EWR Alliance

Title: The Network Rail (East West Rail Bicester to Bedford Improvements) Order Development Stages 2A1, 2A2, 2A3 & 2A4

Contaminated Land Risk Assessment.

Document Number: 133735-EWR-REP-EEN-000137

Date: 19th February 2020

East West Rail Phase 2

The Network Rail (East West Rail Bicester to Bedford Improvements) Order Development Stages 2A1, 2A2, 2A3 & 2A4

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1. Introduction

1.1 Background

This Contaminated Land Risk Assessment report has been prepared by the EWR Alliance (the Alliance) for Development Stages 2A1, 2A2, 2A3 and 2A4 including offline highways (within Route Section 2A) to provide a summary of the available ground investigation (GI) data for Route Section 2A of the East West Rail Phase 2 (EWR2) Project to support the proposed construction works along the route and to discharge Condition 11 of the Network Rail (East West Rail Bicester to Bedford Improvement) Order.

Route Section 2A is located within Oxfordshire County Council, Buckinghamshire County Council, Cherwell District Council and Aylesbury Vale District Council jurisdiction.

As part of the report, a review of the GI data has been carried out and a Generic Quantitative Risk Assessment (GQRA) and Conceptual Site Model (CSM) have been undertaken for Route Section 2A.

1.2 Purpose and structure of the report

The purpose of this report is to collate and assess the historic GI data undertaken for the project in 2016 by WSP for GRIP 3 and data from the GI which was undertaken by The EWR Alliance (the Alliance) for GRIP 4 in 2017 / 2018, to provide information on the contamination status of the soils, groundwater and surface water along Route Section 2A and assessment of the risk to humans and the environment in respect to the proposed development. This report can also be used as evidence for the CEEQUAL assessment question 4.2 of the project.

An outline of the report content is provided below:

- Section 2 provides a description of the site and its location, including details of the proposed development.
- Section 3 provides a summary of the existing data including publicly available data sources which have been used to prepare this report.
- Section 4 provides the Preliminary CSM for Section 2A which has been developed for the site based on the existing information.
- Section 5 summarises the intrusive ground investigations which have been carried out at the site within GRIP 3 and GRIP 4 undertaken by WSP and the Alliance.
- Section 6 provides a description of the ground conditions encountered at the site.
- Section 7 provides a GQRA of the data obtained in the ground investigations to assess potential risks to controlled waters, human health, ecological and property receptors.
- Section 8 provides a revised CSM which has been updated based on the findings of the ground investigations and GQRA.
- Section 9 provides an overall summary of the findings of the report.

1.3 Assumptions and Limitations

The conclusions of this report are based partly on the findings of the assessment of data taken from exploratory holes advanced on site as part of previous GIs and from information obtained from a variety of sources including documents provided by third party sources as detailed within this report, and which the Alliance believes is reliable. Nevertheless, the Alliance cannot and does not guarantee the authenticity or reliability of the information. No attempt has been made to verify independently any data collected by others.

Exploratory holes sample or test a fraction of the ground being investigated and variation can occur between sampling points. Therefore, this report cannot guarantee against unexpected ground conditions occurring between the sampling points.

Ground gas and groundwater conditions are based on observations made at the time of investigation and subsequent monitoring visits and therefore conditions at the site may be subject to variation due to atmospheric, seasonal or other effects.

A geotechnical assessment is outside of the scope of this report and aggressive ground conditions and the potential implications to buried structures will need to be considered separately as part of the geotechnical investigation report.

2. Site Setting and Description

2.1 Site Location and description

Development Stages 2A1, 2A2, 2A3 and 2A4 including offline highways sit within Route Section 2A which is approximately 8.5 km in length running between Bicester in the west and Charndon in the east and has a general southwest-northeast orientation, along the existing OXD line. The route was an operational single-track line used for freight transport and was taken out of service by the Alliance in September 2018.

Route Section 2A passes through predominantly agricultural land with isolated residential housing and woodland. Urban development, including residential homes, industrial and light commercial properties, are present in the west of Route Section 2A associated with the town of Bicester. Several roadways and bridges intersect Route Section 2A at various points.

In this report Route Section 2A applies to the area within the Transport Work Order Act (TWAO) red line boundary.

2.2 Proposed Development

The existing single track OXD Line within Route Section 2A will be double tracked to current design standards as part of the proposed works.

The existing earthworks and trackbed are to be re-engineered in order to achieve a new profile. This will include widening embankments, reengineering slopes, raising track levels in some areas and reducing track levels in other areas, and constructing retaining structures. In some areas, earthworks will have a wider profile than the existing degraded and over-steep earthworks.

New footbridges will be constructed replace existing level crossing points. Three new highways overbridges will be constructed at approximate chainages 109000, 108400 and 10700 to replace existing level crossing points. Five existing highways overbridges / underbridges will also receive repairs and maintenance works.

Seven ecological compensation areas will be constructed as part of the works to mitigate habitat loss. Compensation Flood Storage Areas (CFSAs) sites for flood mitigation have also been proposed along Route Section 2A.

To facilitate the construction works, four temporary compound areas (Compound A1 to A4) will be constructed, centred at approximate Grid References 460304E, 223134N, 461948E, 223411N, 464863E, 224479N and 465685E, 225050N. The compound areas will be reinstated to their original use upon completion of the works and separate planning permission has been sought for these compound sites. On the compounds temporary modular portacabins and/or shipping container type units will be placed but these will have a ventilated void beneath.

Construction of new drainage channels and culverts, and refurbishment and reconstruction of existing culverts and track drainage are required along the length of Route Section 2A. Some minor realignment of a watercourse to the north of Route Section 2A at approximate chainage 106900 is also required. There are also areas of temporary highway widening and passing places.

No permanent buildings are to be constructed as part of the proposed works within Route Section 2A.

3. Environmental Context

3.1 Introduction

The following sections provide a summary of the environmental setting in Route Section 2A.

3.2 Source of Information

3.2.1 Publicly available information sources

The baseline assessment has relied on existing data from previous desk studies and ground investigations (GIs), and historical records. The following sources have been reviewed:

- Environmental data from Landmark Envirocheck Report (September 2017)[1];
- Historical mapping to identify former industrial or similar land uses with the potential to cause residual land contamination;
- Publicly available information from the British Geological Survey (BGS) online mapping resource[2];
- Publicly available information from the Defra Multi-Agency Geographic Information for the Countryside (MAGIC) website[3];
- Publicly available information from the Environment Agency[4]; and
- Existing risk assessment reports regarding the potential risk from unexploded ordnance[5,6];
- .

A site visit was also undertaken along Route Section 2A and within the Study Area on 26 July 2017 and 16 August 2017 to assess current site conditions at the time of the visit.

3.2.2 Previously prepared reports

Previous reports undertaken for Route Section 2A are summarised in Table 3.1 below. The information from these reports has been used to prepare the baseline for Route Section 2A

Table 3.1 - Previous Reports/Investigations undertaken in Route Section 2A

Date	Report	Author
February 2016	Final Factual Geotechnical Report on GI. 5624,2A – East West Rail Phase 2A[7].	Bam Ritchies on behalf of WSP | Parsons Brinckerhoff
October 2016	Final Factual Geotechnical Report on GI. 5624.3 – East West Rail GRIP 3 additional works[8].	Bam Ritchies on behalf of WSP | Parsons Brinckerhoff

1 Landmark. (2017). Envirocheck Report, EWR Route (September of 2017). Supplied as GIS Data.

2 British Geological Survey. [online]. http://www.bgs.ac.uk/GeoIndex/ (accessed September 2017).

3 Department for Environment, Food and Rural Affairs. MAGIC website [online]. http://magic.defra.gov.uk/MagicMap.aspx (accessed September 2017).

4 Environment Agency. What's in your backyard [online]. http://maps.environment-agency.gov.uk/wiyby/wiybyController?ep=maptopics&lang=_e (accessed September 2017).

5 Bomb Search (2014) Preliminary Unexploded Ordnance (UXO) Risk Assessment: East West Rail Phase 2.

6 CIRIA (2009) Unexploded Ordnance (UXO) A guide for the Construction industry. London.

7 Final Factual Geotechnical Report on GI.5624,2A – East West Rail Phase 2A

8 Final Factual Geotechnical Report on GI. 5624.3 – East West Rail GRIP 3 additional works

Date	Report	Author
June 2016	East West Rail Phase 2A Ground Investigation Report, Document No.: 133735-PBR-REP-EGE- 000002 – Revision 01[9].	WSP | Parsons Brinckerhoff
June 2017 – present	Route Section 2A Additional GI: Preliminary logs and chemical testing data[10]**.**	EWR Alliance
June 2018	The Network Rail (East West Rail Western Section Phase 2) Order. Environmental Statement, Chapter 11: Geology, Soils and Land Contamination[11].	EWR Alliance

3.3 Site History

A historical data review was undertaken using publicly available mapping sources and Envirocheck data[17]. The historical development of Route Section 2A is outlined in Table 3.2.

Table 3.2 - Summary of Historical Development

Date	Within Route Section 2A	Within 500 m of Route Section 2A
1885	The Route Section comprises railway (The London and North Western) at grade, in cutting and on embankment. The railway is mainly located within agricultural fields. Two Stations are present at Launton and Marsh Gibbon and Poundon. There is a weighbridge and earthworks associated with Launton Station. There are several surface watercourses crossing the Route Section in an approximate northeast/southwest orientation. Roads also cross the Route Section and signal posts are present along the railway line.	The Bicester main sewage pipe is indicated to run parallel to the line adjacent to the west of Bicester Station. The surrounding area is predominantly agricultural. There is a disused Brick and Tile Works approximately 150 m north, to the east of which is also an old clay pit approximately 110 m to the north of the redline boundary. There is a spring to the south west of the disused Brick and Tile Works. A graveyard is present associated with St. Mary's Church in Launton, approximately 190 m to the south of the redline boundary. The outskirts of Bicester are present approximately 500 m west of Route Section 2A.

9 East West Rail Phase 2A Ground Investigation Report, Document No.: 133735-PBR-REP-EGE- 000002 – Revision 01

10 Route Section 2A Additional GI: Preliminary logs and chemical testing data

11 The Network Rail (East West Rail Western Section Phase 2) Order. Environmental Statement, Chapter 11: Geology, Soils and Land Contamination

Date	Within Route Section 2A	Within 500 m of Route Section 2A
1899	Launton Station weighbridge no longer listed.	The disused Brick and Tile Works located approximately 150 m north is no longer indicated. This is now labelled as Launton Fields. A second spring is also indicated in the vicinity of Launton Fields, to the east of first spring. The old clay pit approximately 110 m north is now indicated to be a slightly marshy area. There is a quarry approximately 415 m to north west of the redline boundary (near Bicester).
1922	No significant change.	At Marsh Gibbon there are old quarries approximately 110 m south and a stump well approximately 420 m south. There is a reservoir approximately 435 m north at Poundon Hill. There are now filter beds approximately 460 m north west associated with the quarry approximately 415 m to north west of the redline boundary (near Bicester). Allotment gardens appear immediately west of Launton Road in Bicester approximately 260 m from the redline boundary.
1923	The Great Western Railway route from Banbury to Princes Risborough which enters Bicester from the south east and intersects with the London and North Western Railway has been constructed. This intersection is at the western end of the Route Section.	To the east of Bicester, the area is largely agricultural with many cottages and farm buildings. There is further residential development in Launton (it is of a similar size to the present day). A sewage works has been added approximately 380 m to the south east at Launton.
1950s	There is a cattle pen at the Marsh Gibbon and Poundon Station.	Bicester has expanded, with more residential properties and businesses being indicated. The agricultural areas to the east of Route Section 2A including the areas around Launton are predominantly unchanged. The reservoir at Poundon Hill is no longer labelled. There is a large pit denoted 'Old Clay Pit (now known as Calvert Brickworks No. 2 pit) located approximately 500 m to the southeast of the Route Section associated with the Calvert Brickworks. The Old Clay Pit appears to extend into a second pit (now known as Calvert Brickworks No. 3 pit) which is present approximately 120 m of the east of the Route Section 2A redline boundary.
1961	No significant change.	Bicester has expanded to the south and east.

Date	Within Route Section 2A	Within 500 m of Route Section 2A
1967-1980	In 1980, the Marsh Gibbon and Poundon Station is no longer labelled and the cattle pen at the station is now a coal yard.	At Poundon Hill the reservoir has been replaced and is now a wireless station. Sewage works are now present to the south of Poundon Hill approximately 262 m to the north of the redline boundary. In 1979, at Marsh Gibbon the old quarries approximately 110 m south of the redline boundary no longer appear on the map.
1983/ 1984	The coal yard.at the former Marsh Gibbon and Poundon Station no longer appears on the map.	The northern third of the Old Clay Pit to the southeast is no longer indicted suggesting that it has been infilled and the southern two thirds is full of water and indicated to be a Nature Reserve. To the west of the Old Clay Pit another large water body denoted 'Nature Reserve' is present approximately 120 m southeast of the Route Section 2A red line boundary.
Present Day	Route Section 2A appears predominantly unchanged.	Bicester has expanded significantly with industrial and commercial properties being constructed to the north of the western extent of Route Section 2A to the north and south of the point that the two railway lines intersect, to the south east of Bicester.

3.4 Geology

3.4.1 Mapped Geology

Made Ground is anticipated along the length of Route Section 2A, primarily associated with the original construction (and in places removal) of the existing railway and stations, as well as at specific locations where landfilling or other earthworks have occurred.

BGS 1:50,000 mapping[12] of Route Section 2A indicates that superficial deposits are in the majority absent under most of Route Section 2A. However, superficial deposits comprising Alluvium are indicated to be present under discrete sections of Route Section 2A around Bicester (associated with the Langford Brook) and along Station Road in Launton associated with Summerston Ditch, Launton Brook and Cutters Brook.

The bedrock geology along Route Section 2A comprises the Oxford Clay Formation (consisting of mudstones from the Stewartby Member and Peterborough Member), this is underlain by the Kellaways Formation (comprising the Kellaways Sand and Clay Members) which in turn are underlain by the Great Oolite Group (comprising the Cornbrash Formation, the Forest Marble and the White Limestone Formation. The base depth of the Great Oolite Group is not proven in any exploratory hole locations. The published geological information for Route Section 2A is summarised in Table 3.3, outlining where the respective bedrock geological units outcrop along Route Section 2A. he bedrock units are generally overlain by Made Ground and/or topsoil.

12 British Geological Survey. [online]. GeoIndex. http://www.bgs.ac.uk/GeoIndex/ (accessed September 2017).

Table 3.3 - Summary of Published Geological Conditions along Route Section 2A

Geological Unit	Description	Extent
Made Ground	Unknown - Made Ground associated with the construction of the railway.	Made Ground, infilled ground and worked ground associated with the construction (and in places removal) of the existing railway.
Superficial Geology – Alluvium	The alluvial sequence is expected to comprise clays, sands and gravels.	Restricted to the routes of Longford Brook and Summerston Ditch, Launton Brook and Cutters Brook.
Bedrock Geology – Oxford Clay Formation – Weymouth Member	Mudstone	Isolated outcrop to the south of Route Section 2A, north east of Marsh Gibbon.
Bedrock Geology – Oxford Clay Formation – Stewartby Member	Mudstone	Eastern end of Route Section 2A, east of Marsh Gibbon. It crosses Route Section 2A diagonally from Hill View Farm/Rectory Farm north of the route to Charndon to the south.
Bedrock Geology – Oxford Clay Formation – Peterborough Member	Mudstone	From Launton to the eastern extent of Route Section 2A.
Bedrock Geology – Kellaways Formation - Kellaways Sand Member.	Interbedded Sandstone and Siltstone	Unit crosses Route Section 2A around Bicester Park and at the eastern boundary of Bicester along Charbridge Lane.
Bedrock Geology – Kellaways Formation – Kellaways Clay Member	Mudstone	Western end of Route Section 2A, through the east of Bicester.
Bedrock Geology – Cornbrash Formation	Limestone with sandy units	While this formation does not directly underlie the track, it occurs to the west of the western boundary of the Route Section 2A area.
Bedrock Geology – Forest Marble	Silicate-mudstone.	At depth, underlying the Cornbrash Formation along Route Section 2A.
Bedrock Geology – White Limestone Formation	Limestone	At depth underlying the Forest Marble Formation along Route Section 2A.

3.4.2 *Historical Borehole Records*

A number of historical borehole and trial pit logs held by the BGS archives[13] are located within 500 m of Route Section 2A and a selection are summarised below:

- Trial Pit SP62SW72 – located adjacent to the south of Route Section 2A to the west of Launton. Topsoil was encountered from ground level to 0.3 metres below ground level (m bgl) overlying possible Weathered Kellaways Clay Member to 2.5 m bgl and Kellaways Sand Member to the base of the pit at 5.0 m bgl;
- Trial Pit SP62SW77 – located adjacent to the south of Route Section 2A to the north west of Launton. Topsoil and possible subsoil were encountered from ground level to 0.4 m bgl overlying possible reworked Kimmeridge Clay Member to 1.7 m bgl overlying Kimmeridge Sand Member to the base of the hole at 3.0 m bgl;
- Trial Pit SP52SE197 – located approximately 255 m south west of Route Section 2A in Bicester encountered topsoil overlying what are likely to be naturally reworked materials to 1.25 m bgl where the Kellaways Clay Member was encountered to the base of the pit at 3.5 m bgl; and
- Borehole SP62SW66 – located approximately 350 m to the south of Route Section 2A to the west of Launton. Made Ground was encountered from 0 to 0.5 m bgl overlying an organic clay, possibly representing Alluvium to approximately 1.2 m bgl overlying the Peterborough Member.

3.4.3 *Ground Stability Hazards*

Geological hazards within Route Section 2A, identified in the Envirocheck Report[1] are detailed within Table 3.4.

Table 3.4 - Geological Hazards

Geological Hazard	Details
Collapsible Ground	Predominantly designated Very Low Hazard. Two bands which correspond to the location of Alluvial deposits are designated No Hazard and located to the south east of Bicester and further to the east.
Compressible Ground	Predominantly designated No Hazard. Two bands which conform with the location of Alluvial deposits are designated Moderate in the south east of Bicester and further to the east.
Ground Dissolution	Predominantly designated No Hazard. An area designated Very Low Hazard corresponds with the location of the Cornbrash Formation to the north west of Route Section 2A.
Landslide	Very Low.
Running sand	No Hazard to Low.
Shrinking or swelling clay	No Hazard in the north west of Route Section 2A which corresponds with the location of the Cornbrash Formation, with a further band designated as No Hazard corresponding with the location of the Kellaways Sand Member. Moderate hazard along the remaining eastern portion of Route Section 2A corresponding with the location of the Peterborough Member and the Kellaways Clay member.
Radon hazards	According to the Envirocheck Report[1], Route Section 2A is within a lower probability radon area, with less than 1% of homes at or exceeding the Action Level.

13 British Geological Survey. [online]. Borehole Scans. http://www.bgs.ac.uk/data/boreholescans/home.html (accessed October 2017).

3.4.4 Mineral Sites

3.4.4.1 Coal mining

Reference to the Coal Authority records[14] indicates that Route Section 2A does not lie within an area affected by coal mining.

3.4.4.2 Mineral Sites

Information within the Envirocheck Report[1] identifies a common clay and shale pit at a location named Hareley's Farm 1.6 km to the northeast of Launton, approximately 290 m to the north of Route Section 2A. It is noted that this name may be incorrect as Hare Leys Farm is further to the east with this location actually being named Field Farm. There is a large pond in this location with the area to the northeast associated with the Brick and Tile Works seen on the earliest map edition. A second common clay and shale pit (Calvert Brickworks No. 3 pit now Grebe Lake and also known as Aylesbury Borough Refuse Tip) is present approximately 120 m to the east of Route Section 2A in Charndon.

Reference to historical maps indicates that there were old quarries located approximately 110 m south of the Route Section at Marsh Gibbon and 415 m to the north west of the Route Section near Bicester.

3.5 Hydrogeology

3.5.1 Aquifer Designations

The Environment Agency's aquifer classifications for the geology underlying Route Section 2A within Route Section 2A are summarised in Table 3.5.

Table 3.5 - Aquifer Designations

Geology	Stratum and General Description	Aquifer Classification
Superficial	Alluvium	Secondary A Aquifer
Bedrock	Oxford Clay – Weymouth Member	Unproductive Strata
	Oxford Clay – Stewartby Member	Unproductive Strata
	Oxford Clay – Peterborough Member	Unproductive Strata
	Kellaways Sand Member	Secondary A Aquifer
	Kellaways Clay Member	Unproductive Strata
	Cornbrash Formation	Secondary A Aquifer
	Forest Marble Formation	Unproductive Strata
	White Limestone Formation	Principal Aquifer

Principal Aquifers are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.

Secondary A Aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are aquifers formerly classified as minor aquifers.

14 British Geological Survey. [online]. Coal Authority Interactive Map. http://mapapps2.bgs.ac.uk/coalauthority/home.html (accessed October 2017).

Unproductive Strata are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

3.5.2 *Groundwater Vulnerability*

According to the Envirocheck Report[1] Route Section 2A is not situated within a groundwater Source Protection Zone (SPZ) and there are no SPZs located within 500m of Route Section 2A.

A minor aquifer with high groundwater vulnerability is present approximately 400 m to the north of Route Section 2A, at the western portion around Bicester. This relates to the bedrock geology (Cornbrash Formation) in this area.

3.5.3 *Licensed Groundwater Abstractions*

The Envirocheck Report[1] does not provide any indication of licensed groundwater abstractions within 500 m of Route Section 2A. The local councils did not identify any records of private groundwater abstraction along or within 500 m of Route Section 2A. There are 13 groundwater wells recorded by the BGS within 500 m of Route Section 2A, the closest is located within the Route Section 2A redline boundary, near station house to the north of Marsh Gibbon.

3.5.4 *Discharge Consents to Groundwater*

According to the Envirocheck Report[1] there are no discharge consents to groundwater within 500 m of Route Section 2A. However, two consents for sewage discharges to land are indicated to be present approximately 250 m to the north of the site in Poundon and 205 m to the south of the Section 2A area, with the entry location is listed as premises behind Launton House.

3.6 Hydrology

3.6.1 *Surface water*

There are two Water Framework Directive (WFD) designated surface water bodies which intersect Route Section 2A at four points. Langford Brook crosses the west of Route Section 2A, to the east of Bicester and discharges to the River Ray located approximately 6.5 km to the south of Route Section 2A[15]. Launton Brook crosses Route Section 2A to the east of Launton and north of Marsh Gibbon and along with the Summerstown Ditch discharges to Cutters Brook which discharges to the River Ray.

Three additional minor watercourses which are tributaries of Langford Brook intersect with Route Section 2A at various points and are identified as ordinary watercourses. Track drainage is also present along Route Section 2A. There is also an additional drain that starts just north of Lawn Farm, flowing northwards to the Padbury Brook just north of Twyford, in the eastern area of Section 2A.

Grebe Lake, a man-made lake in a disused clay pit is located approximately 120m east of Route Section 2A with another man-made lake located further east, to the north of the former Calvert brickworks.

3.6.2 *Flood risk*

According to the Envirocheck Report[1] the western extent of Route Section 2A falls within an area of extreme flood risk. This is the flooding extent of the Langford Brook and extends approximately 2.7 km to the south west and approximately 1.4 km to the north east of the route.

There is a further area of flood risk located to the east associated with Launton Brook which intersects the southern extent of Route Section 2A approximately 1.5 km to the east of Bicester. This area extends approximately 2.2 km to the south west of the route.

15 Environment Agency. [online] Catchment Data Search. http://environment.data.gov.uk/catchment-planning/ (accessed October 2017).

3.6.3 *Licensed surface water abstractions*

According to the Envirocheck Report[1] there are no licensed surface water abstractions recorded within 500 m of Route Section 2A.

3.6.4 *Discharge consent to surface water*

According to the Envirocheck Report[1] there are two active discharge consents to surface water within Route Section 2A, with a further 13 located within 500 m.

One of the discharge consents within Route Section 2A is located on Station Road to the east of Bicester and refers to the discharge of treated sewage effluent from a single residential property to a tributary of Launton Brook. The second discharge consent is located further to the east on Bicester Road and refers to the discharge of process waters from Southern Gas Networks from gas distribution and compressor stations into a tributary of a farm drain.

The additional 13 discharge consents relate to discharges of treated sewage, agricultural effluents, other matter surface water into Langford Brook, the River Ray, a tributary of Launton Brook, Launton Brook, Horsepond Ditch, a tributary of Little Marsh Ditch, a tributary of the River Ouse, a tributary of Padbury Brook and several unnamed ditches. Some of the consents are noted to be revoked and no longer in use.

3.7 Historical and Ecologically Important Sites

Route Section 2A is within 500 m of historically sensitive receptors including several listed buildings around Bicester, Launton, Poundon and Marsh Gibbon. The closest buildings are located in Launton approximately 50 m to 100 m from Route Section 2A and include a Church, Rectory, Memorial, Manor Farmhouse and Barn.

Sensitive ecological receptors have been identified within 500 m of Route Section 2A including several Priority Habitats along Route Section 2A including traditional orchard, good quality semi-improved grassland, deciduous woodland, lowland fens and lowland meadows. A number of these are located within the redline boundary.

3.8 Landfills

3.8.1 *Recorded historical landfill sites*

Environment Agency[4] data identifies two historic landfills located within 500 m of Route Section 2A. One record is for Aylesbury Borough Tip located approximately 120 m to the east of Route Section 2A, to the west of Calvert Pit No3 (also known as Buckingham Rural District Council Refuse Tip). The Aylesbury Tip was operated by Aylesbury Borough Council until December 1963 and received commercial waste. Buckingham Rural District Council Refuse Tip is located approximately 200 m to the southeast of Route Section 2A and received industrial and commercial waste from 31 December 1957 and was operated by Buckingham Borough Council. The majority of both sites are now lakes.

3.8.2 *Recorded Operating landfill sites*

Environment Agency[4] data identifies no operational landfill sites located within 500 m of Route Section 2A. The closest recorded operational landfill is Calvert Landfill Site located approximately 1.8 km to the south east of the redline boundary, beyond which is Calvert Landfill Site Pit 6. Both of these facilities are operated by FCC Waste Services Limited.

3.8.3 *Waste management sites*

There are no waste management sites located within 500 m of Route Section 2A.

3.9 Contemporary Potentially Contaminative Land Uses

3.9.1 Trade Directory Information

Contemporary potentially contaminative land uses identified within 500 m of Route Section 2A from contemporary trade directory information and digital mapping are summarised in Table 3.6. Most of the industrial and commercial activity is located to the west of Route Section 2A, around Bicester.

Table 3.6- Contemporary Potentially Contaminative Land Uses within 500 m of Route Section 2A

Process / Land use	Location	Contaminant Groups Potentially Present
Coal and Smokeless Fuel Merchants and Distributors.	Adjacent to Route Section 2A at the Old Station in Marsh Gibbon.	PAHs, oils, acids and metals.
A Petrol Filling Station	Approximately 90 m to the north of Route Section 2A.	Petroleum hydrocarbons, petrol additives, diesel and other organic compounds.
MOT Testing Centres and Repair Garages	Numerous; the closest being approximately 50 m to the north of Route Section 2A.	Metal and metal compounds, waste oil, anti-freeze, brake fluids, solvents (non-chlorinated), solvents (chlorinated), paints, thinners, inorganic compounds, asbestos and detergents.
Pest Control	Numerous buildings located approximately 8 m to the south east.	Potentially pesticides.
Agricultural land use	Surrounding Route Section 2A to the east and south of Bicester.	Hydrocarbons and lubricating oils associated with machinery. Potential pesticides and herbicides.
Engineering works	Closest approximately 145 m to the north.	Metals for solders, metal salts, inorganic compounds, organic compounds, solvents, lubricants, fuel oils, acids, alkalis, detergents, ash, asbestos, PCBs.
Lighting Manufacturers	Approximately 175 m to the north west at its closest point.	Potentially metals, electrodes and phosphors and PCBs.
Printers	Approximately 290 m to the north west and 450 m south of Route Section 2A.	Pigments, dyes, extenders and binders, organic solvents, additives, fuels and effluent treatment chemicals.
Rubber and Plastics Manufacturing	Approximately 304 m to the north of Route Section 2A.	Rubber product ingredients, general contaminants including solvents, PAHs, phenols, amines, oils, acids and alkalis, metals and metal compounds, plating chemicals, PCBs and asbestos.
Electronic Equipment Manufacturers	Closest approximately 450 m to the south of Route Section 2A	Metals, oils, solvents, acids and alkalis, PCBs and asbestos.

