BH557	BH558	BH561	BH561	BH562
Specimen Depth (m)		0.3 - 0.5	0 - 0.3	0 - 0.5	0.4 - 0.5	1 - 1.1	0.7 - 0.8	0 - 0.2	0.4 - 0.6	0 - 0.2	0.4 - 1	0.2 - 0.5	0.1 - 0.2	1 - 1.2	0.1 - 0.2
OD Level (m)		4.25	24.05	23	22.65	22.05	28.9	29.6	29.2	35.4	35	37.1	26.8	25.9	26.3
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		PEAT	CLAY	CLAY	MG	MG	MG	CLAY	CLAY	CLAY	CLAY	MG	CLAY	SAND /BR	CLAY
Cluster Code		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
2-Chlorophenol	mg/kg										<0.5		<0.5		
2-Methyl-4,6-Dinitrophenol	mg/kg										<0.5		<0.5		
2-Methylnaphthalene	mg/kg										<0.5		<0.5		
2-Methylphenol	mg/kg										<0.5		<0.5		
2-Nitroaniline	mg/kg										<0.5		<0.5		
2-Nitrophenol	mg/kg										<0.5		<0.5		
3-Nitroaniline	mg/kg										<0.5		<0.5		
4-Bromophenyl Phenyl Ether	mg/kg										<0.5		<0.5		
4-Chloro-3-Methylphenol	mg/kg										<0.5		<0.5		
4-Chloroaniline	mg/kg										<0.5		<0.5		
4-Chlorophenyl Phenyl Ether	mg/kg										<0.5		<0.5		
4-Methylphenol	mg/kg										<0.5		<0.5		
4-Nitroaniline	mg/kg										<0.5		<0.5		
4-Nitrophenol	mg/kg										<0.5		<0.5		
Azobenzene	mg/kg										<0.5		<0.5		
Bis(2-chloroethoxy)methane	mg/kg										<0.5		<0.5		
Bis(2-chloroethyl)ether	mg/kg										<0.5		<0.5		
Bis(2-chloroisopropyl)ether	mg/kg										<0.5		<0.5		
Bis(2-ethylhexyl)phthalate	mg/kg										<0.5		<0.5		
Butylbenzylphthalate	mg/kg										<0.5		<0.5		
Carbazole	mg/kg										<0.5		<0.5		
Dibenzofuran	mg/kg										<0.5		<0.5		
Diethylphthalate	mg/kg										<0.5		<0.5		
Dimethylphthalate	mg/kg										<0.5		<0.5		
Di-N-Butyl Phthalate	mg/kg										<0.5		<0.5		
Di-N-Octyl Phthalate	mg/kg										<0.5		<0.5		
Hexachlorobenzene (HCB)	mg/kg										<0.5		<0.5		
Hexachlorocyclopentadiene	mg/kg										<0.5		<0.5		
Hexachloroethane	mg/kg										<0.5		<0.5		
Isophorone	mg/kg										<0.5		<0.5		
Nitrobenzene	mg/kg										<0.5		<0.5		
n-nitrosodimethylamine	mg/kg										<0.5		<0.5		
N-Nitroso-Di-N-Propylamine	mg/kg										<0.5		<0.5		
Pentachlorophenol (PCP)	mg/kg										<0.5		<0.5		

M4CAN	
Soil Analysis Results & Screening Assessment	
Alignment outside of CL sites - chainage +19,650 to +24,000	
16/07/2015	
Screening Values and Assessment	
NAD = No Asbestos Detected	
Chromium VI criteria used	
Elemental Mercury criteria used	
Screening criterion for Pb is C4SL in the absence of a S4UL	
Notes	
Exceeds S4ULs Criteria	Green
Laboratory detection level higher than screening criterion	

Geological Formation Legend	
MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	Units	BH537	BH563	BH564	BH564	BH565	BH565A	BH566B	BH566C	TP518	TP518	TP527	TP528	TP528
Specimen Depth (m)		0.3 - 0.5	0.6 - 0.9	1 - 1.2	1.5 - 1.6	0.7 - 0.8	0.5 - 0.6	0.5 - 0.6	0.7 - 0.8	0 - 0.3	0.8 - 1	0 - 0.15	0 - 0.2	0.8 - 1
OD Level (m)		4.25	13.75	20.8	20.3	20.2	20.5	19.75	19.55	5.1	4.3	14.6	33.15	32.35
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		PEAT	SAND	MG	MG	MG	MG	MG	MG	MG	CLAY	CLAY	SILT	MG
Cluster Code		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														
Antimony	mg/kg													
Arsenic	mg/kg	<1	7.1	40	57	45	52	50	74	9.4	18	6	23	27
Barium	mg/kg													
Beryllium	mg/kg													
Boron	mg/kg	9.1	0.62	0.63	7.8	<0.4	<0.4	<0.4	<0.4	0.96	1.6	<0.4	0.71	0.59
Boron Water Soluble	mg/kg													
Cadmium	mg/kg	<0.1	0.53	0.36	0.56	0.34	0.39	0.41	0.36	<0.1	0.28	0.26	0.49	0.31
Chromium	mg/kg	<1	16	13	33	6.7	7.3	7.8	16	25	27	12	42	36
Copper	mg/kg	2.8	7.7	11	87	<.5	<0.5	<0.5	3.6	16	16	12	16	11
Iron	mg/kg													
Lead	mg/kg	<0.5	17	7.9	23	3.9	5.6	6.2	4.1	36	48	26	28	17
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.11	<0.1	<0.1	0.11	<0.1	0.1	0.11
Molybdenum	mg/kg													
Nickel	mg/kg	<0.5	21	9.4	19	5.3	7.2	8.6	11	18	19	12	37	28
Selenium	mg/kg	0.35	0.34	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.81	1.1	0.44	<0.2	0.22
Vanadium	mg/kg													
Zinc	mg/kg	1.6	89	44	190	17	20	27	31	79	52	51	120	83
Cyanide (total)	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
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
Ammoniacal Nitrogen as N	mg/kg													
Other														
Asbestos Presence Screen	None			0		0	0	0	0				0	0
Asbestos Identification	%			<0.001		<0.001	<0.001	<0.001	<0.001				<0.001	<0.001
Loss on Ignition	%													
Total Organic Carbon	%	5.8										1.1		
pH Value	pH Units	6.2	7.5	9.6	8.3	9.5	9.2	7.9	9.4	6.1	5.7	6.8	7.3	8.2
Material >2mm	%													
Sulphate (soluble)	g/l													
Calorific Value	MJ/kg													
Organics														
PCBs (vs Aroclor 1254)	mg/kg													
Phenols Monohydric	mg/kg													
Phenol	mg/kg													
Phenols	mg/kg			<0.3	<0.3	<0.3	<0.3	<0.3	<0.3				<0.3	<0.3
BTEX														
GRO (C4-C12)	mg/kg													
MTBE	mg/kg													
Benzene	mg/kg			<1	<1		<1						<1	<1
Toluene	mg/kg			<1	<1		<1						<1	<1
Ethyl benzene	mg/kg			<1	<1		<1						<1	<1
m & p Xylene	mg/kg			<1	<1		<1						<1	<1
o Xylene	mg/kg			<1	<1		<1						<1	<1
TPH														
TPH >C6-C8.	mg/kg					<1		<1	<1					
TPH >C8-C10.	mg/kg					<1		<1	<1					
TPH >C10-C12.	mg/kg					<1		<1	<1					
TPH >C12-C16.	mg/kg					<1		<1	<1					
TPH >C16-C21.	mg/kg					<1		1.6	<1					
TPH >C21-C35.	mg/kg					<1		<1	<1					
Aliphatics C5-C6	mg/kg			<0.1	<0.1		<0.1						<0.1	<0.1
Aliphatics >C6-C8	mg/kg			<0.1	<0.1		<0.1						<0.1	<0.1
Aliphatics >C8-C10	mg/kg			<0.1	<0.1		<0.1						<0.1	<0.1
Aliphatics >C10-C12	mg/kg			<1	<1		<1						<1	<1
Aliphatics >C12-C16	mg/kg			<1	<1		<1						<1	<1
Aliphatics >C16-C21	mg/kg			<1	<1		<1						<1	<1
Aliphatics >C21-C35	mg/kg			<1	<1		<1						<1	<1
Total Aliphatics C5-C35	mg/kg													
Aliphatics >C35-44	mg/kg			<1	<1		<1						<1	<1
Aromatics >C5-7	mg/kg			<0.1	<0.1		<0.1						<0.1	<0.1
Aromatics C6-C7	mg/kg													
Aromatics >C7-8	mg/kg			<0.1	<0.1		<0.1						<0.1	<0.1
Aromatics >EC8-EC10	mg/kg			<0.1	<0.1		<0.1						<0.1	<0.1
Aromatics >EC10-EC12	mg/kg			<1	<1		<1						<1	<1
Aromatics >EC12-EC16	mg/kg			<1	<1		<1						<1	<1
Aromatics >EC16-EC21	mg/kg			<1	<1		<1						<1	<1
Aromatics >EC21-EC35	mg/kg			<1	<1		<1						<1	<1
Total Aromatics C6-C35	mg/kg													
Aromatics >C35-44	mg/kg			<1	<1		<1						<1	<1
Total Aliphatic TPH	mg/kg			<5	<5		<5						<5	<5
Total Aromatic TPH	mg/kg			<5	<5		<5						<5	<5
TPH (Aliphatics and Aromatics C5-C35)	mg/kg													
Total petroleum hydrocarbons	mg/kg			<10	<10		<10						<10	<10
PAH														
Acenaphthene	mg/kg	0.26	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	0.29	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
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
Benz(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4.8	<0.1	<0.1	<0.1

M4CAN
Soil Analysis Results & Screening Assessment
Alignment outside of CL sites - chainage +19,650 to +24,000
16/07/2015

Screening Values and Assessment

NAD = No Asbestos Detected
Chromium VI criteria used
Elemental Mercury criteria used
Screening criterion for Pb is C4SL in the absence of a S4UL

Notes

Exceeds S4ULs Criteria
Laboratory detection level higher than screening
criterion

Green

Geological Formation Legend

MG	Made Ground
MMG	Mercia Mudstone Group

Sample Reference	Units	BH537	TP529	TP529	TP532	TP532	TP533	TP534	TP536	TP539	TP539	TP540	TP542	TPM4CAN026
Specimen Depth (m)		0.3 - 0.5	0 - 0.1	0.7 - 0.8	0 - 0.2	0.2 - 0.4	0 - 0.2	0 - 0.3	0 - 0.3	0 - 0.2	0.9 - 1.1	0 - 0.4	0 - 0.4	0.5
OD Level (m)		4.25	36.65	35.95	21.1	20.9	17.2	22.7	31.75	14.1	13.2	12.8	12.25	37.28
Sample Type		ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES	ES
Geology Code		PEAT	MG	CLAY	CLAY	CLAY	CLAY	CLAY	CLAY	CLAY	CLAY	CLAY	CLAY	CLAY
Cluster Code		2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2015 GI	2016 GI
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	<0.015
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	<0.015
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	<0.024
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	<0.014
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	<0.01
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	<0.023
Fluoranthene	mg/kg	18	0.22	<0.1	<0.1	<0.1	<0.1	0.23	0.3	<0.1	<0.1	0.32	<0.1	<0.017
Fluorene	mg/kg	0.17	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.01
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	<0.018
Naphthalene	mg/kg	0.94	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.09
Phenanthrene	mg/kg	0.24	<0.1	<0.1	<0.1	<0.1	<0.1	0.17	0.36	<0.1	<0.1	0.18	<0.1	<0.015
Pyrene	mg/kg	23	0.22	<0.1	<0.1	<0.1	<0.1	0.24	0.5	<0.1	<0.1	0.22	<0.1	<0.015
PAH 16 Total	mg/kg	43	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<0.118
VOCs														
1,1,1,2-Tetrachloroethane	ug/kg													
1,1,2,2-Tetrachloroethane	ug/kg													
1,1,1-Trichloroethane	ug/kg													
1,1,2-Trichloroethane	ug/kg													
1,1-Dichloroethane	ug/kg													
1,1-Dichloroethene	ug/kg													
1,1-Dichloropropene	ug/kg													
1,2,3-Trichlorobenzene	ug/kg													
1,2,3-Trichloropropane	ug/kg													
1,2,4-Trichlorobenzene	ug/kg													
1,2,4-Trimethylbenzene	ug/kg													
1,2-Dibromo-3-Chloropropane	ug/kg													
1,2-Dibromoethane	ug/kg													
1,2-Dichlorobenzene	ug/kg													
1,2-Dichloroethane	ug/kg													
1,2-Dichloropropane	ug/kg													
1,3,5-Trimethylbenzene	ug/kg													
1,3-Dichlorobenzene	ug/kg													
1,3-Dichloropropane	ug/kg													
1,4-Dichlorobenzene	ug/kg													
2,2-Dichloropropane	ug/kg													
2-Chlorotoluene	ug/kg													
4-Chlorotoluene	ug/kg													
4-Isopropyltoluene	ug/kg													
Bromobenzene	ug/kg													
Bromochloromethane	ug/kg													
Bromodichloromethane	ug/kg													
Bromoform	ug/kg													
Bromomethane	ug/kg													
Carbon Disulphide	ug/kg													
Chlorobenzene	ug/kg													
Chloroethane	ug/kg													
Chloroethene	ug/kg													
Chloroform	ug/kg													
Chloromethane	ug/kg													
cis-1,2-Dichloroethene	ug/kg													
cis-1,3-Dichloropropene	ug/kg													
Dibromochloromethane	ug/kg													
Dibromomethane	ug/kg													
Dichlorodifluoromethane	ug/kg													
Dichloromethane	ug/kg													
Hexachlorobutadiene (HCBD)	ug/kg													
Isopropylbenzene	ug/kg													
n-Butylbenzene	ug/kg													
n-propylbenzene	ug/kg													
Sec-Butylbenzene	ug/kg													
Styrene	ug/kg													
Tert-Butylbenzene	ug/kg													
Tetrachloroethene	ug/kg													
Tetrachloromethane (Carbon Tetra Chloride)	ug/kg													
trans-1,2-Dichloroethene	ug/kg													
trans-1,3-Dichloropropene	ug/kg													
Tribromomethane	ug/kg													
Trichloroethene	ug/kg													
Trichlorofluoromethane	ug/kg													
Vinyl Chloride	ug/kg													
SVOCs														
2,4,5-Trichlorophenol	mg/kg													
2,4,6-Trichlorophenol	mg/kg													
2,4-Dichlorophenol	mg/kg													
2,4-Dimethylphenol	mg/kg													
2,4-Dinitrotoluene	mg/kg													
2,6-Dinitrotoluene	mg/kg													
2-Chloronaphthalene	mg/kg													

GROUNDWATER (ALL DATA) DATA SUMMARY

Parameter	Units	No. Analyses	Analyses Above LOD		Concentration		Location with Maximum Concentration
			No.	%'age	Range	Avergae	
Arsenic Dissolved	ug/l	141	121	85.8%	0.309 - 69	7.761	BH503A @ Shallow
Beryllium Dissolved	ug/l	2	0	None > LOD	None > LOD	None > LOD	
Boron Dissolved	ug/l	101	98	97.0%	40 - 4500	922.158	BH533 @ Deep
Calcium Dissolved	ug/l	4	4	100.0%	65000 - 77000	71750.000	SBHJ03 @ 3.4 - 5.2
Chromium Dissolved	ug/l	141	120	85.1%	1.1 - 320	22.440	BH503A @ Shallow
Copper Dissolved	ug/l	141	93	66.0%	0.88 - 150	10.159	BH510 @ Deep
Iron Dissolved	ug/l	5	3	60.0%	9 - 7700	2521.800	SBHJ03 @ 3.4 - 5.2
Lead Dissolved	ug/l	141	38	27.0%	0.035 - 4.4	0.164	BH553 @ 3 - 6.9
Magnesium Dissolved	ug/l	4	4	100.0%	42000 - 94000	66750.000	SBHJ03 @ 3.4 - 5.2
Manganese Dissolved	ug/l	4	4	100.0%	630 - 1600	1000.000	SBHJ03 @ 3.4 - 5.2
Nickel Dissolved	ug/l	141	123	87.2%	0.454 - 32	3.978	BH325C @ Shallow
Selenium Dissolved	ug/l	141	131	92.9%	0.797 - 230	10.473	BH503A @ Shallow
Cadmium Dissolved	ug/l	137	13	9.5%	0.086 - 0.83	0.033	BH536A @
Vanadium Dissolved	ug/l	38	38	100.0%	0.548 - 17.9	5.305	BHM4CAN010 @ Deep
Zinc Dissolved	ug/l	137	110	80.3%	0.55 - 49	5.102	BH324 @ Shallow
Mercury Dissolved	ug/l	137	17	12.4%	0.51 - 2.4	0.141	BH536A @
Cadmium Total	ug/l	4	3	75.0%	0.6 - 18	5.050	SBHJ03 @ 3.4 - 5.2
Zinc Total	ug/l	4	4	100.0%	67 - 1800	544.250	SBHJ03 @ 3.4 - 5.2
Mercury Total	ug/l	4	2	50.0%	0.01 - 0.05	0.015	SBHD06 @ 7.5 - 15
Hardness Total	mg/l	4	4	100.0%	340 - 580	455.000	SBHJ03 @ 3.4 - 5.2
Total Alkalinity as CaCO3	mg/l	40	40	100.0%	145 - 2000	754.375	SBHJ03 @ 3.4 - 5.2
BOD	mg/l	4	3	75.0%	2 - 78	34.000	SBHJ03 @ 3.4 - 5.2
COD	mg/l	4	4	100.0%	25 - 1000	293.750	SBHJ03 @ 3.4 - 5.2
Potassium Dissolved	mg/l	4	4	100.0%	7.8 - 41	23.600	SBHJ03 @ 3.4 - 5.2
Sodium Dissolved	mg/l	4	4	100.0%	15 - 1200	358.750	SBHJ03 @ 3.4 - 5.2
Nitrite as NO2		36	4	11.1%	0.058 - 0.498	0.022	BHM4CANA052 @ Shallow
Nitrate as NO3	mg/l	40	20	50.0%	0.3 - 30.5	6.630	BHM4CAN061 @ Deep
Total Diss Sulphur	mg/l	0	0	No Analyses	No Analyses	No Analyses	
Sulphate (soluble)	mg/l	4	4	100.0%	27 - 130	63.250	SBHJ03 @ 3.4 - 5.2
Chloride	mg/l	85	85	100.0%	13 - 3000	402.305	BH506 @ Deep
Sulphide	mg/l	4	0	None > LOD	None > LOD	None > LOD	
Ammoniacal Nitrogen as N	mg/l	85	69	81.2%	0.017 - 19	3.071	BH506 @ Shallow
Unionised ammonia	mg/l	0	0	No Analyses	No Analyses	No Analyses	
Total Ammonium as NH4	mg/l	2	2	100.0%	0.6 - 21	10.800	SBHJ03 @ 3.4 - 5.2
Phenols Monohydric	mg/l	4	0	None > LOD	None > LOD	None > LOD	
Thiocyanate	mg/l	0	0	No Analyses	No Analyses	No Analyses	
Total Cyanide	mg/l	4	0	None > LOD	None > LOD	None > LOD	
Free Cyanide	mg/l	101	0	None > LOD	None > LOD	None > LOD	
Complex Cyanide	mg/l	0	0	No Analyses	No Analyses	No Analyses	
Conductivity @ 20 deg.C	mS/cm	36	36	100.0%	0.364 - 6.03	2.032	BHM4CAN010 @ Deep
Carbon Dioxide Dissolved	ug/l	2	2	100.0%	14 - 79	46.500	SBHJ03 @ 3.4 - 5.2
pH Value	pH units	140	140	100.0%	7.2 - 8.8	7.907	BH537 @ Deep
GRO (C4-C12)	ug/l	40	0	None > LOD	None > LOD	None > LOD	
MTBE	ug/l	62	0	None > LOD	None > LOD	None > LOD	
Benzene	ug/l	144	0	None > LOD	None > LOD	None > LOD	
Toluene	ug/l	144	0	None > LOD	None > LOD	None > LOD	
Ethyl benzene	ug/l	144	0	None > LOD	None > LOD	None > LOD	
m & p Xylene	ug/l	144	0	None > LOD	None > LOD	None > LOD	
o Xylene	ug/l	144	0	None > LOD	None > LOD	None > LOD	
Aliphatics C5-C6	ug/l	128	0	None > LOD	None > LOD	None > LOD	
Aliphatics >C6-C8	ug/l	144	0	None > LOD	None > LOD	None > LOD	
Aliphatics >C8-C10	ug/l	144	0	None > LOD	None > LOD	None > LOD	
Aliphatics >C10-C12	ug/l	144	1	0.7%	4.3	gle Analysis > L	BH408 @
Aliphatics >C12-C16 Aqueou	ug/l	144	6	4.2%	10 - 350	3.736	SBHJ03 @ 3.4 - 5.2
Aliphatics >C16-C21 Aqueou	ug/l	144	12	8.3%	10 - 140	3.222	SBHJ03 @ 3.4 - 5.2
Aliphatics >C21-C35 Aqueou	ug/l	144	28	19.4%	15 - 1190	48.868	BHM4CAN009 @ Deep
Total Aliphatics C5-C35 Aque	ug/l	40	27	67.5%	16 - 1220	169.725	BHM4CAN009 @ Deep

Max	Min
69	0.309
None > LOD	None > LOD
4500	40
77000	65000
320	1.1
150	0.88
7700	9
4.4	0.035
94000	42000
1600	630
32	0.454
230	0.797
0.83	0.086
17.9	0.548
49	0.55
2.4	0.51
18	0.6
1800	67
0.05	0.01
580	340
2000	145
78	2
1000	25
41	7.8
1200	15
0.498	0.058
30.5	0.3
No Analyses	No Analyses
130	27
3000	13
None > LOD	None > LOD
19	0.017
No Analyses	No Analyses
21	0.6
None > LOD	None > LOD
No Analyses	No Analyses
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
No Analyses	No Analyses
6.03	0.364
79	14
8.8	7.2
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
4.3	4.3
350	10
140	10
1190	15
1220	16

GROUNDWATER (ALL DATA) WATER QUALITY SCREENING ASSESSMENT

Parameter	Units	EQS	Analyses Above EQS		DWS	Analyses Above DWS	
			No.	%'age		No.	%'age
Metals							
Arsenic Dissolved	ug/l	50	2	1.4%	10	33	23.4%
Beryllium Dissolved	ug/l						
Boron Dissolved	ug/l	2000	10	9.9%	1000	26	25.7%
Calcium Dissolved	ug/l						
Chromium Dissolved	ug/l	32	28	19.9%	50	18	12.8%
Copper Dissolved	ug/l	10	29	20.6%	2000	0	None>DWS
Iron Dissolved	ug/l	1000	2	40.0%	200	2	40.0%
Lead Dissolved	ug/l	1.2	5	3.5%	10	0	None>DWS
Magnesium Dissolved	ug/l						
Manganese Dissolved	ug/l	30	2	50.0%	50	2	50.0%
Nickel Dissolved	ug/l	4	44	31.2%	20	1	0.7%
Selenium Dissolved	ug/l				10	34	24.1%
Cadmium Dissolved	ug/l	0.15	7	5.1%	5	0	None>DWS
Vanadium Dissolved	ug/l						
Zinc Dissolved	ug/l	75	0	None>EQS			
Mercury Dissolved	ug/l	0.07	17	12.4%	1	8	5.8%
Cadmium Total	ug/l	0.15	2	50.0%	5	1	25.0%
Zinc Total	ug/l	75	2	50.0%			
Mercury Total	ug/l	0.07	0	None>EQS	1	0	None>DWS
Non-Metal Inorganics							
Hardness Total	mg/l						
Total Alkalinity as CaCO3	mg/l						
BOD	mg/l	5	2	50.0%			
COD	mg/l						
Potassium Dissolved	mg/l						
Sodium Dissolved	mg/l				200	1	25.0%
Nitrite as NO2							
Nitrate as NO3	mg/l				50	0	None>DWS
Total Diss Sulphur	mg/l						
Sulphate (soluble)	mg/l	400	0	None>EQS	250	0	None>DWS
Chloride	mg/l	250	24	28.2%	250	24	28.2%
Sulphide	mg/l						
Ammoniacal Nitrogen as N	mg/l	0.6	36	42.4%			
Unionised ammonia	mg/l						
Total Ammonium as NH4	mg/l				0.5	1	50.0%
Phenols Monohydric	mg/l						
Thiocyanate	mg/l						
Total Cyanide	mg/l	0.001	0	None>EQS	0.05	0	None>DWS
Free Cyanide	mg/l						
Complex Cyanide	mg/l						
Conductivity @ 20 deg.C	mS/cm						
Carbon Dioxide Dissolved	ug/l						
pH Value	pH units	6-9	8	5.7%	6.5-10	6	4.3%
Organics							
GRO (C4-C12)	ug/l						
MTBE	ug/l						
Benzene	ug/l	10	0	None>EQS	1	0	None>DWS
Toluene	ug/l	50	0	None>EQS			
Ethyl benzene	ug/l	20	0	None>EQS			
m & p Xylene	ug/l	30	0	None>EQS			
o Xylene	ug/l	30	0	None>EQS			
TPH							
Aliphatics C5-C6	ug/l						
Aliphatics >C6-C8	ug/l						
Aliphatics >C8-C10	ug/l						
Aliphatics >C10-C12	ug/l						
Aliphatics >C12-C16 Aqueous	ug/l						
Aliphatics >C16-C21 Aqueous	ug/l						
Aliphatics >C21-C35 Aqueous	ug/l						
Total Aliphatics C5-C35 Aqueous	ug/l						