Process / Land use	Location	Contaminant Groups Potentially Present
	around Launton.	
Metal works	Approximately 480 m to the north of Route Section 2A to the west of Marsh Gibbon.	Metals, oils, solvents, lubricants, acids and alkalis, PCBs and asbestos.
Furniture Manufacturers	Approximately 460 m to the north of Route Section 2A to the west of Marsh Gibbon.	Metals, hydrocarbons, solvents, acids and alkalis, PCBs and asbestos.
Gas distribution and compressor station	Adjacent to the north of Route Section 2A in Bicester.	Natural gas processing, fuels. Inorganic chemicals acids and alkalis, other inorganic compounds, metals and metal compounds and asbestos.

3.9.2 Pollution controls

In addition to the petrol filling station located approximately 90 m to the north, Joblings Garage is located in Bicester, approximately 400 m to the west of the western extent of Route Section 2A.

Thirteen Local Authority Pollution Prevention and Control (LAPC) permits were also identified within 500 m of Route Section 2A to the east of Bicester. The closest permit to Route Section 2A is located approximately 40 m to the north of Route Section 2A, to the west of Charbridge Lane and permits metal decontamination processes.

The other LAPC permits are for burning of waste oil; a print works; general coating processes; coating of plastic and metal; blending packing, loading and use of cement; combustion of fuel manufactured from solid waste; manufacture of timber and wood-based products; respraying of road vehicles and burning of waste oil.

3.9.3 Recorded pollution incidents

According to the Envirocheck Report[1] there has been one recorded pollution incident to air, land and water within 500 m of Route Section 2A. The incident was located approximately 270 m to the south of Route Section 2A in Launton and designated as a Category 3 - Minor Incident to air and land and a Category 2 significant incident to water. Details of the receiving watercourse, dates and details of the pollutants are not provided.

3.10 Potential for Unexploded Ordnance

A third-party Preliminary Unexploded Ordnance (UXO) Risk Assessment[16] undertaken in accordance with CIRIA 681 “Unexploded Ordnance (UXO) – A guide for the Construction Industry”[17] indicated that Route Section 2A has been rated as ‘low risk’ for UXO. .

16 Bomb Search (2014) Preliminary Unexploded Ordnance (UXO) Risk Assessment: East West Rail Phase 2.

17 CIRIA (2009) Unexploded Ordnance (UXO) *A guide for the Construction industry*. London.

4. Preliminary Conceptual Site Model (PCSM)

4.1 Approach to PCSM

Under the National Planning Policy Framework (NPPF) 2018[18], land contamination is assessed through the identification of risk presented by potential contaminant linkages (PCLs), i.e. Source – Pathway – Receptor relationships, and the development of a Conceptual Site Model (CSM). Guidance provided by the Environment Agency in CLR11[19] and the Guiding Principles for Land Contamination[20] (GPLC) documents provide the technical framework for the development of such CSMs and the application of risk assessment (qualitative or quantitative) to consider whether potential pollutant linkages are significant and hence require management or mitigation.

The NPPF18[8] states that to prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is suitable for its proposed use and appropriate for its location, taking account of ground conditions and any risks arising from land instability and contamination. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of an area or proposed development to adverse effects from pollution, should be taken into account. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner. The basis of CLR11 and GPLC is the development of the CSM which is the representation of the source-pathway-receptor (pollutant) linkages on which the assessment of risk can be based.

The basic approach to the human health and controlled waters risk assessment reported here follows the principles given in CLR11 and GPLC20, i.e. application of the following assessment hierarchy:

- Tier 1 risk screening by establishment of potential pollutant linkages, i.e. the PCSM;
- Tier 2 GQRA using generic assessment criteria (GAC) that represent ‘minimal’ or ‘tolerable’ risk; and
- Tier 3 DQRA using site specific assessment criteria (SSAC) that represent ‘unacceptable risk’, or where generic assessment criteria are not available, or they are not applicable to the CSM.

The following PCSM has been developed using the proposed scheme details and desk study information summarised in the preceding sections of this report, i.e. a Tier 1 assessment.

It should be noted that under current health and safety legislation, construction and maintenance workers are required to carry out appropriate risk assessments and instigate appropriate mitigating measures to protect themselves, other human receptors and the environment from contamination which may be present. Such risks must be adequately mitigated by the measures required under current legislation, specifically the Construction Design Management (CDM) Regulations[21] which requires that potential risks to human health and the environment from construction activities are appropriately identified and all necessary steps taken to eliminate / manage that risk. On this basis, it been assumed that personal protective equipment (PPE) and health and safety best practices will be adopted during the construction works and acute risks to construction workers / site visitors have therefore not been considered as part of this assessment.

18 Department for Communities and Local Government, 2018. National Planning Policy

19 Environment Agency in Contaminated Land Report-11 - Model Procedures for the Management of Land Contamination. 2004

20 Environment Agency. GPLC1 – Guiding Principles for Land Contamination. March 2010

21 United Kingdom Parliament, 2015. Construction (Design & Management) Regulations (SI 2015/51).

4.2 Risk Estimation

Through consideration of the potential consequence and likelihood of exposure occurring, a potential risk rating for each PCL has been assigned and is presented in Section 4.3. The purpose of this assessment is to focus upon the potential risks present based on the proposed development. The definitions of estimated risk are taken from CIRIA report C552[22] and have been summarised in Table 4.1 below.

Table 4.1 - Definitions of estimated risk

Risk Level	Definition
Very High Risk	There is a high probability that severe harm could arise to a designated receptor or there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not already undertaken) and remediation are likely to be required.
High Risk	Harm is likely to arise to a designated receptor. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not already undertaken) is required and remedial works may be necessary in the short term and are likely over the long term.
Medium Risk	It is possible that harm could arise to a designated receptor. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the long term.
Low Risk	It is possible that harm could arise to a designated receptor, but it is likely that this harm, if realised, would be mild. Further investigation is not necessarily required, however should be considered to confirm that there is no unanticipated contamination present.
Very Low Risk	The possibility of harm to the designated receptor is either not plausible or, if the possibility of harm is plausible, risk is considered to be very unlikely with attenuation along the exposure pathway. Further investigation is not necessarily required, however may be considered to confirm that there is no unanticipated contamination present.

The risk is evaluated through the probability matrix presented in Table 4.2. The definitions of probability and consequence are given in Appendix B.

Table 4.2 - Estimation of the level of risk by comparison of consequence and probability

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability (Likelihood)	High Likelihood	Very High	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/Low	Low
	Low Likelihood	Moderate	Moderate/Low	Low	Very Low
	Unlikely	Moderate/Low	Low	Very Low	Very Low

22 Construction Industry Research and Information Association (CIRIA) C552 – Contaminated Land Risk Assessment – A Guide to Good Practice 2001

4.3 PCSM

Based upon the historical and present land uses identified in Section 3, a PCSM has been produced, identifying potential sources of contamination, migration or exposure pathways and receptors PCLs for the site. These PCLs are based on details of the proposed development, correct at the time of writing.

4.3.1 Potential contaminants

Potential sources of contamination have been identified and assessed from the current and historical land use within Route Section 2A (on-site) and within 500 m (off-site) and are summarised in Table 4.3.

Table 4.3 - Potential sources of contamination identified for Route Section 2A

	Potential source of contamination	**Potential contaminants**
On-site	The operation of, and Made Ground associated with the railway line and stations	Possible organic contaminants including hydrocarbons, diesel, lubricating oils, paraffin, Polychlorinated Biphenyls (PCBs), solvents, ethylene glycol, creosote, herbicides, metals. Other potential contaminants include asbestos and ash used as fill material (metals, phenols, sulphates and PAHs).
	Agricultural activities	A range of inorganic and recalcitrant organic contaminants including heavy metals, fuels / oils from machinery, herbicides and pesticides.
	Possible Made Ground associated with roads intersecting Route Section 2A	A range of inorganic and recalcitrant organic contaminants including heavy metals, hydrocarbons, PAHs, PCBs, solvents, creosote, asbestos.
	Alluvium	Potential for ground gas generation.
Off-site	Agricultural activities within the surrounding area.	A range of inorganic and recalcitrant organic contaminants including heavy metals, fuels / oils from machinery, asbestos, herbicides and pesticides.
	Allotments adjacent to the north of Route Section 2A.	Pesticides and herbicides. Hydrocarbons and lubricating oils associated with machinery and asbestos.
	Commercial and Industrial units to the west of Route Section 2A in Bicester including petrol station, garages, engineering works, printers, electronic manufacturers and metal works.	Metals, pigments, dyes, additives, oils, solvents, anti-freeze, brake fluids, petroleum hydrocarbons, acids and alkalis, PCBs and asbestos.
	Coal yard and Smokeless Fuel Merchants and Distributors (Old Station Marsh Gibbon).	Coal yard and Smokeless Fuel Merchants and Distributors (Old Station Marsh Gibbon).
	Gas distribution and compressor station adjacent to the north of Route Section 2A in Bicester.	Gas distribution and compressor station adjacent to the north of Route Section 2A in Bicester.
	Natural gas processing, fuels. Inorganic chemicals acids and alkalis, other inorganic compounds, metals and metal compounds and asbestos.	Natural gas processing, fuels. Inorganic chemicals acids and alkalis, other inorganic compounds, metals and metal compounds and asbestos.
	The operation of and Made Ground, infilled ground and worked ground associated with	A range of inorganic and recalcitrant organic contaminants including heavy metals, asbestos, leachate, nitrates, and the potential for ground gas generation.

	Potential source of contamination	Potential contaminants
	the former clay pits and historic landfills around Calvert.	
	Sewage Works.	A range of inorganic and organic contaminants including heavy metals, leachate, nitrates, and the potential for ground gas generation. Total Viable Colonies, E. Coli, Faecal coliform and Faecal streptococci.
	Graveyard	A range of inorganic and organic contaminants.

4.3.2 Potential receptors

The following receptors were identified for Route Section 2A:

4.3.2.1 Human receptors

On-site:

- Members of the public using public right of way to cross the railways, level crossing, stations, bridges, agriculture land and public footpath/cycle tracks along the railways corridor.

Off-site:

- Residents living adjacent to Route Section 2A in Bicester, Launton, Charndon and Twyford.
- Farmers working on nearby agricultural land.
- Workers in adjacent commercial / industrial properties in Bicester.
- Members of the public accessing the surrounding area adjacent to Route Section 2A including station and road users.

4.3.2.2 Controlled waters

Aquifers (on- and off-site):

- Secondary A Aquifers - Alluvium, Kellaways Sand Member and Cornbrash Formation.
- Principal Aquifer – White Limestone Formation.

Surface watercourses (on-site):

- Langford Brook and its tributaries, Launton Brook, two unnamed drains flow to the Launton and Cutters Brook (from north of Marsh Gibbon)and an unnamed drain flows to the Padbury Brook (north of Charndon).

Surface watercourses (off-site):

- Cutters Brook, Summerstown Ditchand Grebe Lake.

4.3.2.3 Property receptors

On- and off-site:

- Existing on-site structures and services and track drainage.
- Future on-site structures and services.
- Existing off-site residential houses and commercial properties.

4.3.3 Potential migration / exposure Pathways

The following potentially viable pathways have been identified:

4.3.3.1 Human receptors

On-site:

- Dermal contact with and/or ingestion of contaminants in soil, soil-derived dusts and water.

- Inhalation of contaminants in soils/dust including asbestos fibres.
- Inhalation of ground gases and/or vapours.

Off-site:

- Dermal contact with and / or ingestion of contaminants in windblown soil-derived dusts and water which may have migrated off-site.
- Inhalation of contaminants in windblown dust including asbestos fibres which may have migrated off-site.
- Inhalation of ground gases and / or vapours which may have migrated off-site.

4.3.3.2 Controlled waters

- Leaching and migration of contaminants (free and dissolved phase) from soils in the unsaturated zone into groundwater in underlying aquifers.
- Migration of contaminants via preferential pathways such as via piles and track drainage to deeper groundwater.
- Discharge of contaminants entrained in surface water runoff followed by overland flow and discharge.
- Leaching and migration of contaminants (free and dissolved phase) from soils in the unsaturated zone into groundwater then lateral migration into surface water features.
- Migration of contaminants via preferential pathways such as service runs and track drainage to surface water.

4.3.3.3 Property receptors

- Direct contact of new and existing structures with contaminants in soils and/or groundwater.
- Migration of ground gases or vapours along preferential pathways including permeable ground, track drainage, service trenches and service entry points and accumulation in enclosed spaces such as buildings, service ducts or access points.

4.3.3.4 Ecological receptors

- Direct contact with and / or ingestion of contaminants in windblown soil-derived dusts and water which may have migrated off-site.

4.3.4 PCSM

The PCSM is presented in Table 4.4 below.

Table 4.4 - PCSM for Route Section 2A

Source	Receptor	Pathway	Probability	Consequence	Risk Classification
On-site The historical and current use of the railway line and stations, including trains / goods vehicles using the railway line. Made Ground of unknown provenance associated with the construction of the railway line and roads intersecting Route Section 2A and spills / leaks of oil and fuel and use of herbicides associated with railway activities. Agricultural activities Alluvium *(A range of inorganic and recalcitrant organic contaminants including heavy metals, hydrocarbons, pesticides, herbicides, fuels / oil, Polycyclic Aromatic Hydrocarbons (PAH), Total Petroleum Hydrocarbons (TPH), Polychlorinated Biphenyls (PCBs), solvents, creosote, asbestos).*	Human (on-site) Members of the public using public rights of way to cross the railway, level crossings, stations, bridges, agricultural land and public footpath/cycle tracks along the railway corridor.	Dermal contact with and/or ingestion of contaminants in soil, soil-derived dusts and water.	Low likelihood	Medium	Moderate/Low risk
		Inhalation of contaminants in soils/dust.	Likely	Medium	Moderate risk
		Inhalation of asbestos fibres.	Likely	Severe	High risk
		Inhalation of ground gases and/or vapours.	Likely	Medium	Moderate risk
	Human (off-site) Residents living adjacent to Route Section 2A in Bicester, Launton and Charndon. Workers in adjacent commercial / industrial properties in Bicester. Members of the public accessing the surrounding area adjacent to Route Section 2A including station and road users. Farmers working on nearby agricultural land.	Dermal contact with and / or ingestion of contaminants in windblown soil-derived dusts and water which may have migrated off-site.	Low likelihood	Medium	Moderate/Low risk
		Inhalation of contaminants in windblown dust which may have migrated off-site.	Low Likelihood	Medium	Moderate / Low risk
		Inhalation of contaminants in windblown asbestos fibres which may have migrated off-site.	Low likelihood	Severe	Moderate risk
		Inhalation of ground gases and / or vapours which may have migrated off-site.	Low likelihood	Medium	Moderate/Low risk
	Controlled Waters – Aquifers (on and offsite) Secondary A Aquifers Principal Aquifer	Leaching and migration of contaminants (free and dissolved phase) from soils in the unsaturated zone into groundwater in underlying aquifers.	Likely	Medium	Moderate risk

Source	Receptor	Pathway	Probability	Consequence	Risk Classification
		Migration of contaminants via preferential pathways such as via piles and track drainage to deeper groundwater.	Likely	Medium	Moderate risk
	Controlled Waters – Surface Waters (on- and off-site) Langford Brook, Launton Brook and Summerstown Ditch, unnamed drains to Launton Brook and Padbury Brook.	Discharge of contaminants entrained in surface water runoff followed by overland flow and discharge.	Likely	Medium	Moderate risk
		Leaching and migration of contaminants (free and dissolved phase) from soils in the unsaturated zone into groundwater then lateral migration into surface water features.	Likely	Medium	Moderate risk
		Migration of contaminants via preferential pathways such as service runs and track drainage to surface water.	Likely	Medium	Moderate risk
	Controlled Waters – Surface Waters (off-site) Cutters Brook and Grebe Lake	Discharge of contaminants entrained in surface water runoff followed by overland flow and discharge.	Low Likelihood	Medium	Moderate / low risk
		Leaching and migration of contaminants (free and dissolved phase) from soils in the unsaturated zone into groundwater then lateral migration into surface water features.	Low Likelihood	Medium	Moderate / low risk
		Migration of contaminants via preferential pathways such as service runs and track drainage to surface water.	Low Likelihood	Medium	Moderate / low risk

Source	Receptor	Pathway	Probability	Consequence	Risk Classification
	Property (on-site) Existing structures and services, including track drainage. Future structures and services.	Direct contact of new and existing structures with contaminants in soils and/or groundwater.	Likely	Medium	Moderate risk
		Migration of ground gases or vapours along preferential pathways including permeable ground, track drainage, service trenches and service entry points and accumulation in enclosed spaces such as buildings, service ducts or access points.	Likely	Medium	Moderate risk
	Property (off-site) Existing residential houses and commercial properties.	Direct contact of new and existing structures with contaminants in soils and/or groundwater that has migrated off-site.	Low likelihood	Medium	Moderate/Low risk
		Migration of ground gases or vapours along preferential pathways including permeable ground, track drainage, service trenches and service entry points and accumulation in enclosed spaces service ducts or access points.	Low likelihood	Medium	Moderate/Low risk
Off-site Agricultural activities within the surrounding area. The operation of and Made Ground, infilled ground and worked ground associated with historical landfills located adjacent	Human (on-site) Members of the public using public rights of way to cross the railway, level crossings, stations, bridges, agricultural land and public footpath/cycle tracks along the railway corridor.	Dermal contact with and/or ingestion of contaminants in soil-derived dusts and water which have migrated onto site.	Low likelihood	Medium	Moderate/Low risk
		Inhalation of contaminants in soil-derived dust which have migrated onto site.	Likely	Medium	Moderate risk

Source	Receptor	Pathway	Probability	Consequence	Risk Classification
to the east and south east of Route Section 2A around Calvert. Activities relating to the former brick and tile works located to the south west of Route Section 2A. Allotments adjacent to the north of Route Section 2A. Commercial and Industrial units to the west of Route Section 2A in Bicester including petrol station, garages, engineering works, printers, electronic manufacturers and metal works. Coal yard and Smokeless Fuel Merchants and Distributors (Old Station Marsh Gibbon) adjacent to the south of Route Section 2A. Gas distribution and compressor station adjacent to the north of Route Section 2A in Bicester. Former quarries, brick and tile works, brick works and associated clay pits. Sewage works Graveyard *(A range of inorganic and recalcitrant organic contaminants including heavy metals, hydrocarbons, fuels / oil, PAH, TPH, PCB, coal tar, asbestos, pesticides, herbicides, Total Viable Colonies, E. Coli, Faecal coliform and Faecal streptococci, leachate and the potential for ground gas generation (methane,*		Inhalation of asbestos fibres which have migrated onto site.	Low likelihood	Severe	Moderate risk
		Inhalation of ground gases and/or vapours which have migrated onto site.	Low likelihood	Medium	Moderate/Low risk
	Controlled Waters – Aquifers (on-site) Secondary A Aquifers Principal Aquifer.	Leaching and migration of contaminants (free and dissolved phase) from soils in the unsaturated zone into groundwater in underlying aquifers.	Low likelihood	Medium	Moderate/Low risk
		Migration of contaminants via preferential pathways such as track drainage.	Low likelihood	Medium	Moderate/Low risk
		Lateral migration of contaminants in groundwater.	Low likelihood	Medium	Moderate/Low risk
	Controlled Waters – Surface Waters (on-site) Langford Brook, Launton Brook and Summerstown Ditch, unnamed drains to Launton Brook and Padbury Brook.	Discharge of contaminants entrained in surface water runoff followed by overland flow and discharge.	Low likelihood	Medium	Moderate/Low risk
		Leaching and migration of contaminants (free and dissolved phase) from soils in the unsaturated zone into groundwater in underlying aquifers.	Low likelihood	Medium	Moderate/Low risk
		Migration of contaminants via preferential pathways. Lateral migration of contaminants in groundwater with discharge to surface water as base flow.	Low likelihood	Medium	Moderate/Low risk

Source	Receptor	Pathway	Probability	Consequence	Risk Classification
carbon dioxide, hydrogen sulphide and carbon monoxide).	Property (on-site) Existing structures and services including track drainage. Future structures and services.	Direct contact of new and existing structures with contaminants in groundwater	Low likelihood	Medium	Moderate/Low risk
		Migration of ground gases or vapours along preferential pathways including permeable ground, track drainage, service trenches and service entry points and accumulation in enclosed spaces, service ducts or access points.	Low likelihood	Medium	Moderate/Low risk

5. Ground Investigation

5.1 Ground Investigation Design

Two geo-environmental intrusive GIs have been carried out along the route including a GI undertaken in 2016 by WSP for GRIP 3 and a GI which was undertaken by the Alliance between 2017 and 2018 for GRIP 4.

The aims of the GIs were to:

- Characterise the ground and groundwater conditions along the route (including the soil type, composition, depth, thickness and groundwater flow direction); and
- Characterise the contamination status of the soils and groundwater and the ground gas regime along Route Section 2A.

The design of the investigations was based on the development proposals at the time they were undertaken.

The GIs were undertaken in general accordance with BS:10175 'Code of Practice: Investigation of Potentially Contaminated Sites'[23] and BS:5930[24] 'Code of practice for site investigations' and 'Site Investigation in Construction, UK Specification for Ground Investigation, Second Edition'[25].

It is noted that although geotechnical data was collected as part of the GI a geotechnical assessment is outside of the scope of this assessment and the geotechnical information will be provided as a separate report.

5.2 Scope of Works

5.2.1 Intrusive ground investigation

During the GRIP 3 stage a GI for Route Section 2A was undertaken by BAM Ritchies Ltd (BAM) on behalf of WSP Parsons Brinckerhoff between May and September 2015. This work is documented in the East West Rail Phase 2A Ground Investigation Report (GIR), Document No.: 133735-PBR-REP-EGE-000002 – Revision 1 (June 2016)[9].

The GRIP 3 Phase 2A GI consisted of 18 No. investigation locations spaced at approximately 500 m intervals along the route. Each investigation location consisted of three boreholes, drilled using windowless sampling techniques combined with dynamic probing. At each location generally one exploratory hole was positioned on either side of an earthwork and one in the centre of the track. A further 15 No. two-hole locations were added to the scope for the purposes of investigating the ground conditions at the location of new structures or backfill to existing structures. These holes were drilled using a combination of cable percussion, window sampling techniques and standard penetration testing.

A GRIP 4 stage GI was undertaken by the EWR Alliance. The GI was undertaken by CC Ground Investigation between July 2017 and October 2018 and included exploratory locations both within the railway corridor and adjacent to the railway on third party land in Route Section 2A. The GI included the drilling / excavation of 139 No. exploratory locations in Section 2A comprising trial pits, dynamic probing, window sampling and dynamic sampling with rotary follow on. This GI is documented in East West Rail Phase 2 Factual Report, Document No.: C5759-EWR2-2A-GI-A[26].

23 British Standards: BS:10175 Code of Practice: Investigation of Potentially Contaminated Sites, 2011.

24 British Standards: BS 5930 Code of Practice for site investigations, 2015.

25 Site Investigation in construction, UK Specification for Ground Investigation, Second Edition, 2012.

26 CC Ground Investigations (2019) East West Rail Phase 2 Factual Report, Document No.: C5759-EWR2-2A-GI-A.

Exploratory hole locations are presented on Drawings Nos. 13375-EWR-REP-EEN-000137, 13375-EWR-REP-EEN-000137_1, 13375-EWR-REP-EEN-000137_2 and 13375-EWR-REP-EEN-000137_3 included in Appendix A and logs are presented in Appendix C.

5.2.2 Soil sampling

Environmental soil samples were collected as part of the GIs and submitted to an Environment Agency Certification Scheme (MCERTS) and UK Accreditation Services (UKAS) accredited laboratory for analysis.

5.2.3 Ground gas and groundwater monitoring and sampling

5.2.3.1 Installation Details

Details of the ground gas and groundwater monitoring standpipes installed within boreholes drilled during the GIs are summarised in Table 5.1:

Table 5.1 - Standpipe Installation Details

Monitoring Well	Approx. Chainage	Final Drilled Depth		Response Zone		Geology
		m bgl	m AOD	m bgl	m AOD	
CP2ALLCDE	107070	10.5	59.12	2.5-10.5	67.12-59.12	Alluvium and Oxford Clay - Peterborough Member
CP2AMFOB_2U	108390	30.5	38.93	2.0-30.0	67.43-39.43	Oxford Clay - Peterborough Member, Kellaways Sand Member, Kellaways Clay Member, Cornbrash Limestone, Forest Marble Formation, While Limestone Formation
CP2AMG-U	105430	21.00	59.28	16.5-18.0	63.78-62.28	Kellaways Sand Member
CP2AOB29C	101300	17.0	74.77	1.0-4.0	90.77-87.77	Glacial Deposits Cohesive, Oxford Clay – Stewartby Member
CP2APOOB_1D	105230	20.03	65.70	1.4-19.6	84.33-66.13	Made Ground, Oxford Clay – Peterborough Member, Kellaways Sand Member
CP2AUB32CE	103800	19.0	67.90	17.0-19.0	69.90-67.90	Oxford Clay - Peterborough Member
WS2A100_U	101400	5.6	85.90	1.0-5.6	90.50-85.90	Glacial Deposits Cohesive, Oxford Clay - Peterborough Member
WS2A103_U	101785	4.7	82.91	1.0-4.7	86.61-82.91	Subgrade Fill, Weathered Oxford Clay - Peterborough Member
WS2A106_D	103940	6.0	78.40	1.0-6.0	83.40-78.40	Oxford Clay - Peterborough Member
WS2A109_U	104300	6.45	83.25	1.45-6.45	88.25-83.25	Oxford Clay - Peterborough Member

Monitoring Well	Approx. Chainage	Final Drilled Depth		Response Zone		Geology
		m bgl	m AOD	m bgl	m AOD	
WS2A10U	103650	6.0	81.50	5.0-6.0	82.50-81.50	Oxford Clay - Stewartby Member
WS2A123_D	107425	6.25	59.43	1.25-6.25	64.43-59.43	Alluvium, Kellaways Sand Member, Kellaways Clay Member
WS2A124_U	107575	6.4	59.29	1.0-4.0	64.69-61.69	Alluvium, Oxford Clay - Peterborough Member, Kellaways Sand Member, Kellaways Clay Member
WS2A12U	104650	6.0	73.60	4.0-5.0	75.60-74.60	Oxford Clay - Peterborough Member
WS2A13C	101785	4.0	78.70	3.0-4.0	79.70-78.70	Oxford Clay – Stewartby Member
WS2A14D	101785	4.7	73.25	1.0-4.7	76.95-73.25	Weathered Oxford Clay - Peterborough Member
WS2A16U	103940	4.0	69.26	3.0-4.0	70.26-69.26	Weathered Oxford Clay - Peterborough Member
WS2A17U	103940	4.0	64.50	2.0-4.0	66.50-64.50	Oxford Clay – Peterborough, Member, Kellaways Sand Member
WS2A1C	103940	6.0	80.49	3.0-4.0	83.49-82.49	Oxford Clay - Peterborough Member
WS2A20D	104200	4.3	64.30	1.0-4.3	67.60-64.3	Made Ground, Alluvium, Kellaways Clay Member, Cornbrash Limestone
WS2A2D	104200	5.0	79.96	4.0-5.0	80.96-79.96	Oxford Clay - Peterborough Member
WS2A3U	104300	4.0	80.10	1.0-4.0	83.10-80.10	Alluvium, Glacial Deposits Cohesive
WS2A5U	100970	5.0	82.00	4.0-5.0	83.00-82.00	Oxford Clay - Peterborough Member
WS2A6U	104650	6.0	85.00	1.0-6.0	90.00-85.00	Weathered Oxford Clay - Peterborough Member, Kellaways Clay Member, Oxford Clay - Stewartby Member
WS2A7U	104700	4.0	86.00	3.0-4.0	87.00-86.00	Oxford Clay - Stewartby Member
WS2A9C	105780	3.7	85.40	2.2-3.7	86.90-85.40	Oxford Clay – Peterborough Member, Kellaways Clay Member

Monitoring Well	Approx. Chainage	Final Drilled Depth		Response Zone		Geology
		m bgl	m AOD	m bgl	m AOD	
WS2AFCGF15U	105780	5.0	63.78	2.0-5.0	66.78-63.78	Oxford Clay – Peterborough, Member, Kellaways Sand Member
WS2AFCMGD	105780	7.6	72.26	2.0-7.6	77.86-72.26	Oxford Clay - Peterborough Member, Kellaways Sand Member
WS2AFCT2D	106320	7.0	82.96	2.0-6.0	87.96-83.96	Oxford Clay - Stewartby Member, Oxford Clay - Peterborough Member
WS2ALOB_1D	107010	7.0	60.21	1.0-4.3	66.21-62.91	Alluvium, Oxford Clay Peterborough Member, Kellaways Sand Member Kellaways Clay Member,
WS2A121_U	107425	3.5	62.21	1.0-3.5	64.71-62.21	Alluvium, Kellaways Sand Member

5.2.3.2 Groundwater

No groundwater monitoring or testing was carried out as part of the GRIP 3 investigation.