Groundwater Sample Analysis & Screening Assessment

Non-CL Data

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Parameter	Units	No. Analyses	Analyses Above LOD		Concentration		Location with Maximum Concentration
			No.	%age	Range	Avergae	
Aliphatics >C35-44	ug/l	104	2	1.9%	9.9 - 31	0.393	BH408 @
Aromatics >C5-C7	ug/l	122	0	None > LOD	None > LOD	None > LOD	
Aromatics C6-C7	ug/l	22	0	None > LOD	None > LOD	None > LOD	
Aromatics >C7-C8	ug/l	141	0	None > LOD	None > LOD	None > LOD	
Aromatics >EC8-EC10	ug/l	144	0	None > LOD	None > LOD	None > LOD	
Aromatics >EC10-EC12	ug/l	144	1	0.7%	4.2	gle Analysis > L	BH408 @
Aromatics >EC12-EC16 Aque	ug/l	144	4	2.8%	13 - 10000	73.875	SBHD06 @ 7.5 - 15
Aromatics >EC16-EC21 Aque	ug/l	144	4	2.8%	16 - 1400	14.410	SBHD06 @ 7.5 - 15
Aromatics >EC21-EC35 Aque	ug/l	144	19	13.2%	17 - 510	14.944	SBHJ03 @ 3.4 - 5.2
Total Aromatics C6-C35 Aqu	ug/l	40	17	42.5%	17 - 12000	374.625	SBHD06 @ 7.5 - 15
Aromatics >C35-44	ug/l	104	1	1.0%	11	gle Analysis > L	BH408 @
Total Aliphatic TPH	ug/l	104	2	1.9%	370 - 950	12.692	BH408 @
Total Aromatic TPH	ug/l	0	0	No Analyses	No Analyses	No Analyses	
TPH (Aliphatics and Aromati	ug/l	35	26	74.3%	16 - 12000	614.971	SBHD06 @ 7.5 - 15
Total petroleum hydrocarbo	ug/l	107	4	3.7%	126 - 1100	17.159	BH408 @
TPH FTIR	ug/l	0	0	No Analyses	No Analyses	No Analyses	
TPH GC	ug/l	0	0	No Analyses	No Analyses	No Analyses	
PCB- ARO	ug/l	0	0	No Analyses	No Analyses	No Analyses	
Cresols	ug/l	0	0	No Analyses	No Analyses	No Analyses	
Pcb-101 2,2',4,5,5' - Pentach	ug/l	23	0	None > LOD	None > LOD	None > LOD	
Pcb-118 2,3',4,4',5' - Pentach	ug/l	23	0	None > LOD	None > LOD	None > LOD	
Pcb-138 2,2',3,4,4',5' - Hexa	ug/l	23	0	None > LOD	None > LOD	None > LOD	
Pcb-153 2,2',4,4',5,5' - Hexa	ug/l	23	0	None > LOD	None > LOD	None > LOD	
Pcb-180 2,2',3,4,4',5,5' - Hept	ug/l	23	0	None > LOD	None > LOD	None > LOD	
Pcb-28 2,4,4' - Trichlororbi	ug/l	23	0	None > LOD	None > LOD	None > LOD	
Pcb-52 2,2',5,5' - Tetrachlor	ug/l	23	0	None > LOD	None > LOD	None > LOD	
PCB congener 105	ug/l	18	0	None > LOD	None > LOD	None > LOD	
PCB congener 167	ug/l	18	0	None > LOD	None > LOD	None > LOD	
PCB congener 169	ug/l	18	1	5.6%	0.0156	gle Analysis > L	BHM4CANA052 @ Deep
PCB congener 123	ug/l	18	0	None > LOD	None > LOD	None > LOD	
PCB congener 114	ug/l	18	0	None > LOD	None > LOD	None > LOD	
PCB congener 157	ug/l	18	0	None > LOD	None > LOD	None > LOD	
PCB congener 81	ug/l	18	0	None > LOD	None > LOD	None > LOD	
PCB congener 156	ug/l	18	0	None > LOD	None > LOD	None > LOD	
PCB congener 126	ug/l	18	0	None > LOD	None > LOD	None > LOD	
PCB congener 77	ug/l	18	0	None > LOD	None > LOD	None > LOD	
PCB congener 189	ug/l	18	1	5.6%	0.0185	gle Analysis > L	BHM4CANA052 @ Deep
PCB congener 118	ug/l	18	0	None > LOD	None > LOD	None > LOD	
Dimethylphenols	ug/l	0	0	No Analyses	No Analyses	No Analyses	
Trimethylphenols	ug/l	0	0	No Analyses	No Analyses	No Analyses	
2-Chlorophenol	ug/l	58	0	None > LOD	None > LOD	None > LOD	
2 - Methyl-4,6-Dinitrophenol	ug/l	54	0	None > LOD	None > LOD	None > LOD	
2-Methylphenol	ug/l	58	0	None > LOD	None > LOD	None > LOD	
2-Nitrophenol	ug/l	58	0	None > LOD	None > LOD	None > LOD	
2,4-Dichlorophenol	ug/l	58	0	None > LOD	None > LOD	None > LOD	
2,4-Dimethylphenol	ug/l	58	0	None > LOD	None > LOD	None > LOD	
2,4,5-Trichlorophenol	ug/l	58	1	1.7%	0.64	gle Analysis > L	BH549 @ Deep
2,4,6-Trichlorophenol	ug/l	58	1	1.7%	0.68	gle Analysis > L	BH549 @ Deep
4-Chloro-3-methylphenol	ug/l	58	0	None > LOD	None > LOD	None > LOD	
4-Methylphenol	ug/l	58	0	None > LOD	None > LOD	None > LOD	
4-Nitrophenol	ug/l	36	0	None > LOD	None > LOD	None > LOD	
Pentachlorophenol	ug/l	58	0	None > LOD	None > LOD	None > LOD	
Phenol	ug/l	58	0	None > LOD	None > LOD	None > LOD	
Phenols	mg/l	49	4	8.2%	0.03 - 0.08		

Max	Min
31	9.9
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
4.2	4.2
10000	13
1400	16
510	17
12000	17
11	11
950	370
No Analyses	No Analyses
12000	16
1100	126
No Analyses	No Analyses
No Analyses	No Analyses
No Analyses	No Analyses
No Analyses	No Analyses
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
0.0156	0.0156
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
0.0185	0.0185
None > LOD	None > LOD
No Analyses	No Analyses
No Analyses	No Analyses
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
0.64	0.64
0.68	0.68
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
None > LOD	None > LOD
0.08	0.03
None > LOD	None > LOD
None > LOD	None > LOD
0.0754	0.0237
0.0209	0.0113

Parameter	Units	EQS	Analyses Above EQS		DWS	Analyses Above DWS	
			No.	%age		No.	%age
Aliphatics >C35-44	ug/l						
Aromatics >C5-C7	ug/l						
Aromatics C6-C7	ug/l						
Aromatics >C7-C8	ug/l						
Aromatics >EC8-EC10	ug/l						
Aromatics >EC10-EC12	ug/l						
Aromatics >EC12-EC16 Aqueous	ug/l						
Aromatics >EC16-EC21 Aqueous	ug/l						
Aromatics >EC21-EC35 Aqueous	ug/l						
Total Aromatics C6-C35 Aqueous	ug/l						
Aromatics >C35-44	ug/l						
Total Aliphatic TPH	ug/l						
Total Aromatic TPH	ug/l						
TPH (Aliphatics and Aromatics C5-C35)	ug/l						
Total petroleum hydrocarbons	ug/l						
TPH FTIR	ug/l						
TPH GC	ug/l						
PCBs							
PCB- ARO	ug/l						
Cresols	ug/l						
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l						
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l						
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l						
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l						
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l						
Pcb-28 2,4,4' - Trichlorobiphenyl	ug/l						
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l						
Phenols							
Dimethylphenols	ug/l						
Trimethylphenols	ug/l						
2-Chlorophenol	ug/l	50	0	None>EQS			
2 - Methyl-4,6-Dinitrophenol	ug/l						
2-Methylphenol	ug/l	100	0	None>EQS			
2-Nitrophenol	ug/l						
2,4-Dichlorophenol	ug/l	20	0	None>EQS			
2,4-Dimethylphenol	ug/l						
2,4,5-Trichlorophenol	ug/l						
2,4,6-Trichlorophenol	ug/l						
4-Chloro-3-methylphenol	ug/l	40	0	None>EQS			
4-Methylphenol	ug/l	100	0	None>EQS			
4-Nitrophenol	ug/l						
Pentachlorophenol	ug/l	0.4	0	None>EQS			
Phenol	ug/l	7.7	0	None>EQS			
Phenols	mg/l	0.0077	4	8.2%			
PAHs							
2-Chloronaphthalene	ug/l						
2-Methylnaphthalene	ug/l						
Acenaphthene	ug/l						
Acenaphthylene	ug/l						

Groundwater Sample Analysis & Screening Assessment

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Parameter	Units	No. Analyses	Analyses Above LOD		Concentration		Location with Maximum Concentration
			No.	%'age	Range	Avergae	
Dibromomethane	ug/l	51	0	None > LOD	None > LOD	None > LOD	
Dichlorodifluoromethane	ug/l	51	0	None > LOD	None > LOD	None > LOD	
Dichloromethane	ug/l	29	0	None > LOD	None > LOD	None > LOD	
Ethylbenzene	ug/l	133	0	None > LOD	None > LOD	None > LOD	
Hexachlorobutadiene (HCBD)	ug/l	51	0	None > LOD	None > LOD	None > LOD	
Isopropylbenzene	ug/l	51	0	None > LOD	None > LOD	None > LOD	
m,p xylenes	ug/l	133	0	None > LOD	None > LOD	None > LOD	
Methyl tert-butyl ether (MTBE)	ug/l	51	0	None > LOD	None > LOD	None > LOD	
n-Butylbenzene	ug/l	51	0	None > LOD	None > LOD	None > LOD	
n-propylbenzene	ug/l	51	0	None > LOD	None > LOD	None > LOD	
O-Xylene	ug/l	133	0	None > LOD	None > LOD	None > LOD	
Sec-Butylbenzene	ug/l	51	0	None > LOD	None > LOD	None > LOD	
Styrene	ug/l	51	0	None > LOD	None > LOD	None > LOD	
Tert-Butylbenzene	ug/l	51	0	None > LOD	None > LOD	None > LOD	
Tetrachloroethene	ug/l	51	0	None > LOD	None > LOD	None > LOD	
Tetrachloromethane (Carbochloroform)	ug/l	51	0	None > LOD	None > LOD	None > LOD	
Toluene	ug/l	133	1	0.8%	2	ug/l Analysis > LOD	SBHJ03 @ 3.4 - 5.2
trans-1,2-Dichloroethene	ug/l	51	0	None > LOD	None > LOD	None > LOD	
trans-1,3-Dichloropropene	ug/l	51	0	None > LOD	None > LOD	None > LOD	
Tribromomethane	ug/l	47	0	None > LOD	None > LOD	None > LOD	
Trichloroethene	ug/l	51	0	None > LOD	None > LOD	None > LOD	
Trichlorofluoromethane	ug/l	51	0	None > LOD	None > LOD	None > LOD	
Vinly Chloride	ug/l	29	0	None > LOD	None > LOD	None > LOD	
1,2-Dichlorobenzene	ug/l	42	0	None > LOD	None > LOD	None > LOD	
1,2,4-Trichlorobenzene	ug/l	54	0	None > LOD	None > LOD	None > LOD	
1,3-Dichlorobenzene	ug/l	54	0	None > LOD	None > LOD	None > LOD	
1,4-Dichlorobenzene	ug/l	54	0	None > LOD	None > LOD	None > LOD	
2-Nitroaniline	ug/l	54	0	None > LOD	None > LOD	None > LOD	
2,4-Dinitrotoluene	ug/l	54	0	None > LOD	None > LOD	None > LOD	
2,6-Dinitrotoluene	ug/l	54	0	None > LOD	None > LOD	None > LOD	
2-Methylnaphthalene	ug/l	54	0	None > LOD	None > LOD	None > LOD	
3-Nitroaniline	ug/l	54	0	None > LOD	None > LOD	None > LOD	
4-Bromophenylphenylether	ug/l	32	0	None > LOD	None > LOD	None > LOD	
4-Chloroaniline	ug/l	54	0	None > LOD	None > LOD	None > LOD	
4-Chlorophenylphenylether	ug/l	32	0	None > LOD	None > LOD	None > LOD	
4-Nitroaniline	ug/l	54	0	None > LOD	None > LOD	None > LOD	
Azobenzene	ug/l	54	0	None > LOD	None > LOD	None > LOD	
Bis(2-chloroethoxy)methane	ug/l	54	0	None > LOD	None > LOD	None > LOD	
Bis(2-chloroethyl)ether	ug/l	54	0	None > LOD	None > LOD	None > LOD	
Bis(2-chloroisopropyl)ether	ug/l	50	0	None > LOD	None > LOD	None > LOD	
Carbazole	ug/l	54	0	None > LOD	None > LOD	None > LOD	
Dibenzofuran	ug/l	54	0	None > LOD	None > LOD	None > LOD	
Hexachlorobenzene	ug/l	54	0	None > LOD	None > LOD	None > LOD	
Hexachlorobutadiene	ug/l	54	0	None > LOD	None > LOD	None > LOD	
Hexachlorocyclopentadiene	ug/l	54	0	None > LOD	None > LOD	None > LOD	
Hexachloroethane	ug/l	54	1	1.9%	0.98	ug/l Analysis > LOD	BH545 @
Isophorone	ug/l	54	0	None > LOD	None > LOD	None > LOD	
N-nitrosodi-n-propylamine	ug/l	32	0	None > LOD	None > LOD	None > LOD	
Nitrobenzene	ug/l	54	0	None > LOD	None > LOD	None > LOD	

[illegible]

Parameter	Units	EQS	Analyses Above EQS		DWS	Analyses Above DWS	
			No.	%age		No.	%age
Dibromomethane	ug/l						
Dichlorodifluoromethane	ug/l						
Dichloromethane	ug/l	20		None>EQS			
Ethylbenzene	ug/l	20	0	None>EQS			
Hexachlorobutadiene (HCBD)	ug/l	0.6	0	None>EQS			
Isopropylbenzene	ug/l						
m,p xylenes	ug/l	30	0	None>EQS			
Methyl tert-butyl ether (MTBE)	ug/l						
n-Butylbenzene	ug/l						
n-propylbenzene	ug/l						
O-Xylene	ug/l	30	0	None>EQS			
Sec-Butylbenzene	ug/l						
Styrene	ug/l	50	0	None>EQS			
Tert-Butylbenzene	ug/l						
Tetrachloroethene	ug/l	10	0	None>EQS	10	0	None>DWS
Tetrachloromethane (Carbon Tetra C	ug/l	12	0	None>EQS	3	0	None>DWS
Toluene	ug/l	50	0	None>EQS			
trans-1,2-Dichloroethene	ug/l						
trans-1,3-Dichloropropene	ug/l						
Tribromomethane	ug/l				100	0	None>DWS
Trichloroethene	ug/l	10	0	None>EQS	10	0	None>DWS
Trichlorofluoromethane	ug/l						
Vinly Chloride	ug/l	#N/A	#N/A		#N/A		
Other Semi-Volatiles							
1,2-Dichlorobenzene	ug/l	20	0	None>EQS			
1,2,4-Trichlorobenzene	ug/l	0.4	0	None>EQS			
1,3-Dichlorobenzene	ug/l	20	0	None>EQS			
1,4-Dichlorobenzene	ug/l	20	0	None>EQS			
2-Nitroaniline	ug/l						
2,4-Dinitrotoluene	ug/l						
2,6-Dinitrotoluene	ug/l						
2-Methylnaphthalene	ug/l						
3-Nitroaniline	ug/l						
4-Bromophenylphenylether	ug/l						
4-Chloroaniline	ug/l						
4-Chlorophenylphenylether	ug/l						
4-Nitroaniline	ug/l						
Azobenzene	ug/l						
Bis(2-chloroethoxy)methane	ug/l						
Bis(2-chloroethyl)ether	ug/l						
Bis(2-chloroisopropyl)ether	ug/l						
Carbazole	ug/l						
Dibenzofuran	ug/l						
Hexachlorobenzene	ug/l	0.05	0	None>EQS			
Hexachlorobutadiene	ug/l	0.6	0	None>EQS			
Hexachlorocyclopentadiene	ug/l						
Hexachloroethane	ug/l						
Isophorone	ug/l						
N-nitrosodi-n-propylamine	ug/l						
Nitrobenzene	ug/l						

M4CAN	
Groundwater Sample Analysis & Screening Assessment	
Non-CL Data	
01/07/2015	
Notes	
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
Installation Details not specified. Assumptions made from details from previous rounds.	X
Screening Values & Assessment	
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend	
MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	Units	Screening Criteria		SBHD06	SBHD06	SBHJ03	SBHJ03	BH563	BH563	BH563	BH553	BH549	BH549	BH549
Location		EQS	DWS	SBHD06	SBHD06	SBHJ03	SBHJ03	BH563	BH563	BH563	BH553	BH549	BH549	BH549
Location Type				BH	BH	BH	BH	BH			BH	BH		
Response Zone (RZ) Details				SAND/GRAVEL	SAND/GRAVEL	PEAT	PEAT	MMMF			RTD	MMG		
Drainage Area				Wentloog Levels Area 2	Wentloog Levels Area 2	Caldicot Levels Area 4 Llanwern	Caldicot Levels Area 4 Llanwern	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				7.5 - 15	7.5 - 15	3.4 - 5.2	3.4 - 5.2	4 - 15			3 - 6.9	Deep	Deep	Deep
Depth (mbGL)				1.39	15	0.7	5.2	12.37	12.09	13.06	6.42	9.37	11.51	10.18
Date Sampled				21/02/2008	19/03/2008	27/02/2008	17/03/2008	27/04/2015	05/05/2015	11/05/2015	07/05/2015	17/04/2015	24/04/2015	01/05/2015
PCB congener 105	ug/l													
PCB congener 167	ug/l													
PCB congener 169	ug/l													
PCB congener 123	ug/l													
PCB congener 114	ug/l													
PCB congener 157	ug/l													
PCB congener 81	ug/l													
PCB congener 156	ug/l													
PCB congener 126	ug/l													
PCB congener 77	ug/l													
PCB congener 189	ug/l													
PCB congener 118	ug/l													
Phenols														
Dimethylphenols	ug/l													
Trimethylphenols	ug/l													
2-Chlorophenol	ug/l	50		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2 - Methyl-4,6-Dinitrophenol	ug/l										<LOD	<LOD	<LOD	<LOD
2-Methylphenol	ug/l	100		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2-Nitrophenol	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2,4-Dichlorophenol	ug/l	20		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2,4-Dimethylphenol	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2,4,5-Trichlorophenol	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	0.64
2,4,6-Trichlorophenol	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	0.68
4-Chloro-3-methylphenol	ug/l	40		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
4-Methylphenol	ug/l	100		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
4-Nitrophenol	ug/l			<1	<1	<1	<1							
Pentachlorophenol	ug/l	0.4		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Phenol	ug/l	7.7		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Phenols	mg/l	0.0077									<LOD	<LOD	<LOD	<LOD
PAHs														
2-Chloronaphthalene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2-Methylnaphthalene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Acenaphthene	ug/l			<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Acenaphthylene	ug/l			<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Anthracene	ug/l	0.1		<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)anthracene	ug/l			<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)pyrene	ug/l	0.00017	0.01	<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(b)fluoranthene	ug/l	0.017	0.1	<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(ghi)perylene	ug/l	0.0082	0.1	<1	<1	<1	<1							
Benzo(k)fluoranthene	ug/l	0.017	0.1	<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Chrysene	ug/l			<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dibenzo(a,h)anthracene	ug/l			<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluoranthene	ug/l	0.0063		<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluorene	ug/l			<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Naphthalene	ug/l	2		<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phenanthrene	ug/l			<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pyrene	ug/l			<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total PAHs (USEPA 16)	ug/l							<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phthalates														
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<2	<2	<2	<2				<LOD	<LOD	<LOD	<LOD
Butylbenzyl phthalate	ug/l	20		<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD		
Di-n-butyl phthalate	ug/l	8		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Di-n-Octyl phthalate	ug/l	20		<5	<5	<5	<5				<LOD	<LOD	<LOD	<LOD
Diethyl phthalate	ug/l	200		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Dimethyl phthalate	ug/l	800		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
VOCs														
Full suite	ug/l													
1,1,1,2-Tetrachloroethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,1,1-Trichloroethane	ug/l	100		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A	<1	<1	<1	<1							
1,1,2-Trichloroethane	ug/l	400		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,1-Dichloroethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,1-Dichloroethene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,1-Dichloropropene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2,3-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2,3-Trichloropropane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2,4-Trimethylbenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2-Dibromo-3-Chloropropane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2-Dibromoethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2-Dichlorobenzene	ug/l	20		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2-Dichloroethane	ug/l	10	3	<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2-Dichloropropane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,3,5-Trimethylbenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,3-Dichloropropane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,4-Dichlorobenzene	ug/l	20		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2-Chlorotoluene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
4-Chlorotoluene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
4-Isopropyltoluene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Benzene	ug/l	10	1	<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Bromobenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Bromochloromethane	ug/l		100	<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Bromodichloromethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Bromoform	ug/l			<1	<1	<1	<1							
Bromomethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Carbon Disulphide	ug/l			<1	<1	<1	<1							
Chlorobenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD

M4CAN	
Groundwater Sample Analysis & Screening Assessment	
Non-CL Data	
01/07/2015	
Notes	
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
Installation Details not specified. Assumptions made from details from previous rounds.	X
Screening Values & Assessment	
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend	
MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round	Units	Screening Criteria		SBHD06	SBHD06	SBHJ03	SBHJ03	BH563	BH563	BH563	BH553	BH549	BH549	BH549
Location		EQS	DWS	SBHD06	SBHD06	SBHJ03	SBHJ03	BH563	BH563	BH563	BH553	BH549	BH549	BH549
Location Type				BH	BH	BH	BH	BH			BH	BH		
Response Zone (RZ) Details				SAND/GRAVEL	SAND/GRAVEL	PEAT	PEAT	MMMF			RTD	MMG		
Drainage Area				Wentloog Levels Area 2	Wentloog Levels Area 2	Caldicot Levels Area 4 Llanwern	Caldicot Levels Area 4 Llanwern	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				7.5 - 15	7.5 - 15	3.4 - 5.2	3.4 - 5.2	4 - 15			3 - 6.9	Deep	Deep	Deep
Depth (mbGL)				1.39	15	0.7	5.2	12.37	12.09	13.06	6.42	9.37	11.51	10.18
Date Sampled				21/02/2008	19/03/2008	27/02/2008	17/03/2008	27/04/2015	05/05/2015	11/05/2015	07/05/2015	17/04/2015	24/04/2015	01/05/2015
Chloroethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Chloroethene	ug/l										<LOD	<LOD	<LOD	<LOD
Chloroform	ug/l	2.5	100	<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Chloromethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
cis-1,2-Dichloroethene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
cis-1,3-Dichloropropene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Dibromochloromethane	ug/l		100	<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Dibromomethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Dichlorodifluoromethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Dichloromethane	ug/l	20		<1	<1	<1	<1							
Ethylbenzene	ug/l	20		<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Hexachlorobutadiene (HCBd)	ug/l	0.6		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Isopropylbenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
m,p xylenes	ug/l	30		<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Methyl tert-butyl ether (MTBE)	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
n-Butylbenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
n-propylbenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
O-Xylene	ug/l	30		<1	<1	<1	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Sec-Butylbenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Styrene	ug/l	50		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Tert-Butylbenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Tetrachloroethene	ug/l	10	10	<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3	<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Toluene	ug/l	50		<1	<1	2	<1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
trans-1,2-Dichloroethene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
trans-1,3-Dichloropropene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Tribromomethane	ug/l		100								<LOD	<LOD	<LOD	<LOD
Trichloroethene	ug/l	10	10	<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Trichlorofluoromethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Vinyl Chloride	ug/l	#N/A	#N/A	<1	<1	<1	<1							
Other Semi-Volatiles														
1,2-Dichlorobenzene	ug/l	20		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,3-Dichlorobenzene	ug/l	20		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
1,4-Dichlorobenzene	ug/l	20		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2-Nitroaniline	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2,4-Dinitrotoluene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2,6-Dinitrotoluene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
2-Methylnaphthalene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
3-Nitroaniline	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
4-Bromophenylphenylether	ug/l			<1	<1	<1	<1							
4-Chloroaniline	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
4-Chlorophenylphenylether	ug/l			<1	<1	<1	<1							
4-Nitroaniline	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Azobenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Bis(2-chloroethoxy)methane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Bis(2-chloroethyl)ether	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Bis(2-chloroisopropyl)ether	ug/l										<LOD	<LOD	<LOD	<LOD
Carbazole	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Dibenzofuran	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Hexachlorobenzene	ug/l	0.05		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Hexachlorobutadiene	ug/l	0.6		<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Hexachlorocyclopentadiene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Hexachloroethane	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
Isophorone	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD
N-nitrosodi-n-propylamine	ug/l			<1	<1	<1	<1							
Nitrobenzene	ug/l			<1	<1	<1	<1				<LOD	<LOD	<LOD	<LOD

M4CAN	
Groundwater Sample Analysis & Screening Assessment	
Non-CL Data	
01/07/2015	
Notes	
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
Installation Details not specified. Assumptions made from details from previous rounds.	X
Screening Values & Assessment	
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

MMMF	Merxia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Merxia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