As part of the GRIP 4 GI, several rounds of groundwater level monitoring and sampling have been carried out between December 2017 and October 2018.

At the time of reporting a number of the boreholes were yet to be drilled, however, the boreholes were selected in order to provide a good overall coverage of the different aquifers and soils types across Route Section 2A. Groundwater samples have been taken from locations where piled foundations are proposed so that the data can be used in the Piling Risk Assessments. It is noted that not all of the GRIP 3 boreholes could be located and were therefore these were unable to be monitored. A summary of the groundwater level monitoring and sampling is outlined in Table 5.2:

Table 5.2 - Groundwater Monitoring and Sampling

Location	Groundwater Level Monitoring & Sampling			
	Round 1	Round 2	Round 3	Round 4
CP2AMFOB_2U	01/08/18	03/09/18	24/09/18	23/10/18
CP2APOOB_1D	01/08/18*	03/09/18	25/09/18*	22/10/18
WS2A100_U	01/08/18	04/09/18	27/09/18	22/10/18
WS2A103_U	31/07/18*	04/09/18	27/09/18	22/10/18
WS2A106_D	06/09/18	27/09/18*	-	22/10/18
WS2A109_U	-	-	28/09/18	-
WS2A121_U	03/09/18	-	24/09/18*	23/10/18
WS2A123_D	01/08/18*	03/09/18	24/09/18	23/10/18
WS2A124_U	01/08/18*	03/09/18*	24/09/18	23/10/18

Location	Groundwater Level Monitoring & Sampling			
	Round 1	Round 2	Round 3	Round 4
WS2A14D	06/09/18	-	26/09/18*	22/10/18
WS2A16U	-	06/09/18*	27/09/18*	22/10/18*
WS2AFCGF15U	06/09/18*	-	-	23/10/18*
WS2ALOB_1D	01/08/18*	03/09/18	24/09/18	22/10/18
CP2ALLCDE	-	-	24/09/18	22/10/18
WS2A12U	-	-	27/09/18	22/10/18

*Denotes groundwater level monitoring only.

5.2.3.3 Ground Gas

No ground gas monitoring was carried out as part of the GRIP 3 investigation.

In order to establish baseline conditions from the GRIP 4 GI, four rounds of gas monitoring have been carried out between July 2018 and October 2018 as outlined Table 5.3.

Table 5.3 - Ground Gas Monitoring

Location	Ground Gas Monitoring			
	Round 1	Round 2	Round 3	Round 4
CP2ALLCDE	24/09/2018	22/10/2018	-	-
CP2AMFOB_2U	01/08/2018	03/09/2018	24/09/2018	-
CP2APOOB_1D	01/08/2018	03/09/2018	25/09/2018	-
WS2A100_U	01/08/2018	04/09/2018	27/09/2018	22/10/2018
WS2A103_U	31/07/2018	04/09/2018	27/09/2018	22/10/2018
WS2A106_D	06/09/2018	27/09/2018	-	-
WS2A121_U	03/09/2018	24/09/2018	-	-
WS2A123_D	01/08/2018	03/09/2018	24/09/2018	-
WS2A124_U	01/08/2018	03/09/2018	24/09/2018	-
WS2A12U	27/09/2018	-	-	-
WS2A14D	06/09/2018	26/09/2018	22/10/2018	-
WS2A16U	06/09/2018	27/09/2018	-	-
WS2AFCGF15U	06/09/2018	24/09/2018	-	-
WS2ALOB_1D	03/09/2018	24/09/2018	-	-

Concentrations of carbon dioxide, carbon monoxide, hydrogen sulphide, methane and oxygen were recorded on each monitoring round together with flow rates and atmospheric pressure using a calibrated Geotechnical Instruments GA2000 Gas Analyser.

5.2.3.4 Volatiles

Soil samples taken during the GI were screened on site by the Contractor using a photo-ionisation detector (PID) to measure the concentration of total volatile organic compounds (VOCs).

5.2.3.5 Surface water sampling

No surface water sampling was carried out as part of the GRIP 3 investigation.

As part of the GRIP 4 GI, two rounds of surface water sampling were carried out between August and October 2018 at five locations (2ASW1(E), 2ASW2(S), 2ASW3(S), 2ASW4(S) and 2ASW5(N)) from the Langford Brook, Summerstown Ditch and Launton and Cutters Brook, an unnamed drain/watercourse to the Summerstown Ditch, Launton and Cutters Brook and an unnamed drain into Padbury Brook. These watercourses were selected to provide a good spread of data across the Route Section. The surface water sampling locations are presented on Drawing Nos. 13375-EWR-REP-EEN-000137, 13375-EWR-REP-EEN-000137_1, 13375-EWR-REP-EEN-000137_2 and 13375-EWR-REP-EEN-000137_3 included in Appendix A.

Two of the sampling locations including 2ASW4(S) from the Summerstown Ditch and Launton and Cutters Brook and 2ASW5(N) from the unnamed drain into Padbury Brook were dry and could not be monitored. Three sampling locations were monitored from the western end of the route including 2ASW1(E) from Langford Brook, 2ASW4(S) from the Summerstown Ditch, Launton and Cutters Brook and 2ASW3(S) from an unnamed drain/watercourse to the Summerstown Ditch, Launton and Cutters Brook.

5.3 Chemical Analysis

Chemical analysis of the soils was scheduled by WSP for the GRIP 3 GI and carried out by Chemtest. No leachate, groundwater or surface water testing was undertaken. Chemical analysis was scheduled by the Alliance for the GRIP 4 GI and carried out by i2 Analytical. Chemical analysis was carried out in accordance with MCERTS and UKAS accredited procedures.

5.3.1 Soil testing

A total of 16 No. samples of Made Ground and nine samples of natural ground were tested during the GRIP 3 GI for the following suite of determinands:

- Arsenic, cadmium, boron, chromium (total), lead, mercury, selenium, copper, nickel, zinc;
- Cyanide (total);
- Total Petroleum Hydrocarbons (TPH) (C6-C40);
- Soil organic matter;
- Polycyclic Aromatic Hydrocarbons (PAH) (Speciated 16 USEPA);
- Total phenols;
- pH; and
- Asbestos (presence).

It is noted that some of the exploratory holes included in the GRIP 3 GI are no longer located within the Project area, and these have therefore not been included in this assessment.

As part of the GRIP 4 Alliance GI, a total of 21 No. of samples comprising various material types, including Ballast, Made Ground and Subgrade/Engineered Fill and natural ground were tested for the following suites of determinands which included:

- Arsenic, cadmium, boron, vanadium, chromium (total), chromium hexavalent, lead, mercury, selenium, copper, nickel, and zinc;
- Cyanide (free and total);
- Water soluble sulphate and sulphide;
- Soil organic matter;

- Loss on ignition;
- Fraction organic carbon.
- PAH (Speciated 16 USEPA);
- pH;
- TPH (C10-C40);
- TPH (CWG) (C5-C35);
- Benzene, Toluene, Ethylbenzene and Xylene (BTEX);
- Methyl Tertiary Butyl Ether (MTBE);
- Total phenols;
- Ammonium;
- Asbestos (presence); and
- Asbestos quantification (where asbestos was identified).

Selected soil samples were also tested for:

- Pesticides and herbicides;
- Polychlorinated biphenyls (PCBs); and
- VOCs.

Leachate tests were also scheduled on soil samples and tested for:

- Arsenic, cadmium, boron, vanadium, chromium (total), chromium hexavalent, lead, mercury, selenium, copper, nickel and zinc;
- Cyanide (free and total);
- Iron, calcium, manganese and nitrate;
- Dissolved organic carbon;
- Ammonia, ammonium and ammoniacal nitrogen;
- Sulphate, sulphide; and
- PAHs (Speciated 16 USEPA).

Selected leachate samples were also tested for:

- pH;
- Chloride aqueous;
- Nitrate aqueous;
- Sulphate aqueous;
- Total sulphur and total sulphate; and
- Pesticides and herbicides.

5.3.2 *Groundwater*

Groundwater samples were collected from 13 boreholes as part of the Alliance GRIP 4 GI and tested for the following determinands:

- Arsenic, cadmium, boron, vanadium, chromium (total), chromium hexavalent, lead, calcium, iron, manganese, mercury, vanadium, selenium, copper, nickel, and zinc;
- Cyanide (free and total);
- Water soluble sulphate and sulphide;
- pH;
- Dissolved organic carbon;
- TPH (C5-C35);
- TPH (CWG);
- Total Phenols;
- PAHs;
- BTEX;
- MTBE;
- Ammoniacal Nitrogen and Ammonium;
- Nitrate;
- VOCs; and
- Semi Volatile Organic Compounds (SVOCs).

5.3.3 *Surface water*

Surface water samples were collected from four locations including Langford Brook, Summerstown Ditch and Launton and Cutters Brook as part of the Alliance GRIP 4 GI and tested for the following determinands:

- Arsenic, cadmium, calcium, boron, vanadium, chromium (total), chromium hexavalent, lead, mercury, selenium, iron, copper, manganese, nickel, and zinc;
- Cyanide (free and total);
- Water soluble sulphate and sulphide;
- Nitrate
- PAH (Speciated 16 USEPA);
- pH;
- TPH (C5-C35);
- BTEX;
- MTBE;
- Total Petroleum Hydrocarbons (CWG);
- Total Phenols;
- Ammoniacal Nitrogen and Ammonium;
- Dissolved Organic Carbon (DOC)

- VOCs; and
- SVOC.

6. Ground Conditions

6.1 Ground Investigation Design

This section provides a summary of the ground conditions encountered during the investigations. The depths quoted are relative to the ground levels prevailing at the time of the GIs.

Full details of the ground conditions encountered at each exploratory hole location are provided in the exploratory hole logs included within Appendix C. The exploratory hole locations are presented on Drawing Nos. 13375-EWR-REP-EEN-000137, 13375-EWR-REP-EEN-000137_1, 13375-EWR-REP-EEN-000137_2 and 13375-EWR-REP-EEN-000137_3 in Appendix A.

6.2 Summary of Ground Conditions

The ground conditions along the route broadly reflect those anticipated from the published geology.

The route comprises railtrack at grade, on embankments and in cuttings and the thickness of the underlying railway substructure reflects the previous development of the site as a railway. Underlying the railway substructure, and Topsoil where present, the natural ground comprises Alluvium associated with watercourses around Station Road in Launton. Glacial Till was not previously identified on BGS maps, however, it was identified locally in areas of higher topography in the eastern section of the Route.

The superficial deposits and railway substructure overlay the solid strata of the Oxford Clay Formation across much of Route Section 2A. The Kellaways Formation (sand and clay Member) subcropping below the superficial soils towards the western (Bicester) end of Route Section 2A from Marsh Gibbon. The Cornbrash, Forest Marble, White Limestone and Rutland Formations were encountered underlying the Kellaways Formation in the west end of Route Section 2A.

A summary of the encountered geology along the route is provided in Table 6.1 below:

Table 6.1 - Ground Conditions Summary

Geology	Description	Top of Stratum (m bgl)	Range of thickness (m bgl)
Topsoil	Soft/stiff/firm grey dark brown slightly sandy clay with frequent roots (<2 mm).	0.00-1.70	0.05-1.00
Ballast	Grey angular to sub-angular medium to coarse gravel of igneous material. Angular to sub-angular fine to coarse gravel of igneous material, clinker, slag. Approximately 50-70 % undersized with fines of ash and degraded ballast.	0.00-0.50	0.02-0.60
Trackbed Layers	Yellow/light orangish/orangish/light brown gravelly slightly clayey sand. Gravel is angular to rounded fine to coarse of igneous material, chalk and siliceous material.	0.00-0.70	0.12-0.8
Engineered Ground	Light orangish brown gravelly slightly clayey fine to coarse sand. Gravel is angular to rounded fine to coarse of chert and clinker.	0.00-0.20	0.20-0.40
Made Ground	Firm to stiff friable dark brown slightly sandy slightly gravelly clay with occasional roots (<2 mm). Gravel is angular to sub-rounded fine	0.00-1.00	0.05-1.70

Geology	Description	Top of Stratum (m bgl)	Range of thickness (m bgl)
	to coarse of brick, ash, clinker, concrete, limestone and sandstone. Further comments in text below.		
Subgrade Fill	Soft light grey and bluish grey slightly gravelly slightly sandy clay with rare gypsum crystals (<5 mm). Gravel is angular to rounded fine to coarse of siliceous material, limestone and red brick.	0.00-5.40	0.10-5.10
Glacial Deposits Cohesive	Soft to firm greenish brown mottled brown slightly gravelly silty clay with rare rootlets. Gravel is sub-angular to rounded fine chalk.	0.00-4.20	0.10-1.90
Alluvium	Firm grey mottled dark grey locally orangish brown slightly sandy clay. Occasional partially decomposed organic material (<5 mm).	0.15-6.00	0.10-1.60
Oxford Clay - Peterborough member	Very stiff thinly laminated dark grey silty clay locally tending to extremely weak mudstone with occasional shells (<20 mm).	0.10-19.80	0.15-12.50
Oxford Clay - Stewartby Member	Stiff to very stiff /Hard greyish to dark brown silty friable clay with shell fragments	0.20-5.00	0.10-3.30
Kellaways Clay Member	Stiff dark grey sandy clay with rare pockets (<10 mm) of iron pyrite.	0.40-18.20	0.1-3.45
Kellaways Sand Member	Firm to stiff dark grey silty / clayey fine to medium sand with occasional shell fragments.	0.6-21.40	0.05-4.60
Cornbrash Limestone	Medium strong thinly bedded light grey fossiliferous Limestone. Discontinuities are closely spaced stepped rough with fine sand infill (<6 mm).	3.00-19.30	0.10->3.50
Forest Marble Formation	Weak to medium strong very thinly to thinly bedded light grey fine grained slightly shelly Limestone with medium interbeds of very stiff dark brownish grey clay. Discontinuities are sub-horizontal very closely to medium spaced undulating rough occasionally infilled (<3 mm) with clay.	6.00-20.00	0.43->3.20
White Limestone Formation	Weak to medium strong dark grey fossiliferous Limestone. Discontinuities are sub-horizontal undulating rough and infilled with dark grey silt	9.40-26.29	0.5->11.7
Rutland Formation	Weak dark grey Mudstone. Discontinuities are sub-horizontal undulating medium closely spaced rough.	29.60	>0.90

A summary of the categories applied to the anthropogenic soils and the railway substructure are presented in Table 6.2 below and Made Ground is discussed further in the following sections.

Table 6.2 - Anthropogenic Soil Categories

Geology	Description
Topsoil	Topsoil is the top-most strata present, however it can be present in 'relic' form where it has been buried by artificial ground (beneath embankments).
Ballast	Ballast is encountered in areas which lie within the railway corridor, which were currently or previously part of the trackbed immediately beneath the rails and sleepers.
Trackbed	Trackbed describes material immediately below the ballast, forming part of the existing or former trackbed within the railway corridor.
Made Ground	Made Ground is defined as anthropogenic materials which have not been classified as trackbed or subgrade fill for earthworks, although both of these are still Made Ground.
Subgrade Fill / Embankment Fill	Subgrade Fill and Embankment Fill are used to describe material typically forming the bulk fill of railway embankments, below the trackbed layers, although this material is classed as Made Ground as it has been placed at this location by man. It is likely to include locally occurring geology in re-worked form.

Topsoil was encountered across Route Section 2A offline and occasionally underlying the embankment. Made Ground was encountered locally offline in fifteen locations. The deepest Made Ground was recorded offline (CP2APOOB_1D) in the location of the proposed Poundon Occupation New Overbridge. The Made Ground in this location is described as firm becoming stiff thinly laminated sandy clay with leaf matter.

6.3 Potential Evidence of Contamination

The railway ballast included clinker, ash and slag with hydrocarbon staining noted locally on the ballast. The Made Ground described in Table 6.1 and Sections 6.2.5 and 6.2.6 also included brick, ash, clinker and concrete.

Details of other visual and olfactory evidence of potential contamination within the soil and groundwater across Route Section 2A are presented in Table 6.3. Organic odours were frequently recorded in the Made Ground and underlying natural soils, but these have only been included in the risk assessment if they were accompanied by other evidence of contamination such as elevated PID readings. A strong sulphurous odour and a strong hydrocarbon odour were noted, each at one location within the groundwater during the GRIP 4 GI groundwater monitoring rounds.

Table 6.3 - Visual/Olfactory evidence of soil contamination

Location	Approx. Chainage	Depth (m bgl)	Comment
CP2AOB29_C	101275	8.0-9.0	Hydrocarbon odour in the Oxford Clay. All the natural soils noted to be 'slightly organic'. No PID results available.
WS2A101_C	101400	0.0-1.6	No olfactory or visual evidence of contamination in the Ballast (PID was 3.6 ppm at 0.5 m bgl). Moderate hydrocarbon odour and decomposed organic material in underlying Oxford Clay - Peterborough Member (PID was 31.7 ppm at 1.0 m bgl).

Location	Approx. Chainage	Depth (m bgl)	Comment
			Slight hydrocarbon odour in Oxford Clay-Peterborough Member from 1.6 m bgl to base of exploratory hole
WS2A6U	101600	5.4	Moderate sulphurous odour in the groundwater (180 m southwest of WS2A101_U). Response zone in Oxford Clay – Stewartby Member and Kellaways Formation (Clay).
WS2A8C	102700	0.3-0.4	PID results from the Made Ground at this location ranged between less than LOD and 0.1 ppm between 0.3 m and 1.0 m bgl.
WS2AOB31U	103011	4.5-7.8	Black sandy flint gravel with sulphur odour in the Made Ground. PID results ranged between 0.1 ppm and 2 ppm between 0.3 m and 1.0 m bgl.
WS2A9U	103140	4.5-6.3	Strong hydrocarbon odour to the base of the hole at 7.8 m bgl in the Oxford Clay Formation. No PID results available.
WS2A10U	103560	5.0-6.0	Strong hydrocarbon odour in the Kellaways Clay, no PID results available at this depth. PID results from 0.3 m to 1.0 m bgl within Made Ground ranged between less than LOD and 1.0 ppm. Groundwater strike at 3.67 m bgl noted moderate hydrocarbon odour.
WS2A105_C	103940	0.0-0.45	Strong sulphurous odour noted in the groundwater when the well was developed. Response zone of this monitoring well was in the Oxford Clay – Stewartby Member between 5.0 and 6.0m bgl. PID results 0.6 ppm at 0.3 m and <0.1 ppm at 1.0 m bgl.
WS2A116_C	106320	0.75-3.0	Slight hydrocarbon odour in Ballast.
WS2A119_C	107280	0.95-1.8	PID was 0.1 ppm at 0.5 m bgl, 0.3 ppm at 1.0 m bgl and 2.5 ppm at 2.5 m bgl.
WS2A1C	103940	1.30-2.0	Slight hydrocarbon odour in Subgrade Fill with decomposed roots and rootlets. PID was 0.7 ppm at 0.5 m bgl, 0.5 ppm at 1.0 m bgl, 0.6 ppm at 2.0 m bgl and 0.4 ppm at 3.5 m bgl
WS2A2C	104200	3.40-3.70	Slight hydrocarbon odour in Subgrade Fill with decomposed roots and rootlets. PID was 0.1 ppm at 0.5 m bgl, 1.0 ppm at 1.0 m bgl, 0.8 ppm at 2.0 m bgl and1.4 ppm at 3.5 m bgl.
WS2A9U	105780	4.50-6.30	Slight hydrocarbon odour in Made Ground. PID results <0.1 ppm at 0.30 m and 1.0 m bgl.
WS2AOB31D WS2AOB31U	103020 103010	4.00-6.50	Strong hydrocarbon odour in Reworked Clay. PID results 0.3 ppm at 0.30 m bgl and <0.1 ppm at 1.0 m bgl.
		4.50-7.80	Strong hydrocarbon/ organic odour in Kellaways Clay. PID results 0.1 ppm at 0.3 m bgl and <0.1 at 1.0 m bgl.

Location	Approx. Chainage	Depth (m bgl)	Comment
WS2A8C	102700	0.3 – 0.4	Moderate to strong organic/hydrocarbon odour in Oxford Clay - Peterborough Member. PID results 1.0 ppm at 0.3 m bgl and 0.2 ppm at 1.0 m bgl.
TPA11	102700	0.45 – 1.2	Strong organic/ hydrocarbon odour in Oxford Clay - Peterborough Member. PID results 0.5 ppm at 0.3 m bgl and 0.1 ppm at 1.0 m bgl.
TPA23	105600	0.35 – 0.75 0.75 – 1.2	Slight chemical odour in Trackbed layers. PID results 0.1 ppm at 0.5 m bgl. Slight chemical odour in possible Alluvium. PID results 0.5 ppm at 0.8 m bgl and 0.4 ppm at 1.2 m bgl.
TPA25	105960	0.25 – 0.6	Slight chemical odour in Trackbed layers. PID results <0.1 ppm at 0.5 m bgl.
TPA30	106840	0.6 – 1.25	Slight localised chemical odour in probable Oxford Clay Formation. PID results 0.1 ppm at 0.80 m bgl and 0.3 ppm at 1.1 m bgl.
TPA38	108400	0.6 – 1.2	Slight chemical odour in possible Alluvium. PID results 0.6 ppm at 0.5 m bgl, 0.5 ppm at 0.8 m bgl and 0.9 ppm at 1.1 m bgl.
TPA44	109400	0.08 – 0.33 0.33 – 0.9	Slight chemical odour in Trackbed layers. PID results <0.1 ppm at 0.5 m bgl and 1.0m bgl. Strong chemical odour in Trackbed layers. PID results 0.4 ppm at 0.5 m bgl and 0.2 ppm at 1.0 m bgl.

The results of the PID tests indicate that the majority of results were below or just above detection limits of the equipment used <0.1 ppm with the most elevated results (31.7 ppm) recorded in WS101_C, associated with a hydrocarbon odour in the Oxford Clay Formation at 1.0m bgl.

Slight hydrocarbon odours in the soil were noted in the Made Ground, Trackbed layers and Ballast. Within the natural strata hydrocarbon odours were identified within the Oxford Clay Formation (Peterborough Member and Stewartby Member) and Kellways Clay Member.

Visual/olfactory evidence of hydrocarbons were identified in groundwater from the eastern site boundary (Chainage 101120) to approximate Chainage 104000 (Station Road Marsh Gibbon) with no further evidence of hydrocarbons in groundwater recorded until Chainage 106320 and 107280 (in the general area of Launton Level Crossing) in the Subgrade Fill. A sulphurous odour was also noted in some of the soil and groundwater which can be an indication of the presence of degrading petroleum hydrocarbons or high organic content. The hydrocarbon odour in the groundwater in the eastern end of Route Section 2A could potentially be attributed to the landfills located further southeast.

Chemical odours were identified within both the Made Ground, Trackbed layers, Alluvium and Oxford Clay Formation in TPA25 between the depths of 0.08 m and 1.25 m bgl.

6.4 Groundwater

6.4.1 Groundwater strikes

Groundwater strikes were recorded during drilling at depths of between 0.3 m and 19.0 m bgl in the Ballast, Made Ground, Alluvium and Glacial Deposits and in the Oxford Clay, Kellaways Clay, Kellaways Sand and the White Limestone Formations as summarised in Table 6.4 below:

Table 6.4 - Water Strikes encountered during GIs

Location	Water Strike Details (m bgl)	Stratum
CP2AOB29C	2.1	Oxford Clay-Stewartby Member
CP2AUB32CE	19.0 – slight seepage	Oxford Clay-Peterborough Member
CP2AUB32CW	7.2	Oxford Clay-Peterborough Member
WS2A12U	0.3	Made Ground
WS2A14U	0.9 – seepage	Made Ground
WS2A1U	3.6	Oxford Clay-Peterborough Member
WS2A2D	3.0 – 3.45 –slight seepage	Made Ground
WS2A2U	4.7	Oxford Clay-Peterborough Member
WS2A3D	3.5 – seepage	Oxford Clay-Peterborough Member
WS2A3U	4.0	Glacial Deposits Cohesive
WS2A6U	1.0 – slight seepage	Glacial Deposits Cohesive
WS2AFCMGD	1.2 – 1.65 – seepage	Oxford Clay-Peterborough Member
WS2AOB29UA	3.0 – 4.0 – seepage	Oxford Clay-Stewartby Member
CP2AJLFB_2U	0.6	Kellaways Clay Formation
	12.5 – artesian groundwater rising to 2.85 m above ground level.	White Limestone Formation
TP A20	0.6-0.75	Trackbed Layers
TP A43	1.2	Subgrade Fill
WS2A101_C	2.2	Oxford Clay – Peterborough Member
WS2A107_C	0.45	Ballast
WS2A125_C	7.8	Kellaways Clay Member
WS2ACLOB _1U	4.15	Kellaways Sand Member
CP2ALOB_1D	1.2	Alluvium
	14.7– artesian groundwater rising to 0.3 m above ground level on 15/06/18 but had risen to 5.0m above ground level on 25/06/18.	Boundary between Forest Marble Formation and the While Limestone Formation.
CP2AMFOB_2U	4.45	Kellaways Sand Member
TP2ACLOB_1D	1.8 - seepage	Weathered Oxford Clay - Peterborough member

Location	Water Strike Details (m bgl)	Stratum
TP2ALOB_1U	1.3 – slow seepage	Boundary between Alluvium and the Weathered Oxford Clay - Peterborough member
TP2ALOB_2D	0.9	Alluvium
TP2ALOB_2U	1.4 – slow seepage	Alluvium
TP2ALOB_4D	1.8	Boundary between Oxford Clay - Peterborough member and the Kellaways Sand Member
TP2ALTN_2U	0.9 – seepage 1.2 – 1.6m - heavy seepage	Alluvium
TP2AMFOB_2D	1.2 – 1.45 - seepage	Oxford Clay - Peterborough member
TP2AMFOB_3D	1.3	Oxford Clay - Peterborough member
TP2AMFOB_3U	1.8 - seepage	Oxford Clay - Peterborough member
WS2A118_U	0.6 - rose to 0.56	Alluvium
WS2A120_D	0.8	Alluvium
WS2A121_U	0.5 – rose to 0.39m	Alluvium
WS2A123_D	0.7 – seepage 0.9	Alluvium Alluvium
WS2A124_U	1.2	Boundary between Oxford Clay - Peterborough member and the Kellaways Sand Member
	4.0 – rose to 3.10m	Kellaways Clay Member
WS2A126_D	3.6	Kellaways Sand Member
WS2ALOB_1D	4.1	Kellaways Clay Member
WS2ALOB_1U	0.71 3.91 – rose to 3.30m	Alluvium Kellaways Sand Member
WS2AMFOB_1D	5.0 – rose to 4.60m	Kellaways Sand Member
WS2AMFOB_1U	4.0 – rose to 3.91m	Oxford Clay - Peterborough member

6.4.2 Groundwater level monitoring results

Groundwater levels were recorded from 11 of the boreholes during the groundwater monitoring rounds undertaken between July and October 2018. Boreholes WS2A109_U, WS2A12U, WS2A16U and CP2ALLCDE were not dipped during the monitoring rounds. Groundwater levels were recorded between 0.99 m and 4.92 m bgl as summarised in Table 6.5.