Monitoring Round		Units	Screening Criteria		BH546		BH546		BH545		BH545		BH541		BH541		BH541		BH539		BH539	
Location	Location Type		EQS	DWS	BH546		BH		BH545		BH		BH541		BH		BH541		BH539		BH539	
Response Zone (RZ) Details					TSF							TSF					TSF		TFD			
Drainage Area					Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East				
Installation Details					3-10	3-10	3-10				2-11.5	2-11.5	2-11.5	Deep	Shallow							
Depth (mbGL)					5.14	6.77	6.72	6.75	7.16	7.34	6.67	6.73	6.73	1.97	3.57							
Date Sampled					17/04/2015	24/04/2015	01/05/2015	17/04/2015	24/04/2015	01/05/2015	31/03/2015	16/04/2015	21/04/2015	24/03/2015	14/03/2015							
Metals																						
Arsenic Dissolved	ug/l	50	10	<LOD	<LOD	1.3	1	<LOD	3.4	1.9	<LOD	25	2	<LOD								
Beryllium Dissolved	ug/l																					
Boron Dissolved	ug/l	2000	1000	<LOD	70	42	<LOD	43	160	800	1000	140	820	760								
Calcium Dissolved	ug/l																					
Chromium Dissolved	ug/l	32	50	4.1	<LOD	<LOD	11	<LOD	2.5	26	2.3	14	3.3	6.6								
Copper Dissolved	ug/l	10	2000	<LOD	<LOD	<LOD	<LOD	<LOD	1.6	9.9	<LOD	8.1	<LOD	1.9								
Iron Dissolved	ug/l	1000	200																			
Lead Dissolved	ug/l	1.2	10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Magnesium Dissolved	ug/l																					
Manganese Dissolved	ug/l	30	50																			
Nickel Dissolved	ug/l	4	20	2.9	2.5	1.7	<LOD	<LOD	7	1.4	<LOD	2.6	7	6.2								
Selenium Dissolved	ug/l		10	<LOD	<LOD	1.4	1.6	2.2	3.6	1.3	1.4	3.9	1.5	4								
Cadmium Dissolved	ug/l	0.15	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Vanadium Dissolved	ug/l																					
Zinc Dissolved	ug/l	75		1.4	<LOD	<LOD	3.1	4.7	9.4	3.3	<LOD	2.9	1.4	1.1								
Mercury Dissolved	ug/l	0.07	1	0.77	<LOD	<LOD	0.55	<LOD	<LOD	<LOD	<LOD	<LOD	0.65	1.3								
Cadmium Total	ug/l	0.15	5																			
Zinc Total	ug/l	75																				
Mercury Total	ug/l	0.07	1																			
Non-Metal Inorganics																						
Hardness Total	mg/l																					
Total Alkalinity as CaCO3	mg/l																					
BOD	mg/l	5																				
COD	mg/l																					
Potassium Dissolved	mg/l																					
Sodium Dissolved	mg/l		200																			
Nitrite as NO2	mg/l																					
Nitrate as NO3	mg/l		50																			
Total Diss Sulphur	mg/l																					
Sulphate (soluble)	mg/l	400	250																			
Chloride	mg/l	250	250				220	250	210	13	14	620	32	70								
Sulphide	mg/l																					
Ammoniacal Nitrogen as N	mg/l	0.6					0.023	0.047	0.032	<LOD	0.054	1.4	0.45	0.23								
Unionised ammonia	mg/l																					
Total Ammonium as NH4	mg/l		0.5																			
Phenols Monohydric	mg/l																					
Thiocyanate	mg/l																					
Total Cyanide	mg/l	0.001	0.05																			
Free Cyanide	mg/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Complex Cyanide	mg/l																					
Conductivity @ 20 deg.C	mS/cm																					
Carbon Dioxide Dissolved	ug/l																					
pH Value	pH units	6-9	6.5-10	7.7	8.4	7.9	7.5	8.3	8	8.1	8.6	8.3	7.7	7.8								
Organics																						
GRO (C4-C12)	ug/l																					
MTBE	ug/l						<LOD		<LOD	<LOD	<LOD											
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Ethyl benzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
m & p Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
o Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
TPH																						
Aliphatics C5-C6	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Aliphatics >C6-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Aliphatics >C8-C10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Aliphatics >C10-C12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Aliphatics >C12-C16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Aliphatics >C16-C21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Aliphatics >C21-C35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Total Aliphatics >C35 Aqueous	ug/l																					
Aliphatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Aromatics >C5-C7	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Aromatics C6-C7	ug/l																					
Aromatics >C7-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Aromatics >EC8-EC10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Aromatics >EC10-EC12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Aromatics >EC12-EC16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Aromatics >EC16-EC21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Aromatics >EC21-EC35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Total Aromatics C6-C35 Aqueous	ug/l																					
Aromatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Total Aliphatic TPH	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
Total Aromatic TPH	ug/l																					
TPH (Aliphatics and Aromatics C5-C35)	ug/l																					
Total petroleum hydrocarbons	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD								
TPH FTIR	ug/l																					
TPH GC	ug/l																					
PCBs																						
PCB- ARO	ug/l																					
Cresols	ug/l																					
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l						<LOD	<LOD	<LOD	<LOD	<LOD											
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l						<LOD	<LOD	<LOD	<LOD	<LOD											
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l						<LOD	<LOD	<LOD	<LOD	<LOD											
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l						<LOD	<LOD	<LOD	<LOD	<LOD											
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l						<LOD	<LOD	<LOD	<LOD	<LOD											
Pcb-28 2,4,4' - Trichlorobiphenyl	ug/l						<LOD	<LOD	<LOD	<LOD	<LOD											
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l						<LOD	<LOD	<LOD	<LOD	<LOD											

M4CAN Groundwater Sample Analysis & Screening Assessment Non-CL Data 01/07/2015 Notes EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn Installation Details not specified. Assumptions made from details from previous rounds. Screening Values & Assessment Exceeds EQS Exceeds DWS Laboratory detection level higher than screening criterion		Geological Formation Legend MMMF Mercia Mudstone Marginal Facies RTD River Terrace Deposits TSF Tintern Sandstone Formation TFD Tidal Flat Deposits MMG Mercia Mudstone Group GFD Glaciofluvial Deposits SMF St Maughans Formation	
	X		
	X		
	X		

Monitoring Round	Units	Screening Criteria		BH546	BH546	BH546	BH545	BH545	BH545	BH541	BH541	BH541	BH539	BH539
Location		EQS	DWS	BH546	BH546	BH546	BH545	BH545	BH545	BH541	BH541	BH541	BH539	BH539
Location Type				BH			BH			BH				
Response Zone (RZ) Details				TSF						TSF			TSF	TFD
Drainage Area				Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				3-10	3-10	3-10				2-11.5	2-11.5	2-11.5	Deep	Shallow
Depth (mbGL)				5.14	6.77	6.72	6.75	7.16	7.34	6.67	6.73	6.73	1.97	3.57
Date Sampled				17/04/2015	24/04/2015	01/05/2015	17/04/2015	24/04/2015	01/05/2015	31/03/2015	16/04/2015	21/04/2015	24/03/2015	14/03/2015
PCB congener 105	ug/l													
PCB congener 167	ug/l													
PCB congener 169	ug/l													
PCB congener 123	ug/l													
PCB congener 114	ug/l													
PCB congener 157	ug/l													
PCB congener 81	ug/l													
PCB congener 156	ug/l													
PCB congener 126	ug/l													
PCB congener 77	ug/l													
PCB congener 189	ug/l													
PCB congener 118	ug/l													
Phenols														
Dimethylphenols	ug/l													
Trimethylphenols	ug/l													
2-Chlorophenol	ug/l	50					<LOD		<LOD	<LOD	<LOD			
2 - Methyl-4,6-Dinitrophenol	ug/l						<LOD		<LOD	<LOD	<LOD			
2-Methylphenol	ug/l	100					<LOD		<LOD	<LOD	<LOD			
2-Nitrophenol	ug/l						<LOD		<LOD	<LOD	<LOD			
2,4-Dichlorophenol	ug/l	20					<LOD		<LOD	<LOD	<LOD			
2,4-Dimethylphenol	ug/l						<LOD		<LOD	<LOD	<LOD			
2,4,5-Trichlorophenol	ug/l						<LOD		<LOD	<LOD	<LOD			
2,4,6-Trichlorophenol	ug/l						<LOD		<LOD	<LOD	<LOD			
4-Chloro-3-methylphenol	ug/l	40					<LOD		<LOD	<LOD	<LOD			
4-Methylphenol	ug/l	100					<LOD		<LOD	<LOD	<LOD			
4-Nitrophenol	ug/l													
Pentachlorophenol	ug/l	0.4					<LOD		<LOD	<LOD	<LOD			
Phenol	ug/l	7.7					<LOD		<LOD	<LOD	<LOD			
Phenols	mg/l	0.0077					<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	0.03	<LOD
PAHs														
2-Chloronaphthalene	ug/l						<LOD		<LOD	<LOD	<LOD			
2-Methylnaphthalene	ug/l						<LOD		<LOD	<LOD	<LOD			
Acenaphthene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Acenaphthylene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Anthracene	ug/l	0.1		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(a)pyrene	ug/l	0.00017	0.01	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(b)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzo(ghi)perylene	ug/l	0.0082	0.1											
Benzo(k)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Chrysene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Dibenzo(a,h)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluoranthene	ug/l	0.0063		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Fluorene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Naphthalene	ug/l	2		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phenanthrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Pyrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total PAHs (USEPA 16)	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Phthalates														
Bis(2-ethylhexyl) phthalate	ug/l	1.3					<LOD		<LOD	<LOD	<LOD			
Butylbenzyl phthalate	ug/l	20		<LOD		<LOD	<LOD	<LOD				<LOD	<LOD	<LOD
Di-n-butyl phthalate	ug/l	8					<LOD		<LOD	<LOD	<LOD			
Di-n-Octyl phthalate	ug/l	20					<LOD		<LOD	<LOD	<LOD			
Diethyl phthalate	ug/l	200					<LOD		<LOD	<LOD	<LOD			
Dimethyl phthalate	ug/l	800					<LOD		<LOD	<LOD	<LOD			
VOCs														
Full suite	ug/l													
1,1,1,2-Tetrachloroethane	ug/l						<LOD		<LOD	<LOD	<LOD			
1,1,1-Trichloroethane	ug/l	100					<LOD		<LOD	<LOD	<LOD			
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A											
1,1,2-Trichloroethane	ug/l	400					<LOD		<LOD	<LOD	<LOD			
1,1-Dichloroethane	ug/l						<LOD		<LOD	<LOD	<LOD			
1,1-Dichloroethene	ug/l						<LOD		<LOD	<LOD	<LOD			
1,1-Dichloropropene	ug/l						<LOD		<LOD	<LOD	<LOD			
1,2,3-Trichlorobenzene	ug/l	0.4					<LOD		<LOD	<LOD	<LOD			
1,2,3-Trichloropropane	ug/l						<LOD		<LOD	<LOD	<LOD			
1,2,4-Trichlorobenzene	ug/l	0.4					<LOD		<LOD	<LOD	<LOD			
1,2,4-Trimethylbenzene	ug/l						<LOD		<LOD	<LOD	<LOD			
1,2-Dibromo-3-Chloropropane	ug/l						<LOD		<LOD	<LOD	<LOD			
1,2-Dibromoethane	ug/l						<LOD		<LOD	<LOD	<LOD			
1,2-Dichlorobenzene	ug/l	20					<LOD		<LOD	<LOD	<LOD			
1,2-Dichloroethane	ug/l	10	3				<LOD		<LOD	<LOD	<LOD			
1,2-Dichloropropane	ug/l						<LOD		<LOD	<LOD	<LOD			
1,3,5-Trimethylbenzene	ug/l						<LOD		<LOD	<LOD	<LOD			
1,3-Dichloropropane	ug/l						<LOD		<LOD	<LOD	<LOD			
1,4-Dichlorobenzene	ug/l	20					<LOD		<LOD	<LOD	<LOD			
2-Chlorotoluene	ug/l						<LOD		<LOD	<LOD	<LOD			
4-Chlorotoluene	ug/l						<LOD		<LOD	<LOD	<LOD			
4-Isopropyltoluene	ug/l						<LOD		<LOD	<LOD	<LOD			
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Bromobenzene	ug/l						<LOD		<LOD	<LOD	<LOD			
Bromochloromethane	ug/l		100				<LOD		<LOD	<LOD	<LOD			
Bromodichloromethane	ug/l						<LOD		<LOD	<LOD	<LOD			
Bromoform	ug/l													
Bromomethane	ug/l						<LOD		<LOD	<LOD	<LOD			
Carbon Disulphide	ug/l													
Chlorobenzene	ug/l						<LOD		<LOD	<LOD	<LOD			

M4CAN		Geological Formation Legend	
Groundwater Sample Analysis & Screening Assessment		MMMF	Mercia Mudstone Marginal Facies
Non-CL Data		RTD	River Terrace Deposits
01/07/2015		TSF	Tintern Sandstone Formation
Notes		TFD	Tidal Flat Deposits
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn		MMG	Mercia Mudstone Group
Installation Details not specified. Assumptions made from details from previous rounds.		GFD	Glaciofluvial Deposits
Screening Values & Assessment		SMF	St Maughans Formation
Exceeds EQS			
Exceeds DWS			X
Laboratory detection level higher than screening criterion			X

Monitoring Round	Units	Screening Criteria		BH546	BH546	BH546	BH545	BH545	BH545	BH541	BH541	BH541	BH539	BH539
Location		EQS	DWS	BH546	BH546	BH546	BH545	BH545	BH545	BH541	BH541	BH541	BH539	BH539
Location Type				BH			BH			BH				
Response Zone (RZ) Details				TSF						TSF			TSF	TFD
Drainage Area				Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				3-10	3-10	3-10				2-11.5	2-11.5	2-11.5	Deep	Shallow
Depth (mbGL)				5.14	6.77	6.72	6.75	7.16	7.34	6.67	6.73	6.73	1.97	3.57
Date Sampled				17/04/2015	24/04/2015	01/05/2015	17/04/2015	24/04/2015	01/05/2015	31/03/2015	16/04/2015	21/04/2015	24/03/2015	14/03/2015
Chloroethane	ug/l						<LOD		<LOD	<LOD	<LOD			
Chloroethene	ug/l						<LOD		<LOD	<LOD	<LOD			
Chloroform	ug/l	2.5	100				<LOD		<LOD	<LOD	<LOD			
Chloromethane	ug/l						<LOD		<LOD	<LOD	<LOD			
cis-1,2-Dichloroethene	ug/l						<LOD		<LOD	<LOD	<LOD			
cis-1,3-Dichloropropene	ug/l						<LOD		<LOD	<LOD	<LOD			
Dibromochloromethane	ug/l		100				<LOD		<LOD	<LOD	<LOD			
Dibromomethane	ug/l						<LOD		<LOD	<LOD	<LOD			
Dichlorodifluoromethane	ug/l						<LOD		<LOD	<LOD	<LOD			
Dichloromethane	ug/l	20												
Ethylbenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Hexachlorobutadiene (HCBd)	ug/l	0.6					<LOD		<LOD	<LOD	<LOD			
Isopropylbenzene	ug/l						<LOD		<LOD	<LOD	<LOD			
m,p xylenes	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Methyl tert-butyl ether (MTBE)	ug/l						<LOD		<LOD	<LOD	<LOD			
n-Butylbenzene	ug/l						<LOD		<LOD	<LOD	<LOD			
n-propylbenzene	ug/l						<LOD		<LOD	<LOD	<LOD			
O-Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Sec-Butylbenzene	ug/l						<LOD		<LOD	<LOD	<LOD			
Styrene	ug/l	50					<LOD		<LOD	<LOD	<LOD			
Tert-Butylbenzene	ug/l						<LOD		<LOD	<LOD	<LOD			
Tetrachloroethene	ug/l	10	10				<LOD		<LOD	<LOD	<LOD			
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3				<LOD		<LOD	<LOD	<LOD			
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
trans-1,2-Dichloroethene	ug/l						<LOD		<LOD	<LOD	<LOD			
trans-1,3-Dichloropropene	ug/l						<LOD		<LOD	<LOD	<LOD			
Tribromomethane	ug/l		100				<LOD		<LOD	<LOD	<LOD			
Trichloroethene	ug/l	10	10				<LOD		<LOD	<LOD	<LOD			
Trichlorofluoromethane	ug/l						<LOD		<LOD	<LOD	<LOD			
Vinyl Chloride	ug/l	#N/A	#N/A											
Other Semi-Volatiles														
1,2-Dichlorobenzene	ug/l	20					<LOD		<LOD	<LOD	<LOD			
1,2,4-Trichlorobenzene	ug/l	0.4					<LOD		<LOD	<LOD	<LOD			
1,3-Dichlorobenzene	ug/l	20					<LOD		<LOD	<LOD	<LOD			
1,4-Dichlorobenzene	ug/l	20					<LOD		<LOD	<LOD	<LOD			
2-Nitroaniline	ug/l						<LOD		<LOD	<LOD	<LOD			
2,4-Dinitrotoluene	ug/l						<LOD		<LOD	<LOD	<LOD			
2,6-Dinitrotoluene	ug/l						<LOD		<LOD	<LOD	<LOD			
2-Methylnaphthalene	ug/l						<LOD		<LOD	<LOD	<LOD			
3-Nitroaniline	ug/l						<LOD		<LOD	<LOD	<LOD			
4-Bromophenylphenylether	ug/l													
4-Chloroaniline	ug/l						<LOD		<LOD	<LOD	<LOD			
4-Chlorophenylphenylether	ug/l													
4-Nitroaniline	ug/l						<LOD		<LOD	<LOD	<LOD			
Azobenzene	ug/l						<LOD		<LOD	<LOD	<LOD			
Bis(2-chloroethoxy)methane	ug/l						<LOD		<LOD	<LOD	<LOD			
Bis(2-chloroethyl)ether	ug/l						<LOD		<LOD	<LOD	<LOD			
Bis(2-chloroisopropyl)ether	ug/l						<LOD		<LOD	<LOD	<LOD			
Carbazole	ug/l						<LOD		<LOD	<LOD	<LOD			
Dibenzofuran	ug/l						<LOD		<LOD	<LOD	<LOD			
Hexachlorobenzene	ug/l	0.05					<LOD		<LOD	<LOD	<LOD			
Hexachlorobutadiene	ug/l	0.6					<LOD		<LOD	<LOD	<LOD			
Hexachlorocyclopentadiene	ug/l						<LOD		<LOD	<LOD	<LOD			
Hexachloroethane	ug/l						<LOD		0.98	<LOD	<LOD			
Isophorone	ug/l						<LOD		<LOD	<LOD	<LOD			
N-nitrosodi-n-propylamine	ug/l													
Nitrobenzene	ug/l						<LOD		<LOD	<LOD	<LOD			

M4CAN Groundwater Sample Analysis & Screening Assessment Non-CL Data 01/07/2015 Notes EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn Installation Details not specified. Assumptions made from details from previous rounds. Screening Values & Assessment Exceeds EQS Exceeds DWS Laboratory detection level higher than screening criterion				Geological Formation Legend MMMFMercia Mudstone Marginal Facies RTDRiver Terrace Deposits TSFTintern Sandstone Formation TFDTidal Flat Deposits MMGMercia Mudstone Group GFDGlaciofluvial Deposits SMFSt Maughans Formation																		
Monitoring Round		Units	Screening Criteria						1		2		3		1		2		3		1	
Location			EQS	DWS	BH539	BH539	BH539	BH539	BHM4CAN061	BHM4CAN061	BHM4CAN061	BHM4CAN062	BHM4CAN062	BHM4CAN062	BHM4CAN063							
Location Type					BH				BH				BH									
Response Zone (RZ) Details					TFD	TSF	TFD	TSF	MMG	MMG	MMG	MMMF	MMMF	MMMF	MMMF							
Drainage Area					Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East							
Installation Details					Shallow	Deep	Shallow	Deep	Deep	Deep	Deep				Shallow							
Depth (mbGL)					2.1	2.84	1.49	3.04	12.44	11.16	11.47	6.47	6.58	6.93	7.61							
Date Sampled					31/03/2015	31/03/2015	16/04/2015	16/04/2015	11/05/2016	24/05/2016	06/06/2016	11/05/2016	24/05/2016	06/06/2016	06/05/2016							
Metals																						
Arsenic Dissolved	ug/l	50	10	3.2	3.4	1.9	<LOD	0.434	0.341	0.743	0.309	0.333	0.422	0.653								
Beryllium Dissolved	ug/l																					
Boron Dissolved	ug/l	2000	1000	160	78	1000	960															
Calcium Dissolved	ug/l																					
Chromium Dissolved	ug/l	32	50	25	33	1.8	2.4	7.1	6.62	5.66	9.9	7.98	6.74	9.5								
Copper Dissolved	ug/l	10	2000	16	21	<LOD	<LOD	1.04	0.88	1.38	1.11	0.957	1.28	1.91								
Iron Dissolved	ug/l	1000	200																			
Lead Dissolved	ug/l	1.2	10	<LOD	<LOD	<LOD	<LOD	0.046	<0.02	0.252	0.166	<0.02	0.18	0.247								
Magnesium Dissolved	ug/l																					
Manganese Dissolved	ug/l	30	50																			
Nickel Dissolved	ug/l	4	20	6.3	2.3	3.3	1.3	1.5	0.902	1.82	1.44	1.08	1.75	1								
Selenium Dissolved	ug/l		10	2.9	3.1	1	2.7	1.38	1.15	1.29	2.62	2.67	1.99	1.77								
Cadmium Dissolved	ug/l	0.15	5	<LOD	<LOD	<LOD	<LOD	<0.1	<0.1	0.105	<0.1	<0.1	<0.1	<0.1								
Vanadium Dissolved	ug/l							2.51	2.07	2.35	2.79	2.08	1.82	2.8								
Zinc Dissolved	ug/l	75		5.9	7.6	2.5	3.4	3.3	3.1	8.09	4	4.65	4.63	3.1								
Mercury Dissolved	ug/l	0.07	1	<LOD	<LOD	<LOD	<LOD	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01								
Cadmium Total	ug/l	0.15	5																			
Zinc Total	ug/l	75																				
Mercury Total	ug/l	0.07	1																			
Non-Metal Inorganics																						
Hardness Total	mg/l																					
Total Alkalinity as CaCO3	mg/l							425	400	399	720	465	510	505								
BOD	mg/l	5																				
COD	mg/l																					
Potassium Dissolved	mg/l																					
Sodium Dissolved	mg/l		200																			
Nitrite as NO2	mg/l							<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05								
Nitrate as NO3	mg/l		50					15.4	30.5	29.6	11.6	20	19.3	9.47								
Total Diss Sulphur	mg/l																					
Sulphate (soluble)	mg/l	400	250																			
Chloride	mg/l	250	250	31	73	25	70	63.6	88.2	89.7	171	164	148	78.4								
Sulphide	mg/l																					
Ammoniacal Nitrogen as N	mg/l	0.6		0.78	0.17	0.41	0.041	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2								
Unionised ammonia	mg/l																					
Total Ammonium as NH4	mg/l		0.5																			
Phenols Monohydric	mg/l																					
Thiocyanate	mg/l																					
Total Cyanide	mg/l	0.001	0.05																			
Free Cyanide	mg/l			<LOD	<LOD	<LOD	<LOD															
Complex Cyanide	mg/l																					
Conductivity @ 20 deg.C	mS/cm							0.798	0.858	0.878	1.13	1.09	1.08	0.858								
Carbon Dioxide Dissolved	ug/l																					
pH Value	pH units	6-9	6.5-10	7.8	7.9	8.4	8.6	7.91	7.69	7.42	7.45	7.67	7.29	7.42								
Organics																						
GRO (C4-C12)	ug/l							<50	<50	<50	<50	<50	<50	<50								
MTBE	ug/l			<LOD	<LOD	<LOD	<LOD	<3	<3	<3	<3	<3	<3	<3								
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<7	<7	<7	<7	<7	<7	<7								
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<4	<4	<4	<4	<4	<4	<4								
Ethyl benzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<5	<5	<5	<5	<5	<5	<5								
m & p Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<8	<8	<8	<8	<8	<8	<8								
o Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<3	<3	<3	<3	<3	<3	<3								
TPH																						
Aliphatics C5-C6	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10													
Aliphatics >C6-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10								
Aliphatics >C8-C10	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10								
Aliphatics >C10-C12	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10								
Aliphatics >C12-C16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10								
Aliphatics >C16-C21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10								
Aliphatics >C21-C35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	16	47	61	37	83								
Total Aliphatics C5-C35 Aqueous	ug/l							<10	<10	16	47	61	37	83								
Aliphatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD															
Aromatics >C5-C7	ug/l			<LOD	<LOD	<LOD	<LOD															
Aromatics C6-C7	ug/l																					
Aromatics >C7-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10								
Aromatics >EC8-EC10	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10								
Aromatics >EC10-EC12	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10								
Aromatics >EC12-EC16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10								
Aromatics >EC16-EC21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10								
Aromatics >EC21-EC35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<10	<10	<10	<10	<10	<10	<10								
Total Aromatics C6-C35 Aqueous	ug/l							<10	<10	<10	<10	<10	<10	<10								
Aromatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD															
Total Aliphatic TPH	ug/l			<LOD	<LOD	<LOD	<LOD															
Total Aromatic TPH	ug/l																					
TPH (Aliphatics and Aromatics C5-C35)	ug/l							<10	<10	16	47	61	37	83								
Total petroleum hydrocarbons	ug/l			<LOD	<LOD	<LOD	<LOD															
TPH FTIR	ug/l																					
TPH GC	ug/l																					
PCBs																						
PCB- ARO	ug/l																					
Cresols	ug/l																					
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l					<LOD	<LOD															
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l					<LOD	<LOD															
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l					<LOD	<LOD															
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l					<LOD	<LOD															
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l					<LOD	<LOD															
Pcb-28 2,4,4' - Trichlorobiphenyl	ug/l					<LOD	<LOD															
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l					<LOD	<LOD															