Table 6.5: Summary of Groundwater Level Monitoring

Location	Response Zone		Groundwater Depth Range (m bgl)	Groundwater Level Range (m AOD)
	Geology	Depth (m bgl)		
CP2AMFOB_2U	Oxford Clay - Peterborough Member, Kellaways Clay Member, Cornbrash Limestone, Forest Marble Formation	2.0 – 30.0	1.48 – 1.81	67.95 – 67.62
CP2APOOB_1D	Oxford Clay – Peterborough Member, Kellaways Sand Member	1.4 – 19.6	4.92 – 5.4	80.81 – 80.33
WS2A100_U	Glacial Deposits Cohesive, Oxford Clay - Peterborough Member	1.0 – 5.6	3.84 – 4.5	87.66 – 87.00
WS2A103_U	Subgrade Fill, Weathered Oxford Clay - Peterborough Member	1.0 – 4.7	1.8 – 2.3	85.81 – 85.31
WS2A106_D	Oxford Clay - Peterborough Member	1.0 – 6.0	1.0	83.40
WS2A121_U	Alluvium, Kellaways Sand Member	1.0 – 3.5	2.0	63.71
WS2A123_D	Kellaways Clay Member	1.25 – 6.25	1.96 – 2.28	63.72 – 63.40
WS2A124_U	Kellaways Clay Member	1.0 – 4.0	1.91 – 3.31	63.78 – 62.38
WS2A14D	Weathered Oxford Clay - Peterborough Member	1.0 – 4.7	2.57	75.38
WS2AFCGF15U	Oxford Clay – Peterborough, Member Kellaways Sand Member	2.0 – 5.0	1.87	66.91
WS2ALOB_1D	Alluvium, Oxford Clay	1.0 – 4.0	0.99 – 1.3	66.22 – 65.91

Location	Response Zone		Groundwater Depth Range (m bgl)	Groundwater Level Range (m AOD)
	Geology	Depth (m bgl)		
	Peterborough Member, Kellaways Clay Member, Kellaways Sand Member			

Groundwater levels ranged from 87.66 m AOD (WS2A100_U, August 2018) to 62.38m AOD (WS2A124_U, September 2018).

Two boreholes (CP2AJLFB_2U and CP2ALOB_1D) recorded artesian water. Borehole CP2AJLFB_2U struck water at 12.5 m bgl which rose to 2.85 m above ground level. The water strike occurred when the borehole entered the White Limestone Formation. Borehole CP2ALOB_1D struck groundwater at 14.7m bgl. There was an initial water rise to 0.3 m above ground level and after 10 days water had risen to 5.0m above ground level. This water strike occurred at the boundary between the Forest Marble and White Limestone Formations. The White Limestone Formation is a Principal Aquifer, the groundwater is confined by the overlying Forest Marble Formation, unproductive strata which also separates the White Limestone aquifer from the overlying Cornbrash Formation (Secondary A Aquifer).

Groundwater level monitoring data shows that groundwater is most likely flowing in an easterly / north easterly direction west of Bicester towards a small pond feature north of station road, Launton (chainage 107450), with a westerly/south westerly flow direction in line with topography from Grebe Lake at the eastern boundary towards Launton. However, it is noted that there is a significant distance between the groundwater monitoring locations, and in some cases only one recorded groundwater level, therefore there is insufficient data to determine groundwater flow direction with any accuracy. Further data is needed to inform this assessment.

6.5 Ground Gas Monitoring Results

Four rounds of ground gas monitoring were undertaken along the route between July and October 2018. A summary of peak concentrations is provided in Table 6.6.

Table 6.6 - Summary of Ground Gas Monitoring

Location	Response Zone		Date	Minimum Oxygen (% v/v)	Maximum Carbon Dioxide (% v/v)	Maximum Methane (% v/v)	Maximum Carbon Monoxide (ppm)	Maximum Hydrogen Sulphide (ppm)	Maximum flow rate (l/hr)	Atmospheric Pressure (mb)	Rising/ Falling Atmospheric Pressure*
	Geology	Depth (m bgl)									
CP2ALLCDE	Alluvium and Oxford Clay - Peterborough Member	2.5-10.5	24/09/2018	2.6	14.5	<0.1	<1.0	<1.0	0.2	1032	Rising
			22/10/2018	19.4	0.3	<0.1	<1.0	<1.0	0.2	1032	Rising
CP2AMFOB_2U	Oxford Clay - Peterborough Member, Kellaways Clay Member, Cornbrash Limestone, Forest Marble Formation	2.0-30.0	01/08/2018	19.3	1.4	19.3	5.0	<1.0	<0.1	1016	Rising
			03/09/2018	21.0	0.6	<0.1	<1.0	<1.0	0.2	1015	Falling
			24/09/2018	19.3	0.6	<0.1	<1.0	<1.0	0.3	1032	Rising
CP2APOOB_1D	Oxford Clay - Peterborough Member, Kellaways Sand Member	1.4-19.6	01/08/2018	9.1	5.8	<0.1	1.0	<1.0	0.4	1016	Rising
			03/09/2018	16.5	4.0	<0.1	1.0	<1.0	<0.1	1015	Falling
			25/09/2018	18.1	3.5	<0.1	<1.0	<1.0	0.5	1031	Steady
WS2A100_U	Glacial Deposits Cohesive, Oxford Clay - Peterborough Member	1.0-5.6	01/08/2018	20.3	1.4	0.4	1.5	<1.0	<0.1	1016	Rising
			04/09/2018	20.4	1.9	<0.1	<1.0	<1.0	0.3	1013	Steady
			27/09/2018	20.0	0.5	<0.1	<1.0	<1.0	<0.1	1018	Falling
			22/10/2018	18.3	2.5	<0.1	<1.0	<1.0	Not measured	1028	Rising

Location	Response Zone		Date	Minimum Oxygen (% v/v)	Maximum Carbon Dioxide (% v/v)	Maximum Methane (% v/v)	Maximum Carbon Monoxide (ppm)	Maximum Hydrogen Sulphide (ppm)	Maximum flow rate (l/hr)	Atmospheric Pressure (mb)	Rising/ Falling Atmospheric Pressure*
	Geology	Depth (m bgl)									
WS2A103_U	Subgrade Fill, Oxford Clay - Peterborough Member	1.0-4.7	31/07/2018	19.0	1.5	<0.1	<1.0	1.0	0.2	1007	Falling
			04/09/2018	21.1	0.8	<0.1	<1.0	<1.0	0.3	Not measured	Steady
			27/09/2018	19.4	0.6	<0.1	<1.0	<1.0	<0.1	1018	Falling
			22/10/2018	18.5	1.7	<0.1	<1.0	<1.0	<0.1	1028	Rising
WS2A106_D	Oxford Clay - Peterborough Member	1.0-6.0	06/09/2018	20.4	0.7	<0.1	<1.0	<1.0	0.2	1009	Falling
			27/09/2018	20.3	0.3	<0.1	<1.0	<1.0	<0.1	1019	Falling
WS2A121_U	Alluvium, Kellaways Sand Member	1.0-3.5	03/09/2018	20.7	1.0	<0.1	<1.0	<1.0	<0.1	1015	Falling
			24/09/2018	18.6	2.1	<0.1	<1.0	<1.0	0.3	1032	Rising
WS2A123_D	Kellaways Clay Member	1.25-6.25	01/08/2018	15.4	5.8	<0.1	1.0	<1.0	0.1	1016	Rising
			03/09/2018	17.2	4.7	<0.1	<1.0	<1.0	0.1	1015	Falling
			24/09/2018	17.0	4.3	<0.1	<1.0	<1.0	0.4	1034	Rising
WS2A124_U	Kellaways Clay Member	1.0-4.0	01/08/2018	19.6	3.6	<0.1	1.0	<1.0	<0.1	1016	Rising
			03/09/2018	19.9	2.7	<0.1	1.0	<1.0	0.1	1015	Falling
			24/09/2018	18.4	2.7	<0.1	<1.0	<1.0	0.4	1044	Rising

Location	Response Zone		Date	Minimum Oxygen (% v/v)	Maximum Carbon Dioxide (% v/v)	Maximum Methane (% v/v)	Maximum Carbon Monoxide (ppm)	Maximum Hydrogen Sulphide (ppm)	Maximum flow rate (l/hr)	Atmospheric Pressure (mb)	Rising/ Falling Atmospheric Pressure*
	Geology	Depth (m bgl)									
WS2A12U	Oxford Clay - Peterborough Member	4.0-5.0	27/09/2018	19.5	0.9	<0.1	<1.0	<1.0	<0.1	1017	Falling
WS2A14D	Oxford Clay - Peterborough Member	1.0-4.7	06/09/2018	20.3	0.5	<0.1	<1.0	1	-0.1	1010	Falling
			26/09/2018	19.6	0.3	<0.1	<1.0	<1.0	0.6	1037	Falling
			22/10/2018	19.9	0.1	<0.1	<1.0	<1.0	<0.1	1030	Rising
WS2A16U	Oxford Clay - Peterborough Member	3.0-4.0	06/09/2018	19.9	0.6	<0.1	<1.0	2.0	-0.2	1010	Falling
			27/09/2018	10.5	7.2	<0.1	2.0	<1.0	0.3	1021	Falling
WS2AFCGF15U	Oxford Clay - Peterborough Member, Kellaways Sand Member	2.0-5.0	06/09/2018	20.3	0.9	<0.1	<1.0	1.0	-0.1	1015	Falling
			24/09/2018	20.1	1.3	<0.1	<1.0	<1.0	0.5	1032	Rising
WS2ALOB_1D	Alluvium, Oxford Clay - Peterborough Member, Kellaways Clay Member, Kellaways Sand Member	1.0-4.0	01/08/2018	19.8	0.3	<0.1	1.0	<1.0	0.3	1016	Rising
			03/09/2018	21.0	0.3	<0.1	1.0	<1.0	0.3	1015	Falling
			24/09/2018	20.5	0.2	<0.1	<1.0	<1.0	0.3	1032	Rising

*Atmospheric pressure falling / rising trends have been calculated based on the trend two days before and after the monitoring visit

7. Contamination Assessment

7.1 Introduction

The following presents a summary of the soil, leachate and groundwater analytical data and ground gas monitoring data collected from the ground investigations and provides a preliminary assessment of the results based on the proposed end use for the site.

7.2 Human Health Risk Assessment

7.2.1 Generic assessment criteria

A Tier 2 human health GQRA has been undertaken for the receptors identified in the PCSM in Section 4. To evaluate the potential risks to human health, soil data have been screened against a Generic Assessment Criteria (GAC). Detailed guidance on human health risk assessment is available in Science Report SR2[27], SR3[28] and the CLEA Model. The GACs used in this assessment include the following:

- **Soil Screening Values (SSVs)** – Atkins has produced SSVs based on minimal toxicological risk for a variety of standard land uses at 1 % Soil Organic Matter (SOM) (sand soil type) and 6 % SOM (sandy loam soil type) using CLEA v1.071 in accordance with Environment Agency guidance.
- **Category 4 Screening Levels (C4SLs)** – A revision to the Statutory Guidance of Part 2A of the Environmental Protection Act 1990 was published in April 2012, introducing a new category-based system for assessing risks associated with land contamination including the assessment of the 'significant possibility of significant harm' (SPOSH) whereby Category 1 sites are clearly contaminated and represent a high risk and Category 4 sites are clearly identifiable as low risk and as such would not be classified as Contaminated Land.
- **C4SLs** - Six contaminants (arsenic, cadmium, hexavalent chromium, lead, benzene and benzo(a)pyrene) for a sandy loam soil with 6 % SOM were issued by Defra in December 2014[29] to provide an indication of "low risk" (i.e. the site is clearly within Category 4), whereas GAC, such as SGVs / SSVs, are based on "minimal risk". If soil concentrations exceed the C4SLs, then further assessment is required to confirm whether the site lies within Category 4 or may lie within Categories 1-3. The Department for Communities and Local Government has indicated the C4SLs can also be used under the planning regime. Therefore, for this site C4SLs have been used for those determinants that do not have a SSV.
- **Suitable for Use Levels (S4ULs)** – The Land Quality Management Ltd (LQM) S4UL for nickel has been selected as a GAC because there is currently no SGV, SSV or C4SL for nickel. The S4UL is based on a sandy loam soil as defined in SR3[30] with 6 % SOM.
- **Atkins Water Screening Values (WSVs)** – To assess potential risks from volatile contaminants in perched water to human health receptors, laboratory analytical data is screened against Atkins generic Water Screening Values (WSVs) for a commercial end use. Atkins WSVs are derived for commercial end uses, using the receptor exposure parameters provided in the CLEA framework.

GACs for a public open space (parks) and a commercial end use have been adopted for the assessment, as they are considered appropriate for the proposed end-use as a railway which will include both outdoor human health receptors (users crossing the railway) including potential for dust inhalation and indoor human health receptors (station users).

27 Environment Agency (2009) Human Health Toxicological Assessment of Contaminants in Soil. Science Report SC050021/SR2.

28 Environment Agency (2009) Science Report SC050021/SR3; Updated Technical Background to the CLEA Model.

29 CL:AIRE (2013) Category 4 Screening Levels (C4SLs):C4SL Project Methodology.

30 Environment Agency (2009) Science Report SC050021/SR3; Updated Technical Background to the CLEA Model.

The public open space GACs are based on an outdoor scenario which assumes a critical receptor (female child, age 0 to 6 years) spending between 85 days (0-1 year olds) and 170 days (1-6 year olds) of the year outside, with a soil exposure rate of 50 %. The commercial GACs are based on an office scenario which assumes a critical receptor (female worker, age 16 to >65 years) working five days a week for 46 weeks of the year, with an exposure frequency of 230 days per year.

The GAC developed for a SOM content of 1 % have been adopted as this is a more conservative assessment.

Based on the ratio of genotoxic PAHs to benzo(a)pyrene, the surrogate marker approach for genotoxic PAHs as set out in the C4SL Project Methodology[29] has been adopted.

Potential acute risks resulting from short term exposure to contamination by construction/ maintenance workers involved with the proposed development cannot be assessed using these GAC because they relate to the long-term (chronic) risk. Risks to construction/maintenance workers should be managed with the use of appropriate safe systems of work including PPE.

It should be noted that the GACs are liable to change as new policy and technical guidance, including toxicological data, are published by the Environment Agency and other authoritative sources. Further to this, a Detailed Quantitative Risk Assessment (DQRA) may be required to review the level of conservatism in the screening values, depending upon the outcome of the generic data screening exercise at detailed design stage.

7.2.2 Soil Assessment

A total of 56 No. soil samples were tested as part of the GRIP 3 and GRIP 4 GIs. No exceedances of the commercial land use or public open space (parks) GAC were identified in the soil samples tested.

TPH was predominantly recorded below laboratory detection limits within the GRIP 3 Total TPH C6-C40 soil samples and the GRIP 4 TPH CWG aliphatic and aromatic range samples. PAHs were below the GAC but above the laboratory's limit of detection in all samples.

PCBs were also less than the limit of detection in all samples tested and the pesticides and herbicide screen did not detect evidence of these compounds within soil samples. An assessment table of the data including the GAC is included in Appendix D.

7.2.3 Asbestos

Asbestos screening in the laboratory was undertaken on 51 No. samples all of which were within the top 1.0 m of material collected from topsoil, Made Ground, ballast, trackbed layers, subgrade fill and Alluvium. No asbestos fibres or Asbestos Containing Material was identified within any of the samples.

7.2.4 Groundwater Vapour Assessment

Organic contaminants including PAHs, TPHs, VOCs and SVOCs were predominantly reported below the laboratory's limit of detection in all groundwater testing results, no exceedances of the Atkins Water Screening Values were identified. In addition, no enclosed structures are proposed to be constructed within Route Section 2A. Therefore, groundwater is considered unlikely to present significant risks to human health receptors via the vapour inhalation pathway.

7.3 Controlled Waters Assessment

7.3.1 Generic assessment criteria

A Tier 2 controlled waters GQRA has been undertaken to assess the potential risks posed to the identified controlled waters receptors from the migration of contaminants from identified on-site sources. To assess potential risks to the identified receptors, a comparison of soil-derived leachate and groundwater data against water quality standards (WQS) has been undertaken.

Soil-leachate tests give an indication of the concentrations at which contaminants may leach from soil and potentially migrate to groundwater or surface water receptors. Groundwater samples give an indication of the general groundwater quality underlying the site and which contaminants may have the potential to migrate to surface water and into aquifers.

The screening criteria for the controlled waters assessment are dependent on the nature of the key receptor. Secondary A Aquifers underlying Route Section 2A comprise Alluvium (superficial deposits), Kellaways Sand Member (bedrock geology), Cornbrash Formation (bedrock geology) and Forest Marble Formation (bedrock geology). The White Limestone Formation (bedrock geology) underlying Route Section 2A is classified as a Principal Aquifer. It is indicated that there are no licensed groundwater abstractions within 500 m of Route Section 2A and the route is not located within 500 m of a Groundwater SPZ. However, there are 13 No. groundwater wells recorded by the BGS[12] located within 500 m of Route Section 2A with the nearest located within the Route Section 2A redline boundary, near station house to the north of Marsh Gibbon.

Langford Brook crosses the west of Route Section 2A, to the south east of Bicester and discharges to the River Ray located approximately 6.5 km to the south of Route Section 2A. Launton Brook crosses Route Section 2A to the east of Launton and north of Marsh Gibbon and along with the Summerstown Ditch discharges to Cutters Brook which discharges to the River Ray. Three tributaries of Langford Brook intersect with Route Section 2A and Grebe Lake a man-made lake in a disused clay pit located approximately 120 m east of Route Section 2A.

The primary controlled waters receptors are considered to be the Secondary A Aquifers and Principal Aquifer as a groundwater resource. However, the WFD watercourses (Langford Brook and Launton Brook), Summerstown Ditch and Grebe Lake within 500 m of Route Section 2A are also identified to be the key controlled waters receptors.

Soil leachate and groundwater data has therefore been screened against WQS based on both Drinking Water Standards (DWS)[31] to assess the potential risk posed to the underlying Secondary A and Principal Aquifers and freshwater Environmental Quality Standards (EQS)[32] to assess risks to the surface watercourses.

The Environment Agency Water Framework Directive bioavailability tool (M-BAT)[33] has been used to derive Tier 2 site specific WQS values for copper, lead, manganese, nickel and zinc based on the EQS 2015 Tier 1 long term bioavailability freshwater concentrations.

7.3.2 Soil Leachate Results

A total of 9 No. samples were tested for their leachability of contaminants. These samples were taken from 8 No. locations. Three samples were taken from the bedrock in error (these samples are CP2ATFB_2U (0.2m), CP2AMG-D (17m) and CP2AMG-U (2m). The bedrock results will not be discussed further.

Several exceedances of metals and inorganics against WQS were identified in the Trackbed Layers, Subgrade Fill and Alluvium from various locations within Route Section 2A as outlined in Table 7.1 below. A more detailed assessment table of the data including WQS is presented in Appendix E.

31 Statutory Instruments (2016) The Water Supply (Water Quality Regulations) No. 614.

32 DEFRA (2015) Water Framework Directive

33 Environment Agency (2013) Water Framework Directive bioavailability tool (M-BAT).

Table 7.1 - Summary of Leachate Exceedances

Determinand	Unit	Screening Value		Min. Value	Max. Value	No. Exceedances		Location
		EQS	DWS			EQS	DWS	
Sulphate	mg/l	400	250	8.7	1500	1	1	WS2A122_C (1.0 m – Subgrade Fill)
Selenium	mg/l	N/A	0.01	<0.01	0.015	0	1	WS2A122_C (1.0 m – Subgrade Fill)
Iron	mg/l	1	0.2	0.013	2.5	1	2	WS2ALOB_1D, (0.3 m – Alluvium) WS2A113_C (0.3 m, 0.5 m – Trackbed Layers)
Lead	mg/l	0.0012	0.01	<0.005	0.0095	3	0	WS2A102_C, 0.5 m – Trackbed Layers; WS2A104_U, 0.3 m – Subgrade Fill; WS2ALOB_1D, 0.3 m - Alluvium
Copper	mg/l	0.001	2	0.0044	0.034	6	0	WS2A102_C, 0.5 m - Trackbed Layers; WS2A104_U, 0.3 m - Subgrade Fill; WS2A113_C, 0.5 m - Trackbed Layers; WS2A122_C, 1 m - Subgrade Fill; WS2ALOB_1D, 0.3 m – Alluvium; WS2ALOB_1D, 1 m - Alluvium
Nickel	mg/l	0.004	0.02	<0.001	0.0079	1	0	WS2A122_C, 1 m - Subgrade Fill
Zinc	mg/l	0.0109	3	0.0032	0.019	2	0	WS2A122_C, 1 m - Subgrade Fill; WS2ALOB_1D, 1 m - Alluvium

7.3.3 Groundwater Results

A total of 35 No. groundwater samples were collected from 13 No. monitoring boreholes across Route Section 2A between August 2018 and October 2018.

Elevated concentrations of copper are recorded in all groundwater samples, with elevated sulphate, manganese, nickel and zinc recorded in the majority of samples when assessed against the EQS criteria. Elevated concentrations of sulphate, ammonium as NH4, iron and manganese are also recorded above the DWS assessment criteria. In addition to metals and inorganics there are four recorded TPH concentrations and one phenol EQS exceedance recorded across Route Section 2A.

A summary of the exceedances is provided in Table 7.2. A more detailed assessment of the data including WQS is included in Appendix F.

Table 7.2 - Summary of Groundwater Exceedances

Determinand	Unit	Screening Value		Min. Value	Max. Value	No. of DWS Exceedances		Locations of Exceedances	Monitoring Round	Strata
		EQS (mg/l)	DWS (mg/l)			EQS	DWS			
pH	pH unit	6-9	6.5-9.5	5.6	8.3	5	6	WS2A14D	26/09/2018 06/09/2018 22/10/2018	Weathered Oxford Clay - Peterborough Member
								WS2A106_D	27/09/2018 06/09/2018 22/10/2018	Oxford Clay - Peterborough Member
Sulphate	mg/l	400	250	83	4290	24	26	WS2A12U	22/10/2018	Made Ground, Oxford Clay - Peterborough Member
								WS2A124_U	24/09/2018 23/10/2018	Alluvium, Oxford Clay - Peterborough Member, Kellaways Sand Member Kellaways Clay Member
								WS2ALOB_1D	03/09/2018 24/09/2018 22/10/2018	Alluvium, Oxford Clay Peterborough Member, Kellaways Sand Member, Kellaways Clay Member
								CP2ALLCDE	24/09/2018 22/10/2018	Subgrade Fill, Alluvium, Kellaways Sand Member and Oxford Clay - Peterborough Member
								CP2APOOB_1D	03/09/2018 25/09/2018 22/10/2018	Made Ground, Oxford Clay – Peterborough Member, Kellaways Sand Member, Kellaways Clay Member
								WS2A14D	06/09/2018 26/09/2018 22/10/2018	Weathered Oxford Clay - Peterborough Member

Determinand	Unit	Screening Value		Min. Value	Max. Value	No. of DWS Exceedances		Locations of Exceedances	Monitoring Round	Strata
		EQS (mg/l)	DWS (mg/l)			EQS	DWS			
								WS2A100_U	01/08/2018 04/09/2018 27/09/2018 22/10/2018	Made Ground, Glacial Deposits Cohesive, Oxford Clay - Peterborough Member
								WS2A103_U	04/09/2018 27/09/2018 22/10/2018	Subgrade Fill, Weathered Oxford Clay - Peterborough Member
								WS2A106_D	06/09/2018 27/09/2018 22/10/2018	Subgrade Fill, Oxford Clay - Peterborough Member
								WS2A109_U	28/09/2018	Glacial Deposits Cohesive, Oxford Clay - Peterborough Member
								CP2AMFOB_2U	01/08/2018	Made Ground, Weathered Oxford Clay - Peterborough Member, Kellaways Sand Member, Kellaways Clay Member, Cornbrash Limestone, Forest Marble Formation White Limestone Formation
Ammonium	mg/l	No WQS	0.5	0.2	6.8	-	25	WS2ALOB_1D	03/09/2018 24/09/2018 22/10/2018	Alluvium, Oxford Clay Peterborough Member, Kellaways Sand Member, Kellaways Clay Member
								CP2AMFOB_2U	01/08/2018 24/09/2018	Made Ground, weathered Oxford Clay - Peterborough Member, Kellaways Sand Member, Kellaways Clay Member Cornbrash Limestone, Forest

Determinand	Unit	Screening Value		Min. Value	Max. Value	No. of DWS Exceedances		Locations of Exceedances	Monitoring Round	Strata
		EQS (mg/l)	DWS (mg/l)			EQS	DWS			
										Marble Formation, White Limestone Formation
								CP2ALLCDE	24/09/2018 22/10/2018	Subgrade Fill, Alluvium, Kellaways Sand Member and Oxford Clay - Peterborough Member
								CP2APOOB_1D	03/09/2018 25/09/2018 22/10/2018	Made Ground, Oxford Clay – Peterborough Member, Kellaways Sand Member, Kellaways Clay Member
								WS2A14D	06/09/2018 26/09/2018 22/10/2018	Weathered Oxford Clay - Peterborough Member
								WS2A100_U	01/08/2018 04/09/2018 27/09/2018 22/10/2018	Made Ground, Glacial Deposits Cohesive, Oxford Clay - Peterborough Member
								WS2A103_U	04/09/2018 27/09/2018 22/10/2018	Subgrade Fill, Weathered Oxford Clay - Peterborough Member
								WS2A106_D	06/09/2018 27/09/2018 22/10/2018	Subgrade Fill, Oxford Clay - Peterborough Member
								WS2A109_U	28/09/2018	Glacial Deposits Cohesive, Oxford Clay - Peterborough Member

Determinand	Unit	Screening Value		Min. Value	Max. Value	No. of DWS Exceedances		Locations of Exceedances	Monitoring Round	Strata
		EQS (mg/l)	DWS (mg/l)			EQS	DWS			
								WS2A12U	22/10/2018	Made Ground, Oxford Clay - Peterborough Member
Cadmium	mg/l	0.00008	0.005	<0.00002	0.05	1	1	CP2APOOB_1D	22/10/2018	Made Ground, Oxford Clay - Peterborough Member, Kellaways Sand Member, Kellaways Clay Member
Iron (dissolved)	mg/l	1	0.2	<0.004	430	7	15	WS2A14D	06/09/2018 26/09/2018 22/10/2018	Weathered Oxford Clay - Peterborough Member
								WS2A103_U	27/09/2018 22/10/2018	Subgrade Fill, Weathered Oxford Clay - Peterborough Member
								WS2A106_D	06/09/2018 27/09/2018 22/10/2018	Subgrade Fill, Oxford Clay - Peterborough Member
								WS2A109_U	28/09/2018	Glacial Deposits Cohesive, Oxford Clay - Peterborough Member
								WS2A100_U	01/08/2018 22/10/2018	Made Ground, Glacial Deposits Cohesive, Oxford Clay - Peterborough Member
								WS2A121_U	03/09/2018	Alluvium, Kellaways Sand Member
								WS2A12U	22/10/2018	Made Ground, Oxford Clay - Peterborough Member
								CP2ALLCDE	22/10/2018	Subgrade Fill, Alluvium, Kellaways Sand Member and Oxford Clay - Peterborough Member

Determinand	Unit	Screening Value		Min. Value	Max. Value	No. of DWS Exceedances		Locations of Exceedances	Monitoring Round	Strata
		EQS (mg/l)	DWS (mg/l)			EQS	DWS			
								WS2A124_U	23/10/2018	Alluvium, Oxford Clay - Peterborough Member, Kellaways Sand Member Kellaways Clay Member
Manganese (dissolved)	mg/l	0.123	0.05	0.0046	3.6	31	31	WS2A121_U	03/09/2018 24/09/2018 23/10/2018	Alluvium, Kellaways Sand Member
								WS2A123_D	03/09/2018 24/09/2018 23/10/2018	Made Ground, Alluvium, Kellaways Sand Member, Kellaways Clay Member
								WS2A124_U	24/09/2018 23/10/2018	Alluvium, Oxford Clay - Peterborough Member, Kellaways Sand Member Kellaways Clay Member
								WS2ALOB_1D	03/09/2018 24/09/2018 22/10/2018	Alluvium, Oxford Clay Peterborough Member, Kellaways Sand Member, Kellaways Clay Member
								CP2ALLCDE	24/09/2018 22/10/2018	Subgrade Fill, Alluvium, Kellaways Sand Member and Oxford Clay - Peterborough Member
								CP2APOOB_1D	03/09/2018 25/09/2018 22/10/2018	Made Ground, Oxford Clay – Peterborough Member, Kellaways Sand Member, Kellaways Clay Member
								WS2A14D	06/09/2018 26/09/2018 22/10/2018	Weathered Oxford Clay - Peterborough Member

Determinand	Unit	Screening Value		Min. Value	Max. Value	No. of DWS Exceedances		Locations of Exceedances	Monitoring Round	Strata
		EQS (mg/l)	DWS (mg/l)			EQS	DWS			
								WS2A100_U	01/08/2018 04/09/2018 27/09/2018 22/10/2018	Made Ground, Glacial Deposits Cohesive, Oxford Clay - Peterborough Member
								WS2A103_U	04/09/2018 27/09/2018 22/10/2018	Subgrade Fill, Weathered Oxford Clay - Peterborough Member
								WS2A106_D	06/09/2018 27/09/2018 22/10/2018	Subgrade Fill, Oxford Clay - Peterborough Member
								WS2A109_U	28/09/2018	Glacial Deposits Cohesive, Oxford Clay - Peterborough Member
								WS2A12U	22/10/2018	Made Ground, Weathered Oxford Clay - Peterborough Member
Nickel (dissolved)	mg/l	0.004	0.02	0.0013	0.35	25	10	CP2APOOB_1D	25/09/2018 03/09/2018 22/10/2018	Made Ground, Oxford Clay – Peterborough Member, Kellaways Sand Member, Kellaways Clay Member
								WS2A14D	06/09/2018 26/09/2018 22/10/2018	Weathered Oxford Clay - Peterborough Member
								WS2A100_U	01/08/2018 04/09/2018 27/09/2018 22/10/2018	Made Ground, Glacial Deposits Cohesive, Oxford Clay - Peterborough Member
								WS2A106_D	06/09/2018	Subgrade Fill, Oxford Clay - Peterborough Member

Determinand	Unit	Screening Value		Min. Value	Max. Value	No. of DWS Exceedances		Locations of Exceedances	Monitoring Round	Strata
		EQS (mg/l)	DWS (mg/l)			EQS	DWS			
									27/09/2018 22/10/2018	
								WS2A121_U	24/09/2018 03/09/2018	Alluvium, Kellaways Sand Member
								WS2A123_D	24/09/2018 03/09/2018	Made Ground, Alluvium, Kellaways Sand Member, Kellaways Clay Member
								WS2A124_U	2409/2018 23/10/2018	Alluvium, Oxford Clay - Peterborough Member, Kellaways Sand Member Kellaways Clay Member
								WS2A103_U	27/09/2018 04/09/2018 22/10/2018	Subgrade Fill, Weathered Oxford Clay - Peterborough member
								WS2ALOB_1D	03/09/2018	Alluvium, Oxford Clay Peterborough Member, Kellaways Sand Member, Kellaways Clay Member
								WS2A109_U	28/09/2018	Glacial Deposits Cohesive, Oxford Clay - Peterborough Member
								WS2A12U	22/10/2018	Made Ground, Weathered Oxford Clay - Peterborough member
Selenium (dissolved)	mg/l	No WSV	0.01	<0.0006	0.016	0	2	WS2A103_U	27/09/2018	Subgrade Fill, Weathered Oxford Clay - Peterborough Member
								WS2A106_D	27/09/2018	Subgrade Fill, Oxford Clay - Peterborough Member

Determinand	Unit	Screening Value		Min. Value	Max. Value	No. of DWS Exceedances		Locations of Exceedances	Monitoring Round	Strata
		EQS (mg/l)	DWS (mg/l)			EQS	DWS			
Chromium (dissolved)	mg/l	0.0034	0.05	<0.0002	0.033	3	0	WS2A106_D	06/09/2018 27/09/2018 22/10/2018	Oxford Clay - Peterborough Member
Copper (dissolved)	mg/l	0.001	2	<0.0005	0.032	27	0	WS2A121_U	24/09/2018 03/09/2018	Alluvium, Kellaways Sand Member
								WS2A123_D	24/09/2018 03/09/2018 23/10/2018	Made Ground, Alluvium, Kellaways Sand Member, Kellaways Clay Member
								WS2A124_U	24/09/2018;	Alluvium, Oxford Clay - Peterborough Member, Kellaways Sand Member, Kellaways Clay Member
								WS2ALOB_1D	24/09/2018 03/09/2018	Alluvium, Oxford Clay Peterborough Member, Kellaways Sand Member, Kellaways Clay Member
								CP2AMFOB_2U	24/09/2018 03/09/2018 23/10/2018	Made Ground, Weathered Oxford Clay - Peterborough member, Kellaways Sand Member, Kellaways Clay Member Cornbrash Limestone, Forest Marble Formation, White Limestone Formation
								CP2ALLCDE	24/09/2018 22/10/2018	Subgrade Fill, Alluvium, Kellaways Sand Member and Oxford Clay - Peterborough Member
								CP2APOOB_1D	25/09/2018	Made Ground Oxford Clay - Peterborough member

Determinand	Unit	Screening Value		Min. Value	Max. Value	No. of DWS Exceedances		Locations of Exceedances	Monitoring Round	Strata
		EQS (mg/l)	DWS (mg/l)			EQS	DWS			
									03/09/2018 22/10/2018	Kellaways Sand Member, Kellaways Clay Member
								WS2A14D	26/09/2018 06/09/2018	Weathered Oxford Clay - Peterborough Member
								WS2A100_U	27/09/2018 01/08/2018 04/09/2018	Made Ground, Glacial Deposits Cohesive, Oxford Clay - Peterborough Member
								WS2A103_U	27/09/2018 04/09/2018	Subgrade Fill, Weathered Oxford Clay - Peterborough member
								WS2A106_D	27/09/2018 22/10/2018	Oxford Clay - Peterborough Member
								WS2A109_U	28/09/2018	Glacial Deposits Cohesive, Oxford Clay - Peterborough member
								WS2A12U	22/10/2018	Made Ground, Weathered Oxford Clay - Peterborough member
Lead (Dissolved)	mg/l	0.0012	0.01	<0.0002	0.01	4	1	WS2A106_D	06/09/2018 27/09/2018 22/10/2018	Oxford Clay - Peterborough Member
								WS2A14D	06/09/2018	Weathered Oxford Clay - Peterborough Member
Zinc (dissolved)	mg/l	0.0109	3.0	<0.0005	0.16	14	0	WS2A14D	26/09/2018 06/09/2018 22/10/2018	Weathered Oxford Clay - Peterborough Member
								WS2A106_D	06/09/2018 27/09/2018 22/10/2018	Subgrade Fill, Oxford Clay - Peterborough Member

Determinand	Unit	Screening Value		Min. Value	Max. Value	No. of DWS Exceedances		Locations of Exceedances	Monitoring Round	Strata
		EQS (mg/l)	DWS (mg/l)			EQS	DWS			
								WS2A121_U	24/09/2018	Alluvium, Kellaways Sand Member
								WS2A123_D	24/09/2018	Made Ground, Alluvium, Kellaways Sand Member, Kellaways Clay Member
								WS2A124_D	24/09/2018	Alluvium, Oxford Clay - Peterborough Member, Kellaways Sand Member, Kellaways Clay Member
								CP2ALLCDE	24/09/2018	Subgrade Fill, Alluvium, Kellaways Sand Member and Oxford Clay - Peterborough Member
								CP2APOOB_1D	25/09/2018 03/09/2016	Made Ground, Oxford Clay – Peterborough Member, Kellaways Sand Member, Kellaways Clay Member
								WS2A109_U	28/09/2018	Glacial Deposits Cohesive, Oxford Clay - Peterborough member
								WS2A12U	22/10/2018	Made Ground, Weathered Oxford Clay - Peterborough member
Phenol	mg/l	0.0077	0.05	<0.00005	0.047	1	0	WS2A106_D	27/09/2018	Subgrade Fill, Oxford Clay - Peterborough Member

7.3.4 Leachate Exceedances

Five locations show leachate exceedances. The leachate exceedances appear to occur in discrete areas only copper exceeds the EQS at all leachate sample locations.

Samples WS2A122_C (1.0 m) and WS2ALOB_1D (0.3 m) record the largest number of exceedances with copper, nickel, zinc and sulphate exceeding the EQS at WS2A122_C while sulphate and selenium exceed the DWS. Copper, zinc, iron and lead exceed the EQS at WS2ALOB_1D, with iron also exceeding the DWS.

The sample from WS2A122_C is taken from subgrade fill located to the west of the track junction with Station road, Launton. This is also west of the former Launton Station and immediately south of a small surface water feature. This is the only exceedance of sulphate and selenium in leachate samples and there is no identified source for these substances. WS2ALOB_1D is taken from natural material (Alluvium) adjacent to Station road north of the former Launton Station junction.

Iron and copper also exceed the EQS at WS2A113_C located to the east of Bicester Road, while lead and copper exceed the EQS at WS2A102_C (in the eastern part of Route Section 2A) and WS2A104_U (taken from subgrade fill at rail embankments west of Station road, Marsh Gibbon).

The m-BAT tool was used to calculate the bioavailability for the metal exceedances of copper, zinc, manganese, nickel and lead for the leachate samples. The calculated bioavailability results show that all calculated bioavailability concentrations of copper, zinc, manganese and nickel are significantly below the EQS. Only one exceedance of lead recorded at WS2ALOB_1D still exceeded the EQS.

Considering the following lines of evidence, it is unlikely that exceedances of contaminants identified in soil leachate would represent a significant risk to identified controlled waters receptors:

Laboratory leachate testing is generally more aggressive than in-situ conditions and may not be representative of actual leaching conditions, potentially overestimating the concentrations;

All calculated bioavailability concentrations for the copper, zinc, nickel and manganese exceedances were within the EQS limit;

No licensed groundwater abstractions are present with 500 m of the route and the site is outside of a Gourndwater SPZ; and

The elevated concentrations of sulphate and iron, recorded in the soil-leachate samples are likely to be due to influences from the underlying geology and representative of background concentrations in the wider area.

7.3.5 Groundwater Exceedances

The 35 No. groundwater samples have been taken from 13 No, locations spread across Route Section 2A from the east of Bicester Road at approximate chainage 108400 (CP2AMFOB_2U) to the west of Main Street (connecting Marsh Gibbon with Twyford) and at approximate chainage 101400 (WS2A100_U). The samples were taken over four separate monitoring rounds from August to October 2018.

The data shows that copper exceeds the EQS at all monitored locations. Manganese exceeds both the EQS and DWS at all locations with the exception of CP2AMFOB_2U. Ammonium as NH4 exceeds the DWS at all monitored locations with the exception of WS2A121_U and WS2A123_D and WS2A124_U (which are located to the west of station road between chainages 107400 and 107600). Nickel and zinc also exceed the EQS at numerous locations across Route Section 2A.

The m-BAT tool was used to calculate the bioavailability of the metal exceedances of copper, zinc, manganese and nickel for the groundwater samples. The calculated bioavailability results show that only one copper concentration still exceeded the EQS at WS2A106_D (September 2018). The results for manganese show that at six locations (WS2A121_U, WS2A123_D, WS2ALOB_1D, WS2A109_U, WS2A12U, CP2ALLCDE) the bioavailable manganese concentration exceeded the EQS on all monitored occasions. Bioavailable zinc exceeds the EQS at three locations, WS2A106_D, WS2A14D and WS2A12U on all monitored occasions. Bioavailable nickel exceeds the EQS at WS2A106_D on all monitored occasions, with two exceedances at WS2A100_U and one exceedance at WS2A14D.

The Environment Agency Water Framework Directive Lead Screening Tool was used to assess the four recorded EQS exceedances of lead recorded at WS2A106_D and WS2A14D. The calculation showed that the available lead concentrations do not exceed the EQS.

Sulphate exceeds both the EQS and the DWS at the majority of monitored locations with the exception of CP2AMFOB_2U, WS2A121_U and WS2A123_D (all located in the western part of Route Section 2A between Bicester Road and Station Road). While iron exceedance is frequently associated with sulphate, the two September monitoring rounds only showed three EQS iron exceedances with seven exceedances of DWS. The October monitoring round shows additional iron exceedances with the exceedances spread across the Route Section 2A; however, the reason for this increase is unclear.

The elevated concentrations of iron are generally identified within groundwater samples collected from exploratory hole locations with monitoring well response zones installed within the Oxford Clay Formation and Cohesive Glacial Deposits (unproductive strata). The Oxford Clay Formation and cohesive Glacial Deposits are low permeability strata and therefore will significantly reduce the lateral migration of contaminants to surface water receptors.

There is one recorded exceedance of phenol across Route Section 2A at WS2A106_D (0.047 mg/l on 27/09/18). This location recorded the highest number of metal exceedances in the same monitoring round with many metals exceedances above the calculated bioavailable EQS. This is also the only location for the two recorded chromium exceedances. It is located immediately west of Station Road, Marsh Gibbon. Adjacent to the east of this road is the site of a former coal yard, which may be the source of the metal exceedances. Although the exceedances may have an agricultural source, as prior to the use as a coal yard, this area was the location of a cattle pen.

There are two locations where TPH has been identified above MDL in groundwater across Route Section 2A. There are no suitable generic assessment criteria for TPH. Location WS2A100_U at the eastern end of the Section 2A (west of main street) at chainage 101400. This location is to the south of the Portway Farm and CP2APOOB_1D situated between Bicester Road and Station road at a section of rail embankment to the south of the former Rhonhill Barn approximate chainage 105250. The TPH concentrations are only recorded during one groundwater monitoring round at each location, no visual or olfactory evidence of hydrocarbons were recorded during the borehole installations or groundwater monitoring rounds. There are no obvious sources of TPH at these locations.

In addition to TPHs, groundwater monitoring location CP2APOOB_1D also recorded the only exceedance of cadmium in Route Section 2A. The environmental quality standard for cadmium is dependent on the water hardness. The EQS is categorised based on the calcium carbonate in the sample. While there is no measure of calcium carbonate in the sample results, the EQS value ranges from 0.08 µg/l to 0.25 µg/l. The recorded concentration of 5 mg/l on 22/10/18 exceeds the highest EQS value. Cadmium can be present in agricultural products, given this is the only recorded exceedance and the only location, the exceedance may stem from a localised agricultural source.

7.3.6 Discussion

Of the two locations recording TPH, phenol and cadmium concentrations, location CP2APOOB_1D comprises a thin band of Topsoil overlying Made Ground comprising very stiff, sandy gravelly clay to a depth of 2.70 m bgl below which is the Oxford Clay Peterborough Member. Location WS2A100_U comprises 0.3 m of Made Ground comprising silt and stiff clay to a depth of 0.30 m bgl below which glacial cohesive deposits of stiff to very stiff clay extending to a depth of 5.0 m bgl, underlying which is stiff to very stiff clay of the Oxford Clay Peterborough Member. The impermeable nature of the Glacial and Oxford clay geological strata at these locations is likely to result in limited hydraulic continuity between groundwater and any surface watercourse. The Oxford Clay Formation is classified as Unproductive Strata will act as a barrier to both the horizontal and vertical flow of contaminants leaching from soil and in shallow groundwater. Given the distance between both of these locations and the Summerstown Ditch and Launton/Cutters Brook, it is highly unlikely that the contaminants at these locations represent a significant risk to controlled waters.

Given the geographically widespread and ubiquitous nature of the ammonium as NH4, sulphate, copper, manganese, nickel and zinc exceedances and the absence of potential sources of these contaminants, they are more likely representative of naturally occurring metals within the Oxford Clay and therefore reflective of the wider background chemistry.

The geological maps show a lack of superficial deposits in the area. The majority of the bedrock geology in Route Section 2A comprises Unproductive Strata. The Secondary A Aquifers are the Kellaways Sand Member and the Cornbrash Formation. The geological maps show the Kellaways Sand Member and Cornbrash Formation are located close to the surface in the west of Section 2A, however these units dip to the east and from Launton to the eastern boundary of Section 2A they occur at depth, overlain by impermeable strata of the Oxford Clay Formation. Shallow groundwater is unlikely to be in hydraulic continuity with groundwater in the principal aquifer of the White Limestone Formation due to the presence of impermeable clay layers that will act as barriers to vertical flow migration.

The Kellaways Sand Member is confined by both low permeable reworked Made Ground and by the Oxford Clay Formation. It is overlain by Made Ground in the Bicester area and directly overlain by the Oxford Clay Formation for most of Route Section 2A from Launton to the eastern section 2A boundary. This overlying clay forms a physical barrier, separating the Kellaways sand from any superficial deposits.

Directly underlying the Kellaways Sand is the Kellaways Clay Member, this serves as a physical impermeable barrier between the Kellaways Sand Secondary Aquifer and the Cornbrash Secondary Aquifer. The Cornbrash is itself separated from the Principal Aquifer at depth by the Forest Marble Formation. The aquifers are unlikely to be in hydraulic continuity with each other. Therefore, the potential for contaminants identified in shallow groundwater to migrate into the Secondary A Aquifer or to the Principal Aquifer at depth is considered to be low.

Two exploratory holes were extended to the Principal Aquifer (the White Limestone Formation). The groundwater encountered at these boreholes is artesian. The White Limestone is confined at depth by the overlying Forest Marble Formation. The Forest Marble is separated from the extensive Oxford Clay Formation by the Cornbrash Formation which is a Secondary A Aquifer. The lack of groundwater encountered in the Cornbrash Formation in some exploratory hole locations suggests this may not be a laterally hydraulically continuous aquifer. The Cornbrash Formation is a fractured limestone, geological logs state that the fractures have been infilled with clay at some locations, this may locally disrupt groundwater flow in the Cornbrash. Additionally, a couple of exploratory holes encounter the White Limestone Formation but do not contain artesian water. The yields from the Limestone Formation Aquifer may be variable and depend on whether a borehole intersects an interconnected system of water-filled openings/fractures. The artesian boreholes do not have groundwater monitoring installations, nor have they been sampled. However, due to the confined nature of this aquifer at depth, it is highly unlikely a viable pathway exists from the soils/leachate or groundwater to this aquifer, therefore there is no significant risk to this Principal Aquifer from the contaminant exceedances encountered in the groundwater samples.

7.3.7 Surface Water

A total of nine surface water samples were collected from three surface watercourse locations including the Langford Brook, the Summerstown Ditch and Launton and Cutters Brook and an unnamed drain/watercourse to the Summerstown Ditch, Launton and Cutters Brook located within Route Section 2A between August and October 2018. Surface water exceedances are outlined in Table 7.3. A more detailed assessment of the data is included in Appendix G.

Table 7.3 - Summary of Surface Water Exceedances

Determinand	Unit	Screening Value EQS (mg/l)	Min. Value	Max. Value	No. of EQS Exceedances	Locations of Exceedances	Monitoring Round	geology
Manganese	mg/l	0.33249	0.00079	0.36	6	2ASW3(S)	17/08/2018 28/08/2018 24/09/2018	Unnamed drain/ watercourse to the Summerstown Ditch and Launton and Cutters Brook
						2ASW4(S)	28/08/208 15/08/2018 08/10/2018	Summerstown Ditch and Launton and Cutters Brook
Iron	mg/l	1.0	<0.004	1.5	2	2ASW3(S)	24/09/2018	Unnamed drain /watercourse to the Summerstown Ditch and Launton and Cutters Brook
						2ASW4(S)	28/08/2018	Summerstown Ditch and Launton and Cutters Brook
Copper (dissolved)	mg/l	0.001	<0.0005	0.0041	6	2ASW1(E)	25/09/2018 28/08/2018 15/08/2018	Langford Brook
						2ASW3(S)	28/08/2018 24/09/2018	Unnamed drain/ watercourse to the Summerstown Ditch and Launton and Cutters Brook
						2ASW4(S)	08/10/2018	Summerstown Ditch and Launton and Cutters Brook
Nickel (dissolved)	mg/l	0.004	<0.0005	0.0069	2	2ASW3(S)	28/08/2018 24/09/2018	Unnamed drain / watercourse to the Summerstown Ditch and Launton and Cutters Brook
Zinc (dissolved)	mg/l	0.0109	0.0035	0.031	1	2ASW1(E)	15/08/2018	Langford Brook

Elevated concentrations of manganese were identified within all surface water samples collected from the Summerstown Ditch, Launton and Cutters Brook (2ASW4(S)) and the unnamed drain/watercourse to the Summerstown Ditch, Launton and Cutters Brook (2ASW3(S)). This is consistent with the groundwater data which showed elevated concentrations of manganese at all monitoring locations with the exception of CP2AMFOB_2U (the most westerly groundwater monitored location, closest to the Langford Brook which also records no manganese exceedance). There were no recorded WQS exceedances of manganese in the leachate samples. Where there are exceedances of manganese they are within the same order of magnitude as the WQS and are therefore considered to be marginal.

Elevated concentrations of copper occur at all three monitoring locations. The samples from the Langford Brook exceeded the EQS for copper on every monitored occasion. Additionally, there was an exceedance of copper within the Summerstown Ditch, Launton and Cutters Brook (2ASW4(S)) and two exceedances in the unnamed drain/watercourse to the Summerstown Ditch, Launton and Cutters Brook (2ASW3(S)). A soil leachate sample taken upstream of (2ASW4(S)) at WS2ALOB_1D shows the copper to exceed the EQS. All leachate samples recorded EQS exceedances of copper as did all groundwater monitoring locations.

Given the ubiquitous nature of manganese and copper exceedances in surface water across Route Section 2A and the lack of any obvious sources, it would suggest that manganese and copper concentration is likely to be due to influences from the underlying geology and representative of background concentrations in the wider area.

Monitoring location 2ASW3(S) also recorded two EQS exceedances of nickel. The groundwater monitoring locations in the vicinity WS2A121_U and WS2A123_D both also record EQS exceedances on more than one occasion. The only leachate sample in this area does not record a nickel exceedance, given the wide geographical spread of nickel exceedances in the groundwater in the region, it is likely to be representative of background concentrations.

The Summerstown Ditch, Launton and Cutters Brook (2ASW4(S)) and the unnamed drain/watercourse to this brook (2ASW3(S)) each record one marginal EQS iron exceedance. The groundwater sample upgradient of these surface water locations (WS2ALOB_1D) does not record a WQS exceedance of iron. Therefore, it is unlikely that groundwater is the source of this iron exceedance and that a pathway exists from the groundwater to the surface waters in this area.

There are no exceedances of sulphate or ammonium as NH4 (which widely exceeds WQS in the groundwater samples). There are also no PAH, TPH, VOC or SVOC exceedances in the surface water samples.

The m-BAT tool was used to calculate the bioavailability for all metal exceedances of copper, zinc, manganese and nickel in the surface water samples. The calculated bioavailability results show that for copper, nickel and manganese, all calculated bioavailability concentrations are below the EQS. One zinc exceedance that occurred in the Langford Brook (2ASW1(E)) still exceeded the EQS.

Route Section 2A contains very limited coverage of superficial deposits, with the superficial geology confined to very narrow alluvial channels associated with small watercourses. At many locations Made Ground/subgrade fill and/or cohesive glacial clay deposits directly overly the Oxford Clay. Groundwater was not encountered in many of the shallower boreholes during drilling. Given the nature of the Oxford Clay as lower permeability strata (classified as hydraulically unproductive), and the glacial cohesive deposits frequently comprising stiff to very stiff clays, suitable viable pathways from groundwater to the nearest surface water receptor are extremely limited.

The Summerstown Ditch, Launton and Cutters Brook was classified by the Environment Agency as having an overall water body classification of 'bad' in 2016. Therefore, considering the above lines of evidence, it is unlikely that exceedances of contaminants identified in surface water samples would represent a significant risk to identified controlled waters receptors.

7.4 Ground Gas Assessment

The preliminary ground gas risk assessment has been undertaken in general accordance with BS 8485:2015[34] code of practice for design of protective measures for methane and carbon dioxide ground gases for buildings, which provides a semi-quantitative assessment methodology for assessing the risk of permanent ground gas generation to buildings.

34 BS 8485:2015 +A1: 2019 - Code of Practise for the design of protective measures for methane and carbon dioxide ground gases for new buildings.

BS8485:2015 states that hazardous gas flow rates (Qhg) should be calculated for methane and carbon dioxide for every borehole for each visit and suggests the Qhgs be presented alongside the gas monitoring results in a database. Qhg is calculated using the maximum gas concentration recorded (unless lower values can be justified) and the steady state flow rate using the formula:

Qhg (l/hr) = flow rate (l/hr) x [gas concentration (%) / 100]

The Gas Screening Value (GSV) is the flow rate of a specific hazardous gas considered to be representative of a site, following assessment of all borehole concentrations and gas flow rates, whilst taking account of other influencing factors. Such factors being, for example, whether a response zone was completed flooded (which can compromise gas data), the temporal/spatial nature of the data set and the acute one-off nature of the risk.

BS8485:2015 indicates that a decision must be made to determine whether the maximum Qhg in the dataset is appropriate to represent the site (and thereby be selected as the GSV), or whether maximum gas concentrations and maximum steady state flow rates should be combined from any borehole/visit to derive a "worst case GSV".

The GSV considered representative for the site is then used to select a Characteristic Situation (CS), which is the ground gas regime assumed for design of gas protection measures for new buildings in accordance with BS8485:2015. The GSVs and CS are presented in Table 7.4

Adopting a GSV based on peak flow measurements (i.e. those measured initially after the gas tap is opened) might result in a disproportionately high gas hazard prediction and assignment of an over-precautionary GSV and Characteristic Situation (CS), leading to overly conservative gas protection measures being incorporated into the development.