M4CAN Groundwater Sample Analysis & Screening Assessment Non-CL Data 01/07/2015				Geological Formation Legend											
Notes				MMMFMercia Mudstone Marginal Facies RTDRiver Terrace Deposits TSFTintern Sandstone Formation TFDTidal Flat Deposits MMGMercia Mudstone Group GFDGlaciofluvial Deposits SMFSt Maughans Formation											
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn															
Installation Details not specified. Assumptions made from details from previous rounds.			X												
Screening Values & Assessment															
Exceeds EQS															
Exceeds DWS			X												
Laboratory detection level higher than screening criterion			X												
Monitoring Round	Units	Screening Criteria						1	2	3	1	2	3	3	
Location		EQS	DWS	BH539				BHM4CAN061	BHM4CAN061	BHM4CAN061	BHM4CAN062	BHM4CAN062	BHM4CAN062	BHM4CAN063	
Location Type				BH				BH				BH			
Response Zone (RZ) Details				TFD	TSF	TFD	TSF	MMG	MMG	MMG	MMMFM	MMMFM	MMMFM	MMMFM	
Drainage Area				Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				Shallow	Deep	Shallow	Deep	Deep	Deep	Deep				Shallow	
Depth (mbGL)				2.1	2.84	1.49	3.04	12.44	11.16	11.47	6.47	6.58	6.93	7.61	
Date Sampled				31/03/2015	31/03/2015	16/04/2015	16/04/2015	11/05/2016	24/05/2016	06/06/2016	11/05/2016	24/05/2016	06/06/2016	06/05/2016	
PCB congener 105	ug/l				<0.015	<0.015									
PCB congener 167	ug/l				<0.015	<0.015									
PCB congener 169	ug/l				<0.015	<0.015									
PCB congener 123	ug/l				<0.015	<0.015									
PCB congener 114	ug/l				<0.015	<0.015									
PCB congener 157	ug/l				<0.015	<0.015									
PCB congener 81	ug/l				<0.015	<0.015									
PCB congener 156	ug/l				<0.015	<0.015									
PCB congener 126	ug/l				<0.015	<0.015									
PCB congener 77	ug/l				<0.015	<0.015									
PCB congener 189	ug/l				<0.015	<0.015									
PCB congener 118	ug/l				<0.015	<0.015									
Phenols															
Dimethylphenols	ug/l														
Trimethylphenols	ug/l														
2-Chlorophenol	ug/l	50		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
2 - Methyl-4,6-Dinitrophenol	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
2-Methylphenol	ug/l	100		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
2-Nitrophenol	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
2,4-Dichlorophenol	ug/l	20		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
2,4-Dimethylphenol	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
2,4,5-Trichlorophenol	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
2,4,6-Trichlorophenol	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
4-Chloro-3-methylphenol	ug/l	40		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
4-Methylphenol	ug/l	100		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
4-Nitrophenol	ug/l							<1	<1		<1	<1	<1	<1	
Pentachlorophenol	ug/l	0.4		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
Phenol	ug/l	7.7		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
Phenols	mg/l	0.0077		<LOD	<LOD	<LOD	<LOD								
PAHs															
2-Chloronaphthalene	ug/l			<LOD	<LOD	<LOD	<LOD								
2-Methylnaphthalene	ug/l			<LOD	<LOD	<LOD	<LOD								
Acenaphthene	ug/l			<LOD	<LOD	<LOD	<LOD	<0.015	<0.015	<0.015	<0.03	<0.015	<0.015	<0.015	
Acenaphthylene	ug/l			<LOD	<LOD	<LOD	<LOD	<0.011	<0.011	<0.011	<0.022	<0.011	<0.011	<0.011	
Anthracene	ug/l	0.1		<LOD	<LOD	<LOD	<LOD	<0.015	<0.015	<0.015	<0.03	<0.015	<0.015	<0.015	
Benzo(a)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<0.017	<0.017	<0.017	<0.034	0.0173	0.0437	0.0292	
Benzo(a)pyrene	ug/l	0.00017	0.01	<LOD	<LOD	<LOD	<LOD	<0.009	<0.009	0.00901	0.0259	0.0167	0.0304	0.0689	
Benzo(b)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<0.023	<0.023	<0.023	<0.046	0.0279	0.0578	0.108	
Benzo(ghi)perylene	ug/l	0.0082	0.1					<0.016	<0.016	0.0203	<0.032	0.016	0.027	0.0801	
Benzo(k)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<0.027	<0.027	<0.027	<0.054	<0.027	<0.027	0.0353	
Chrysene	ug/l			<LOD	<LOD	<LOD	<LOD	<0.013	<0.013	<0.013	<0.026	<0.013	0.0278	0.0391	
Dibenzo(a,h)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<0.016	<0.016	<0.016	<0.032	<0.016	<0.016	0.0172	
Fluoranthene	ug/l	0.0063		<LOD	<LOD	<LOD	<LOD	<0.017	<0.017	<0.017	<0.034	0.0273	0.0661	0.0702	
Fluorene	ug/l			<LOD	<LOD	<LOD	<LOD	<0.014	<0.014	<0.014	<0.028	<0.014	<0.014	<0.014	
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<LOD	<LOD	<LOD	<LOD	<0.014	<0.014	0.0143	<0.028	<0.014	0.0278	0.0532	
Naphthalene	ug/l	2		<LOD	<LOD	<LOD	<LOD	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	
Phenanthrene	ug/l			<LOD	<LOD	<LOD	<LOD	<0.022	<0.022	<0.022	<0.044	0.0233	0.0451	0.0276	
Pyrene	ug/l			<LOD	<LOD	<LOD	<LOD	<0.015	<0.015	0.0184	0.03	0.0248	0.0458	0.0639	
Total PAHs (USEPA 16)	ug/l			<LOD	<LOD	<LOD	<LOD	<0.344	<0.344	<0.344	<0.688	<0.344	0.372	0.593	
Phthalates															
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<LOD	<LOD	<LOD	<LOD	<2	<2		<2	4.53	<2	2.96	
Butylbenzyl phthalate	ug/l	20		<LOD				<1	<1		<1	<1	<1	<1	
Di-n-butyl phthalate	ug/l	8		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
Di-n-Octyl phthalate	ug/l	20		<LOD	<LOD	<LOD	<LOD	<5	<5		<5	<5	<5	<5	
Diethyl phthalate	ug/l	200		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
Dimethyl phthalate	ug/l	800		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
VOCs															
Full suite	ug/l														
1,1,1,2-Tetrachloroethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
1,1,1-Trichloroethane	ug/l	100		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A					<1	<1		<1	<1	<1	<1	
1,1,2-Trichloroethane	ug/l	400		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
1,1-Dichloroethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
1,1-Dichloroethene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1	
1,1-Dichloropropene	ug/l			<LOD	<LOD	<LOD	<								

M4CAN		Geological Formation Legend	
Groundwater Sample Analysis & Screening Assessment		MMMF	Mercia Mudstone Marginal Facies
Non-CL Data		RTD	River Terrace Deposits
01/07/2015		TSF	Tintern Sandstone Formation
Notes		TFD	Tidal Flat Deposits
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn		MMG	Mercia Mudstone Group
Installation Details not specified. Assumptions made from details from previous rounds.		GFD	Glaciofluvial Deposits
Screening Values & Assessment		SMF	St Maughans Formation
Exceeds EQS			
Exceeds DWS			X
Laboratory detection level higher than screening criterion			X

Monitoring Round	Units	Screening Criteria						1	2	3	1	2	3	
Location		EQS	DWS	BH539	BH539	BH539	BH539	BHM4CAN061	BHM4CAN061	BHM4CAN061	BHM4CAN062	BHM4CAN062	BHM4CAN062	BHM4CAN063
Location Type				BH				BH			BH			
Response Zone (RZ) Details				TFD	TSF	TFD	TSF	MMG	MMG	MMG	MMMF	MMMF	MMMF	MMMF
Drainage Area				Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East
Installation Details				Shallow	Deep	Shallow	Deep	Deep	Deep	Deep				Shallow
Depth (mbGL)				2.1	2.84	1.49	3.04	12.44	11.16	11.47	6.47	6.58	6.93	7.61
Date Sampled				31/03/2015	31/03/2015	16/04/2015	16/04/2015	11/05/2016	24/05/2016	06/06/2016	11/05/2016	24/05/2016	06/06/2016	06/05/2016
Chloroethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Chloroethene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Chloroform	ug/l	2.5	100	<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Chloromethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Dibromochloromethane	ug/l		100	<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Dibromomethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Dichlorodifluoromethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Dichloromethane	ug/l	20						<1	<1		<1	<1	<1	<1
Ethylbenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Hexachlorobutadiene (HCBd)	ug/l	0.6		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Isopropylbenzene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
m,p xylenes	ug/l	30		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
n-Butylbenzene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
n-propylbenzene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
O-Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Sec-Butylbenzene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Styrene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Tert-Butylbenzene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10	<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3	<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Tribromomethane	ug/l		100	<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Trichloroethene	ug/l	10	10	<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Trichlorofluoromethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Vinyl Chloride	ug/l	#N/A	#N/A					<1	<1		<1	<1	<1	<1
Other Semi-Volatiles														
1,2-Dichlorobenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l	0.4		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,3-Dichlorobenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
2-Nitroaniline	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
2,4-Dinitrotoluene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
2,6-Dinitrotoluene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
2-Methylnaphthalene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
3-Nitroaniline	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
4-Bromophenylphenylether	ug/l							<1	<1		<1	<1	<1	<1
4-Chloroaniline	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
4-Chlorophenylphenylether	ug/l							<1	<1		<1	<1	<1	<1
4-Nitroaniline	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Azobenzene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Bis(2-chloroethoxy)methane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Bis(2-chloroethyl)ether	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Bis(2-chloroisopropyl)ether	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Carbazole	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Dibenzofuran	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Hexachlorobenzene	ug/l	0.05		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Hexachlorobutadiene	ug/l	0.6		<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Hexachlorocyclopentadiene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Hexachloroethane	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
Isophorone	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1
N-nitrosodi-n-propylamine	ug/l							<1	<1		<1	<1	<1	<1
Nitrobenzene	ug/l			<LOD	<LOD	<LOD	<LOD	<1	<1		<1	<1	<1	<1

M4CAN		Geological Formation Legend <table><tr><td>MMMF</td><td>Mercia Mudstone Marginal Facies</td></tr><tr><td>RTD</td><td>River Terrace Deposits</td></tr><tr><td>TSF</td><td>Tintern Sandstone Formation</td></tr><tr><td>TFD</td><td>Tidal Flat Deposits</td></tr><tr><td>MMG</td><td>Mercia Mudstone Group</td></tr><tr><td>GFD</td><td>Glaciofluvial Deposits</td></tr><tr><td>SMF</td><td>St Maughans Formation</td></tr></table>	MMMF	Mercia Mudstone Marginal Facies	RTD	River Terrace Deposits	TSF	Tintern Sandstone Formation	TFD	Tidal Flat Deposits	MMG	Mercia Mudstone Group	GFD	Glaciofluvial Deposits	SMF	St Maughans Formation
MMMF	Mercia Mudstone Marginal Facies															
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Non-CL Data																
01/07/2015																
Notes																
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn																
Installation Details not specified. Assumptions made from details from previous rounds.	X															
Screening Values & Assessment																
Exceeds EQS																
Exceeds DWS	X															
Laboratory detection level higher than screening criterion	X															

Monitoring Round	Units	Screening Criteria		1	2		3		1	2	3		
Location		EQS	DWS	BHM4CAN063	BHM4CAN063	BHM4CAN063	BHM4CAN063	BHM4CAN063	BHM4CAN064	BHM4CAN064	BHM4CAN064	BH537	BH537
Location Type				BH					BH				
Response Zone (RZ) Details				MMMF	MMMF	MMMF	MMMF	MMMF	MMMF	MMMF	MMMF	PEAT	MMG
Drainage Area				Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Magor Area 5 East	Caldicot Levels Area 4	Caldicot Levels Area 4
Installation Details				Deep	Shallow	Deep	Shallow	Deep				Shallow	Deep
Depth (mbGL)				7.64	7.77	7.76	8.05	18.22	7.42	8.2	8.65	0.46	2.62
Date Sampled				06/05/2016	24/05/2016	24/05/2016	03/06/2016	03/06/2016	11/05/2016	24/05/2016	06/06/2016	24/03/2015	24/03/2015
PCB congener 105	ug/l								<0.015	<0.015			
PCB congener 167	ug/l								<0.015	<0.015			
PCB congener 169	ug/l								<0.015	<0.015			
PCB congener 123	ug/l								<0.015	<0.015			
PCB congener 114	ug/l								<0.015	<0.015			
PCB congener 157	ug/l								<0.015	<0.015			
PCB congener 81	ug/l								<0.015	<0.015			
PCB congener 156	ug/l								<0.015	<0.015			
PCB congener 126	ug/l								<0.015	<0.015			
PCB congener 77	ug/l								<0.015	<0.015			
PCB congener 189	ug/l								<0.015	<0.015			
PCB congener 118	ug/l								<0.015	<0.015			
Phenols													
Dimethylphenols	ug/l												
Trimethylphenols	ug/l												
2-Chlorophenol	ug/l	50		<1	<1	<1	<1	<1	<1	<1	<1		
2 - Methyl-4,6-Dinitrophenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
2-Methylphenol	ug/l	100		<1	<1	<1	<1	<1	<1	<1	<1		
2-Nitrophenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
2,4-Dichlorophenol	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1		
2,4-Dimethylphenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
2,4,5-Trichlorophenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
2,4,6-Trichlorophenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
4-Chloro-3-methylphenol	ug/l	40		<1	<1	<1	<1	<1	<1	<1	<1		
4-Methylphenol	ug/l	100		<1	<1	<1	<1	<1	<1	<1	<1		
4-Nitrophenol	ug/l			<1	<1	<1	<1	<1	<1	<1	<1		
Pentachlorophenol	ug/l	0.4		<1	<1	<1	<1	<1	<1	<1	<1		
Phenol	ug/l	7.7		<1	<1	<1	<1	<1	<1	<1	<1		
Phenols	mg/l	0.0077											
PAHs													
2-Chloronaphthalene	ug/l												
2-Methylnaphthalene	ug/l												
Acenaphthene	ug/l			<0.015	<0.015	<0.015	<0.015	<0.015	<0.03	0.0237	<0.015	<LOD	<LOD
Acenaphthylene	ug/l			<0.011	<0.011	<0.011	<0.011	<0.011	<0.022	0.0125	<0.011	<LOD	<LOD
Anthracene	ug/l	0.1		<0.015	<0.015	<0.015	<0.015	<0.015	<0.03	0.0305	<0.015	<LOD	<LOD
Benzo(a)anthracene	ug/l			<0.017	0.0903	<0.017	0.0575	<0.017	0.131	0.344	0.0976	<LOD	<LOD
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.009	0.145	<0.009	0.0875	0.0165	0.211	0.671	0.107	<LOD	<LOD
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.023	0.207	<0.023	0.139	0.0249	0.334	1.06	0.193	<LOD	<LOD
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.016	0.161	<0.016	0.11	0.02	0.236	0.642	0.137		
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.027	0.0739	<0.027	0.0433	<0.027	0.115	0.401	0.0688	<LOD	<LOD
Chrysene	ug/l			<0.013	0.084	<0.013	0.0565	<0.013	0.117	0.306	0.082	<LOD	<LOD
Dibenzo(a,h)anthracene	ug/l			<0.016	0.0345	<0.016	0.0247	<0.016	0.055	0.147	0.0315	<LOD	<LOD
Fluoranthene	ug/l	0.0063		<0.017	0.143	<0.017	0.0986	0.0181	0.192	0.544	0.129	<LOD	<LOD
Fluorene	ug/l			<0.014	<0.014	<0.014	<0.014	<0.014	<0.028	0.0176	<0.014	<LOD	<LOD
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.014	0.141	<0.014	0.0846	0.0165	0.137	0.58	0.127	<LOD	<LOD
Naphthalene	ug/l	2		<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<LOD	<LOD
Phenanthrene	ug/l			<0.022	0.0601	<0.022	0.0387	<0.022	0.064	0.18	0.0554	<LOD	<LOD
Pyrene	ug/l			<0.015	0.133	<0.015	0.0915	0.017	0.182	0.485	0.117	<LOD	<LOD
Total PAHs (USEPA 16)	ug/l			<0.344	1.27	<0.344	0.832	<0.344	1.79	5.45	1.14	<LOD	<LOD
Phthalates													
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<2	<2	<2	<2	<2	2.03	<2	<2		
Butylbenzyl phthalate	ug/l	20		<1	<1	<1	<1	<1	<1	<1	<1		
Di-n-butyl phthalate	ug/l	8		<1	<1	<1	<1	<1	<1	<1	<1		
Di-n-Octyl phthalate	ug/l	20		<5	<5	<5	<5	<5	<5	<5	<5		
Diethyl phthalate	ug/l	200		<1	<1	<1	<1	<1	<1	<1	<1		
Dimethyl phthalate	ug/l	800		<1	<1	<1	<1	<1	<1	<1	<1		
VOCs													
Full suite	ug/l												
1,1,1,2-Tetrachloroethane	ug/l			<1	<1	<1			<1	<1			
1,1,1-Trichloroethane	ug/l	100		<1	<1	<1			<1	<1			
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A	<1	<1	<1			<1	<1			
1,1,2-Trichloroethane	ug/l	400		<1	<1	<1			<1	<1			
1,1-Dichloroethane	ug/l			<1	<1	<1			<1	<1			
1,1-Dichloroethene	ug/l			<1	<1	<1			<1	<1			
1,1-Dichloropropene	ug/l			<1	<1	<1			<1	<1			
1,2,3-Trichlorobenzene	ug/l	0.4		<1	<1	<1			<1	<1			
1,2,3-Trichloropropane	ug/l			<1	<1	<1			<1	<1			
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1	<1			<1	<1			
1,2,4-Trimethylbenzene	ug/l			<1	<1	<1			<1	<1			
1,2-Dibromo-3-Chloropropane	ug/l			<1	<1	<1			<1	<1			
1,2-Dibromoethane	ug/l			<1	<1	<1			<1	<1			
1,2-Dichlorobenzene	ug/l	20		<1	<1	<1			<1	<1			
1,2-Dichloroethane	ug/l	10	3	<1	<1	<1			<1	<1			
1,2-Dichloropropane	ug/l			<1	<1	<1			<1	<1			
1,3,5-Trimethylbenzene	ug/l			<1	<1	<1			<1	<1			
1,3-Dichloropropane	ug/l			<1	<1	<1			<1	<1			
1,4-Dichlorobenzene	ug/l	20		<1	<1	<1			<1	<1			
2-Chlorotoluene	ug/l			<1	<1	<1			<1	<1			
4-Chlorotoluene	ug/l			<1	<1	<1			<1	<1			
4-Isopropyltoluene	ug/l			<1	<1	<1			<1	<1			
Benzene	ug/l	10	1	<1	<1	<1			<1	<1		<LOD	<LOD
Bromobenzene	ug/l			<1	<1	<1			<1	<1			
Bromochloromethane	ug/l		100	<1	<1	<1			<1	<1			
Bromodichloromethane	ug/l			<1	<1	<1			<1	<1			
Bromoform	ug/l			<1	<1	<1			<1	<1			
Bromomethane	ug/l			<1	<1	<1			<1	<1			
Carbon Disulphide	ug/l			<1	<1	<1			<1	<1			
Chlorobenzene	ug/l			<1	<1	<1			<1	<1			

M4CAN	
Groundwater Sample Analysis & Screening Assessment	
Non-CL Data	
01/07/2015	
Notes	
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
Installation Details not specified. Assumptions made from details from previous rounds.	X
Screening Values & Assessment	
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend	
MMMF	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

[illegible]

M4CAN	
Groundwater Sample Analysis & Screening Assessment	
Non-CL Data	
01/07/2015	
Notes	
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
Installation Details not specified. Assumptions made from details from previous rounds.	X
Screening Values & Assessment	
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend	
MMMM	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
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TFD	Tidal Flat Deposits
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GFD	Glaciofluvial Deposits
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Monitoring Round		Units	Screening Criteria													
Location			EQS	DWS	BH533	BH533	BH510	BH510	BH510	BH510	BH510	BH510	BH506	BH506	BH506	
Location Type																
Response Zone (RZ) Details					TFD	TFD	TFD	TFD/MMG	TFD	TFD/MMG	TFD	TFD/MMG	TFD	MMG	TFD	
Drainage Area					Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4
Installation Details					Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	
Depth (mbGL)					3.36	6.88	0.68	0.87	2.52	7.34	2.82	5.84	4.87	11.62	5.83	
Date Sampled				17/03/2015	17/03/2015	04/03/2015	04/03/2015	12/03/2015	12/03/2015	18/03/2015	18/03/2015	21/04/2015	21/04/2015	28/04/2015		
Metals																
Arsenic Dissolved	ug/l	50	10	15	16	6.7	17	22	43	18	27	10	18	5.2		
Beryllium Dissolved	ug/l															
Boron Dissolved	ug/l	2000	1000	2600	3800	760	340	2300	600	1400	940	850	610	640		
Calcium Dissolved	ug/l															
Chromium Dissolved	ug/l	32	50	86	91	20	56	36	62	57	120	18	27	24		
Copper Dissolved	ug/l	10	2000	54	82	5	52	23	24	39	150	9.4	37	7.3		
Iron Dissolved	ug/l	1000	200													
Lead Dissolved	ug/l	1.2	10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Magnesium Dissolved	ug/l															
Manganese Dissolved	ug/l	30	50													
Nickel Dissolved	ug/l	4	20	14	19	2.2	12	<LOD	4.5	13	13	5.3	5.8	5.4		
Selenium Dissolved	ug/l		10	39	51	8.4	29	24	36	23	56	9.1	18	2.1		
Cadmium Dissolved	ug/l	0.15	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Vanadium Dissolved	ug/l															
Zinc Dissolved	ug/l	75		6.9	21	1.4	4	7.5	3.8	6	12	4	5.5	3.6		
Mercury Dissolved	ug/l	0.07	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Cadmium Total	ug/l	0.15	5													
Zinc Total	ug/l	75														
Mercury Total	ug/l	0.07	1													
Non-Metal Inorganics																
Hardness Total	mg/l															
Total Alkalinity as CaCO3	mg/l															
BOD	mg/l	5														
COD	mg/l															
Potassium Dissolved	mg/l															
Sodium Dissolved	mg/l		200													
Nitrite as NO2	mg/l															
Nitrate as NO3	mg/l		50													
Total Diss Sulphur	mg/l															
Sulphate (soluble)	mg/l	400	250													
Chloride	mg/l	250	250									860	3000	1300		
Sulphide	mg/l															
Ammoniacal Nitrogen as N	mg/l	0.6										5.8	10	16		
Unionised ammonia	mg/l															
Total Ammonium as NH4	mg/l		0.5													
Phenols Monohydric	mg/l															
Thiocyanate	mg/l															
Total Cyanide	mg/l	0.001	0.05													
Free Cyanide	mg/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Complex Cyanide	mg/l															
Conductivity @ 20 deg.C	mS/cm															
Carbon Dioxide Dissolved	ug/l															
pH Value	pH units	6-9	6.5-10	7.6	7.2	7.6	8	7.8	7.8	7.6	8.4	8.8	8.8	8.2		
Organics																
GRO (C4-C12)	ug/l															
MTBE	ug/l											<LOD	<LOD	<LOD		
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Ethyl benzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
m & p Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
o Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
TPH																
Aliphatics C5-C6	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Aliphatics >C6-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Aliphatics >C8-C10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Aliphatics >C10-C12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Aliphatics >C12-C16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Aliphatics >C16-C21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Aliphatics >C21-C35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Total Aliphatics C5-C35 Aqueous	ug/l															
Aliphatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Aromatics >C5-C7	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Aromatics C6-C7	ug/l															
Aromatics >C7-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Aromatics >EC8-EC10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Aromatics >EC10-EC12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Aromatics >EC12-EC16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Aromatics >EC16-EC21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Aromatics >EC21-EC35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Total Aromatics C6-C35 Aqueous	ug/l															
Aromatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Total Aliphatic TPH	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
Total Aromatic TPH	ug/l															
TPH (Aliphatics and Aromatics C5-C35)	ug/l															
Total petroleum hydrocarbons	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD		
TPH FTIR	ug/l															
TPH GC	ug/l															
PCBs																
PCB- ARO	ug/l															
Cresols	ug/l															
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l															
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l															
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l															
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l															
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l															
Pcb-28 2,4,4' - Trichlorobiphenyl	ug/l															
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l															

M4CAN		Geological Formation Legend <table><tr><td>MMMF</td><td>Mercia Mudstone Marginal Facies</td></tr><tr><td>RTD</td><td>River Terrace Deposits</td></tr><tr><td>TSF</td><td>Tintern Sandstone Formation</td></tr><tr><td>TFD</td><td>Tidal Flat Deposits</td></tr><tr><td>MMG</td><td>Mercia Mudstone Group</td></tr><tr><td>GFD</td><td>Glaciofluvial Deposits</td></tr><tr><td>SMF</td><td>St Maughans Formation</td></tr></table>		MMMF	Mercia Mudstone Marginal Facies	RTD	River Terrace Deposits	TSF	Tintern Sandstone Formation	TFD	Tidal Flat Deposits	MMG	Mercia Mudstone Group	GFD	Glaciofluvial Deposits	SMF	St Maughans Formation
MMMF	Mercia Mudstone Marginal Facies																
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Groundwater Sample Analysis & Screening Assessment																	
Non-CL Data																	
01/07/2015																	
Notes																	
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn																	
Installation Details not specified. Assumptions made from details from previous rounds.	X																
Screening Values & Assessment																	
Exceeds EQS																	
Exceeds DWS	X																
Laboratory detection level higher than screening criterion	X																

Monitoring Round	Units	Screening Criteria		BH533	BH533	BH510	BH510	BH510	BH510	BH510	BH510	BH510	BH506	BH506	BH506
Location		EQS	DWS												
Location Type															
Response Zone (RZ) Details				TFD	TFD	TFD	TFD/MMG	TFD	TFD/MMG	TFD	TFD/MMG	TFD	MMG	TFD	
Drainage Area				Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4
Installation Details				Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Shallow
Depth (mbGL)				3.36	6.88	0.68	0.87	2.52	7.34	2.82	5.84	4.87	11.62	5.83	
Date Sampled				17/03/2015	17/03/2015	04/03/2015	04/03/2015	12/03/2015	12/03/2015	18/03/2015	18/03/2015	21/04/2015	21/04/2015	28/04/2015	
PCB congener 105	ug/l														
PCB congener 167	ug/l														
PCB congener 169	ug/l														
PCB congener 123	ug/l														
PCB congener 114	ug/l														
PCB congener 157	ug/l														
PCB congener 81	ug/l														
PCB congener 156	ug/l														
PCB congener 126	ug/l														
PCB congener 77	ug/l														
PCB congener 189	ug/l														
PCB congener 118	ug/l														
Phenols															
Dimethylphenols	ug/l														
Trimethylphenols	ug/l														
2-Chlorophenol	ug/l	50										<LOD	<LOD	<LOD	
2 - Methyl-4,6-Dinitrophenol	ug/l											<LOD	<LOD	<LOD	
2-Methylphenol	ug/l	100										<LOD	<LOD	<LOD	
2-Nitrophenol	ug/l											<LOD	<LOD	<LOD	
2,4-Dichlorophenol	ug/l	20										<LOD	<LOD	<LOD	
2,4-Dimethylphenol	ug/l											<LOD	<LOD	<LOD	
2,4,5-Trichlorophenol	ug/l											<LOD	<LOD	<LOD	
2,4,6-Trichlorophenol	ug/l											<LOD	<LOD	<LOD	
4-Chloro-3-methylphenol	ug/l	40										<LOD	<LOD	<LOD	
4-Methylphenol	ug/l	100										<LOD	<LOD	<LOD	
4-Nitrophenol	ug/l														
Pentachlorophenol	ug/l	0.4										<LOD	<LOD	<LOD	
Phenol	ug/l	7.7										<LOD	<LOD	<LOD	
Phenols	mg/l	0.0077										<LOD	<LOD	<LOD	
PAHs															
2-Chloronaphthalene	ug/l											<LOD	<LOD	<LOD	
2-Methylnaphthalene	ug/l											<LOD	<LOD	<LOD	
Acenaphthene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Acenaphthylene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Anthracene	ug/l	0.1		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Benzo(a)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Benzo(a)pyrene	ug/l	0.00017	0.01	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Benzo(b)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Benzo(ghi)perylene	ug/l	0.0082	0.1												
Benzo(k)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Chrysene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Dibenzo(a,h)anthracene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Fluoranthene	ug/l	0.0063		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Fluorene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Naphthalene	ug/l	2		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Phenanthrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Pyrene	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Total PAHs (USEPA 16)	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Phthalates															
Bis(2-ethylhexyl) phthalate	ug/l	1.3										<LOD	<LOD	<LOD	
Butylbenzyl phthalate	ug/l	20							<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Di-n-butyl phthalate	ug/l	8										<LOD	<LOD	<LOD	
Di-n-Octyl phthalate	ug/l	20										<LOD	<LOD	<LOD	
Diethyl phthalate	ug/l	200										<LOD	<LOD	<LOD	
Dimethyl phthalate	ug/l	800										<LOD	<LOD	<LOD	
VOCs															
Full suite	ug/l														
1,1,1,2-Tetrachloroethane	ug/l											<LOD	<LOD	<LOD	
1,1,1-Trichloroethane	ug/l	100										<LOD	<LOD	<LOD	
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A												
1,1,2-Trichloroethane	ug/l	400										<LOD	<LOD	<LOD	
1,1-Dichloroethane	ug/l											<LOD	<LOD	<LOD	
1,1-Dichloroethene	ug/l											<LOD	<LOD	<LOD	
1,1-Dichloropropene	ug/l											<LOD	<LOD	<LOD	
1,2,3-Trichlorobenzene	ug/l	0.4										<LOD	<LOD	<LOD	
1,2,3-Trichloropropane	ug/l											<LOD	<LOD	<LOD	
1,2,4-Trichlorobenzene	ug/l	0.4										<LOD	<LOD	<LOD	
1,2,4-Trimethylbenzene	ug/l											<LOD	<LOD	<LOD	
1,2-Dibromo-3-Chloropropane	ug/l											<LOD	<LOD	<LOD	
1,2-Dibromoethane	ug/l											<LOD	<LOD	<LOD	
1,2-Dichlorobenzene	ug/l	20										<LOD	<LOD	<LOD	
1,2-Dichloroethane	ug/l	10	3									<LOD	<LOD	<LOD	
1,2-Dichloropropane	ug/l											<LOD	<LOD	<LOD	
1,3,5-Trimethylbenzene	ug/l											<LOD	<LOD	<LOD	
1,3-Dichloropropane	ug/l											<LOD	<LOD	<LOD	
1,4-Dichlorobenzene	ug/l	20										<LOD	<LOD	<LOD	
2-Chlorotoluene	ug/l											<LOD	<LOD	<LOD	
4-Chlorotoluene	ug/l											<LOD	<LOD	<LOD	
4-Isopropyltoluene	ug/l											<LOD	<LOD	<LOD	
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Bromobenzene	ug/l											<LOD	<LOD	<LOD	
Bromochloromethane	ug/l		100									<LOD	<LOD	<LOD	
Bromodichloromethane	ug/l											<LOD	<LOD	<LOD	
Bromoform	ug/l														
Bromomethane	ug/l											<LOD	<LOD	<LOD	
Carbon Disulphide	ug/l														
Chlorobenzene	ug/l											<LOD	<LOD	<LOD	