BS8485:2015 does not include an approach for assessing carbon monoxide or hydrogen sulphide. The relevant Workplace Exposure Limits (WELs) as outlined within the HSE EH40/2015 (2011) document (Health and safety executive, 2011) have been adopted for use in a preliminary assessment of carbon monoxide and hydrogen sulphide. The WELs used for carbon monoxide and hydrogen sulphide have been provided below:

- Carbon monoxide: 30 parts per million (ppm) for long-term (eight hours) exposure limit and 200 ppm for short-term (15 minutes) exposure limit.
- Hydrogen sulphide: 5 ppm for the long-term exposure limit and 10 ppm for the short-term exposure limit.

Table 7.4 - Site Characteristic GSV and Associated Characteristic Situation (CS)

CS	Risk Classification	GSV (l/hr)	Additional Factors
1	Very Low Risk	<0.07	Typical methane <1 % and/or carbon dioxide <5 %. Otherwise consider increase to characteristic Situation 2.
2	Low Risk	<0.7	Borehole air flow rate not to exceed 70 l/hr. Otherwise consider increase to Characteristic Situation 3
3	Moderate Risk	<3.5	-
4	Moderate to High Risk	<15	Quantitative risk assessment required to evaluate scope of protective measure
5	High Risk	<70	-
6	Very High Risk	>70	-

7.4.1 *Carbon dioxide and Methane Results*

The Q_{hg} of each monitoring well has been calculated and a summary of the maximum gas concentrations and steady state flow rates for each monitoring location is presented in Table 7.5.

Table 7.5: Ground Gas Assessment

Location	Strata	Max. Peak Recorded conc. (% v/v)		Max. Steady State Flow Rate (l/hr)	Qhg (l/hr) calculated for each well*#		Gas Screening Value (l/hr)	Response Zone Flooded?
		Carbon Dioxide	Methane		Carbon Dioxide	Methane		
CP2ALLCDE	Alluvium and Oxford Clay - Peterborough Member	14.5	0.1	0.2	0.029	0.0002	<0.07 (CS2)	Yes
CP2AMFOB_2U	Oxford Clay - Peterborough Member, Kellaways Clay Member, Cornbrash Limestone, Forest Marble Formation	1.4	19.3	0.3	0.0042	0.0579	<0.7 (CS2)	Yes
CP2APOOB_1D	Oxford Clay - Peterborough Member, Kellaways Sand Member	5.8	0.1	0.5	0.029	0.0005	<0.7 (CS2)	Yes
WS2A100_U	Glacial Deposits Cohesive, Oxford Clay - Peterborough Member	2.5	0.4	0.3	0.0075	0.0012	<0.07 (CS1)	Yes
WS2A103_U	Subgrade Fill, Oxford Clay - Peterborough Member	1.7	0.1	0.3	0.0051	0.0003	<0.07 (CS1)	Yes
WS2A106_D	Oxford Clay - Peterborough Member	0.7	0.1	0.2	0.0014	0.0002	<0.07 (CS1)	Yes
WS2A121_U	Alluvium, Kellaways Sand Member	2.1	0.1	0.3	0.0063	0.0003	<0.07 (CS1)	Yes
WS2A123_D	Kellaways Clay Member	5.8	0.1	0.4	0.0232	0.0004	<0.7 (CS2)	Yes
WS2A124_U	Kellaways Clay Member	3.6	0.1	0.4	0.0144	0.0004	<0.07 (CS1)	Yes
WS2A12U	Oxford Clay - Peterborough Member	0.9	0.1	0.1	0.0009	0.0001	<0.07 (CS1)	Yes
WS2A14D	Oxford Clay - Peterborough Member	0.5	0.1	0.6	0.003	0.0006	<0.07 (CS1)	Yes
WS2A16U	Oxford Clay - Peterborough Member	7.2	0.1	0.3	0.0216	0.0003	<0.7 (CS2)	Dry

Location	Strata	Max. Peak Recorded conc. (% v/v)		Max. Steady State Flow Rate (l/hr)	Qhg (l/hr) calculated for each well*#		Gas Screening Value (l/hr)	Response Zone Flooded?
		Carbon Dioxide	Methane		Carbon Dioxide	Methane		
WS2AFCGF15U	Oxford Clay - Peterborough Member, Kellaways Sand Member	1.3	0.1	0.5	0.0065	0.0005	<0.07 (CS1)	Yes
WS2ALOB_1D	Alluvium, Oxford Clay - Peterborough Member, Kellaways Clay Member, Kellaways Sand Member	0.3	0.1	0.3	0.0009	0.0003	<0.07 (CS1)	Yes

*Maximum gas concentrations combined with maximum steady state flow recorded on any site visit

#Note: where gas concentrations have been recorded as <0.1 % v/v, a value of 0.1 % has been used in calculation of the Q_{hg} and where the maximum steady state flow rate is negative, the value has been converted to a positive flow rate.

The potential sources of ground gas along Route Section 2A are considered to be the landfills around Calvert approximately 120 m to 700 m to the south east of the redline boundary, the anthropogenic materials (Made Ground / Fill material) which are present with variable thicknesses (as listed in Table 6.1) from ground level up to 5.40 m bgl and localised areas of Alluvium associated with watercourses around Station Road in Launton which was recorded between the depths of 0.15 m and 6.0 m bgl (with a thickness of 0.10 – 1.60 m).

The response zones of the monitoring wells were flooded during the gas monitoring rounds, with the exception of WS2A16U which was dry on all monitoring occasions. It is noted that gas data collected from flooded response zones may not be representative of the site gas regime (e.g. methane could be dissociating from groundwater into the artificially created void of the well). In addition, it is noted that gas monitoring installations did not target the Made Ground. However, installations were located within the Alluvium and within the vicinity of the landfills.

Atmospheric pressures were found to be between 1009 mb and 1037 mb during the monitoring rounds, with pressures found to be falling on four visits (3 September 2018, 6 September 2018, 26 September 2018 and 27 September 2018). Steady state flow rates within all of the installations ranged between <0.2 l/hr and 0.5 l/hr, with slightly negative flow rates recorded occasionally. The highest negative flow rate was in WS2A16U installed within the Oxford Clay where a maximum steady state flow of -0.2 l/hr recorded. This negative flow was associated with falling atmospheric pressures. The highest positive flow rate of 0.6 l/hr was recorded in WS2A14D installed within the Oxford Clay Peterborough Member. This flow rate was recorded over a period of falling atmospheric pressure.

Recorded methane concentrations were generally less than 1% v/v, apart from CP2AMFOB_2U installed within the Oxford Clay, Kellaways Clay, Cornbrash Limestone, Forest Marble Formation, where methane was recorded at 19.3% v/v in the August 2018 monitoring round. During two subsequent gas monitoring rounds undertaken in September 2018 concentrations of methane were recorded at <0.1% v/v. CP2AMFOB_2U is located approximately 130 m west of Compound A1. It is noted that gas flow was recorded in this location (0.3 l/hr) and given the response zone in the Cornbrash and Marble Forest Formations, this may be due to changes in groundwater levels. Atmospheric pressures remained high, falling on the second monitoring round and rising on the final monitoring round. There are no obvious sources of methane (including no landfills) in the vicinity of this location either historical or current and it is therefore considered that the result is either the result of operator error when the monitoring was undertaken or potentially due to shale units within the Kimmeridge Clay in the vicinity of this borehole.

Elevated concentrations of carbon dioxide greater than 5 % v/v were identified were identified within four monitoring wells CP2ALLCDE (80 m west of Compound A2), CP2APOOB_1D (244 m north west of Compound A2), WS2A123_D (242 m north west of Compound A2) and WS2A16U (357 m north east of Compound A2) installed within the Alluvium, Oxford Clay, Kellaways Sand and the Kellaways Clay. A maximum carbon dioxide concentration of 14.5% v/v was recorded within CP2ALLCDE. These elevated concentrations are considered to be naturally derived. In addition, none of these locations are located near (>500 m) to the historical landfills around Calvert or screened over Made Ground strata.

It is noted that low flow rates were recorded in the five monitoring wells where elevated concentrations of methane and carbon dioxide were identified on all monitoring rounds, with a maximum flow of 0.5 l/hr. Carbon dioxide concentrations were also recorded at concentrations below 5% v/v on subsequent monitoring rounds excluding WS2A16U.

In locations were elevated concentrations of methane and carbon dioxide were recorded no new permanent enclosed structures are proposed to be constructed within these areas as part of the works. The temporary site accommodation within Compounds A1 and A2 will be modular portacabins and/or shipping container type units raised with a ventilated void beneath and these structures have therefore been excluded as 'built environment' receptors.

Based on the results, the Characteristic Situation for Route Section 2A has been assessed as CS2 (low risk), which would require gas protection measures in accordance with BS8485:2015[34] to be incorporated within buildings / structures. It is noted that this is based on the results recorded to date and that gas monitoring is ongoing at the time of writing this report (November 2018). However, as there are no enclosed spaces it is unlikely that gas protection measures will be required to be installed.

7.4.2 Carbon Monoxide and Hydrogen Sulphide

Concentrations of carbon monoxide and hydrogen sulphide were recorded below the instrument's limit of detection in the majority of monitoring locations.

The maximum concentration of hydrogen sulphide was recorded at 2 ppm which does not exceed the short or long-term exposure limits for hydrogen sulphide. The maximum concentration of carbon monoxide was recorded at 5 ppm in CP2AMFOB_2U installed within the Oxford Clay, Kellaways Clay Member, Cornbrash Limestone, Forest Marble Formation which does not exceed the short or long term-exposure limits for carbon monoxide.

7.5 Structures and Embankments

Parts of the Route Section 2A are to be regraded and in some areas, earthworks will have a wider profile than the existing degraded and over-steep earthworks. As a result, several existing structures, including bridges and culverts, will require modification.

Piled foundations up to c. 20 m bgl are proposed for several of the structures along Route Section 2A including the level crossings at Charbridge Lane (and retaining wall), Manor Farm, Station Road (Launton) and the overbridge at Marsh Gibbon Farm. In addition, mini piled foundations (up to c.15-20 m bgl) are also to be used. The groundwater is important when considering structures where piled foundations are to be used, especially in Route Section 2A where artesian water has been identified and a qualitative and potentially quantitative foundation / piling risk assessment may be required to be produced for the proposed works.

A geotechnical assessment is outside of the scope of this report and aggressive ground conditions and the potential implications to buried structures will need to be considered separately as part of the geotechnical investigation report.

7.6 Earthworks and Material Re-use

The existing earthworks and trackbed are to be engineered in order to achieve a new profile. This will comprise widening embankments and cuttings, reengineering slopes, raising track levels in some areas and reducing track levels in other areas, and locally using retaining structures.

Material can be re-used on-site if, among other criteria, it can be demonstrated that it does not pose a potential risk to human health or the environment. Based on the sampling and laboratory testing undertaken, there are not considered to be a significant risk to human health or controlled waters from contaminants detected in soils from the site. Whilst no asbestos has been recorded in Route Section 2A to date, the potential for asbestos to be present is still a significant risk and additional testing and assessment is required prior to reusing these materials.

Appropriate and representative geotechnical and environmental sampling and laboratory analysis of the material excavated will be required with detected concentrations compared to appropriate site specific re-use criteria to confirm suitability for re-use or otherwise prior to placement on-site, with material managed under the CL:AIRE Definition of Waste Code of Practice (DoWCoP). An MMP will need to be developed for the Project, including for each Route Section. A watching brief will need to be kept for any soils with visual/olfactory evidence of contamination during the earthworks.

In addition, the Code of Construction Practice (CoCP) and Construction Environment Management Plan (CEMP) will detail minimum requirements with respect to materials and waste management on site. This will include testing requirements, record keeping and reporting requirements relating to the movement, storage and placement of materials within the scheme.

The soils are likely to present a low risk to human health and Controlled Waters. However, the risk to Controlled Waters may need to be further assessed as part of a Piling Risk Assessment which is to be prepared for the proposed structures along the route. The Piling Risk Assessment will consider the potential for the creation of preferential pathways as part of the works and identify suitable mitigation measures if required.

7.7 Preliminary Classification of Waste

To classify materials that may potentially be excavated across the site during construction works and require disposal to landfill, a number of steps are required as part of the WM3 Regulations[35] and the current waste management legislation and guidance. The initial steps are to identify:

- If the materials are waste;
- Whether the waste is required to be classified at all;
- The relevant EU List of Waste codes;
- The chemical composition of the material; and
- If the substances in the waste are ‘hazardous substances’ or ‘Persistent Organic Pollutants’.

Material that is surplus to requirements and where there is no clear strategy for reuse on-site is classified as waste and should be disposed of in accordance with Duty of Care as specified in the current waste management legislation and guidance[36]. If material is destined for landfill, Waste Acceptance Criteria (WAC) analysis will be required to demonstrate to the landfill that the material is acceptable for disposal at the specific landfill.

A preliminary waste assessment has been undertaken based on analysed concentrations of contaminants in the soil samples obtained during the site investigations and using Atkins’ on-line waste classification tool (CatWaste^{Soil})[37].

A total of 56 No. soil samples were assessed using CatWaste^{Soil}. The results of the assessment indicate that the majority of samples would be classified as non-hazardous waste. The waste assessment results are included in Appendix H.

This classification is based on a limited number of samples and any actual material to be removed off-site for disposal must be appropriately classified and agreed with the chosen landfill operator. It is the responsibility of the waste producer to classify, treat, manage and dispose of waste appropriately and to ensure the chosen landfill is licensed to accept such material. WAC testing will be required if the material is destined for landfill

35 Environment Agency (2015) Waste Classification - Guidance on the classification and assessment of waste. Technical Guidance WM3.

36 DEFRA (2016) Waste Duty of Care Code of Practice.

37 Atkins (2018) Cat-WasteSOIL. online www.catwastesoil.co.uk. Accessed October 2018.

8. Revised CSM

8.1 Introduction

The findings of the GIs, GQRA and gas assessment have been used to update the PCSM presented in Section 4. The risk categorisations presented are based on an assessment of the potential consequence of each PCL occurring along with the likelihood that each PCL will occur in accordance with the methodology outlined in Section 4.

The revised CSM has been developed taking into account the proposed final development upon completion of the works. It has also been assumed that the following mitigation measures will be implemented during the construction and operation of the Project:

- Implementation of measures in the CoCP such as good management of stockpiles, implementation of pollution incident control e.g. plant drip trays, dampening down of dust and spill kits;
- Implementing an appropriate Soils Management Plan (SMP), MMP and Site Waste Management Plan (SWMP) as required to provide assessment of the suitability of soils for re-use, storage, validation and the appropriate destination for waste;
- Implementation of a watching brief during site clearance and excavation works to identify any areas of suspected contamination and ensure appropriate management; and
- The Project will be operated in accordance with the relevant regulations and best practice guidance.

As with the preliminary CSM, future construction and ground maintenance workers are excluded from the revised CSM, as such risks should be addressed through their employers' health and safety risk assessments and work procedures. The revised CSM is presented in Table 8.1 below

Table 8.1 - Revised CSM for Route Section 2A

Source	Receptor	Pathway	Probability	Consequence	Risk Classification	Comment
On-site Made Ground, Ballast, Trackbed Layers, Subgrade Fill and Embankment Fill Shallow groundwater *(Metals, inorganics and TPH)*	Human (on-site) Members of the public using public rights of way to cross the railway, level crossings, stations, bridges, agricultural land and public footpath/cycle tracks along the railway corridor	Dermal contact with, inhalation and/or ingestion of contaminants in soil, soil-derived dusts and water	Low likelihood	Mild	Low risk	The results of the screening have indicated no exceedances of the human health GAC for a public open space or commercial end use in the soil samples analysed and no exceedances of the WSV for a commercial end use in the groundwater samples analysed. This indicates that there are unlikely to be significant risks to on-site and off-site human receptors from contaminants detected in soils and groundwater underlying the site.
		Inhalation of asbestos fibres	Unlikely	Severe	Moderate/Low risk	No asbestos fibres or Asbestos Containing Material were identified within any of the soil samples tested. Soil will be placed under compacted hardcover or vegetation so likelihood of dust generation following construction is low. However, the potential for asbestos to be present is still a significant risk and additional testing and assessment by a suitably qualified asbestos specialist is required prior to the re-use of materials to confirm the suitability of material for re-use on-site.
		Inhalation of ground gases and/or vapours	Low Likelihood	Mild	Low risk	The ground gas regime at the site has been initially classified as CS2 (low risk), which would require gas protection measures to be incorporated within buildings / structures in accordance with BS8485:2015. In addition, given the elevated concentrations of

Source	Receptor	Pathway	Probability	Consequence	Risk Classification	Comment
						methane and carbon dioxide recorded in natural soils across the site care should be taken when entering excavations during construction. However, no enclosed spaces are being proposed as part of the design, therefore the need for gas protection measures is considered to be unlikely. The results of the PID screening indicate that volatiles within soil samples are low. In addition, PAHs, TPH, VOC and SVOC results in soil and groundwater were either below detection limits or only trace concentrations were recorded. Volatiles in groundwater samples were found to be below the WSV. Therefore, it is considered that there are unlikely to be significant vapour risks to on-site human receptors from contaminants detected in soils from the site.
	<u>Human (off-site)</u> Residents living adjacent to Route Section 2A in Bicester, Launton and Charndon. Workers in adjacent commercial / industrial properties in Bicester. Members of the public	Dermal contact with and / or ingestion of contaminants in windblown soil-derived dusts and water which may have migrated off-site. Inhalation of contaminants in windblown dust which may have migrated off-site	Low likelihood	Minor	Very Low risk	There were no exceedances of the human health GAC for a public open space or commercial end use in the soil samples analysed. It is therefore considered that there are unlikely to be significant dermal contact risks to off-site human receptors from contaminants detected in soils from the site. The ground gas regime at the site has been initially classified as CS2 (low risk). Volatile compounds in soil and groundwater were identified at either at or just above detection

Source	Receptor	Pathway	Probability	Consequence	Risk Classification	Comment
	accessing the surrounding area adjacent to Route Section 2A including station and road users Farmers working on nearby agricultural land	Inhalation of ground gases and / or vapours which may have migrated off-site				limit. It is unlikely based on these results and the geology that significant migration of gas or vapour off site is likely, therefore there is a very low risk.
		Inhalation of asbestos fibres which may have migrated off-site	Unlikely	Severe	Moderate/Low risk	No asbestos fibres or Asbestos Containing Material were identified within any of the soil samples tested. Soil will be placed under compacted hardcover or vegetation so likelihood of dust generation following construction is low. However, the potential for asbestos to be present is still a significant risk and additional testing and assessment by a suitably qualified person is required prior to the re-use of materials to confirm the suitability of material for re-use on-site.
	Controlled Waters (on- and off-site) Secondary A Aquifers Principal Aquifer	Leaching and migration of contaminants (free and dissolved phase) from soils in the unsaturated zone into groundwater in underlying aquifers Migration of contaminants via preferential pathways such as via piles or track drainage to deeper groundwater	Low likelihood	Mild	Low risk	Exceedances of metals and inorganics were recorded in leachate and groundwater samples tested. However, given the widespread nature of the exceedances and the lack of an identified source it is considered likely that these elevated concentrations are due to influences from the underlying geology and representative of background concentrations in the wider area. The underlying Secondary A Aquifer is not considered to be in hydraulic connectivity with the shallow groundwater sampled at site and the Alluvium Secondary A Aquifer is

Source	Receptor	Pathway	Probability	Consequence	Risk Classification	Comment
						considered to be of limited extent. The groundwater sampled at site is taken from boreholes with response zones in unproductive strata. Deeper groundwater within the Secondary A and Principal Aquifers is geologically separated by lower permeability Made Ground/stiff cohesive clays and the Oxford Clay. Additionally, there are no licenced groundwater abstractions within 500m of the site and the site is not within a groundwater SPZ. Therefore, it is highly unlikely the exceedances in the soil leachate and groundwater would present a risk to the Secondary A or Principal Aquifers. However, foundation / piling risk assessments may be required to be produced for the proposed works. Groundwater will be further assessed as part of the Piling Risk Assessment which will consider the potential for the creation of preferential pathways and identify suitable mitigation measures if required.
	<u>Controlled Waters (on- and off-site)</u> <u>Surface Waters</u> Langford Brook, Summerstown Ditch, Launton and Cutters Brook, Grebe Lake	Discharge of contaminants entrained in surface water runoff followed by overland flow and discharge Leaching and migration of contaminants (free and dissolved phase)	Low likelihood	Mild	Low risk	Exceedances of metals were recorded in surface water samples tested. However, it is considered likely that these elevated concentrations are due to influences from the underlying geology and representative of background concentrations in the wider area.

Source	Receptor	Pathway	Probability	Consequence	Risk Classification	Comment
		from soils in the unsaturated zone into groundwater then lateral migration into surface water features Migration of contaminants via preferential pathways such as track drainage or service runs to surface water				Route Section 2A contains very little coverage of superficial deposits, with the superficial geology confined to very narrow alluvial channels associated with small watercourses. At many locations Made Ground/subgrade fill and/or cohesive glacial clay deposits directly overly the Oxford Clay. Groundwater was not encountered in many of the shallower boreholes. Given the nature of the Oxford Clay as lower permeability unproductive strata, and the glacial cohesive deposits frequently comprising stiff to very stiff clays, suitable viable pathways to the nearest surface water receptor are extremely limited. Therefore, the exceedances identified in soil leachate and groundwater are considered unlikely to represent a significant risk to surface water receptors.
	Property (on-site) Existing structures and services and track drainage Future structures and services	Direct contact of new and existing structures with contaminants in soils and/or groundwater	Low Likelihood	Mild	Low risk	The results of the screening have indicated that concentrations of metals, PAHs and TPH were reported at low concentrations within soil samples. Slightly elevated concentrations of metals, TPH and inorganics were recorded in leachate and groundwater samples. This indicates that there are unlikely to be significant risks to on-site property receptors from contaminants detected in soils and groundwater underlying the route.

Source	Receptor	Pathway	Probability	Consequence	Risk Classification	Comment
						However, aggressive ground conditions (particularly sulphate) and the potential implications to buried structures will need to be assessed further as part of the geotechnical investigation report
		Migration of ground gases or vapours along preferential pathways including permeable ground, track drainage, service trenches and service entry points and accumulation in enclosed spaces such as buildings, service ducts or access points.	Low likelihood	Mild	Low risk	The ground gas regime at the site has been initially classified as CS2 (low risk), which would require gas protection measures to be incorporated within buildings / structures in accordance with BS8485:2015. In addition, given the elevated concentrations of methane and carbon dioxide recorded in natural soils across the site care should be taken when entering excavations during construction. However, no enclosed spaces are being proposed as part of the design, therefore the need for gas protection measures is considered to be unlikely. In addition, risks from vapours are considered to be low, as concentrations of volatile contaminants have been reported to be low within soil and groundwater samples along the route.
	<u>Property (off-site)</u> Existing residential houses and commercial properties	Direct contact of new and existing structures with contaminants in soils and/or groundwater that has migrated off-site	Low likelihood	Mild	Low risk	The results of the screening have indicated that concentrations of metals, PAHs and TPH were reported at low concentrations within soil samples. Therefore, there is unlikely to be significant risks to off-site property receptors from contaminants detected in soils and groundwater underlying the route.

Source	Receptor	Pathway	Probability	Consequence	Risk Classification	Comment
		Migration of ground gases or vapours along preferential pathways including permeable ground, track drainage, service trenches and service entry points and accumulation in enclosed spaces such as buildings, service ducts or access points	Low likelihood	Mild	Low risk	The ground gas regime at the site has been initially classified as CS2 (low risk). However, elevated concentrations of ground gas were recorded in natural strata. Low gas flow rates were also recorded ranging between <0.1 l/hr and 0.6 l/hr. Volatiles were identified at or just above detection limit in soil and groundwater samples. Therefore, there is low potential for ground gas and / or vapour to migrate off-site and risks to off-site property receptors are considered to be low.
Off-site Agricultural activities within the surrounding area. The operation of and Made Ground, infilled ground and worked ground associated with historical landfills located adjacent to the east and south east of Route Section 2A around Calvert. Activities relating to the former gas works and brick works located approximately 480 m to the south west of Route Section 2A. Allotments adjacent to the north of Route Section 2A.	Human (on-site) Members of the public using public rights of way to cross the railway, level crossings, stations, bridges, agricultural land and public footpath/cycle tracks along the railway corridor	Dermal contact with and/or ingestion of contaminants in soil, soil-derived dusts and water which have migrated onto site Inhalation of contaminants in soils/dust including asbestos fibres which have migrated onto site Inhalation of ground gases and/or vapours which have migrated onto site	Low Likelihood	Minor	Very low risk	The areas surrounding Route Section 2A are covered with hardstanding or vegetated, which will reduce dust generation and therefore limit the potential for dermal, inhalation and ingestion pathways. Also, the low permeability geology means that the potential for migration is low. Therefore, it is considered that there are unlikely to be a significant risk to on-site human receptors from off-site soils.
	Controlled Waters - Aquifers (On Site) Secondary A Aquifers	Leaching and migration of contaminants (free and dissolved phase)	Low Likelihood	Minor	Very low risk	Exceedances of metals were recorded in the leachate and groundwater samples tested. However, given the widespread nature of

Source	Receptor	Pathway	Probability	Consequence	Risk Classification	Comment
Commercial and Industrial units to the west of Route Section 2A in Bicester including petrol station, garages, engineering works, printers, electronic manufacturers and metal works Coal yard and Smokeless Fuel Merchants and Distributors (Old Station Marsh Gibbon) adjacent to the south of Route Section 2A. Gas distribution and compressor station adjacent to the north of Route Section 2A in Bicester Graveyard *(A range of inorganic and recalcitrant organic contaminants including heavy metals, hydrocarbons, fuels / oil, PAH, TPH, PCB, coal tar, asbestos, pesticides, herbicides, Total Viable Colonies, E. Coli, Faecal coliform and Faecal*	Principal Aquifer	from soils in the unsaturated zone into groundwater in underlying aquifers Migration of contaminants via preferential pathways such as track drainage Lateral migration of contaminants in groundwater.				the exceedances and the lack of an identified source it is considered likely that these elevated concentrations are due to influences from the underlying geology and representative of background concentrations in the wider area. The widespread extensive nature of the inorganic WQS exceedances in the groundwater (ammonium as NH4 and sulphate) across Section 2A and the lack of ammonium exceedance in the leachate samples (with only one recorded sulphate exceedance) suggest that the inorganic exceedances most likely originate from an off-site source potentially of an agricultural nature. The underlying Secondary A Aquifers are unlikely to be in hydraulic connectivity with the shallow groundwater sampled at site. The Secondary A and Principal Aquifers are geologically separated by impermeable Made Ground/stiff cohesive clays and the Oxford Clay Formation. There will also be limited lateral migration between borehole locations. Given that there are no licensed groundwater abstractions present within 500 m of the route, it is considered unlikely that off-site contamination would present a risk to the underlying on-site Secondary A or Principal Aquifers. However, foundation / piling risk assessments may be required to be produced for the proposed works.

Source	Receptor	Pathway	Probability	Consequence	Risk Classification	Comment
streptococci, leachate and the potential for ground gas generation (methane, carbon dioxide, hydrogen sulphide and carbon monoxide).	Controlled Waters– Surface Waters (on - site) Langford Brook, Launton Brook and Summerstown Ditch	Discharge of contaminants entrained in surface water runoff followed by overland flow and discharge Leaching and migration of contaminants (free and dissolved phase) from soils in the unsaturated zone into groundwater in underlying aquifers Migration of contaminants via preferential pathways. Lateral migration of contaminants in groundwater with discharge to surface water as base flow.	Low Likelihood	Minor	Very low risk	Limited exceedances of metals were recorded in surface water samples tested. However, the calculated bioavailability concentrations of the metal exceedances showed that only one concentration of zinc still exceeded the EQS. All other exceedances do not pose a significant risk to surface waters. It is considered likely that these elevated concentrations are due to influences from the underlying geology and representative of background concentrations in the wider area. Given the impermeable nature of the strata underlying the route, there are very limited viable pathways to the watercourses from off-site sources. Therefore, the risk to on-site surface water receptors from off-site contamination is considered to be low.
	Property (on-site) Existing structures and services and track drainage Future structures and services	Direct contact of new and existing structures with contaminants in groundwater Migration of ground gases or vapours along preferential pathways including permeable ground, track drainage, service trenches and	Unlikely	Minor	Very low risk	The areas surrounding Route Section 2A are covered with hardstanding or vegetated, which will reduce the potential for inhalation and vapour pathways. Limited flow rates have been identified during gas monitoring, therefore it is unlikely that there is a significant flow and migration of gas and vapour onto site. Therefore, it is considered that there are unlikely to be significant risks

Source	Receptor	Pathway	Probability	Consequence	Risk Classification	Comment
		service entry points and accumulation in enclosed spaces such as buildings, service ducts or access points				to on-site property receptors from off-site soils.

9. Conclusions and Recommendations

Route Section 2A is approximately 8.5 km in length running between Bicester in the west and Charndon in the east and has a general southwest-northeast orientation, along the existing OXD line. The existing single track OXD Line within Route Section 2A will be double tracked to current design standards as part of the proposed works.

This Contaminated Land Risk Assessment report has been prepared for Development Stages 2A1, 2A2, 2A3 and 2A4 including offline highways located within Oxfordshire County Council, Buckinghamshire County Council, Cherwell District Council and Aylesbury Vale District Council jurisdiction to provide a summary of the available ground investigation (GI) data for Route Section 2A of the East West Rail Phase 2 (EWR2) Project to support the proposed construction works along the route and to discharge Condition 11 of the Network Rail (East West Rail Bicester to Bedford Improvements) Order.

Two geo-environmental intrusive GIs have been carried out along Route Section 2A including a GI undertaken in 2016 by WSP for GRIP 3 and a GI which was undertaken by the Alliance between 2017 and 2018 for GRIP 4. The investigations comprised the drilling and excavation of 157 No. exploratory locations in total including trial pits, dynamic probing, window sampling and dynamic sampling with rotary follow on. Soil, leachate, groundwater and surface water samples were collected and tested as part of the GIs. Groundwater level and gas monitoring has also been undertaken.

The route comprises railtrack at grade, on embankments and in cuttings and the thickness of the underlying railway substructure reflects that change. Underlying the railway substructure, and Topsoil where present, the natural ground comprises Alluvium associated with watercourses around the Station Road Launton end of Route Section 2A and Glacial Till, which was locally present in areas of higher topography in the eastern section of the Route. The superficial deposits and railway substructure overlay the solid strata of the Oxford Clay Formation across much of Route Section 2A, with the underlying Kellaways Formation (comprising a sand and clay member) sub cropping below the superficial soils towards the western (Bicester) end of Route Section 2A from Marsh Gibbon. The Cornbrash, Forest Marble, White Limestone and Rutland Formations were encountered underlying the Kellaways Formation in the west end of Route Section 2A.

Groundwater strikes were recorded within the Ballast, Subgrade Fill, Trackbed Layers, Made Ground, Alluvium, Glacial Deposits, Oxford Clay, Kellaways Clay Member, Kellaways Sand Member, Cornbrash Limestone and Forest Marble Limestone and the White Limestone Formation. The majority of groundwater samples are taken from boreholes within response zones in the Alluvium, Oxford Clay Formation and Kellaways Sand Member.

The only groundwater level noted in the western most part of Section 2A is the artesian borehole encountered at CP2AJLFB_2U, chainage 109300 (south of the track line and immediately south west of Jarvis Lane, Bicester). Groundwater at this location rose to 2.85 m above ground level. There are no other groundwater dip levels data for the western part of Route Section 2A (the nearest dips are taken from borehole CP2AMFOB_2U at chainage 108400), however it can be inferred that groundwater flow is most likely in an easterly direction at location CP2AJLFB_2U towards Langford Brook. A second artesian borehole was encountered a third of the way along Route Section 2A at CPA2ALOB_1D (chainage 107000), immediately east of the junction between the track line and Station Road in Launton. The groundwater at this location initially rose to 0.30 m above ground level but had risen to 5.0 m above ground level approximately two weeks after borehole installation. Groundwater dip data in this area shows that groundwater is likely to flow in a westerly/south westerly direction. The artesian groundwater was encountered within the White Limestone Formation, this Principal Aquifer is encountered at depth below Section 2A and is confined by the Forest Marble Formation.

The results of the screening have indicated that there were no exceedances of the human health GAC and WSV for a commercial end use or public open space (parks) end use in the soil and groundwater samples analysed, indicating that there are unlikely to be significant risks to on and off-site human and property receptors from contaminants detected in soils and groundwater underlying the site.

Leachate testing of soils identified limited exceedances of metals and inorganics in the five locations sampled along the route. Exceedances of metals, inorganics and TPH were also recorded in the groundwater samples tested. However, it is considered likely given the widespread geographical distribution of the exceedances that these elevated concentrations of metals and inorganics are due to influences from the underlying geology and representative of background concentrations in the wider area.

TPH concentrations exceedances were identified above the MDL in the groundwater at two monitoring locations across Section 2A (WS2A100_U and CP2APOOB_1D) on one monitoring round per location. The recorded concentrations are considered to be marginal and were not identified during later monitoring rounds. The geology at WS2A100_U comprises Made Ground of sandy silt and stiff friable clay overlying glacial cohesive deposits of stiff to very stiff clay. While the geology at CP2APOOB_1D comprises Made Ground of silty clay and very stiff clay overlying the stiff to very stiff clay of the Oxford Clay Peterborough Member. The nature of the geology at both locations is stiff lower permeability unproductive strata, therefore it is extremely unlikely that a suitable viable pathway exists from either of these locations to Secondary A or Principal Aquifers or to the nearest surface water receptor. Additionally, WS2A100_U is located over 500 m away from a surface receptor. It is considered unlikely that the concentrations identified in soil leachate and groundwater would represent a significant risk to identified groundwater receptors. Groundwater may be further assessed as part of the Piling Risk Assessments which will be produced for the proposed works to assess the potential for the creation of preferential pathways and identify suitable mitigation measures if required.

Surface water testing identified limited exceedances of metals within the Summerstown Ditch, Launton and Cutters Brook, the unnamed drain/watercourse to the Summerstown Ditch, Launton and Cutters Brook and within Langford Brook. However, it is considered likely that these elevated concentrations of metals are due to influences from the underlying geology and representative of background concentrations in the wider area. The calculated bioavailability of the copper, manganese and nickel exceedances did not exceed the EQS. Additionally, the lack of superficial deposits in the area and the underlying low permeability strata shows that the surface water courses will unlikely be in hydraulic continuity with the underlying Secondary A or Principal Aquifers. The lack of hydraulic continuity and the stiff to very stiff lower permeability clays that underlie the site will make the viability of any migratory pathway from the soil leachate to the surface watercourses highly unlikely. Therefore, it is considered unlikely that the exceedances identified in soil leachate and groundwater would represent a significant risk to the identified surface water receptors.

The ground gas regime at the site has been initially classified as CS2 (low risk), which may require special gas protection measures to be incorporated within buildings / structures in accordance with BS8485:2015. In addition, given the elevated concentrations of methane and carbon dioxide recorded in natural soils across the site care should be taken when entering excavations during construction.

The results of the soil and groundwater screening indicate that there are unlikely to be significant risks to property receptors from contaminants detected in soils and groundwater underlying the route. However, aggressive ground conditions and the potential implications to buried structures will need to be assessed further as part of the geotechnical investigation report and incorporated into the Project design.

Appropriate and representative geotechnical and environmental sampling and laboratory analysis of the material excavated and proposed to be re-used will be required with detected concentrations compared to appropriate re-use criteria to confirm suitability for re-use of material on-site or otherwise, with material managed under the CL:AIRE DoWCoP and following a MMP. In addition, although no asbestos fibres or Asbestos Containing Material were identified within the soil samples tested, the potential for asbestos to be present is still a significant risk and additional testing and assessment by a suitably qualified asbestos specialist is required prior to the re-use of materials to confirm the suitability of material for re-use on-site.

Material that is surplus to requirements and where there is no clear strategy for reuse on-site is classified as waste and should be disposed of in accordance with Duty of Care as specified in the current waste management legislation and guidance. If materials are to be removed off-site for disposal, they must be appropriately classified using WAC testing and disposed of in agreement with the chosen landfill operator. A preliminary waste assessment indicates that the samples would be classified as non-hazardous waste.

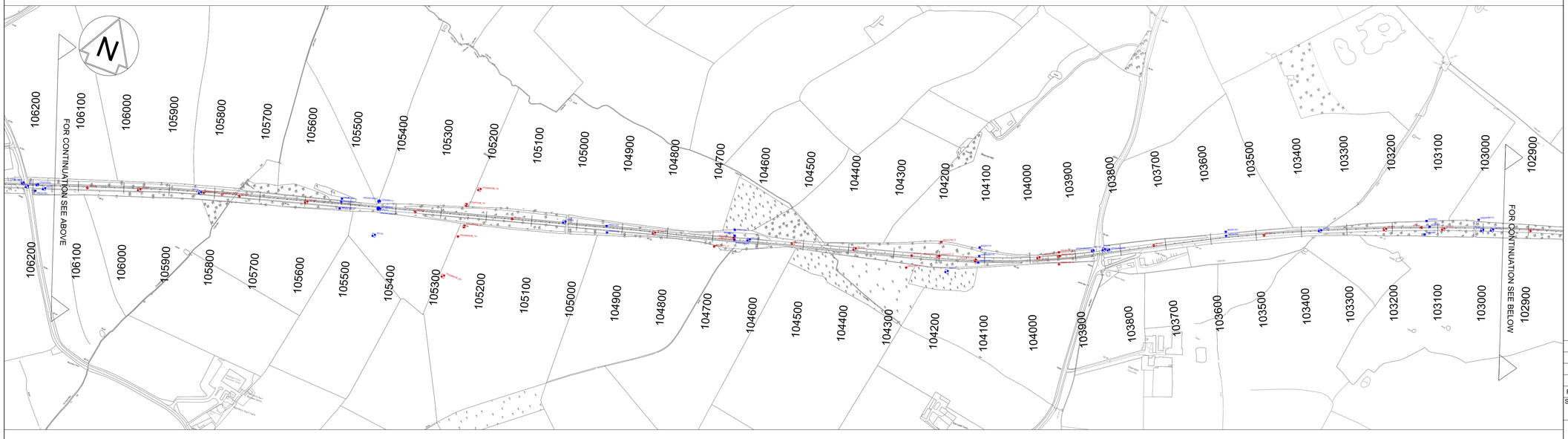
In order to ensure the protection of human, controlled waters, property receptors and the environment as a whole, there will be requirements to be followed during the construction works as part of the CoCP. These will include but are not limited to:

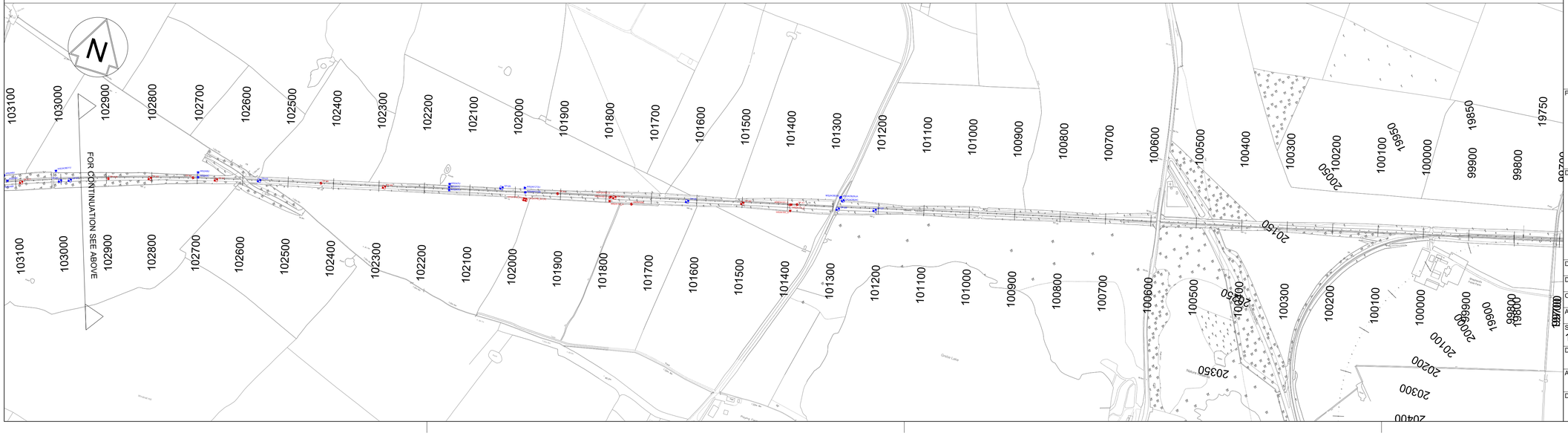
- Robust method statements and risk assessment to identify appropriate working methods and PPE to protect on-site workers, adjacent residents/workers, and the environment where applicable; and
- Measures and strategy to manage and control unforeseen and unexpected contamination if encountered during the works.

Appendix A – Drawings and Figures

Revision & Version
P01

Drawing Number
13375-EWR-REP-EEN-000137





KEY:

GRIP 4 - EXPLORATORY LOCATIONS

- DYNAMIC PROBE (HEAVY AND SUPER HEAVY)
- WINDOWLESS SAMPLE
- ROTARY CORE BOREHOLE or DYNAMIC SAMPLING WITH ROTARY CORE FOLLOW ON
- TRIAL PIT
- SURFACE WATER SAMPLES

GRIP 3 - EXPLORATORY LOCATIONS

- WINDOWLESS SAMPLE
- CABLE PERCUSSION BOREHOLE
- TRIAL PIT

Rev	Date	Description of Revisions	Dsnd	Chkd	Appr

Status: Status
Suitability: S0

EWR Alliance
Connecting People

Project: East West Rail

Drawing Title: Exploratory Hole Location Plan Section 2A

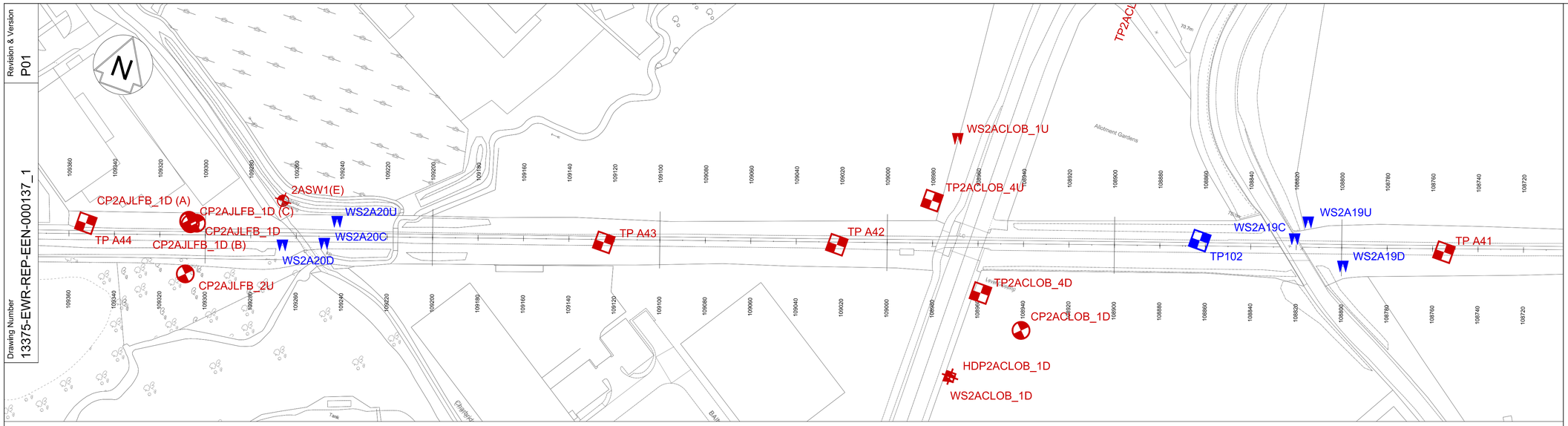
Designed	Cassie Ellis	Signed	Date 18/12/18
Drawn	Christian McArdle	Signed	Date 18/12/18
Checked	Cassie Ellis	Signed	Date 18/12/18
Approved	Jane Allum	Signed	Date 18/12/18

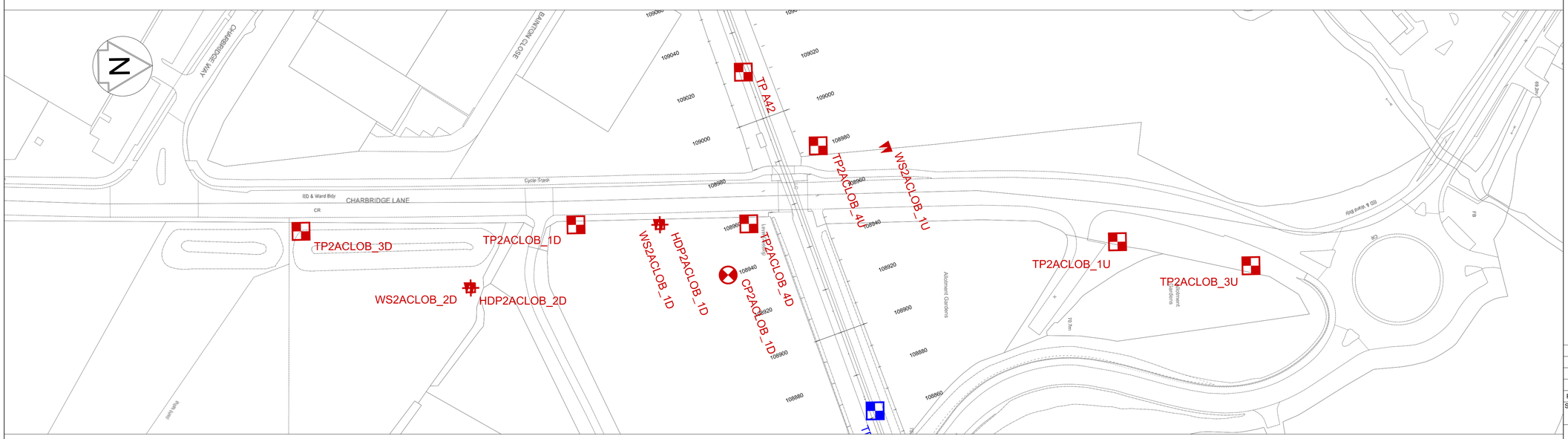
Scale(s): 1:5000
ELR - Project Chainage (Miles Yards)
Design Package Risk Classification
Sheet: 1 of 1
Alternative Reference
Revision: P01
Drawing Number: 13375-EWR-REP-EEN-000137

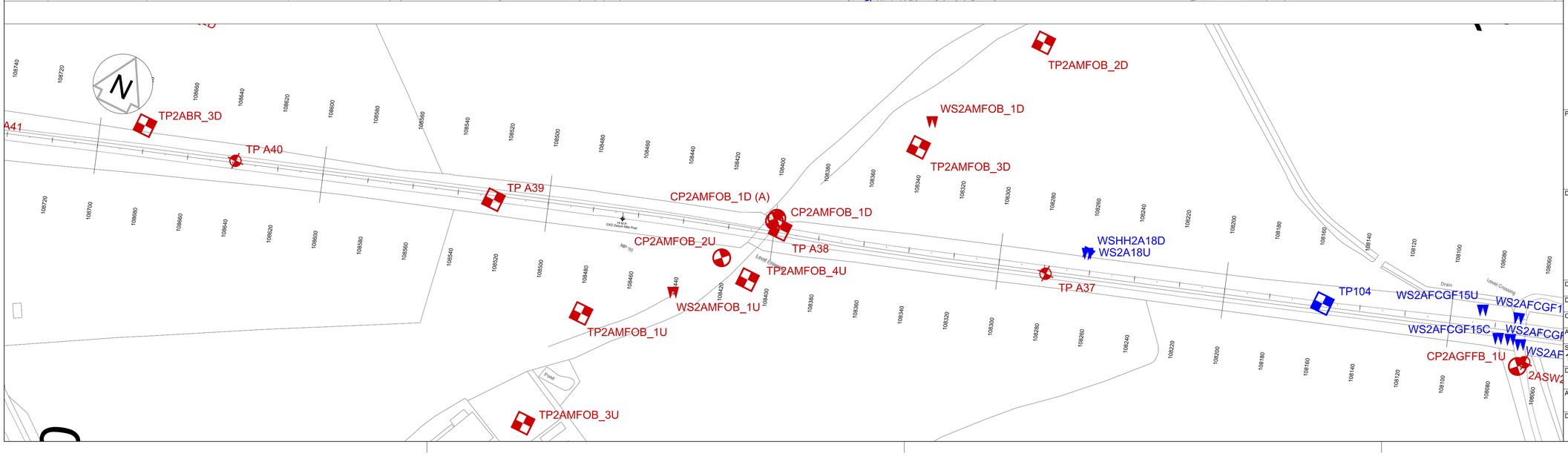
Sheet Size A1 594 x 841

Revision & Version P01

Drawing Number 13375-EWR-REP-EEN-000137_1







KEY:

GRIP 4 - EXPLORATORY LOCATIONS

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GRIP 3 - EXPLORATORY LOCATIONS

- WINDOWLESS SAMPLE
- CABLE PERCUSSION BOREHOLE
- TRIAL PIT

Rev	Date	Description of Revisions	Dsnd	Chkd	Appr

Status: Status — Suitability: S0

EWR Alliance
Connecting People

Project: East West Rail

Drawing Title: Exploratory Hole Location Plan Section 2A

Designed	Cassie Ellis	Signed	Date 18/12/18
Drawn	Christian McArdle	Signed	Date 18/12/18
Checked	Cassie Ellis	Signed	Date 18/12/18
Approved	Jane Allum	Signed	Date 18/12/18

Scale(s): 1:1000 — ELR - Project Chainage (Miles Yards)

Design Package Risk Classification — Sheet: 1 of 5

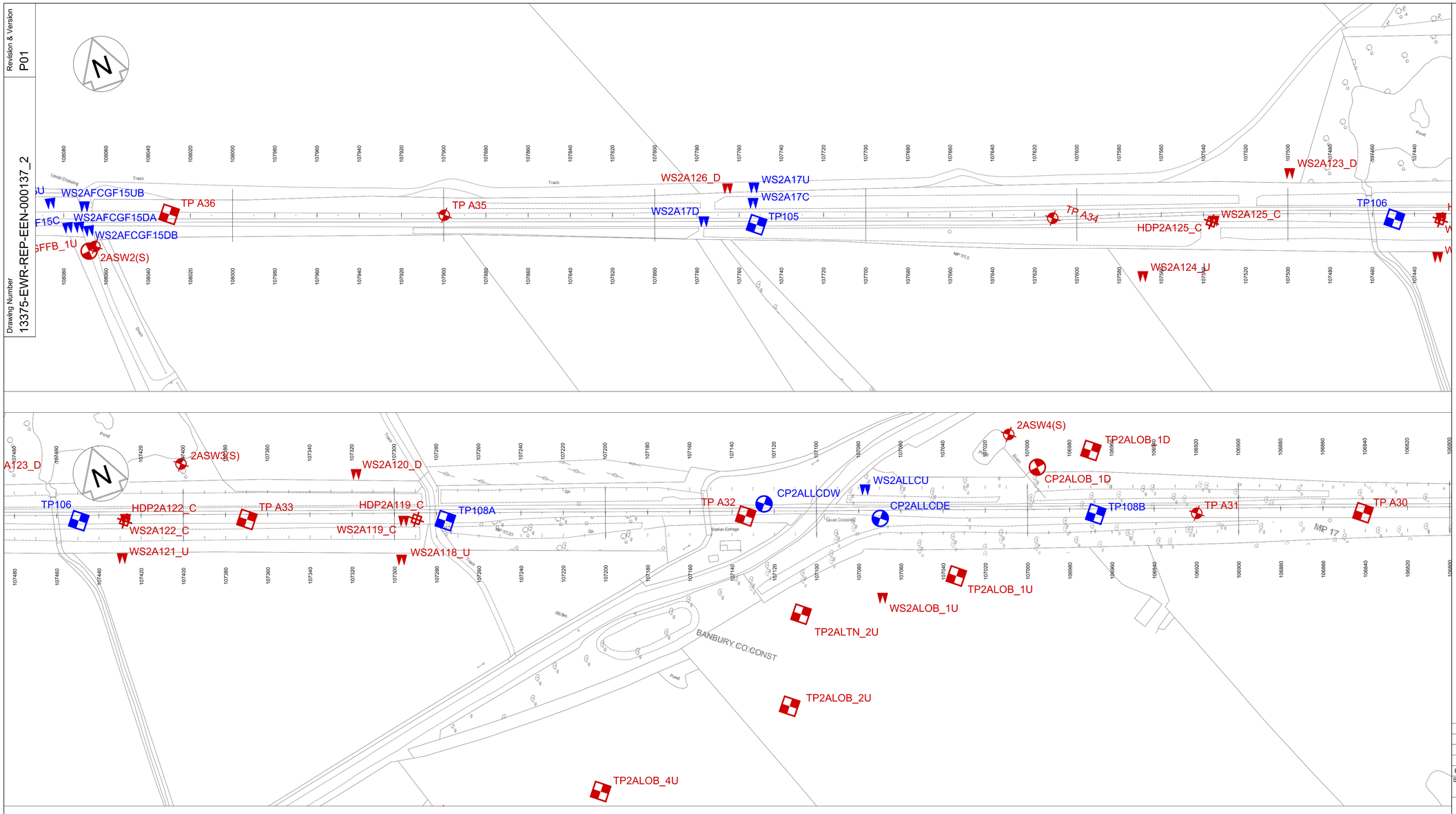
Alternative Reference — Revision: P01

Drawing Number: 13375-EWR-REP-EEN-000137_1

Sheet Size A1 594 x 841

Revision & Version
P01

Drawing Number
13375-EWR-REP-EEN-000137_2



KEY:

GRIP 4 - EXPLORATORY LOCATIONS

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- WINDOWLESS SAMPLE
- ROTARY CORE BOREHOLE or DYNAMIC SAMPLING WITH ROTARY CORE FOLLOW ON
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GRIP 3 - EXPLORATORY LOCATIONS