M4CAN		Geological Formation Legend MMMF Mercia Mudstone Marginal Facies RTD River Terrace Deposits TSF Tintern Sandstone Formation TFD Tidal Flat Deposits MMG Mercia Mudstone Group GFD Glaciofluvial Deposits SMF St Maughans Formation

Monitoring Round	Units	Screening Criteria		BH533	BH533	BH510	BH510	BH510	BH510	BH510	BH510	BH510	BH506	BH506	BH506
Location		EQS	DWS												
Location Type															
Response Zone (RZ) Details				TFD	TFD	TFD	TFD/MMG	TFD	TFD/MMG	TFD	TFD/MMG	TFD	MMG	TFD	
Drainage Area				Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4	Caldicot Levels Area 4
Installation Details				Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Shallow
Depth (mbGL)				3.36	6.88	0.68	0.87	2.52	7.34	2.82	5.84	4.87	11.62	5.83	
Date Sampled				17/03/2015	17/03/2015	04/03/2015	04/03/2015	12/03/2015	12/03/2015	18/03/2015	18/03/2015	21/04/2015	21/04/2015	28/04/2015	
Chloroethane	ug/l											<LOD	<LOD	<LOD	
Chloroethene	ug/l											<LOD	<LOD	<LOD	
Chloroform	ug/l	2.5	100									<LOD	<LOD	<LOD	
Chloromethane	ug/l											<LOD	<LOD	<LOD	
cis-1,2-Dichloroethene	ug/l											<LOD	<LOD	<LOD	
cis-1,3-Dichloropropene	ug/l											<LOD	<LOD	<LOD	
Dibromochloromethane	ug/l		100									<LOD	<LOD	<LOD	
Dibromomethane	ug/l											<LOD	<LOD	<LOD	
Dichlorodifluoromethane	ug/l											<LOD	<LOD	<LOD	
Dichloromethane	ug/l	20													
Ethylbenzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Hexachlorobutadiene (HCBd)	ug/l	0.6										<LOD	<LOD	<LOD	
Isopropylbenzene	ug/l											<LOD	<LOD	<LOD	
m,p xylenes	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Methyl tert-butyl ether (MTBE)	ug/l											<LOD	<LOD	<LOD	
n-Butylbenzene	ug/l											<LOD	<LOD	<LOD	
n-propylbenzene	ug/l											<LOD	<LOD	<LOD	
O-Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Sec-Butylbenzene	ug/l											<LOD	<LOD	<LOD	
Styrene	ug/l	50										<LOD	<LOD	<LOD	
Tert-Butylbenzene	ug/l											<LOD	<LOD	<LOD	
Tetrachloroethene	ug/l	10	10									<LOD	<LOD	<LOD	
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3									<LOD	<LOD	<LOD	
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
trans-1,2-Dichloroethene	ug/l											<LOD	<LOD	<LOD	
trans-1,3-Dichloropropene	ug/l											<LOD	<LOD	<LOD	
Tribromomethane	ug/l		100									<LOD	<LOD	<LOD	
Trichloroethene	ug/l	10	10									<LOD	<LOD	<LOD	
Trichlorofluoromethane	ug/l											<LOD	<LOD	<LOD	
Vinyl Chloride	ug/l	#N/A	#N/A												
Other Semi-Volatiles															
1,2-Dichlorobenzene	ug/l	20										<LOD	<LOD	<LOD	
1,2,4-Trichlorobenzene	ug/l	0.4										<LOD	<LOD	<LOD	
1,3-Dichlorobenzene	ug/l	20										<LOD	<LOD	<LOD	
1,4-Dichlorobenzene	ug/l	20										<LOD	<LOD	<LOD	
2-Nitroaniline	ug/l											<LOD	<LOD	<LOD	
2,4-Dinitrotoluene	ug/l											<LOD	<LOD	<LOD	
2,6-Dinitrotoluene	ug/l											<LOD	<LOD	<LOD	
2-Methylnaphthalene	ug/l											<LOD	<LOD	<LOD	
3-Nitroaniline	ug/l											<LOD	<LOD	<LOD	
4-Bromophenylphenylether	ug/l														
4-Chloroaniline	ug/l											<LOD	<LOD	<LOD	
4-Chlorophenylphenylether	ug/l														
4-Nitroaniline	ug/l											<LOD	<LOD	<LOD	
Azobenzene	ug/l											<LOD	<LOD	<LOD	
Bis(2-chloroethoxy)methane	ug/l											<LOD	<LOD	<LOD	
Bis(2-chloroethyl)ether	ug/l											<LOD	<LOD	<LOD	
Bis(2-chloroisopropyl)ether	ug/l											<LOD	<LOD	<LOD	
Carbazole	ug/l											<LOD	<LOD	<LOD	
Dibenzofuran	ug/l											<LOD	<LOD	<LOD	
Hexachlorobenzene	ug/l	0.05										<LOD	<LOD	<LOD	
Hexachlorobutadiene	ug/l	0.6										<LOD	<LOD	<LOD	
Hexachlorocyclopentadiene	ug/l											<LOD	<LOD	<LOD	
Hexachloroethane	ug/l											<LOD	<LOD	<LOD	
Isophorone	ug/l											<LOD	<LOD	<LOD	
N-nitrosodi-n-propylamine	ug/l														
Nitrobenzene	ug/l											<LOD	<LOD	<LOD	

M4CAN	
Groundwater Sample Analysis & Screening Assessment	
Non-CL Data	
01/07/2015	
Notes	
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn	
Installation Details not specified. Assumptions made from details from previous rounds.	X
Screening Values & Assessment	
Exceeds EQS	
Exceeds DWS	X
Laboratory detection level higher than screening criterion	X

Geological Formation Legend	
MMMM	Mercia Mudstone Marginal Facies
RTD	River Terrace Deposits
TSF	Tintern Sandstone Formation
TFD	Tidal Flat Deposits
MMG	Mercia Mudstone Group
GFD	Glaciofluvial Deposits
SMF	St Maughans Formation

[illegible]

M4CAN Groundwater Sample Analysis & Screening Assessment Non-CL Data 01/07/2015 Notes EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn Installation Details not specified. Assumptions made from details from previous rounds. Screening Values & Assessment Exceeds EQS Exceeds DWS Laboratory detection level higher than screening criterion		Geological Formation Legend <table><tr><td>MMMF</td><td>Mercia Mudstone Marginal Facies</td></tr><tr><td>RTD</td><td>River Terrace Deposits</td></tr><tr><td>TSF</td><td>Tintern Sandstone Formation</td></tr><tr><td>TFD</td><td>Tidal Flat Deposits</td></tr><tr><td>MMG</td><td>Mercia Mudstone Group</td></tr><tr><td>GFD</td><td>Glaciofluvial Deposits</td></tr><tr><td>SMF</td><td>St Maughans Formation</td></tr></table>		MMMF	Mercia Mudstone Marginal Facies	RTD	River Terrace Deposits	TSF	Tintern Sandstone Formation	TFD	Tidal Flat Deposits	MMG	Mercia Mudstone Group	GFD	Glaciofluvial Deposits	SMF	St Maughans Formation
MMMF	Mercia Mudstone Marginal Facies																
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SMF	St Maughans Formation																
	X																
	X																
	X																

Monitoring Round		Units	Screening Criteria		BH411	BH411	BH411	BH411	BH408	BH408	BH408	BH408	BH408	BH404	BH404			
Location	Location Type		EQS	DWS	BH		BH								GFD	TFD		
Response Zone (RZ) Details							TFD	GFD	TFD or GFD									
Drainage Area					Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	
Installation Details							Shallow	Deep									Deep	Shallow
Depth (mbGL)					6.17		5.26		6.53		2.40		2.42		2.79		3.11	
Date Sampled					23/04/2015		23/04/2015		08/05/2015		08/05/2015		02/03/2015		09/03/2015		16/03/2015	
Metals																		
Arsenic Dissolved	ug/l	50	10	5.5	10	9	9.4							<LOD	6.2			
Beryllium Dissolved	ug/l																	
Boron Dissolved	ug/l	2000	1000	1400	780	680	840							480	610			
Calcium Dissolved	ug/l																	
Chromium Dissolved	ug/l	32	50	1.9	7.8	<LOD	<LOD							<LOD	<LOD			
Copper Dissolved	ug/l	10	2000	6.5	3.9	3.3	2.6							<LOD	<LOD			
Iron Dissolved	ug/l	1000	200															
Lead Dissolved	ug/l	1.2	10	<LOD	<LOD	2.2	1.2							<LOD	<LOD			
Magnesium Dissolved	ug/l																	
Manganese Dissolved	ug/l	30	50															
Nickel Dissolved	ug/l	4	20	8.4	6.1	1.7	5.7							<LOD	<LOD			
Selenium Dissolved	ug/l		10	8.3	10	3.2	3.8							<LOD	2			
Cadmium Dissolved	ug/l	0.15	5	0.14	0.086	0.12	<LOD							<LOD	<LOD			
Vanadium Dissolved	ug/l																	
Zinc Dissolved	ug/l	75		5.9	2.7	<LOD	<LOD							<LOD	<LOD			
Mercury Dissolved	ug/l	0.07	1	<LOD	<LOD	<LOD	<LOD							<LOD	<LOD			
Cadmium Total	ug/l	0.15	5															
Zinc Total	ug/l	75																
Mercury Total	ug/l	0.07	1															
Non-Metal Inorganics																		
Hardness Total	mg/l																	
Total Alkalinity as CaCO3	mg/l																	
BOD	mg/l	5																
COD	mg/l																	
Potassium Dissolved	mg/l																	
Sodium Dissolved	mg/l		200															
Nitrite as NO2	mg/l																	
Nitrate as NO3	mg/l		50															
Total Diss Sulphur	mg/l																	
Sulphate (soluble)	mg/l	400	250															
Chloride	mg/l	250	250	1200	800													
Sulphide	mg/l																	
Ammoniacal Nitrogen as N	mg/l	0.6		7.8	6.5													
Unionised ammonia	mg/l																	
Total Ammonium as NH4	mg/l		0.5															
Phenols Monohydric	mg/l																	
Thiocyanate	mg/l																	
Total Cyanide	mg/l	0.001	0.05															
Free Cyanide	mg/l			<LOD	<LOD	<LOD	<LOD							<LOD	<LOD			
Complex Cyanide	mg/l																	
Conductivity @ 20 deg.C	mS/cm																	
Carbon Dioxide Dissolved	ug/l																	
pH Value	pH units	6-9	6.5-10	7.9	7.5	7.7	7.5							8.2	8.2			
Organics																		
GRO (C4-C12)	ug/l																	
MTBE	ug/l			<LOD	<LOD													
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Ethyl benzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
m & p Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
o Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
TPH																		
Aliphatics C5-C6	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Aliphatics >C6-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Aliphatics >C8-C10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Aliphatics >C10-C12	ug/l			<LOD	<LOD	<LOD	<LOD	4.3	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Aliphatics >C12-C16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	83	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Aliphatics >C16-C21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	21	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Aliphatics >C21-C35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	810	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Total Aliphatics C5-C35 Aqueous	ug/l																	
Aliphatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	31	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Aromatics >C5-C7	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Aromatics C6-C7	ug/l																	
Aromatics >C7-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Aromatics >EC8-EC10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Aromatics >EC10-EC12	ug/l			<LOD	<LOD	<LOD	<LOD	4.2	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Aromatics >EC12-EC16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	35	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Aromatics >EC16-EC21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	16	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Aromatics >EC21-EC35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	67	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Total Aromatics C6-C35 Aqueous	ug/l																	
Aromatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	11	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Total Aliphatic TPH	ug/l			<LOD	<LOD	<LOD	<LOD	950	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
Total Aromatic TPH	ug/l																	
TPH (Aliphatics and Aromatics C5-C35)	ug/l																	
Total petroleum hydrocarbons	ug/l			<LOD	<LOD	<LOD	<LOD	1100	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD			
TPH FTIR	ug/l																	
TPH GC	ug/l																	
PCBs																		
PCB- ARO	ug/l																	
Cresols	ug/l																	
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l			<LOD	<LOD				<LOD	<LOD								
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l			<LOD	<LOD				<LOD	<LOD								
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l			<LOD	<LOD				<LOD	<LOD								
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l			<LOD	<LOD				<LOD	<LOD								
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l			<LOD	<LOD				<LOD	<LOD								
Pcb-28 2,4,4' - Trichlorobiphenyl	ug/l			<LOD	<LOD				<LOD	<LOD								
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l			<LOD	<LOD				<LOD	<LOD								

M4CAN		Geological Formation Legend <table><tr><td>MMMF</td><td>Mercia Mudstone Marginal Facies</td></tr><tr><td>RTD</td><td>River Terrace Deposits</td></tr><tr><td>TSF</td><td>Tintern Sandstone Formation</td></tr><tr><td>TFD</td><td>Tidal Flat Deposits</td></tr><tr><td>MMG</td><td>Mercia Mudstone Group</td></tr><tr><td>GFD</td><td>Glaciofluvial Deposits</td></tr><tr><td>SMF</td><td>St Maughans Formation</td></tr></table>		MMMF	Mercia Mudstone Marginal Facies	RTD	River Terrace Deposits	TSF	Tintern Sandstone Formation	TFD	Tidal Flat Deposits	MMG	Mercia Mudstone Group	GFD	Glaciofluvial Deposits	SMF	St Maughans Formation
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Groundwater Sample Analysis & Screening Assessment																	
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01/07/2015																	
Notes																	
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn																	
Installation Details not specified. Assumptions made from details from previous rounds.	X																
Screening Values & Assessment																	
Exceeds EQS																	
Exceeds DWS	X																
Laboratory detection level higher than screening criterion	X																

Monitoring Round	Units	Screening Criteria												
Location		EQS	DWS	BH404	BH404	BH404	BH401	BH401	BH401	BH325C	BH325C	BH325C	BH325C	BH325C
Location Type				BH			BH			BH				
Response Zone (RZ) Details				TFD or GFD	TFD or GFD	TFD or GFD	TFD	TFD	TFD	TFD	TFD	MMG	TFD	MMG
Drainage Area				Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2
Installation Details							7.5-13	7.5-13	7.5-13	Shallow	Shallow	Deep	Shallow	Deep
Depth (mbGL)					1.44	1.39	0.55	1.44	1.30	2.95	3.96	5.28	3.82	5.43
Date Sampled		09/03/2015	09/03/2015	16/03/2015	02/03/2015	09/03/2015	16/03/2015	27/02/2015	06/03/2015	06/03/2015	13/03/2015	13/03/2015		
Metals														
Arsenic Dissolved	ug/l	50	10	7.1	2.5	1.8	<LOD	<LOD	1.1	2.4	3.3	1.4	17	2.4
Beryllium Dissolved	ug/l													
Boron Dissolved	ug/l	2000	1000	830	160	210	2400	1200	1600	590	370	110	4100	950
Calcium Dissolved	ug/l													
Chromium Dissolved	ug/l	32	50	8.8	1.1	7.9	<LOD	<LOD	5.4	<LOD	3.8	1.4	110	16
Copper Dissolved	ug/l	10	2000	3	<LOD	1.5	<LOD	<LOD	1.2	<LOD	<LOD	<LOD	25	1.4
Iron Dissolved	ug/l	1000	200			9								
Lead Dissolved	ug/l	1.2	10	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Magnesium Dissolved	ug/l													
Manganese Dissolved	ug/l	30	50											
Nickel Dissolved	ug/l	4	20	8.2	1.6	2	1.6	3.1	4.2	32	12	1.7	20	1.5
Selenium Dissolved	ug/l		10	2.4	1.5	2.4	1.9	1.5	2.4	6.5	4.1	1	48	2.2
Cadmium Dissolved	ug/l	0.15	5	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Vanadium Dissolved	ug/l													
Zinc Dissolved	ug/l	75		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	2.8	<LOD	25	1
Mercury Dissolved	ug/l	0.07	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Cadmium Total	ug/l	0.15	5											
Zinc Total	ug/l	75												
Mercury Total	ug/l	0.07	1											
Non-Metal Inorganics														
Hardness Total	mg/l													
Total Alkalinity as CaCO3	mg/l													
BOD	mg/l	5												
COD	mg/l													
Potassium Dissolved	mg/l													
Sodium Dissolved	mg/l		200											
Nitrite as NO2	mg/l													
Nitrate as NO3	mg/l		50											
Total Diss Sulphur	mg/l													
Sulphate (soluble)	mg/l	400	250											
Chloride	mg/l	250	250	32	49	60				19	21	22	20	24
Sulphide	mg/l													
Ammoniacal Nitrogen as N	mg/l	0.6		0.03	0.017	0.052				5.4	4.4	0.033	5	0.03
Unionised ammonia	mg/l													
Total Ammonium as NH4	mg/l		0.5											
Phenols Monohydric	mg/l													
Thiocyanate	mg/l													
Total Cyanide	mg/l	0.001	0.05											
Free Cyanide	mg/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Complex Cyanide	mg/l													
Conductivity @ 20 deg.C	mS/cm													
Carbon Dioxide Dissolved	ug/l													
pH Value	pH units	6-9	6.5-10	8.4	8.4	8.5	7.9	8.1	8	7.9	7.8	8.4	7.9	8.6
Organics														
GRO (C4-C12)	ug/l													
MTBE	ug/l													
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Toluene	ug/l	50		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ethyl benzene	ug/l	20		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
m & p Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
o Xylene	ug/l	30		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH														
Aliphatics C5-C6	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C6-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C8-C10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C10-C12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C12-C16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C16-C21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aliphatics >C21-C35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatics C5-C35 Aqueous	ug/l													
Aliphatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >C5-C7	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics C6-C7	ug/l													
Aromatics >C7-C8	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC8-EC10	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC10-EC12	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC12-EC16 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC16-EC21 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Aromatics >EC21-EC35 Aqueous	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aromatics C6-C35 Aqueous	ug/l													
Aromatics >C35-44	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aliphatic TPH	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Total Aromatic TPH	ug/l													
TPH (Aliphatics and Aromatics C5-C35)	ug/l													
Total petroleum hydrocarbons	ug/l			<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH FTIR	ug/l													
TPH GC	ug/l													
PCBs														
PCB- ARO	ug/l													
Cresols	ug/l													
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l			<LOD	<LOD	<LOD				<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l			<LOD	<LOD	<LOD				<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l			<LOD	<LOD	<LOD				<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l			<LOD	<LOD	<LOD				<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l			<LOD	<LOD	<LOD				<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-28 2,4,4' - Trichlorobiphenyl	ug/l			<LOD	<LOD	<LOD				<LOD	<LOD	<LOD	<LOD	<LOD
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l			<LOD	<LOD	<LOD				<LOD	<LOD	<LOD	<LOD	<LOD

M4CAN		Geological Formation Legend MMMFMercia Mudstone Marginal Facies RTDRiver Terrace Deposits TSFTintern Sandstone Formation TFDTidal Flat Deposits MMGMercia Mudstone Group GFDGlaciofluvial Deposits SMFSt Maughans Formation	
Groundwater Sample Analysis & Screening Assessment			
Non-CL Data			
01/07/2015			
Notes			
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn			
Installation Details not specified. Assumptions made from details from previous rounds.		X	
Screening Values & Assessment			
Exceeds EQS			
Exceeds DWS		X	
Laboratory detection level higher than screening criterion		X	

Monitoring Round	Units	Screening Criteria		1		2		3		1		2	
Location		EQS	DWS	BHM4CAN009	BHM4CAN009	BHM4CAN009	BHM4CAN009	BHM4CAN009	BHM4CAN009	BHM4CAN010	BHM4CAN010	BHM4CAN010	BHM4CAN010
Location Type				BH						BH			
Response Zone (RZ) Details				TFD	GFD	TFD	GFD	TFD	GFD	TFD	GFD	TFD	GFD
Drainage Area				Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2
Installation Details				Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth (mbGL)				0.59	2.33	0.47	2.31	1.23	2.44	1.47	3.47	0.94	3.82
Date Sampled				10/05/2016	10/05/2016	23/05/2016	23/05/2016	07/06/2016	07/06/2015	10/05/2016	10/05/2016	23/05/2016	23/05/2016
PCB congener 105	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 167	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 169	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 123	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 114	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 157	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 81	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 156	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 126	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 77	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 189	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
PCB congener 118	ug/l			<0.015	<0.015	<0.015	<0.015			<0.015	<0.015	<0.015	<0.015
Phenols													
Dimethylphenols	ug/l												
Trimethylphenols	ug/l												
2-Chlorophenol	ug/l	50		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
2 - Methyl-4,6-Dinitrophenol	ug/l			<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
2-Methylphenol	ug/l	100		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
2-Nitrophenol	ug/l			<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
2,4-Dichlorophenol	ug/l	20		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
2,4-Dimethylphenol	ug/l			<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
2,4,5-Trichlorophenol	ug/l			<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
2,4,6-Trichlorophenol	ug/l			<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
4-Chloro-3-methylphenol	ug/l	40		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
4-Methylphenol	ug/l	100		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
4-Nitrophenol	ug/l			<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
Pentachlorophenol	ug/l	0.4		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
Phenol	ug/l	7.7		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
Phenols	mg/l	0.0077											
PAHs													
2-Chloronaphthalene	ug/l			<1									
2-Methylnaphthalene	ug/l			<1									
Acenaphthene	ug/l			<0.15	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Acenaphthylene	ug/l			<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	0.0121	<0.011	<0.011	<0.011
Anthracene	ug/l	0.1		<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.0248	<0.015	0.0183	<0.015
Benzo(a)anthracene	ug/l			<0.017	<0.017	<0.017	<0.017	0.0208	<0.017	0.189	<0.017	0.0773	<0.017
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.009	<0.009	<0.009	<0.009	0.0253	0.0128	0.28	0.0199	0.0752	0.0115
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.023	<0.023	<0.023	<0.023	0.0331	<0.023	0.572	0.0419	0.1	<0.023
Benzo(ghi)perylene	ug/l	0.0082	0.1	0.0237	0.0179	<0.016	<0.016	0.0487	0.0556	0.279	0.0197	0.0741	<0.016
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.027	<0.027	<0.027	<0.027	<0.027	<0.027	0.166	<0.027	0.043	<0.027
Chrysene	ug/l			<0.013	<0.013	<0.013	<0.013	0.0178	0.0153	0.233	0.0247	0.0579	<0.013
Dibenzo(a,h)anthracene	ug/l			<0.016	<0.016	<0.016	<0.016	0.0187	0.0194	0.077	<0.016	0.0214	<0.016
Fluoranthene	ug/l	0.0063		<0.017	<0.017	<0.017	<0.017	0.0365	0.0206	0.31	0.0408	0.133	<0.017
Fluorene	ug/l			<0.014	<0.014	<0.014	<0.014	<0.014	<0.014	0.0199	<0.014	0.0148	<0.014
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.014	<0.014	<0.014	<0.014	0.0274	0.0173	0.232	0.0167	0.0621	<0.014
Naphthalene	ug/l	2		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	ug/l			<0.022	<0.022	<0.022	<0.022	<0.022	<0.022	0.113	0.0294	0.0548	<0.022
Pyrene	ug/l			<0.015	<0.015	<0.015	<0.015	0.0377	0.0197	0.249	0.0434	0.126	0.0176
Total PAHs (USEPA 16)	ug/l			<0.344	<0.344	<0.344	<0.344	<0.344	<0.344	2.76	<0.344	0.858	<0.344
Phthalates													
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<2	2.51	<2	<2	<2	<2	<8	<8	<8	<2
Butylbenzyl phthalate	ug/l	20		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
Di-n-butyl phthalate	ug/l	8		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
Di-n-Octyl phthalate	ug/l	20		<5	<5	<5	<5	<5	<5	<20	<20	<20	<5
Diethyl phthalate	ug/l	200		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
Dimethyl phthalate	ug/l	800		<1	<1	<1	<1	<1	<1	<4	<4	<4	<1
VOCs													
Full suite	ug/l												
1,1,1,2-Tetrachloroethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,1,1-Trichloroethane	ug/l	100		<1	<1	<1	<1			<1	<1	<1	<1
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A	<1	<1	<1	<1			<1	<1	<1	<1
1,1,2-Trichloroethane	ug/l	400		<1	<1	<1	<1			<1	<1	<1	<1
1,1-Dichloroethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,1-Dichloroethene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,1-Dichloropropene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,2,3-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1			<1	<1	<1	<1
1,2,3-Trichloropropane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1			<1	<1	<1	<1
1,2,4-Trimethylbenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,2-Dibromo-3-Chloropropane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,2-Dibromoethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,2-Dichlorobenzene	ug/l	20		<1	<1	<1	<1			<1	<1	<1	<1
1,2-Dichloroethane	ug/l	10	3	<1	<1	<1	<1			<1	<1	<1	<1
1,2-Dichloropropane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,3,5-Trimethylbenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,3-Dichloropropane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l	20		<1	<1	<1	<1			<1	<1	<1	<1
2-Chlorotoluene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
4-Chlorotoluene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
4-Isopropyltoluene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Benzene	ug/l	10	1	<1	<1	<1	<1			<1	<1	<1	<1
Bromobenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Bromochloromethane	ug/l		100	<1	<1	<1	<1			<1	<1	<1	<1
Bromodichloromethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Bromoform	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Bromomethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Carbon Disulphide	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Chlorobenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1

M4CAN		Geological Formation Legend <table><tr><td>MMMF</td><td>Mercia Mudstone Marginal Facies</td></tr><tr><td>RTD</td><td>River Terrace Deposits</td></tr><tr><td>TSF</td><td>Tintern Sandstone Formation</td></tr><tr><td>TFD</td><td>Tidal Flat Deposits</td></tr><tr><td> </td><td> </td></tr><tr><td>MMG</td><td>Mercia Mudstone Group</td></tr><tr><td>GFD</td><td>Glaciofluvial Deposits</td></tr><tr><td>SMF</td><td>St Maughans Formation</td></tr></table>	MMMF	Mercia Mudstone Marginal Facies	RTD	River Terrace Deposits	TSF	Tintern Sandstone Formation	TFD	Tidal Flat Deposits			MMG	Mercia Mudstone Group	GFD	Glaciofluvial Deposits	SMF	St Maughans Formation
MMMF	Mercia Mudstone Marginal Facies																	
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Groundwater Sample Analysis & Screening Assessment																		
Non-CL Data																		
01/07/2015																		
Notes																		
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn																		
Installation Details not specified. Assumptions made from details from previous rounds.	X																	
Screening Values & Assessment																		
Exceeds EQS																		
Exceeds DWS	X																	
Laboratory detection level higher than screening criterion	X																	

Monitoring Round	Units	Screening Criteria		1		2		3		1		2	
Location		EQS	DWS	BHM4CAN009	BHM4CAN009	BHM4CAN009	BHM4CAN009	BHM4CAN009	BHM4CAN009	BHM4CAN010	BHM4CAN010	BHM4CAN010	BHM4CAN010
Location Type				BH						BH			
Response Zone (RZ) Details				TFD	GFD	TFD	GFD	TFD	GFD	TFD	GFD	TFD	GFD
Drainage Area				Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2
Installation Details				Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth (mbGL)				0.59	2.33	0.47	2.31	1.23	2.44	1.47	3.47	0.94	3.82
Date Sampled				10/05/2016	10/05/2016	23/05/2016	23/05/2016	07/06/2016	07/06/2015	10/05/2016	10/05/2016	23/05/2016	23/05/2016
Chloroethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Chloroethene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Chloroform	ug/l	2.5	100	<1	<1	<1	<1			<1	<1	<1	<1
Chloromethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
cis-1,2-Dichloroethene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
cis-1,3-Dichloropropene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Dibromochloromethane	ug/l		100	<1	<1	<1	<1			<1	<1	<1	<1
Dibromomethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Dichlorodifluoromethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Dichloromethane	ug/l	20		<1	<1	<1	<1			<1	<1	<1	<1
Ethylbenzene	ug/l	20		<1	<1	<1	<1			<1	<1	<1	<1
Hexachlorobutadiene (HCBd)	ug/l	0.6		<1	<1	<1	<1			<1	<1	<1	<1
Isopropylbenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
m,p xylenes	ug/l	30		<1	<1	<1	<1			<1	<1	<1	<1
Methyl tert-butyl ether (MTBE)	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
n-Butylbenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
n-propylbenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
O-Xylene	ug/l	30		<1	<1	<1	<1			<1	<1	<1	<1
Sec-Butylbenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Styrene	ug/l	50		<1	<1	<1	<1			<1	<1	<1	<1
Tert-Butylbenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Tetrachloroethene	ug/l	10	10	<1	<1	<1	<1			<1	<1	<1	<1
Tetrachloromethane (Carbon Tetra Chloride)	ug/l	12	3	<1	<1	<1	<1			<1	<1	<1	<1
Toluene	ug/l	50		<1	<1	<1	<1			<1	<1	<1	<1
trans-1,2-Dichloroethene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
trans-1,3-Dichloropropene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Tribromomethane	ug/l		100	<1	<1	<1	<1			<1	<1	<1	<1
Trichloroethene	ug/l	10	10	<1	<1	<1	<1			<1	<1	<1	<1
Trichlorofluoromethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Vinyl Chloride	ug/l	#N/A	#N/A	<1	<1	<1	<1			<1	<1	<1	<1
Other Semi-Volatiles													
1,2-Dichlorobenzene	ug/l	20											
1,2,4-Trichlorobenzene	ug/l	0.4		<1	<1	<1	<1			<1	<1	<1	<1
1,3-Dichlorobenzene	ug/l	20		<1	<1	<1	<1			<1	<1	<1	<1
1,4-Dichlorobenzene	ug/l	20		<1	<1	<1	<1			<1	<1	<1	<1
2-Nitroaniline	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
2,4-Dinitrotoluene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
2,6-Dinitrotoluene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
2-Methylnaphthalene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
3-Nitroaniline	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
4-Bromophenylphenylether	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
4-Chloroaniline	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
4-Chlorophenylphenylether	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
4-Nitroaniline	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Azobenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Bis(2-chloroethoxy)methane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Bis(2-chloroethyl)ether	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Bis(2-chloroisopropyl)ether	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Carbazole	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Dibenzofuran	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Hexachlorobenzene	ug/l	0.05		<1	<1	<1	<1			<1	<1	<1	<1
Hexachlorobutadiene	ug/l	0.6		<1	<1	<1	<1			<1	<1	<1	<1
Hexachlorocyclopentadiene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Hexachloroethane	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Isophorone	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
N-nitrosodi-n-propylamine	ug/l			<1	<1	<1	<1			<1	<1	<1	<1
Nitrobenzene	ug/l			<1	<1	<1	<1			<1	<1	<1	<1

M4CAN		Geological Formation Legend MMMF RTD TSF TFD MMG GFD SMF Mercia Mudstone Marginal Facies River Terrace Deposits Tintern Sandstone Formation Tidal Flat Deposits Mercia Mudstone Group Glaciofluvial Deposits St Maughans Formation	
Groundwater Sample Analysis & Screening Assessment			
Non-CL Data			
01/07/2015			
Notes			
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn			
Installation Details not specified. Assumptions made from details from previous rounds.		X	
Screening Values & Assessment			
Exceeds EQS			
Exceeds DWS		X	
Laboratory detection level higher than screening criterion		X	

Monitoring Round	Units	Screening Criteria		3		1		2		3			
Location		EQS	DWS	BHM4CAN010	BHM4CAN010	BHM4CANA052	BHM4CANA052	BHM4CANA052	BHM4CANA052	BHM4CANA052	BHM4CANA052	BH324	BH324
Location Type								BH					
Response Zone (RZ) Details				TFD	GFD	TFD	GFD	TFD	GFD	TFD	GFD	MG / RTD	SMF
Drainage Area				Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Castleton Area 1	Castleton Area 1
Installation Details				Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth (mbGL)				1.70		0.00	4.53	0.25	4.57	0.59	4.63	1.10	3.10
Date Sampled				07/06/2016	07/06/2016	10/05/2016	10/05/2016	23/05/2016	23/05/2016	07/06/2016	07/06/2016	26/02/2015	27/02/2015
PCB congener 105	ug/l					<0.015	<0.015	<0.015	<0.015				
PCB congener 167	ug/l					<0.015	<0.015	<0.015	<0.015				
PCB congener 169	ug/l					<0.015	<0.015	<0.015	0.0156				
PCB congener 123	ug/l					<0.015	<0.015	<0.015	<0.015				
PCB congener 114	ug/l					<0.015	<0.015	<0.015	<0.015				
PCB congener 157	ug/l					<0.015	<0.015	<0.015	<0.015				
PCB congener 81	ug/l					<0.015	<0.015	<0.015	<0.015				
PCB congener 156	ug/l					<0.015	<0.015	<0.015	<0.015				
PCB congener 126	ug/l					<0.015	<0.015	<0.015	<0.015				
PCB congener 77	ug/l					<0.015	<0.015	<0.015	<0.015				
PCB congener 189	ug/l					<0.015	<0.015	<0.015	0.0185				
PCB congener 118	ug/l					<0.015	<0.015	<0.015	<0.015				
Phenols													
Dimethylphenols	ug/l												
Trimethylphenols	ug/l												
2-Chlorophenol	ug/l	50		<1	<1	<1	<1	<4	<1				
2 - Methyl-4,6-Dinitrophenol	ug/l			<1	<1	<1	<1	<4	<1				
2-Methylphenol	ug/l	100		<1	<1	<1	<1	<4	<1				
2-Nitrophenol	ug/l			<1	<1	<1	<1	<4	<1				
2,4-Dichlorophenol	ug/l	20		<1	<1	<1	<1	<4	<1				
2,4-Dimethylphenol	ug/l			<1	<1	<1	<1	<4	<1				
2,4,5-Trichlorophenol	ug/l			<1	<1	<1	<1	<4	<1				
2,4,6-Trichlorophenol	ug/l			<1	<1	<1	<1	<4	<1				
4-Chloro-3-methylphenol	ug/l	40		<1	<1	<1	<1	<4	<1				
4-Methylphenol	ug/l	100		<1	<1	<1	<1	<4	<1				
4-Nitrophenol	ug/l			<1	<1	<1	<1	<4	<1				
Pentachlorophenol	ug/l	0.4		<1	<1	<1	<1	<4	<1				
Phenol	ug/l	7.7		<1	<1	<1	<1	<4	<1				
Phenols	mg/l	0.0077											
PAHs													
2-Chloronaphthalene	ug/l												
2-Methylnaphthalene	ug/l												
Acenaphthene	ug/l			<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.0356	<0.015	<LOD	<LOD
Acenaphthylene	ug/l			<0.011	0.0125	<0.011	<0.011	<0.011	<0.011	0.0209	<0.011	<LOD	<LOD
Anthracene	ug/l	0.1		<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.0425	<0.015	<LOD	<LOD
Benzo(a)anthracene	ug/l			<0.017	<0.017	0.0425	<0.017	0.0944	<0.017	0.182	<0.017	<LOD	<LOD
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.009	<0.009	0.0402	0.0146	0.138	<0.009	0.287	<0.009	<LOD	<LOD
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.023	<0.023	0.0722	0.024	0.222	<0.023	0.387	<0.023	<LOD	<LOD
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.016	<0.016	0.0426	0.017	0.116	<0.016	0.267	<0.016		
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.027	<0.027	0.0287	<0.027	0.0802	<0.027	0.188	<0.027	<LOD	<LOD
Chrysene	ug/l			<0.013	<0.013	0.0373	<0.013	0.107	<0.013	0.168	<0.013	<LOD	<LOD
Dibenzo(a,h)anthracene	ug/l			<0.016	<0.016	<0.016	<0.016	0.0427	<0.016	0.0857	<0.016	<LOD	<LOD
Fluoranthene	ug/l	0.0063		0.0192	<0.017	0.0586	<0.017	0.179	<0.017	0.386	<0.017	<LOD	<LOD
Fluorene	ug/l			<0.014	0.0201	0.0211	<0.014	<0.014	<0.014	0.0585	<0.014	<LOD	<LOD
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<0.014	<0.014	0.0287	<0.014	0.114	<0.014	0.23	<0.014	<LOD	<LOD
Naphthalene	ug/l	2		<0.1	0.225	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<LOD	<LOD
Phenanthrene	ug/l			<0.022	0.0413	0.0401	<0.022	0.0597	<0.022	0.244	<0.022	<LOD	<LOD
Pyrene	ug/l			0.0186	<0.015	0.0508	0.0173	0.17	<0.015	0.331	<0.015	<LOD	<LOD
Total PAHs (USEPA 16)	ug/l			<0.344	<0.344	0.463	<0.344	1.32	<0.344	2.91	<0.344	<LOD	<LOD
Phthalates													
Bis(2-ethylhexyl) phthalate	ug/l	1.3		<2	<2	<2	<2	<8	<2				
Butylbenzyl phthalate	ug/l	20		<1	<1	<1	<1	<4	<1				
Di-n-butyl phthalate	ug/l	8		<1	<1	<1	<1	<4	<1				
Di-n-Octyl phthalate	ug/l	20		<5	<5	<5	<5	<20	<5				
Diethyl phthalate	ug/l	200		<1	<1	<1	<1	<4	<1				
Dimethyl phthalate	ug/l	800		<1	<1	<1	<1	<4	<1				
VOCs													
Full suite	ug/l												
1,1,1,2-Tetrachloroethane	ug/l					<1	<1	<1	<1				
1,1,1-Trichloroethane	ug/l	100				<1	<1	<1	<1				
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A			<1	<1	<1	<1				
1,1,2-Trichloroethane	ug/l	400				<1	<1	<1	<1				
1,1-Dichloroethane	ug/l					<1	<1	<1	<1				
1,1-Dichloroethene	ug/l					<1	<1	<1	<1				
1,1-Dichloropropene	ug/l					<1	<1	<1	<1				
1,2,3-Trichlorobenzene	ug/l	0.4				<1	<1	<1	<1				
1,2,3-Trichloropropane	ug/l					<1	<1	<1	<1				
1,2,4-Trichlorobenzene	ug/l	0.4				<1	<1	<1	<1				
1,2,4-Trimethylbenzene	ug/l					<1	<1	<1	<1				
1,2-Dibromo-3-Chloropropane	ug/l					<1	<1	<1	<1				
1,2-Dibromoethane	ug/l					<1	<1	<1	<1				
1,2-Dichlorobenzene	ug/l	20				<1	<1	<1	<1				
1,2-Dichloroethane	ug/l	10	3			<1	<1	<1	<1				
1,2-Dichloropropane	ug/l					<1	<1	<1	<1				
1,3,5-Trimethylbenzene	ug/l					<1	<1	<1	<1				
1,3-Dichloropropane	ug/l					<1	<1	<1	<1				
1,4-Dichlorobenzene	ug/l	20				<1	<1	<1	<1				
2-Chlorotoluene	ug/l					<1	<1	<1	<1				
4-Chlorotoluene	ug/l					<1	<1	<1	<1				
4-Isopropyltoluene	ug/l					<1	<1	<1	<1				
Benzene	ug/l	10	1			<1	<1	<1	<1			<LOD	<LOD
Bromobenzene	ug/l					<1	<1	<1	<1				
Bromochloromethane	ug/l		100			<1	<1	<1	<1				
Bromodichloromethane	ug/l					<1	<1	<1	<1				
Bromoform	ug/l					<1	<1	<1	<1				
Bromomethane	ug/l					<1	<1	<1	<1				
Carbon Disulphide	ug/l					<1	<1	<1	<1				
Chlorobenzene	ug/l					<1	<1	<1	<1				

M4CAN		Geological Formation Legend <table><tr><td>MMMF</td><td>Mercia Mudstone Marginal Facies</td></tr><tr><td>RTD</td><td>River Terrace Deposits</td></tr><tr><td>TSF</td><td>Tintern Sandstone Formation</td></tr><tr><td>TFD</td><td>Tidal Flat Deposits</td></tr><tr><td>MMG</td><td>Mercia Mudstone Group</td></tr><tr><td>GFD</td><td>Glaciofluvial Deposits</td></tr><tr><td>SMF</td><td>St Maughans Formation</td></tr></table>		MMMF	Mercia Mudstone Marginal Facies	RTD	River Terrace Deposits	TSF	Tintern Sandstone Formation	TFD	Tidal Flat Deposits	MMG	Mercia Mudstone Group	GFD	Glaciofluvial Deposits	SMF	St Maughans Formation
MMMF	Mercia Mudstone Marginal Facies																
RTD	River Terrace Deposits																
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Groundwater Sample Analysis & Screening Assessment																	
Non-CL Data																	
01/07/2015																	
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EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn																	
Installation Details not specified. Assumptions made from details from previous rounds.	X																
Screening Values & Assessment																	
Exceeds EQS																	
Exceeds DWS	X																
Laboratory detection level higher than screening criterion	X																

Monitoring Round	Units	Screening Criteria		3		1		2		3			
Location		EQS	DWS	BHM4CAN010	BHM4CAN010	BHM4CANA052	BHM4CANA052	BHM4CANA052	BHM4CANA052	BHM4CANA052	BHM4CANA052	BH324	BH324
Location Type						BH							
Response Zone (RZ) Details				TFD	GFD	TFD	GFD	TFD	GFD	TFD	GFD	MG / RTD	SMF
Drainage Area				Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Wentloog Levels Area 2	Castleton Area 1	Castleton Area 1
Installation Details				Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Depth (mbGL)				1.70		0.00	4.53	0.25	4.57	0.59	4.63	1.10	3.10
Date Sampled				07/06/2016	07/06/2016	10/05/2016	10/05/2016	23/05/2016	23/05/2016	07/06/2016	07/06/2016	26/02/2015	27/02/2015
Chloroethane	ug/l					<1	<1	<1	<1				
Chloroethene	ug/l					<1	<1	<1	<1				
Chloroform	ug/l	2.5	100			<1	<1	<1	<1				
Chloromethane	ug/l					<1	<1	<1	<1				
cis-1,2-Dichloroethene	ug/l					<1	<1	<1	<1				
cis-1,3-Dichloropropene	ug/l					<1	<1	<1	<1				
Dibromochloromethane	ug/l		100			<1	<1	<1	<1				
Dibromomethane	ug/l					<1	<1	<1	<1				
Dichlorodifluoromethane	ug/l					<1	<1	<1	<1				
Dichloromethane	ug/l	20				<1	<1	<1	<1				
Ethylbenzene	ug/l	20				<1	<1	<1	<1			<LOD	<LOD
Hexachlorobutadiene (HCBd)	ug/l	0.6				<1	<1	<1	<1				
Isopropylbenzene	ug/l					<1	<1	<1	<1				
m,p xylenes	ug/l	30				<1	<1	<1	<1			<LOD	<LOD
Methyl tert-butyl ether (MTBE)	ug/l					<1	<1	<1	<1				
n-Butylbenzene	ug/l					<1	<1	<1	<1				
n-propylbenzene	ug/l					<1	<1	<1	<1				
O-Xylene	ug/l	30				<1	<1	<1	<1			<LOD	<LOD
Sec-Butylbenzene	ug/l					<1	<1	<1	<1				
Styrene	ug/l	50				<1	<1	<1	<1				
Tert-Butylbenzene	ug/l					<1	<1	<1	<1				
Tetrachloroethene	ug/l	10	10			<1	<1	<1	<1				
Tetrachloromethane (Carbon Tetra Chl)	ug/l	12	3			<1	<1	<1	<1				
Toluene	ug/l	50				<1	<1	<1	<1			<LOD	<LOD
trans-1,2-Dichloroethene	ug/l					<1	<1	<1	<1				
trans-1,3-Dichloropropene	ug/l					<1	<1	<1	<1				
Tribromomethane	ug/l		100			<1	<1	<1	<1				
Trichloroethene	ug/l	10	10			<1	<1	<1	<1				
Trichlorofluoromethane	ug/l					<1	<1	<1	<1				
Vinly Chloride	ug/l	#N/A	#N/A			<1	<1	<1	<1				
Other Semi-Volatiles													
1,2-Dichlorobenzene	ug/l	20						<4	<1				
1,2,4-Trichlorobenzene	ug/l	0.4				<1	<1	<4	<1				
1,3-Dichlorobenzene	ug/l	20				<1	<1	<4	<1				
1,4-Dichlorobenzene	ug/l	20				<1	<1	<4	<1				
2-Nitroaniline	ug/l					<1	<1	<4	<1				
2,4-Dinitrotoluene	ug/l					<1	<1	<4	<1				
2,6-Dinitrotoluene	ug/l					<1	<1	<4	<1				
2-Methylnaphthalene	ug/l					<1	<1	<4	<1				
3-Nitroaniline	ug/l					<1	<1	<4	<1				
4-Bromophenylphenylether	ug/l					<1	<1	<4	<1				
4-Chloroaniline	ug/l					<1	<1	<4	<1				
4-Chlorophenylphenylether	ug/l					<1	<1	<4	<1				
4-Nitroaniline	ug/l					<1	<1	<4	<1				
Azobenzene	ug/l					<1	<1	<4	<1				
Bis(2-chloroethoxy)methane	ug/l					<1	<1	<4	<1				
Bis(2-chloroethyl)ether	ug/l					<1	<1	<4	<1				
Bis(2-chloroisopropyl)ether	ug/l					<1	<1	<4	<1				
Carbazole	ug/l					<1	<1	<4	<1				
Dibenzofuran	ug/l					<1	<1	<4	<1				
Hexachlorobenzene	ug/l	0.05				<1	<1	<4	<1				
Hexachlorobutadiene	ug/l	0.6				<1	<1	<4	<1				
Hexachlorocyclopentadiene	ug/l					<1	<1	<4	<1				
Hexachloroethane	ug/l					<1	<1	<4	<1				
Isophorone	ug/l					<1	<1	<4	<1				
N-nitrosodi-n-propylamine	ug/l					<1	<1	<4	<1				
Nitrobenzene	ug/l					<1	<1	<4	<1				

M4CAN Groundwater Sample Analysis & Screening Assessment Non-CL Data 01/07/2015 Notes EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn Installation Details not specified. Assumptions made from details from previous rounds. Screening Values & Assessment Exceeds EQS Exceeds DWS Laboratory detection level higher than screening criterion				Geological Formation Legend MMMFMercia Mudstone Marginal Facies RTDRiver Terrace Deposits TSFTintern Sandstone Formation TFDTidal Flat Deposits MMGMercia Mudstone Group GFDGlaciofluvial Deposits SMFSt Maughans Formation												
Monitoring Round		Units	Screening Criteria		BH313		BH312		BH312		1		2		3	
Location					BH313		BH312		BH312		WSM4CAN022		WSM4CAN022		WSM4CAN022	
Location Type					BH		BH		BH		WS		WS		WS	
Response Zone (RZ) Details					MF		SMF		SMF		TFD		TFD		TFD	
Drainage Area					Castleton Area 1		Castleton Area 1		Castleton Area 1							
Installation Details					2.5		1-5 - 11		1-5 - 11							
Depth (mbGL)					11.75		3.88		8.76		0.00		0.45		0.52	
Date Sampled					11/03/2015		25/02/2015		11/03/2015		10/05/2016		19/05/2016		27/05/2016	
Metals																
Arsenic Dissolved	ug/l		50	10	<LOD	1.1	3.4	1.94	3.71	2.53						
Beryllium Dissolved	ug/l															
Boron Dissolved	ug/l		2000	1000	410	120	400									
Calcium Dissolved	ug/l															
Chromium Dissolved	ug/l		32	50	3.9	<LOD	19	14.8	14.4	2.55						
Copper Dissolved	ug/l		10	2000	8.8	5.3	13	2.61	<0.85	2.45						
Iron Dissolved	ug/l		1000	200												
Lead Dissolved	ug/l		1.2	10	<LOD	<LOD	<LOD	0.111	0.164	0.035						
Magnesium Dissolved	ug/l															
Manganese Dissolved	ug/l		30	50												
Nickel Dissolved	ug/l		4	20	2	<LOD	1.5	4.18	3.69	4.22						
Selenium Dissolved	ug/l			10	<LOD	3.2	4.4	6.92	6.15	9.96						
Cadmium Dissolved	ug/l		0.15	5	<LOD	<LOD	<LOD	<0.1	<0.1	<0.1						
Vanadium Dissolved	ug/l							5.65	6.35	0.548						
Zinc Dissolved	ug/l		75		<LOD	<LOD	1.1	2.66	2.08	2.54						
Mercury Dissolved	ug/l		0.07	1	<LOD	<LOD	<LOD	<0.01	<0.01	<0.01						
Cadmium Total	ug/l		0.15	5												
Zinc Total	ug/l		75													
Mercury Total	ug/l		0.07	1												
Non-Metal Inorganics																
Hardness Total	mg/l															
Total Alkalinity as CaCO3	mg/l							685	916	623						
BOD	mg/l		5													
COD	mg/l															
Potassium Dissolved	mg/l															
Sodium Dissolved	mg/l			200												
Nitrite as NO2	mg/l							0.058	<0.05	<0.05						
Nitrate as NO3	mg/l			50				<0.3	<0.3	0.338						
Total Diss Sulphur	mg/l															
Sulphate (soluble)	mg/l		400	250												
Chloride	mg/l		250	250				61.3	138	57.2						
Sulphide	mg/l															
Ammoniacal Nitrogen as N	mg/l		0.6					2.58	5.87	1.63						
Unionised ammonia	mg/l															
Total Ammonium as NH4	mg/l			0.5												
Phenols Monohydric	mg/l															
Thiocyanate	mg/l															
Total Cyanide	mg/l		0.001	0.05												
Free Cyanide	mg/l				<LOD	<LOD	<LOD									
Complex Cyanide	mg/l															
Conductivity @ 20 deg.C	mS/cm							1.21	1.55	1.19						
Carbon Dioxide Dissolved	ug/l															
pH Value	pH units		6-9	6.5-10	8.3	8.1	8.4	7.49	7.59	7.38						
Organics																
GRO (C4-C12)	ug/l							<50	<50	<50						
MTBE	ug/l							<3	<3	<3						
Benzene	ug/l		10	1	<LOD	<LOD	<LOD	<7	<7	<7						
Toluene	ug/l		50		<LOD	<LOD	<LOD	<4	<4	<4						
Ethyl benzene	ug/l		20		<LOD	<LOD	<LOD	<5	<5	<5						
m & p Xylene	ug/l		30		<LOD	<LOD	<LOD	<8	<8	<8						
o Xylene	ug/l		30		<LOD	<LOD	<LOD	<3	<3	<3						
TPH																
Aliphatics C5-C6	ug/l				<LOD	<LOD	<LOD									
Aliphatics >C6-C8	ug/l				<LOD	<LOD	<LOD	<10	<10	<10						
Aliphatics >C8-C10	ug/l				<LOD	<LOD	<LOD	<10	<10	<10						
Aliphatics >C10-C12	ug/l				<LOD	<LOD	<LOD	<10	<10	<10						
Aliphatics >C12-C16 Aqueous	ug/l				<LOD	<LOD	61	<10	<10	<10						
Aliphatics >C16-C21 Aqueous	ug/l				<LOD	<LOD	36	<10	<10	<10						
Aliphatics >C21-C35 Aqueous	ug/l				<LOD	<LOD	260	109	113	<10						
Total Aliphatics C5-C35 Aqueous	ug/l							109	113	<10						
Aliphatics >C35-44	ug/l				<LOD	<LOD	9.9									
Aromatics >C5-C7	ug/l				<LOD	<LOD	<LOD									
Aromatics C6-C7	ug/l															
Aromatics >C7-C8	ug/l				<LOD	<LOD	<LOD									
Aromatics >EC8-EC10	ug/l				<LOD	<LOD	<LOD	<10	<10	<10						
Aromatics >EC10-EC12	ug/l				<LOD	<LOD	<LOD	<10	<10	<10						
Aromatics >EC12-EC16 Aqueous	ug/l				<LOD	<LOD	13	<10	<10	<10						
Aromatics >EC16-EC21 Aqueous	ug/l				<LOD	<LOD	49	<10	<10	<10						
Aromatics >EC21-EC35 Aqueous	ug/l				<LOD	<LOD	50	17	17	<10						
Total Aromatics C6-C35 Aqueous	ug/l							17	17	<10						
Aromatics >C35-44	ug/l				<LOD	<LOD	<LOD									
Total Aliphatic TPH	ug/l				<LOD	<LOD	370									
Total Aromatic TPH	ug/l															
TPH (Aliphatics and Aromatics C5-C35)	ug/l															
Total petroleum hydrocarbons	ug/l				<LOD	<LOD	480	126	130	<10						
TPH FTIR	ug/l															
TPH GC	ug/l															
PCBs																
PCB- ARO	ug/l															
Cresols	ug/l															
Pcb-101 2,2',4,5,5' - Pentachlorobiphenyl	ug/l															
Pcb-118 2,3',4,4',5 - Pentachlorobiphenyl	ug/l															
Pcb-138 2,2',3,4,4',5' - Hexachlorobiphenyl	ug/l															
Pcb-153 2,2',4,4',5,5' - Hexachlorobiphenyl	ug/l															
Pcb-180 2,2',3,4,4',5,5' - Heptachlorobiphenyl	ug/l															
Pcb-28 2,4,4' - Trichlorobiphenyl	ug/l															
Pcb-52 2,2',5,5' - Tetrachlorobiphenyl	ug/l															

M4CAN		Geological Formation Legend <table><tr><td>MMMF</td><td>Mercia Mudstone Marginal Facies</td></tr><tr><td>RTD</td><td>River Terrace Deposits</td></tr><tr><td>TSF</td><td>Tintern Sandstone Formation</td></tr><tr><td>TFD</td><td>Tidal Flat Deposits</td></tr><tr><td>MMG</td><td>Mercia Mudstone Group</td></tr><tr><td>GFD</td><td>Glaciofluvial Deposits</td></tr><tr><td>SMF</td><td>St Maughans Formation</td></tr></table>		MMMF	Mercia Mudstone Marginal Facies	RTD	River Terrace Deposits	TSF	Tintern Sandstone Formation	TFD	Tidal Flat Deposits	MMG	Mercia Mudstone Group	GFD	Glaciofluvial Deposits	SMF	St Maughans Formation
MMMF	Mercia Mudstone Marginal Facies																
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Groundwater Sample Analysis & Screening Assessment																	
Non-CL Data																	
01/07/2015																	
Notes																	
EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn																	
Installation Details not specified. Assumptions made from details from previous rounds.		X															
Screening Values & Assessment																	
Exceeds EQS																	
Exceeds DWS		X															
Laboratory detection level higher than screening criterion		X															

Monitoring Round	Units	Screening Criteria					1	2	3
Location		EQS	DWS	BH313	BH312	BH312	WSM4CAN022	WSM4CAN022	WSM4CAN022
Location Type				H	BH		WS		
Response Zone (RZ) Details				MF	SMF		TFD	TFD	TFD
Drainage Area				Castleton Area 1	Castleton Area 1	Castleton Area 1			
Installation Details				2.5	1-5 - 11				
Depth (mbGL)				11.75	3.88	8.76	0.00	0.45	0.52
Date Sampled				11/03/2015	25/02/2015	11/03/2015	10/05/2016	19/05/2016	27/05/2016
PCB congener 105	ug/l						<0.015	<0.015	
PCB congener 167	ug/l						<0.015	<0.015	
PCB congener 169	ug/l						<0.015	<0.015	
PCB congener 123	ug/l						<0.015	<0.015	
PCB congener 114	ug/l						<0.015	<0.015	
PCB congener 157	ug/l						<0.015	<0.015	
PCB congener 81	ug/l						<0.015	<0.015	
PCB congener 156	ug/l						<0.015	<0.015	
PCB congener 126	ug/l						<0.015	<0.015	
PCB congener 77	ug/l						<0.015	<0.015	
PCB congener 189	ug/l						<0.015	<0.015	
PCB congener 118	ug/l						<0.015	<0.015	
Phenols									
Dimethylphenols	ug/l								
Trimethylphenols	ug/l								
2-Chlorophenol	ug/l	50					<1	<1	
2 - Methyl-4,6-Dinitrophenol	ug/l						<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	
Phenol	ug/l	7.7					<1	<1	
Phenols	mg/l	0.0077		<LOD					
PAHs									
2-Chloronaphthalene	ug/l								
2-Methylnaphthalene	ug/l								
Acenaphthene	ug/l			<LOD	<LOD	<LOD	<0.015	0.0754	<0.015
Acenaphthylene	ug/l			<LOD	<LOD	<LOD	<0.011	0.0113	<0.011
Anthracene	ug/l	0.1		<LOD	<LOD	<LOD	<0.015	<0.015	<0.015
Benzo(a)anthracene	ug/l			<LOD	<LOD	<LOD	<0.017	0.0562	<0.017
Benzo(a)pyrene	ug/l	0.00017	0.01	<LOD	<LOD	<LOD	<0.009	0.0673	<0.009
Benzo(b)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<0.023	0.103	<0.023
Benzo(ghi)perylene	ug/l	0.0082	0.1				<0.016	0.0665	<0.016
Benzo(k)fluoranthene	ug/l	0.017	0.1	<LOD	<LOD	<LOD	<0.027	0.0463	<0.027
Chrysene	ug/l			<LOD	<LOD	<LOD	<0.013	0.0406	<0.013
Dibenzo(a,h)anthracene	ug/l			<LOD	<LOD	<LOD	<0.016	<0.016	<0.016
Fluoranthene	ug/l	0.0063		<LOD	<LOD	<LOD	<0.017	0.0649	<0.017
Fluorene	ug/l			<LOD	<LOD	<LOD	<0.014	0.0235	<0.014
Indeno(1,2,3-cd)pyrene	ug/l		0.1	<LOD	<LOD	<LOD	<0.014	0.0588	<0.014
Naphthalene	ug/l	2		<LOD	<LOD	<LOD	<0.1	0.55	<0.1
Phenanthrene	ug/l			<LOD	<LOD	<LOD	<0.022	0.0438	<0.022
Pyrene	ug/l			<LOD	<LOD	<LOD	<0.015	0.0628	<0.015
Total PAHs (USEPA 16)	ug/l			<LOD	<LOD	<LOD	<0.344	1.27	<0.344
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	
VOCs									
Full suite	ug/l								
1,1,1,2-Tetrachloroethane	ug/l						<1	<1	
1,1,1-Trichloroethane	ug/l	100					<1	<1	
1,1,1,2,2-Tetrachloroethane	ug/l	#N/A	#N/A				<1	<1	
1,1,2-Trichloroethane	ug/l	400					<1	<1	
1,1-Dichloroethane	ug/l						<1	<1	
1,1-Dichloroethene	ug/l						<1	<1	
1,1-Dichloropropene	ug/l						<1	<1	
1,2,3-Trichlorobenzene	ug/l	0.4					<1	<1	
1,2,3-Trichloropropane	ug/l						<1	<1	
1,2,4-Trichlorobenzene	ug/l	0.4					<1	<1	
1,2,4-Trimethylbenzene	ug/l						<1	<1	
1,2-Dibromo-3-Chloropropane	ug/l						<1	<1	
1,2-Dibromoethane	ug/l						<1	<1	
1,2-Dichlorobenzene	ug/l	20					<1	<1	
1,2-Dichloroethane	ug/l	10	3				<1	<1	
1,2-Dichloropropane	ug/l						<1	<1	
1,3,5-Trimethylbenzene	ug/l						<1	<1	
1,3-Dichloropropane	ug/l						<1	<1	
1,4-Dichlorobenzene	ug/l	20					<1	<1	
2-Chlorotoluene	ug/l						<1	<1	
4-Chlorotoluene	ug/l						<1	<1	
4-Isopropyltoluene	ug/l						<1	<1	
Benzene	ug/l	10	1	<LOD	<LOD	<LOD	<1	<1	
Bromobenzene	ug/l						<1	<1	
Bromochloromethane	ug/l		100				<1	<1	
Bromodichloromethane	ug/l						<1	<1	
Bromoform	ug/l						<1	<1	
Bromomethane	ug/l						<1	<1	
Carbon Disulphide	ug/l						<1	<1	
Chlorobenzene	ug/l						<1	<1	

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Groundwater Sample Analysis & Screening Assessment																	
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EQS calcium carbonate 200-250mg/l for heavy metals: Cr, Cu, Pb, Ni & Zn																	
Installation Details not specified. Assumptions made from details from previous rounds.		X															
Screening Values & Assessment																	
Exceeds EQS																	
Exceeds DWS		X															
Laboratory detection level higher than screening criterion		X															

Monitoring Round	Units	Screening Criteria					1	2	3
Location		EQS	DWS	BH313	BH312	BH312	WSM4CAN022	WSM4CAN022	WSM4CAN022
Location Type				H	BH		WS		
Response Zone (RZ) Details				MF	SMF		TFD	TFD	TFD
Drainage Area				Castleton Area 1	Castleton Area 1	Castleton Area 1			
Installation Details				2.5	1-.5 - 11				
Depth (mbGL)				11.75	3.88	8.76	0.00	0.45	0.52
Date Sampled				11/03/2015	25/02/2015	11/03/2015	10/05/2016	19/05/2016	27/05/2016
Chloroethane	ug/l						<1	<1	
Chloroethene	ug/l						<1	<1	
Chloroform	ug/l	2.5	100				<1	<1	
Chloromethane	ug/l						<1	<1	
cis-1,2-Dichloroethene	ug/l						<1	<1	
cis-1,3-Dichloropropene	ug/l						<1	<1	
Dibromochloromethane	ug/l		100				<1	<1	
Dibromomethane	ug/l						<1	<1	
Dichlorodifluoromethane	ug/l						<1	<1	
Dichloromethane	ug/l	20					<1	<1	
Ethylbenzene	ug/l	20		<LOD	<LOD	<LOD	<1	<1	
Hexachlorobutadiene (HCBD)	ug/l	0.6					<1	<1	
Isopropylbenzene	ug/l						<1	<1	
m,p xylenes	ug/l	30		<LOD	<LOD	<LOD	<1	<1	
Methyl tert-butyl ether (MTBE)	ug/l						<1	<1	
n-Butylbenzene	ug/l						<1	<1	
n-propylbenzene	ug/l						<1	<1	
O-Xylene	ug/l	30		<LOD	<LOD	<LOD	<1	<1	
Sec-Butylbenzene	ug/l						<1	<1	
Styrene	ug/l	50					<1	<1	
Tert-Butylbenzene	ug/l						<1	<1	
Tetrachloroethene	ug/l	10	10				<1	<1	
Tetrachloromethane (Carbon Tetra Chl	ug/l	12	3				<1	<1	
Toluene	ug/l	50		<LOD	<LOD	<LOD	<1	<1	
trans-1,2-Dichloroethene	ug/l						<1	<1	
trans-1,3-Dichloropropene	ug/l						<1	<1	
Tribromomethane	ug/l		100				<1	<1	
Trichloroethene	ug/l	10	10				<1	<1	
Trichlorofluoromethane	ug/l						<1	<1	
Vinly Chloride	ug/l	#N/A	#N/A				<1	<1	
Other Semi-Volatiles									
1,2-Dichlorobenzene	ug/l	20					<1	<1	
1,2,4-Trichlorobenzene	ug/l	0.4					<1	<1	
1,3-Dichlorobenzene	ug/l	20					<1	<1	
1,4-Dichlorobenzene	ug/l	20					<1	<1	
2-Nitroaniline	ug/l						<1	<1	
2,4-Dinitrotoluene	ug/l						<1	<1	
2,6-Dinitrotoluene	ug/l						<1	<1	
2-Methylnaphthalene	ug/l						<1	<1	
3-Nitroaniline	ug/l						<1	<1	
4-Bromophenylphenylether	ug/l						<1	<1	
4-Chloroaniline	ug/l						<1	<1	
4-Chlorophenylphenylether	ug/l						<1	<1	
4-Nitroaniline	ug/l						<1	<1	
Azobenzene	ug/l						<1	<1	
Bis(2-chloroethoxy)methane	ug/l						<1	<1	
Bis(2-chloroethyl)ether	ug/l						<1	<1	
Bis(2-chloroisopropyl)ether	ug/l						<1	<1	
Carbazole	ug/l						<1	<1	
Dibenzofuran	ug/l						<1	<1	
Hexachlorobenzene	ug/l	0.05					<1	<1	
Hexachlorobutadiene	ug/l	0.6					<1	<1	
Hexachlorocyclopentadiene	ug/l						<1	<1	
Hexachloroethane	ug/l						<1	<1	
Isophorone	ug/l						<1	<1	
N-nitrosodi-n-propylamine	ug/l						<1	<1	
Nitrobenzene	ug/l						<1	<1	

[illegible]

[illegible]

Surface Water Dataset Summary

Parameter	Unit	No. Analyses	Analyses Above LOD		Concentration	
			No.	% of Analyses	Range	Average
General Parameters						
Alkalinity	mg CaCO3/l	28	26	92.9%	170 - 1500	514
Total Hardness as CaCO3	mg/l	55	53	96.4%	100 - 491	265
Ammoniacal Nitrogen as N	mg/l	98	74	75.5%	0.034 - 1.7	0.28
BOD + ATU (5 day)	mg/l	72	42	58.3%	1 - 33	6.11
Calcium (diss.filt)	mg/l	71	69	97.2%	2.8 - 152	66.4
Chloride	mg/l	98	96	98.0%	7 - 250	42.7
Conductivity	uS/cm	56	54	96.4%	206 - 1164	563
Cyanide	mg/l	28	0	None > LOD	None > LOD	None > LOD
Dissolved oxygen	mg/l	72	68	94.4%	0.47 - 13.6	6.52
Dissolved oxygen (saturation)	%	55	51	92.7%	3.7 - 139.3	54.1
Magnesium dissolved as Mg	mg/l	55	53	96.4%	1.1 - 35	15.6
Nitrogen, Total Oxidised as N	mg/l	72	39	54.2%	0.123 - 9.43	2.08
Nitrate as NO3	mg/l	72	45	62.5%	0.467 - 41.5	8.0
Nitrite as NO2	mg/l	72	14	19.4%	0.05 - 0.2	0.100
pH	pH Units	82	80	97.6%	7 - 12	8.04
Phosphate, Ortho as P	mg/l	71	43	60.6%	0.0424 - 4.2	0.67
Suspended solids, Total	mg/l	72	65	90.3%	2 - 714	72.8
Sulphate	mg/l	72	62	86.1%	7 - 110	30.8
Metals						
Arsenic	ug/l	42	37	88.1%	0.253 - 6.9	2.16
Boron	ug/l	28	26	92.9%	24 - 1300	548
Cadmium	ug/l	97	27	27.8%	0.097 - 2.9	0.88
Chromium	ug/l	97	34	35.1%	0.671 - 18	5.81
Copper	ug/l	97	41	42.3%	0.852 - 19	4.63
Lead	ug/l	97	30	30.9%	0.026 - 27	4.11
Mercury	ug/l	42	4	9.5%	0.68 - 2.5	1.45
Nickel	ug/l	97	42	43.3%	0.644 - 15	3.34
Selenium	ug/l	42	27	64.3%	0.47 - 4.9	1.76
Zinc	ug/l	97	94	96.9%	0.558 - 360	27.79
BTEX Compounds						
Sum of detected BTEX	ug/l	18	0	None > LOD	None > LOD	None > LOD
Benzene	ug/l	45	0	None > LOD	None > LOD	None > LOD
Ethylbenzene	ug/l	45	0	None > LOD	None > LOD	None > LOD
Toluene	ug/l	45	0	None > LOD	None > LOD	None > LOD
Sum of detected Xylenes	ug/l	18	0	None > LOD	None > LOD	None > LOD
m,p xylenes	ug/l	28	0	None > LOD	None > LOD	None > LOD
m,p-Xylene	ug/l	19	0	None > LOD	None > LOD	None > LOD
o-Xylene	ug/l	45	0	None > LOD	None > LOD	None > LOD
Petroleum Hydrocarbons						
NVM, light petroleum extract	mg/l	55	11	20.0%	5 - 29	10
Total petroleum hydrocarbons	ug/l	28	0	None > LOD	None > LOD	None > LOD
GRO >C5-C12	ug/l	18	0	None > LOD	None > LOD	None > LOD
TPH >C10-C16	ug/l	55	0	None > LOD	None > LOD	None > LOD
TPH >C16-C24	ug/l	55	7	12.7%	21 - 169	85
TPH >C24-C40	ug/l	55	12	21.8%	51 - 284	159
TPH >C6-C40	ug/l	55	13	23.6%	51 - 422	189
TPH >C6-C8	ug/l	55	0	None > LOD	None > LOD	None > LOD
TPH >C8-C10	ug/l	55	0	None > LOD	None > LOD	None > LOD
Total Aliphatic TPH	ug/l	28	0	None > LOD	None > LOD	None > LOD
Total Aliphatics & Aromatics >C5-35 (aq)	ug/l	18	2	11.1%	59 - 193	126.0
Total Aliphatics >C12-C35 (aq)	ug/l	18	2	11.1%	23 - 76	49.5
Total Aromatics >EC12-EC35 (aq)	ug/l	18	2	11.1%	36 - 117	76.5
Aromatic hydrocarbons	ug/l	28	0	None > LOD	None > LOD	None > LOD
Ali >C10-12	ug/l	28	0	None > LOD	None > LOD	None > LOD
Ali >C12-16	ug/l	28	0	None > LOD	None > LOD	None > LOD
Ali >C16-21	ug/l	28	0	None > LOD	None > LOD	None > LOD
Ali >C21-35	ug/l	28	0	None > LOD	None > LOD	None > LOD
Ali >C35-44	ug/l	28	0	None > LOD	None > LOD	None > LOD
Ali >C5-6	ug/l	28	0	None > LOD	None > LOD	None > LOD
Ali >C6-8	ug/l	28	0	None > LOD	None > LOD	None > LOD
Ali >C8-10	ug/l	28	0	None > LOD	None > LOD	None > LOD
Aliphatics >C10-C12	ug/l	18	0	None > LOD	None > LOD	None > LOD
Aliphatics >C12-C16 (aq)	ug/l	18	0	None > LOD	None > LOD	None > LOD
Aliphatics >C16-C21 (aq)	ug/l	18	1	5.6%	11	11
Aliphatics >C21-C35 (aq)	ug/l	18	2	11.1%	23 - 65	44
Aliphatics >C5-C6	ug/l	18	0	None > LOD	None > LOD	None > LOD
Aliphatics >C6-C8	ug/l	18	0	None > LOD	None > LOD	None > LOD
Aliphatics >C8-C10	ug/l	18	0	None > LOD	None > LOD	None > LOD
Arom >C10-12	ug/l	28	0	None > LOD	None > LOD	None > LOD
Arom >C12-16	ug/l	28	0	None > LOD	None > LOD	None > LOD
Arom >C16-21	ug/l	28	0	None > LOD	None > LOD	None > LOD
Arom >C21-35	ug/l	28	0	None > LOD	None > LOD	None > LOD
Arom >C35-44	ug/l	28	0	None > LOD	None > LOD	None > LOD
Arom >C5-7	ug/l	28	0	None > LOD	None > LOD	None > LOD
Arom >C7-8	ug/l	28	0	None > LOD	None > LOD	None > LOD
Arom >C8-10	ug/l	28	0	None > LOD	None > LOD	None > LOD
Aromatics >EC10-EC12	ug/l	18	0	None > LOD	None > LOD	None > LOD
Aromatics >EC12-EC16 (aq)	ug/l	18	1	5.6%	11	11
Aromatics >EC16-EC21 (aq)	ug/l	18	1	5.6%	21	21
Aromatics >EC21-EC35 (aq)	ug/l	18	2	11.1%	36 - 85	60.5
Aromatics >EC5-EC7	ug/l	18	0	None > LOD	None > LOD	None > LOD
Aromatics >EC7-EC8	ug/l	18	0	None > LOD	None > LOD	None > LOD
Aromatics >EC8-EC10	ug/l	18	0	None > LOD	None > LOD	None > LOD

Surface Water Screening Assessment

Parameter	Unit	EQS	Analyses Above EQS		Additional Notes	CCW TL	Analyses Above CCW TL		Additional Notes	Min	Max
			No.	%'age of Analyses			No.	%'age of Analyses			
General Parameters											
Alkalinity	mg CaCO3/l	-	No EQS			-	No TL			170	1500
Total Hardness as CaCO3	mg/l	-	No EQS			-	No TL			100	491
Ammoniacal Nitrogen as N	mg/l	0.6	6	6.1%	"Good" Status under WFD	1	3	3.1%		0.034	1.7
BOD + ATU (5 day)	mg/l	5	15	20.8%	"Good" Status under WFD	18	3	4.2%		1	33
Calcium (diss.filt)	mg/l	-	No EQS			300	0	0.0%		2.8	152
Chloride	mg/l	250	0	0.0%		300	0	0.0%		7	250
Conductivity	uS/cm	-	No EQS			2000	0	0.0%		206	1164
Cyanide	mg/l	1	None > LOD			-	No TL				
Dissolved oxygen	mg/l	-	No EQS			5	44	61.1%		0.47	13.6
Dissolved oxygen (saturation)	%	60	28	50.9%	"Good" Status under WFD	-	No TL			3.7	139.3
Magnesium dissolved as Mg	mg/l	-	No EQS			-	No TL			1.1	35
Nitrogen, Total Oxidised as N	mg/l	-	No EQS			2	14	19.4%		0.123	9.43
Nitrate as NO3	mg/l	-	No EQS			1	44	61.1%		0.467	41.5
Nitrite as NO2	mg/l	-	No EQS			1	0	0.0%		0.05	0.2
pH	pH Units	9	3	3.7%	Around Llanwern	8.5	16	19.5%		7	12
Phosphate, Ortho as P	mg/l	0.12	36	50.7%	"Good" Status under WFD	1	12	16.9%		0.0424	4.2
Suspended solids, Total	mg/l	-	No EQS			250	5	6.9%		2	714
Sulphate	mg/l	400	0	0.0%		300	0	0.0%		7	110
Metals											
Arsenic	ug/l	50	0			-	No TL			0.253	6.9
Boron	ug/l	2000	0			-	No TL			24	1300
Cadmium	ug/l	0.15	24	24.7%		5	0	0.0%		0.097	2.9
Chromium	ug/l	3.4	16	16.5%	Chromium VI	-	No TL			0.671	18
Copper	ug/l	10	6	6.2%		-	No TL			0.852	19
Lead	ug/l	1.2	14	14.4%		250	0	0.0%		0.026	27
Mercury	ug/l	0.07	4	9.5%		-	No TL			0.68	2.5
Nickel	ug/l	4	11	11.3%		100	0	0.0%		0.644	15
Selenium	ug/l	-	No EQS			-	No TL			0.47	4.9
Zinc	ug/l	75	7			1000	0	0.0%		0.558	360
BTEX Compoundas											
Sum of detected BTEX	ug/l	-	-			2000	None > LOD				
Benzene	ug/l	-	-			2000	None > LOD				
Ethylbenzene	ug/l	-	-			2000	None > LOD				
Toluene	ug/l	-	-			2000	None > LOD				
Sum of detected Xylenes	ug/l	-	-			2000	None > LOD				
m,p xylenes	ug/l	-	-			2000	None > LOD				
m,p-Xylene	ug/l	-	-			2000	None > LOD				
o-Xylene	ug/l	-	-			2000	None > LOD				
Petroleum Hydrocarbons											
NVM, light petroleum extract	mg/l	-	-			2	11	20.0%		5	29
Total petroleum hydrocarbons	ug/l	-	-			2000	None > LOD				
GRO >C5-C12	ug/l	-	-			2000	None > LOD				
TPH >C10-C16	ug/l	-	-			-	No TL				
TPH >C16-C24	ug/l	-	-			-	No TL			21	169
TPH >C24-C40	ug/l	-	-			-	No TL			51	284
TPH >C6-C40	ug/l	-	-			-	No TL			51	422
TPH >C6-C8	ug/l	-	-			-	No TL				
TPH >C8-C10	ug/l	-	-			-	No TL				
Total Aliphatic TPH	ug/l	-	-			-	No TL				
Total Aliphatics & Aromatics >C5-35 (aq)	ug/l	-	-			2000	0	0.0%		59	193
Total Aliphatics >C12-C35 (aq)	ug/l	-	-			2000	0	0.0%		23	76
Total Aromatics >EC12-EC35 (aq)	ug/l	-	-			2000	0	0.0%		36	117
Aromatic hydrocarbons	ug/l	-	-			-	No TL				
Ali >C10-12	ug/l	-	-			-	No TL				
Ali >C12-16	ug/l	-	-			-	No TL				
Ali >C16-21	ug/l	-	-			-	No TL				
Ali >C21-35	ug/l	-	-			-	No TL				
Ali >C35-44	ug/l	-	-			-	No TL				
Ali >C5-6	ug/l	-	-			-	No TL				
Ali >C6-8	ug/l	-	-			-	No TL				
Ali >C8-10	ug/l	-	-			-	No TL				
Aliphatics >C10-C12	ug/l	-	-			-	No TL				
Aliphatics >C12-C16 (aq)	ug/l	-	-			-	No TL				
Aliphatics >C16-C21 (aq)	ug/l	-	-			-	No TL			11	11
Aliphatics >C21-C35 (aq)	ug/l	-	-			-	No TL			23	65
Aliphatics >C5-C6	ug/l	-	-			-	No TL				
Aliphatics >C6-C8	ug/l	-	-			-	No TL				
Aliphatics >C8-C10	ug/l	-	-			-	No TL				
Arom >C10-12	ug/l	-	-			-	No TL				
Arom >C12-16	ug/l	-	-			-	No TL				
Arom >C16-21	ug/l	-	-			-	No TL				
Arom >C21-35	ug/l	-	-			-	No TL				
Arom >C35-44	ug/l	-	-			-	No TL				
Arom >C5-7	ug/l	-	-			-	No TL				
Arom >C7-8	ug/l	-	-			-	No TL				
Arom >C8-10	ug/l	-	-			-	No TL				
Aromatics >EC10-EC12	ug/l	-	-			-	No TL				
Aromatics >EC12-EC16 (aq)	ug/l	-	-			-	No TL			11	11
Aromatics >EC16-EC21 (aq)	ug/l	-	-			-	No TL			21	21
Aromatics >EC21-EC35 (aq)	ug/l	-	-			-	No TL			36	85
Aromatics >EC5-EC7	ug/l	-	-			-	No TL				
Aromatics >EC7-EC8	ug/l	-	-			-	No TL				
Aromatics >EC8-EC10	ug/l	-	-			-	No TL				

Parameter	Unit	No. Analyses	Analyses Above LOD		Concentration	
			No.	% of Analyses	Range	Average
Other Organic Compounds						
PAH, Total Detected USEPA 16 (aq)	ug/l	19	2	10.5%	6.21 - 17.2	11.7
Chrysene (aq)	ug/l	19	2	10.5%	0.032 - 1.85	0.94
Fluoranthene (aq)	ug/l	19	2	10.5%	0.0365 - 2.24	1.14
Pyrene (aq)	ug/l	19	2	10.5%	0.0289 - 1.88	0.95
Benzo(a)anthracene (aq)	ug/l	19	2	10.5%	0.021 - 1.09	0.56
Phenanthrene (aq)	ug/l	19	2	10.5%	0.0337 - 0.949	0.49
Acenaphthene (aq)	ug/l	19	2	10.5%	0.121 - 0.13	0.13
Acenaphthylene (aq)	ug/l	19	1	5.3%	0.0601	0.060
Benzo(a)pyrene (aq)	ug/l	19	2	10.5%	0.016 - 1.56	0.79
Benzo(b)fluoranthene (aq)	ug/l	19	2	10.5%	0.0362 - 2.83	1.43
Benzo(g,h,i)perylene (aq)	ug/l	19	2	10.5%	0.0205 - 1.57	0.80
Fluorene (aq)	ug/l	19	2	10.5%	0.042 - 0.0858	0.064
Indeno[1,2,3-cd]pyrene (aq)	ug/l	19	2	10.5%	0.0141 - 1.43	0.72
Naphthalene (aq)	ug/l	19	2	10.5%	0.318 - 6.02	3.17
Phenols	mg/l	28	2	7.1%	0.03 - 0.29	0.16
4-Bromofluorobenzene**	%	3	1	33.3%	95.8	95.8
Anthracene (aq)	ug/l	19	1	5.3%	0.125	0.125
Benzo(k)fluoranthene (aq)	ug/l	19	1	5.3%	1.09	1.09
Dibenzo(a,h)anthracene (aq)	ug/l	19	1	5.3%	0.367	0.367
Dibromofluoromethane**	%	3	1	33.3%	115	115
Isophorone (aq)	ug/l	3	1	33.3%	1.59	1.59
1,1,1,2-Tetrachloroethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,1,1-Trichloroethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,1,2,2-Tetrachloroethane	ug/l	3	0	None > LOD	None > LOD	None > LOD
1,1,2-Trichloroethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,1-Dichloroethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,1-Dichloroethene	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,1-Dichloropropene	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,2,3,6,7,8 HxCDD*	ng/l	3	0	None > LOD	None > LOD	None > LOD
1,2,3-Trichlorobenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,2,3-Trichloropropane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,2,4-Trichlorobenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,2,4-Trichlorobenzene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
1,2,4-Trimethylbenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,2-Dibromo-3-chloropropane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,2-Dibromomethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,2-Dichlorobenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,2-Dichlorobenzene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
1,2-Dichloroethane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,2-Dichloropropane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,3,5-Trichlorobenzene	ug/l	3	0	None > LOD	None > LOD	None > LOD
1,3,5-Trimethylbenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,3-Dichlorobenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,3-Dichlorobenzene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
1,3-Dichloropropane	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,4-Dichlorobenzene	ug/l	29	0	None > LOD	None > LOD	None > LOD
1,4-Dichlorobenzene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2,2-Dichloropropane	ug/l	3	0	None > LOD	None > LOD	None > LOD
2,4,5-Trichlorophenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
2,4,5-Trichlorophenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2,4,6-Trichlorophenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
2,4,6-Trichlorophenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2,4-Dichlorophenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
2,4-Dichlorophenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2,4-Dimethylphenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
2,4-Dimethylphenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2,4-Dinitrotoluene	ug/l	28	0	None > LOD	None > LOD	None > LOD
2,4-Dinitrotoluene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2,6-Dinitrotoluene	ug/l	28	0	None > LOD	None > LOD	None > LOD
2,6-Dinitrotoluene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2-Chloronaphthalene	ug/l	28	0	None > LOD	None > LOD	None > LOD
2-Chloronaphthalene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2-Chlorophenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
2-Chlorophenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2-Chlorotoluene	ug/l	29	0	None > LOD	None > LOD	None > LOD
2-Methyl-4,6-Dinitrophenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
2-Methylnaphthalene	ug/l	28	0	None > LOD	None > LOD	None > LOD
2-Methylnaphthalene (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2-Methylphenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
2-Methylphenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2-Nitroaniline	ug/l	28	0	None > LOD	None > LOD	None > LOD
2-Nitroaniline (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
2-Nitrophenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
2-Nitrophenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
3-Nitroaniline	ug/l	28	0	None > LOD	None > LOD	None > LOD
3-Nitroaniline (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
4-Bromophenyl Phenyl Ether	ug/l	28	0	None > LOD	None > LOD	None > LOD
4-Bromophenylphenylether (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
4-Chloro-3-Methylphenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
4-Chloro-3-methylphenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
4-Chloroaniline	ug/l	28	0	None > LOD	None > LOD	None > LOD
4-Chloroaniline (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
4-Chlorophenyl Phenyl Ether	ug/l	28	0	None > LOD	None > LOD	None > LOD
4-Chlorophenylphenylether (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
4-Chlorotoluene	ug/l	29	0	None > LOD	None > LOD	None > LOD
4-Isopropyltoluene	ug/l	28	0	None > LOD	None > LOD	None > LOD
4-iso-Propyltoluene	ug/l	3	0	None > LOD	None > LOD	None > LOD
4-Methylphenol	ug/l	28	0	None > LOD	None > LOD	None > LOD
4-Methylphenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
4-Nitroaniline	ug/l	28	0	None > LOD	None > LOD	None > LOD
4-Nitroaniline (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
4-Nitrophenol (aq)	ug/l	3	0	None > LOD	None > LOD	None > LOD
Acenaphthene	ug/l	28	0	None > LOD	None > LOD	None > LOD
Acenaphthylene	ug/l	28	0	None > LOD	None > LOD	None > LOD

Parameter	Unit	EQS	Analyses Above EQS		Additional Notes	CCW TL	Analyses Above CCW TL		Additional Notes	Min	Max
			No.	%age of Analyses			No.	%age of Analyses			
Other Organic Compounds											
PAH, Total Detected USEPA 16 (aq)	ug/l	-	-							6.21	17.2
Chrysene (aq)	ug/l	-	-							0.032	1.85
Fluoranthene (aq)	ug/l	-	-							0.0365	2.24
Pyrene (aq)	ug/l	-	-							0.0289	1.88
Benzo(a)anthracene (aq)	ug/l	-	-							0.021	1.09
Phenanthrene (aq)	ug/l	-	-							0.0337	0.949
Acenaphthene (aq)	ug/l	-	-							0.121	0.13
Acenaphthylene (aq)	ug/l	-	-							0.0601	0.0601
Benzo(a)pyrene (aq)	ug/l	0.00017	2	10.5%						0.016	1.56
Benzo(b)fluoranthene (aq)	ug/l	0.017	2	10.5%						0.0362	2.83
Benzo(g,h,i)perylene (aq)	ug/l	-	-							0.0205	1.57
Fluorene (aq)	ug/l	-	-							0.042	0.0858
Indeno(1,2,3-cd)pyrene (aq)	ug/l	-	-							0.0141	1.43
Naphthalene (aq)	ug/l	2	1	5.3%						0.318	6.02
Phenols	mg/l	-	-							0.03	0.29
4-Bromofluorobenzene**	%	-	-							95.8	95.8
Anthracene (aq)	ug/l	0.1	1	5.3%						0.125	0.125
Benzo(k)fluoranthene (aq)	ug/l	0.017	1	5.3%						1.09	1.09
Dibenzo(a,h)anthracene (aq)	ug/l	-	-							0.367	0.367
Dibromofluoromethane**	%	-	-							115	115
Isophorone (aq)	ug/l	-	-							1.59	1.59
1,1,1,2-Tetrachloroethane	ug/l										
1,1,1-Trichloroethane	ug/l										
1,1,2,2-Tetrachloroethane	ug/l										
1,1,2-Trichloroethane	ug/l										
1,1-Dichloroethane	ug/l										
1,1-Dichloroethene	ug/l										
1,1-Dichloropropene	ug/l										
1,2,3,6,7,8 HxCDD*	ng/l										
1,2,3-Trichlorobenzene	ug/l										
1,2,3-Trichloropropane	ug/l										
1,2,4-Trichlorobenzene	ug/l										
1,2,4-Trichlorobenzene (aq)	ug/l										
1,2,4-Trimethylbenzene	ug/l										
1,2-Dibromo-3-chloropropane	ug/l										
1,2-Dibromoethane	ug/l										
1,2-Dichlorobenzene	ug/l										
1,2-Dichlorobenzene (aq)	ug/l										
1,2-Dichloroethane	ug/l										
1,2-Dichloropropane	ug/l										
1,3,5-Trichlorobenzene	ug/l										
1,3,5-Trimethylbenzene	ug/l										
1,3-Dichlorobenzene	ug/l										
1,3-Dichlorobenzene (aq)	ug/l										
1,3-Dichloropropane	ug/l										
1,4-Dichlorobenzene	ug/l										
1,4-Dichlorobenzene (aq)	ug/l										
2,2-Dichloropropane	ug/l										
2,4,5-Trichlorophenol	ug/l										
2,4,5-Trichlorophenol (aq)	ug/l										
2,4,6-Trichlorophenol	ug/l										
2,4,6-Trichlorophenol (aq)	ug/l										
2,4-Dichlorophenol	ug/l										
2,4-Dichlorophenol (aq)	ug/l										
2,4-Dimethylphenol	ug/l										
2,4-Dimethylphenol (aq)	ug/l										
2,4-Dinitrotoluene	ug/l										
2,4-Dinitrotoluene (aq)	ug/l										
2,6-Dinitrotoluene	ug/l										
2,6-Dinitrotoluene (aq)	ug/l										
2-Chloronaphthalene	ug/l										
2-Chloronaphthalene (aq)	ug/l										
2-Chlorophenol	ug/l										
2-Chlorophenol (aq)	ug/l										
2-Chlorotoluene	ug/l										
2-Methyl-4,6-Dinitrophenol	ug/l										
2-Methylnaphthalene	ug/l										
2-Methylnaphthalene (aq)	ug/l										
2-Methylphenol	ug/l										
2-Methylphenol (aq)	ug/l										
2-Nitroaniline	ug/l										
2-Nitroaniline (aq)	ug/l										
2-Nitrophenol	ug/l										
2-Nitrophenol (aq)	ug/l										
3-Nitroaniline	ug/l										
3-Nitroaniline (aq)	ug/l										
4-Bromophenyl Phenyl Ether	ug/l										
4-Bromophenylphenylether (aq)	ug/l										
4-Chloro-3-Methylphenol	ug/l										
4-Chloro-3-methylphenol (aq)	ug/l										
4-Chloroaniline	ug/l										
4-Chloroaniline (aq)	ug/l										
4-Chlorophenyl Phenyl Ether	ug/l										
4-Chlorophenylphenylether (aq)	ug/l										
4-Chlorotoluene	ug/l										
4-Isopropyltoluene	ug/l										
4-iso-Propyltoluene	ug/l										
4-Methylphenol	ug/l										
4-Methylphenol (aq)	ug/l										
4-Nitroaniline	ug/l										
4-Nitroaniline (aq)	ug/l										
4-Nitrophenol (aq)	ug/l										
Acenaphthene	ug/l										
Acenaphthylene	ug/l										

M4CAN
Leachate Analysis Results & Screening Assessment
Outside CL Sites - chainage +11,850 to +19,650
31/07/2015

Sample Reference	Units	Screening Criteria		BH503	TPM4CANA010
Specimen Depth		EQS	DWS	0.5 - 0.7	0.5
Level				5.65	5.38
Sample Type				ES	ES
Geology Code				MG	TFD
Cluster Code				2015 GI	2016 GI
Aromatics >C12-C16	ug/l			<0.1	<10
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	<0.015
Acenaphthylene	ug/l			<0.1	<0.011
Anthracene	ug/l	0.1		<0.1	<0.015
Benz(a)anthracene	ug/l			<0.1	<0.017
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.1	<0.009
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.1	<0.023
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.1	<0.016
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.1	<0.027
Chrysene	ug/l			<0.1	0.0216
Dibenzo(ah)anthracene	ug/l			<0.1	<0.016
Fluoranthene	ug/l	0.0063		<0.1	0.0254
Fluorene	ug/l			<0.1	<0.014
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.1	<0.014
Naphthalene	ug/l	2		<0.1	<0.1
Phenanthrene	ug/l			<0.1	<0.022
Pyrene	ug/l			<0.1	0.024
PAH 16 Total	ug/l			<2	<0.344

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: Cr, Cu, Pb, Ni & Zn

IS denotes Insufficient Sample

NDP denotes no determination possible

Environmental Quality Standards (EQS)

UK Drinking Water Standards (DWS)

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
2	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
1	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	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	1	0.0216	0.0216	TPM4CANA010 @ 5.38mAOD		
2	0	None > LOD	None > LOD			
2	1	0.0254	0.0254	TPM4CANA010 @ 5.38mAOD	1	
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			
2	1	0.024	0.024	TPM4CANA010 @ 5.38mAOD		
2	0	None > LOD	None > LOD			

M4CAN
Leachate Analysis Results & Screening Assessment
Outside CL Sites - chainage +19,650 to +24,000
31/07/2015

Sample Reference	Units	Screening Criteria		BH543	BHM4CAN064
Specimen Depth		EQS	DWS	0.8 - 1	1.2
Level				27.55	11.69
Sample Type				ES	ES
Geology Code				CLAY/MG?	MG
Cluster Code				2015 GI	2016 GI
Aromatics >C12-C16	ug/l			<0.1	<10
Aromatics >C16-C21	ug/l			<0.1	<10
Aromatics >C21-C35	ug/l			<0.1	<10
Aromatics >C35-44	ug/l			<0.1	
Total Aliphatic TPH	ug/l			<5	<10
Total Aromatic TPH	ug/l			<5	<10
Total petroleum hydrocarbons	ug/l			<10	<10
PAH					
Acenaphthene	ug/l			<0.1	0.0335
Acenaphthylene	ug/l			<0.1	<0.011
Anthracene	ug/l	0.1		<0.1	0.00162
Benz(a)anthracene	ug/l			<0.1	0.0182
Benzo(a)pyrene	ug/l	0.00017	0.01	<0.1	0.0232
Benzo(b)fluoranthene	ug/l	0.017	0.1	<0.1	0.0454
Benzo(ghi)perylene	ug/l	0.0082	0.1	<0.1	0.0324
Benzo(k)fluoranthene	ug/l	0.017	0.1	<0.1	<0.027
Chrysene	ug/l			<0.1	0.0365
Dibenzo(ah)anthracene	ug/l			<0.1	<0.016
Fluoranthene	ug/l	0.0063		<0.1	0.0888
Fluorene	ug/l			<0.1	0.0155
Indeno(123cd)pyrene	ug/l	N/A	0.1	<0.1	0.0245
Naphthalene	ug/l	2		<0.1	<0.1
Phenanthrene	ug/l			<0.1	0.0719
Pyrene	ug/l			<0.1	0.0643
PAH 16 Total	ug/l			<2	0.47

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

IS denotes Insufficient Sample

NDP denotes no determination possible

Environmental Quality Standards (EQS)

UK Drinking Water Standards (DWS)

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
2	0	None > LOD	None > LOD			
2	0	None > LOD	None > LOD			
2	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			
2	0	None > LOD	None > LOD			
2	0	None > LOD	None > LOD			
2	0	None > LOD	None > LOD			
2	1	0.0335	0.0335	BHM4CAN064 @ 11.69mAOD		
2	0	None > LOD	None > LOD			
2	1	0.00162	0.00162	BHM4CAN064 @ 11.69mAOD	0	
2	1	0.0182	0.0182	BHM4CAN064 @ 11.69mAOD		
2	1	0.0232	0.0232	BHM4CAN064 @ 11.69mAOD	1	1
2	1	0.0454	0.0454	BHM4CAN064 @ 11.69mAOD	1	0
2	1	0.0324	0.0324	BHM4CAN064 @ 11.69mAOD	1	0
2	0	None > LOD	None > LOD		0	0
2	1	0.0365	0.0365	BHM4CAN064 @ 11.69mAOD		
2	0	None > LOD	None > LOD			
2	1	0.0888	0.0888	BHM4CAN064 @ 11.69mAOD	1	
2	1	0.0155	0.0155	BHM4CAN064 @ 11.69mAOD		
2	1	0.0245	0.0245	BHM4CAN064 @ 11.69mAOD	0	0
2	0	None > LOD	None > LOD		0	
2	1	0.0719	0.0719	BHM4CAN064 @ 11.69mAOD		
2	1	0.0643	0.0643	BHM4CAN064 @ 11.69mAOD		
2	1	0.47	0.47	BHM4CAN064 @ 11.69mAOD		

M4CAN
Leachate Analysis Results & Screening Assessment
Outside CL Sites - chainage +6,600 to +8,900
10/08/2016

Sample Reference	Units	Screening Criteria		TPM4CANA019
Specimen Depth		EQS	DWS	0.5
Level				5.93
Sample Type				ES
Geology Code				TFD
Cluster Code				2016 GI
4-Nitroaniline	ug/l			<1
4-Nitrophenol	ug/l			<1
Acenaphthene	ug/l			<1
Acenaphthylene	ug/l			<1
Anthracene	ug/l			<1
Azobenzene	ug/l			<1
Benzo(a)anthracene	ug/l			<1
Benzo(a)pyrene	ug/l	0.00017	0.01	<1
Benzo(b)fluoranthene	ug/l	0.017	0.1	<1
Benzo(g,h,i)perylene	ug/l			<1
Benzo(k)fluoranthene	ug/l			<1
bis(2-Chloroethoxy)methane	ug/l			<1
bis(2-Chloroethyl)ether	ug/l			<1
bis(2-Ethylhexyl) phthalate	ug/l			<1
Butylbenzyl phthalate	ug/l			<1
Carbazole	ug/l			<1
Chrysene	ug/l			<1
Dibenzo(a,h)anthracene	ug/l			<1
Dibenzofuran	ug/l			<1
Diethyl phthalate	ug/l			<1
Dimethyl phthalate	ug/l			<1
Fluoranthene	ug/l	0.0063		<1
Fluorene	ug/l			<1
Hexachlorobenzene	ug/l			<1
Hexachlorobutadiene	ug/l	0.6		<1
Hexachlorocyclopentadiene	ug/l			<1
Hexachloroethane	ug/l			<1
Indeno(1,2,3-cd)pyrene	ug/l			<1
Isophorone	ug/l			<1
Naphthalene	ug/l			<1
n-Dibutyl phthalate	ug/l			<1
n-Dioctyl phthalate	ug/l			<5
Nitrobenzene	ug/l			<1
n-Nitroso-n-dipropylamine	ug/l			<1
Pentachlorophenol	ug/l			<1
Phenanthrene	ug/l			<1
Phenol	ug/l	7.7		<1
Pyrene	ug/l			<1

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
IS denotes Insufficient Sample
NDP denotes no determination possible
Environmental Quality Standards (EQS)
UK Drinking Water Standards (DWS)

No. Analyses	No. Analyses Above LOD	Maximum	Minimum	Location & Depth of Maximum Concentration	No. Data Exceeding EQS	No. Data Exceeding DWS
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD		0	0
1	0	None > LOD	None > LOD		0	0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD		0	
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD		0	
1	0	None > LOD	None > LOD			
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD			0
1	0	None > LOD	None > LOD		0	
1	0	None > LOD	None > LOD			0

Annex E

Summary Risk Matrix

Summary of Risks for each Potential Area of Contamination

Potential contamination source area	CL1	CL2	CL3	CL4	CL5	CL6	CL8	CL9	CL10	CL13	CL14	CL15	CL17	CL18	CL22 (Benzene pipeline)	CL26 Lagoons	CL26 Reedbeds (MRA)	CL27	CL29	CL30	CL32	CL33	CL35	CL38	CL39	CL41
Risk during construction requiring mitigation																										
Ingestion / dermal contact / inhalation of contaminated dusts and soils by C-workers	n/a	V L	L	n/a	L	V L	L	V L	V L	M	M to L	M to L	H	L	L (M)	M	M	M	L	V L	M	L	M to L	V L	M	L
Inhalation of asbestos fibres by construction workers	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	H	n/a	n/a	H	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ingestion / dermal contact / inhalation of contaminated dusts and soils by off site public	n/a	V L	V L	n/a	n/a	V L	L	n/a	n/a	n/a	V L	V L	H	V L	V L (M to L)	V L	V L	L	V L	V L	L	L	M to L	V L	L	L
Inhalation of ground gas / vapours by C-workers from MG material	n/a	V L	L	n/a	n/a	V L	V L	V L	n/a	H	M	M to L	M	L	L (H)	H	L	L	V L	L	M	L	M to L	V L	M	n/a
Inhalation of ground gas / vapours by off site public from MG material	n/a	n/a	V L	n/a	n/a	V L	n/a	n/a	n/a	n/a	V L	V L	L	n/a	V L (H)	M	V L	L	V L	V L	L	L	M to L	V L	L	n/a
Contaminated surface runoff to surface water	n/a	n/a	n/a	n/a	V L	L	V L	L	L	M	L	L	M	n/a	M (M)	H	H	M	n/a	n/a	n/a	n/a	M to L	n/a	n/a	V L
Contaminants leaching from MG into surface water	n/a	n/a	n/a	n/a	V L and L	L	V L	L	n/a	n/a	n/a	n/a	L	L	n/a	n/a	M	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	M to L
Perched water or aquifer groundwater entering surfacewater	n/a	n/a	n/a	n/a	n/a	L	V L	L	V L	M	V L	V L	L	V L	M (M)	H	M	M to L	n/a	n/a	n/a	n/a	M to L	n/a	n/a	n/a
Contaminants leaching from MG into deep aquifer	n/a	L	V L	n/a	n/a	M to L	n/a	n/a	V L	M	L	L	M	L	M (M to L)	L	M	M to L	V L	L	M to L	M to L	M to L	V L	M	L
Contaminants leaching from MG via band drains or piling	n/a	n/a	n/a	n/a	n/a	M to L	V L	L	V L	M	L	M	M	n/a	M (M to L)	n/a	M	M to L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Inhalation of soil gas / explosion for C-workers from PEAT	n/a	n/a	n/a	n/a	n/a	H	n/a	M	n/a	M to L	M to L	M	M	M to L	M	M	M	M	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Inhalation of soil gas / explosion for off site public from PEAT	n/a	n/a	n/a	n/a	n/a	M to L	n/a	n/a	n/a	n/a	M to L	M to L	M to L	n/a	M to L	M to L	M to L	M to L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Band drain / pile pathway causing GW to contaminate surface water	n/a	n/a	n/a	n/a	n/a	n/a	n/a	L	n/a	n/a	V L	V L	n/a	n/a	M	M to L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Contaminated Perched GW ingestion / dermal/ inhalation of HC vapours by C-workers	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Dewatering pathway causing GW to contaminate surface water	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	M	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Risk during operation requiring mitigation																										
Ingestion / dermal contact / inhalation of contaminated dusts and soils by MW	L	V L	n/a	n/a	V L	V L	V L	V L	V L	L	V L	V L	M	n/a	V L	V L	V L	V L	n/a	V L	V L	V L	L	V L	n/a	V L
Inhalation of asbestos fibres by maintenance workers	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	M to L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ingestion / dermal contact / inhalation of contaminated dusts and soils by motorway users	V L	V L	n/a	n/a	V L	V L	V L	V L	V L	V L	V L	V L	L	n/a	V L	V L	V L	V L	n/a	V L	n/a	V L	L	V L	n/a	V L
Ingestion / dermal contact / inhalation of contaminated dusts and soils by off site general public	V L	V L	n/a	n/a	V L	n/a	n/a	n/a	V L	V L	V L	V L	L	n/a	V L	V L	V L	V L	n/a	V L	n/a	V L	n/a	V L	n/a	V L
Inhalation of ground gas / vapours by MW by MG material	L	V L	n/a	n/a	n/a	V L	V L	V L	n/a	L	V L	V L	L	n/a	V L	V L	V L	V L	n/a	V L	V L	M to L	L	n/a	L	n/a
Inhalation of ground gas / vapours by off site workers / public / motorway users by MG material	V L	V L	n/a	n/a	n/a	V L	V L	V L	n/a	V L	V L	V L	V L	n/a	V L	V L	M to L (M)	V L	n/a	V L	V L	L	L	V L	L	n/a
Contaminated run-off to surface water	L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	L	n/a	n/a	n/a	n/a	L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Contaminants leaching from MG into surface water	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	V L	L	n/a	n/a	n/a	n/a	L	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Contaminants leaching from MG into deep aquifer	V L	L	n/a	n/a	n/a	n/a	n/a	L	V L	V L	L	L	M to L	L	M to L	L	M	M to L	V L	L	M	M to L	M to L	V L	M	M to L
Contaminants leaching from MG via band drains or piling	n/a	n/a	n/a	n/a	n/a	L	V L	n/a	V L	V L	V L	L	M to L	L	M to L	n/a	M	M to L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Perched water or aquifer groundwater entering surfacewater	n/a	n/a	n/a	n/a	n/a	L	V L	L	M	M	V L	n/a	L	L	M to L	L	M	n/a	n/a	n/a	n/a	n/a	M to L	n/a	n/a	L
Band drain pathway causing GW to contaminate surface water	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	M	M to L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Inhalation of soil gas / explosion for M-workers from PEAT	n/a	n/a	n/a	n/a	n/a	M	n/a	M	n/a	M to L	M to L	M to L	V L	n/a	M to L	M to L	M to L	M to L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Inhalation of soil gas / explosion for motorway users from PEAT	n/a	n/a	n/a	n/a	n/a	M to L	n/a	M to L	n/a	M to L	M to L	M to L	V L	n/a	M to L	M to L	M to L	M to L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Inhalation of soil gas / explosion for off site public from PEAT	n/a	n/a	n/a	n/a	n/a	M to L	n/a	n/a	n/a	n/a	M to L	M to L	V L	n/a	M to L	M to L	M to L	M to L	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Key:	
C. worker	Construction worker
CW	Controlled water
MG	Made ground
MW	Maintenance worker
H	High
M	Moderate
L	Low
V L	Very Low