- WINDOWLESS SAMPLE
- CABLE PERCUSSION BOREHOLE
- TRIAL PIT

Rev	Date	Description of Revisions	Dsnd	Chkd	Appr

Status: Status
Suitability: S0

EWR Alliance
Connecting People

Project: East West Rail

Drawing Title: Exploratory Hole Location Plan Section 2A

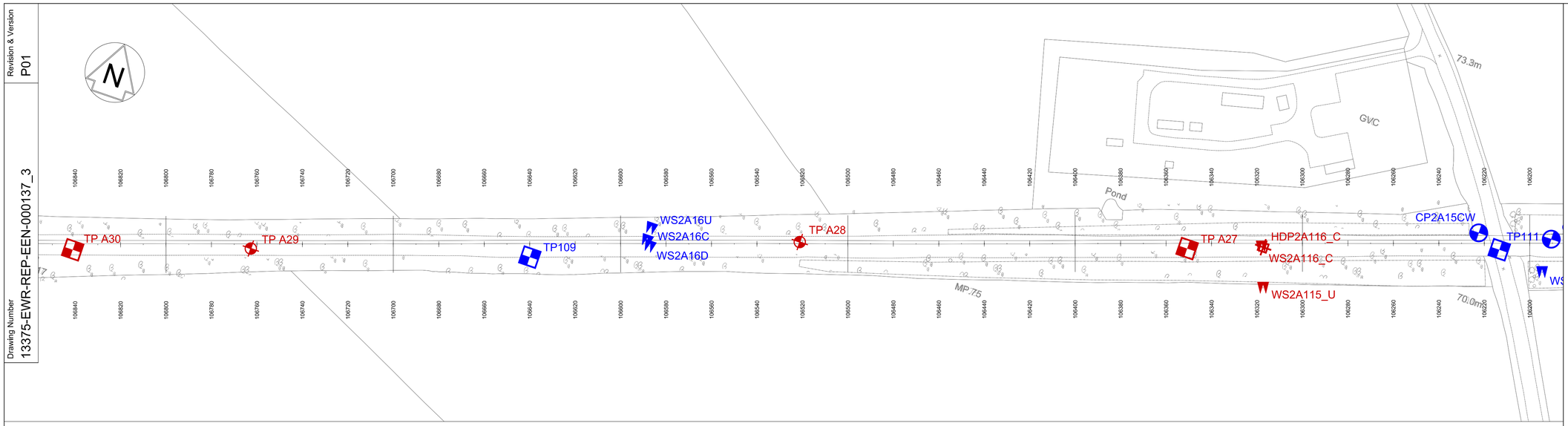
Designed	Cassie Ellis	Signed	Date 18/12/18
Drawn	Christian McArdle	Signed	Date 18/12/18
Checked	Cassie Ellis	Signed	Date 18/12/18
Approved	Jane Allum	Signed	Date 18/12/18

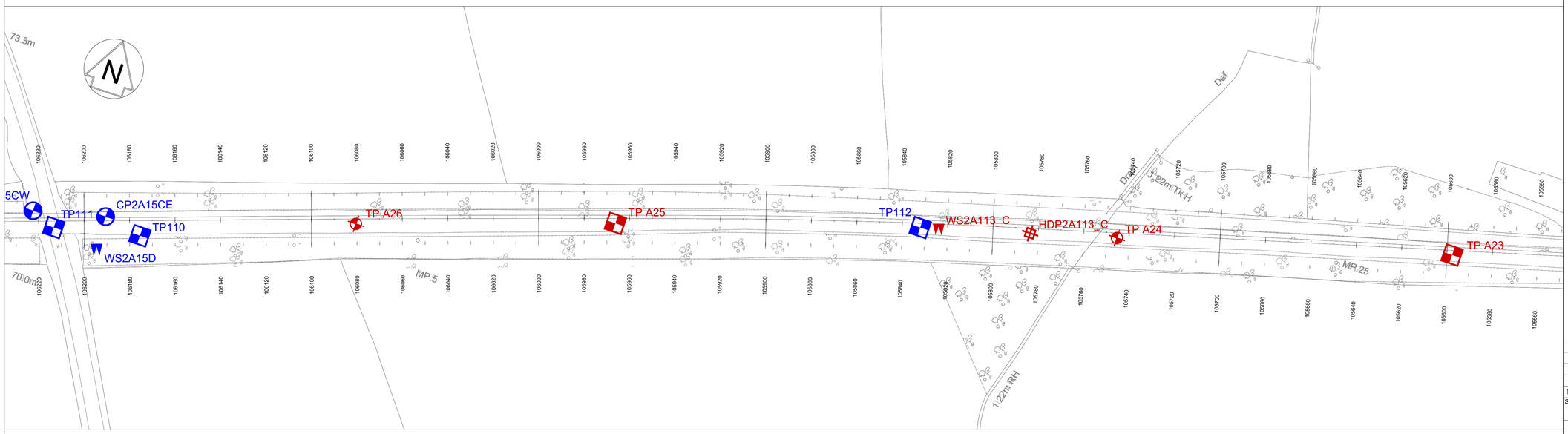
Scale(s): 1:1000
ELR - Project Chainage (Miles Yards)
Design Package Risk Classification
Sheet: 2 of 5
Alternative Reference
Revision: P01
Drawing Number: 13375-EWR-REP-EEN-000137_2

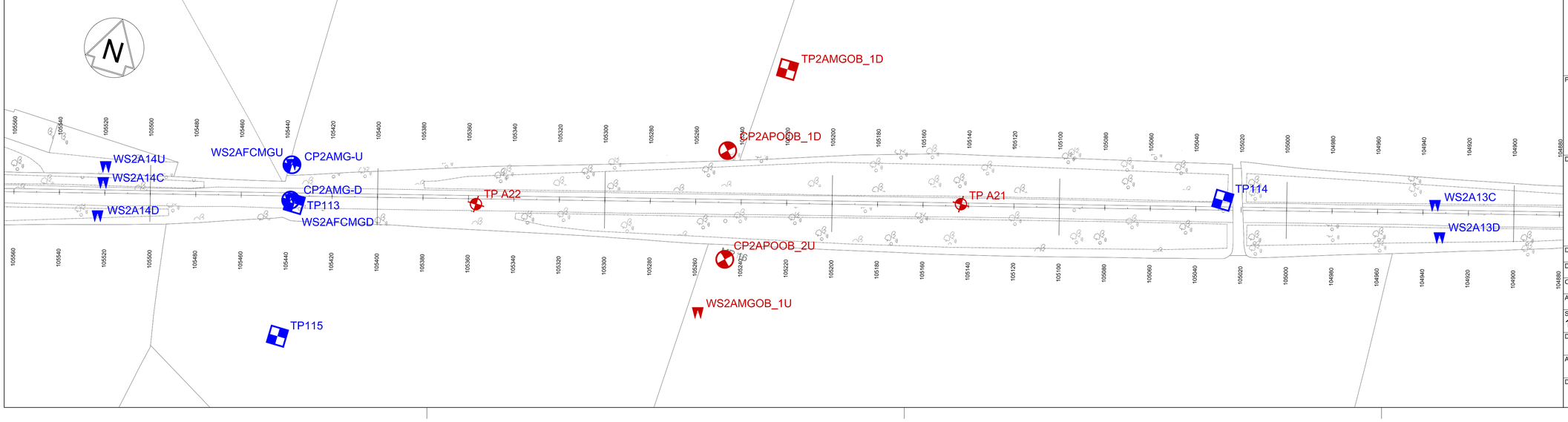
Sheet Size A1 594 x 841

Revision & Version
P01

Drawing Number
13375-EWR-REP-EEN-000137_3







KEY:

GRIP 4 - EXPLORATORY LOCATIONS

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GRIP 3 - EXPLORATORY LOCATIONS

- WINDOWLESS SAMPLE
- CABLE PERCUSSION BOREHOLE
- TRIAL PIT

Rev	Date	Description of Revisions	Dsnd	Chkd	Appr

Status: Status
Suitability: S0

EWR Alliance
Connecting People

Project: East West Rail

Drawing Title: Exploratory Hole Location Plan Section 2A

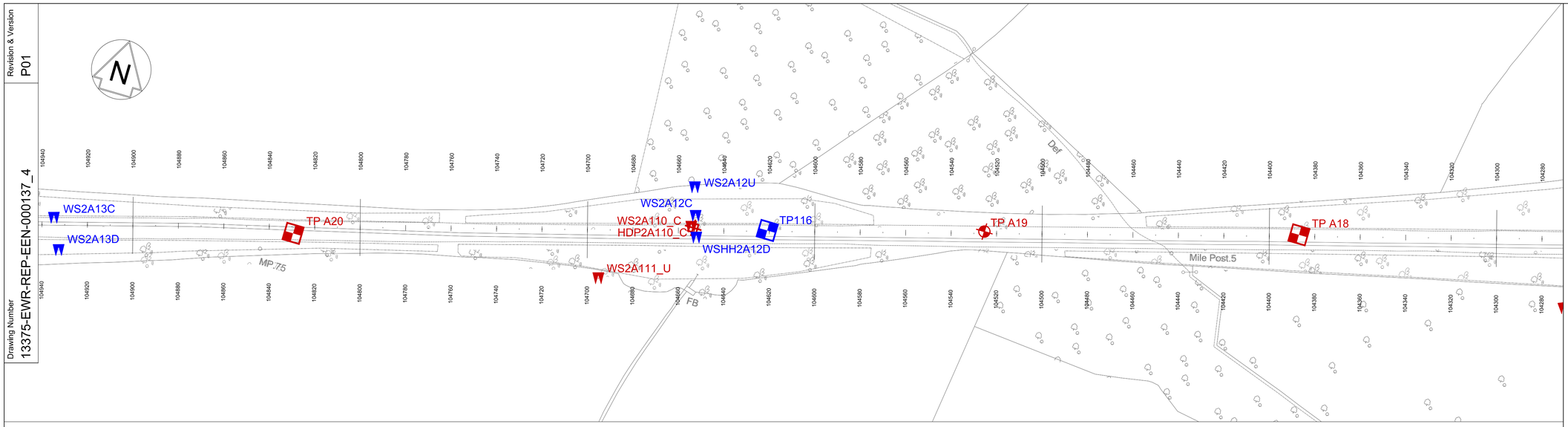
Designed	Cassie Ellis	Signed	Date 18/12/18
Drawn	Christian McArdle	Signed	Date 18/12/18
Checked	Cassie Ellis	Signed	Date 18/12/18
Approved	Jane Allum	Signed	Date 18/12/18

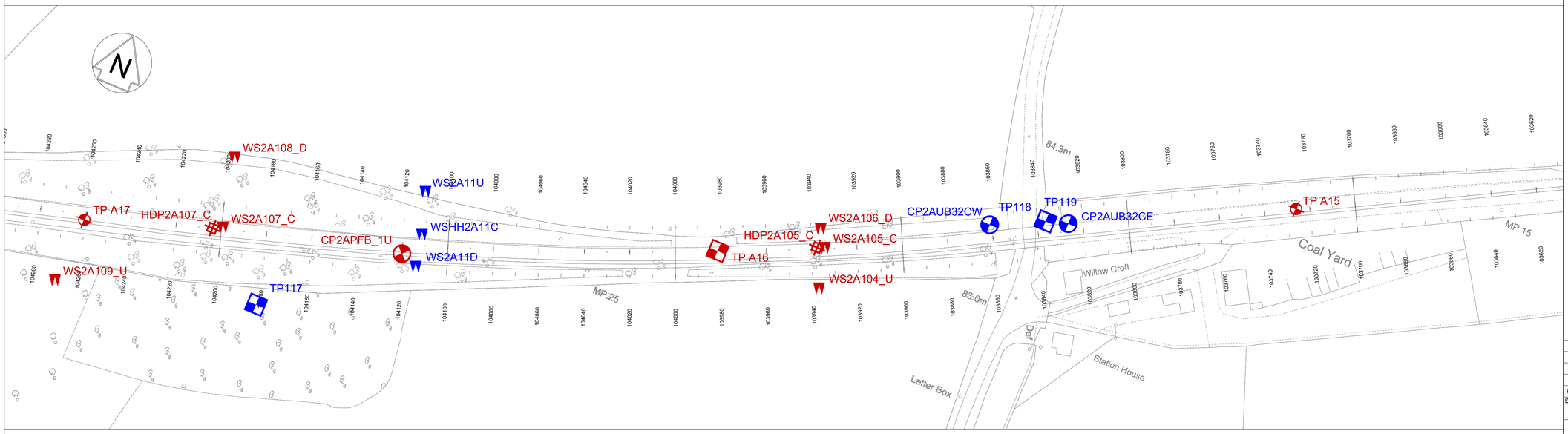
Scale(s): 1:1000
ELR - Project Chainage (Miles Yards)
Design Package Risk Classification
Sheet: 3 of 5
Alternative Reference
Revision: P01
Drawing Number: 13375-EWR-REP-EEN-000137_3

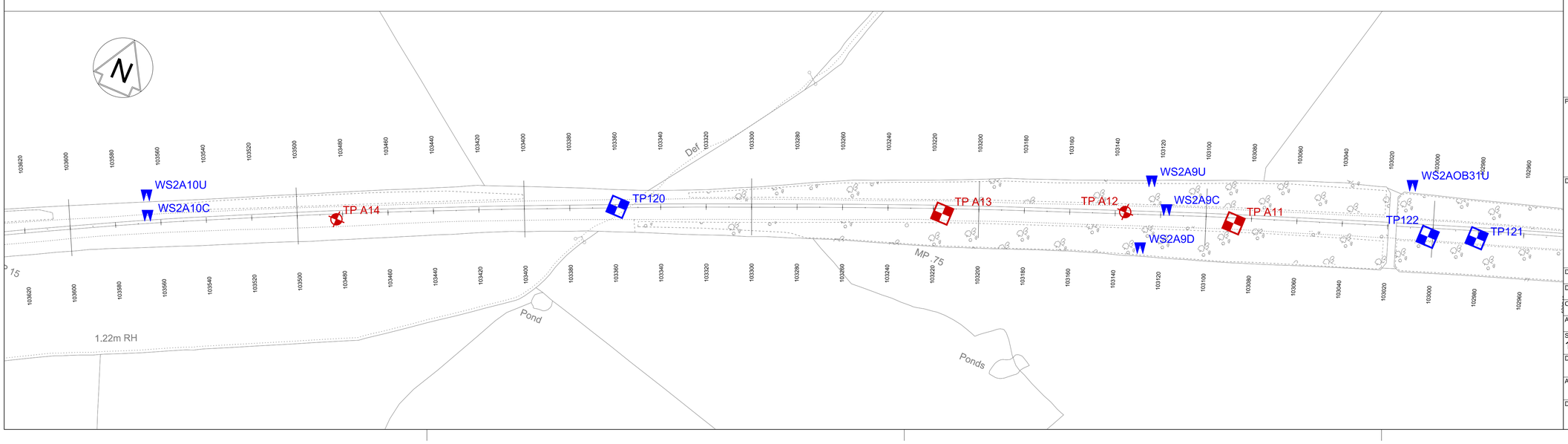
Sheet Size A1 594 x 841

Revision & Version
P01

Drawing Number
13375-EWR-REP-EEN-000137_4







KEY:

GRIP 4 - EXPLORATORY LOCATIONS

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GRIP 3 - EXPLORATORY LOCATIONS

- WINDOWLESS SAMPLE
- CABLE PERCUSSION BOREHOLE
- TRIAL PIT

Rev	Date	Description of Revisions	Dsnd	Chkd	Appr

Status: Status — Suitability: S0

EWR Alliance
Connecting People

Project
East West Rail

Drawing Title
Exploratory Hole Location Plan
Section 2A

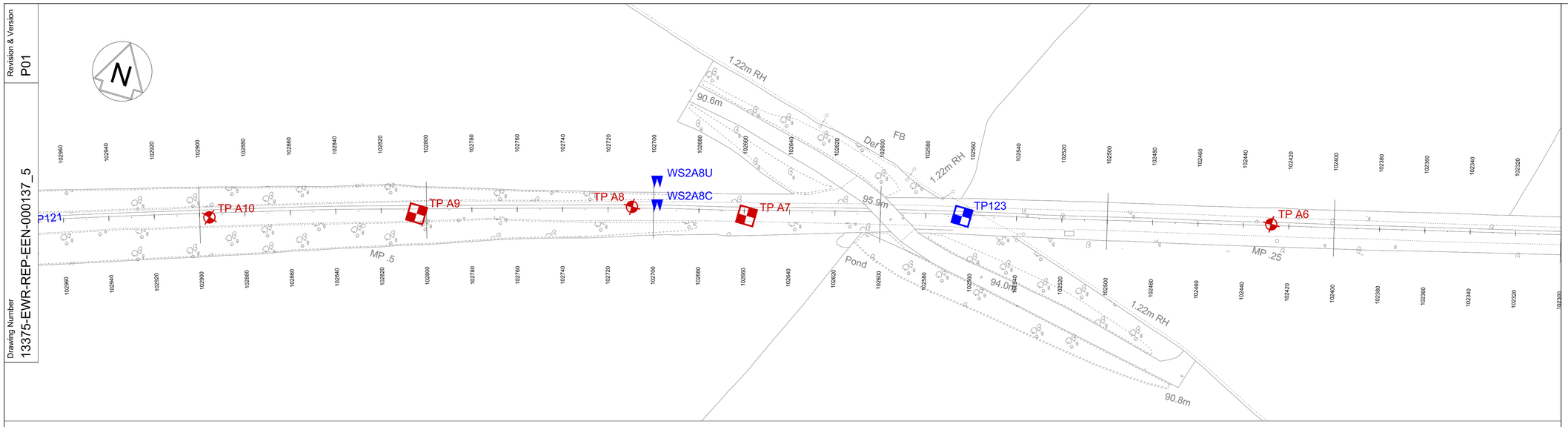
Designed	Cassie Ellis	Signed	Date 18/12/18
Drawn	Christian McArdle	Signed	Date 18/12/18
Checked	Cassie Ellis	Signed	Date 18/12/18
Approved	Jane Allum	Signed	Date 18/12/18

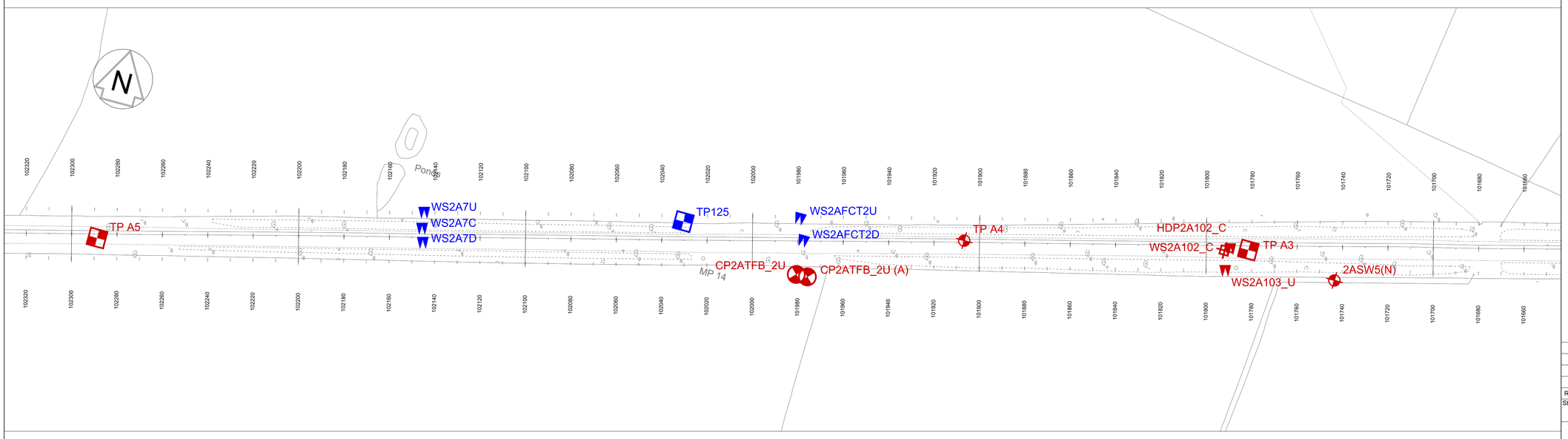
Scale(s): 1:1000
ELR - Project Chainage (Miles Yards)
Design Package Risk Classification
Sheet: 4 of 5
Alternative Reference
Revision: P01
Drawing Number: 13375-EWR-REP-EEN-000137_4

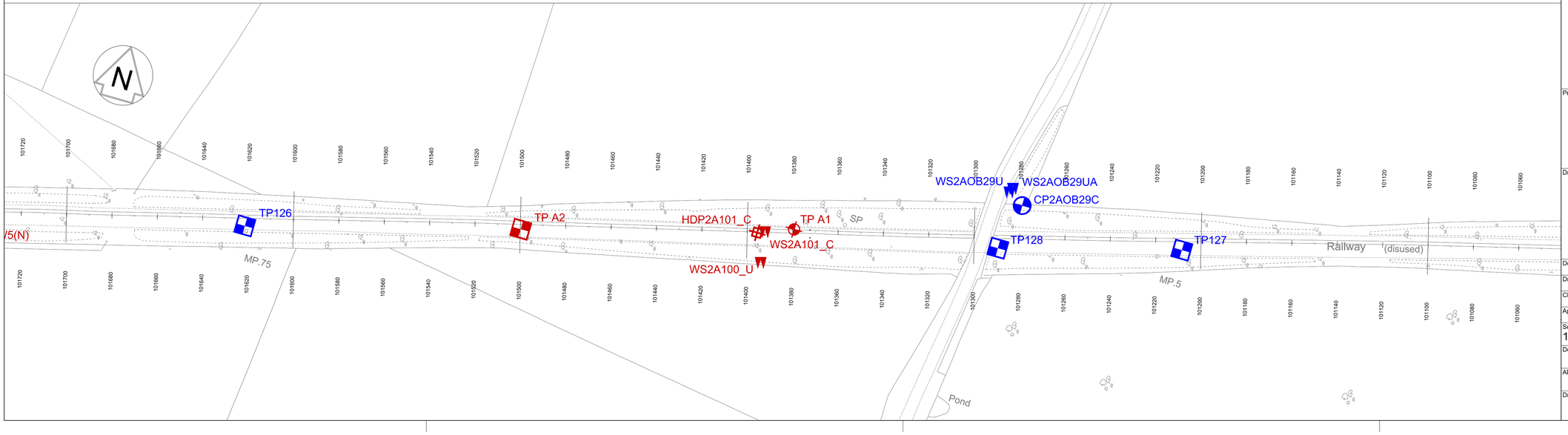
Sheet Size A1 594 x 841

Revision & Version
P01

Drawing Number
13375-EWR-REP-EEN-000137_5







KEY:

GRIP 4 - EXPLORATORY LOCATIONS

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GRIP 3 - EXPLORATORY LOCATIONS

- WINDOWLESS SAMPLE
- CABLE PERCUSSION BOREHOLE
- TRIAL PIT

Rev	Date	Description of Revisions	Dsnd	Chkd	Appr

Status: Status
Suitability: S0

EWR Alliance
Connecting People

Project
East West Rail

Drawing Title
Exploratory Hole Location Plan
Section 2A

Designed	Cassie Ellis	Signed	Date 18/12/18
Drawn	Christian McArdle	Signed	Date 18/12/18
Checked	Cassie Ellis	Signed	Date 18/12/18
Approved	Jane Allum	Signed	Date 18/12/18

Scale(s): 1:1000
ELR - Project Chainage (Miles Yards)
Design Package Risk Classification
Sheet: 5 of 5
Alternative Reference
Revision: P01
Drawing Number: 13375-EWR-REP-EEN-000137_5

Sheet Size A1 594 x 841

Appendix B – Definition of Probability & Consequence

The descriptions of the classified risks as given in R&D 66 are summarised in the following tables:

Table B1 - Risk estimation – classification of probability

Classification	Definition of the probability of harm / pollution occurring
High Likelihood	The pollutant linkage exists, and it is very likely to result in harm/pollution in the short term, and/or will almost inevitably result in harm/pollution in the long term, and/or there is current evidence of harm/pollution. Likelihood is defined as more likely than not and meets the definition of 'significant possibility' under Part 2A of EPA 1990.
Likely	The source, pathway and receptor exist for the pollutant linkage and it is probable that harm/pollution will occur. Circumstances are such that harm/pollution is not inevitable, but possible in the short term and likely over the long term. Likelihood is defined as reasonably possible and meets the definition of 'significant possibility' under Part 2A of EPA 1990.
Low Likelihood	The source, pathway and receptor exist, and it is possible that harm/pollution could occur. Circumstances are such that harm/pollution is by no means certain in the long term and less likely in the short term.
Unlikely	The source, pathway and receptor exist for the pollutant linkage, but it is improbable that harm/pollution will occur even in the long term.

Table B-2 - Risk estimation – definition of consequence

Classification	Definition of consequence
Human Health Receptors – Site end use or other more sensitive receptor	
Severe	Acute damage to human health based on the effects on the critical human health receptor. Concentrations of contaminants above appropriate site-specific assessment criteria. Harm meets definition of 'significant harm' under Part 2A of EPA 1990.
Medium	Chronic damage to human health based on the effects on the critical human health receptor. Concentrations of contaminants above appropriate site-specific assessment criteria. Harm meets definition of 'significant harm' under Part 2A of EPA 1990.
Mild	No appreciable impact on human health based on the potential effects on the critical human health receptor. Concentrations of contaminants above generic assessment criteria but below appropriate site-specific assessment criteria.
Minor	No appreciable impact on human health based on the effects on the critical human health receptor. Concentrations of contaminants below appropriate generic assessment criteria.
Human Health Receptors – Site construction workers	
Severe	Exposure to hazardous substances resulting in a reportable death, major injury, 3-day injury or illness/disease under RIDDOR.

Classification	Definition of consequence
Medium	Exposure to hazardous substances resulting in a dangerous occurrence reportable under RIDDOR. Exposure to hazardous substances resulting in exceedance of a workplace exposure limit.
Mild	Exposure to hazardous substances resulting in limited effects such as headache, dizziness, nausea. Exposures below the workplace exposure limits. Not reportable under RIDDOR.
Minor	Minor exposure to hazardous substance resulting in no appreciable ill health effects.
Controlled Water Receptors	
Severe	Pollution of a Principal aquifer within a source protection zone or potable supply characterised by a breach of drinking water standards. Pollution of a surface water course characterised by a breach of an EQS at a statutory monitoring location or resulting in a change in GQA grade of river reach. Discharge of a List I or List II substance to groundwater. Pollution meets Part 2A definition.
Medium	Pollution of a Principal aquifer outside a source protection zone or a Secondary A aquifer characterised by a breach of drinking water standards. Pollution of an industrial groundwater abstraction or irrigation supply that impairs its function. Substantial pollution but insufficient to result in a change in the GQA grade of river reach. Pollution meets Part 2A definition.
Mild	Low levels of pollution of a Principal aquifer outside a source protection zone or an industrial abstraction, or pollution of a Secondary aquifer. Low levels of pollution insufficient to result in a change in the GQA grade of river reach, pollution of a surface water course without a quality classification.
Minor	No appreciable pollution, or pollution of a low sensitivity receptor such as a non-aquifer or a surface water course without a quality classification
Property Receptors – Buildings, Foundations and Services	
Severe	Catastrophic damage to buildings, such as explosion. Catastrophic failure of foundations and services. Substantial damage to a Scheduled Monument significantly impairing the by reason of which the monument is scheduled. Harm meets definition of 'significant harm' under Part 2A of EPA 1990.
Medium	Substantial damage to buildings and foundations rendering the structures unsafe. Substantial damage to services impairing their function. Significant damage to a Scheduled Monument significantly impairing the reason of which the monument is scheduled. Harm meets definition of 'significant harm' under Part 2A of EPA 1990.
Mild	Significant damage to buildings and foundations but not resulting in them being unsafe for occupation. Damage to services but not sufficient to impair their function. Damage to a Scheduled Monument but no significant impairment to the reason of which the monument is scheduled.
Minor	Easily repairable damage to buildings, foundations and services.

Table B-3 - Risk estimation – classification of consequence

Classification	Definition of risk
Very High Risk	There is a high probability that severe harm may arise to a designated receptor or there is evidence that severe harm to a designated receptor is currently happening. This risk is likely to result in a substantial liability. Urgent investigation (if not already undertaken) and remediation are likely to be required.
High Risk	Harm is likely to arise to a designated receptor. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not already undertaken) is required and remedial works may be necessary in the short term and are likely over the longer term.
Moderate Risk	It is possible that harm may arise to a designated receptor. It is either relatively unlikely that any such harm will be severe, or if any harm were to occur, it is more likely that the harm will be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Low Risk	It is possible that harm will arise to a designated receptor, but it is likely that this harm will be mild. Further investigation is not necessarily required and should be considered to confirm that there is no unanticipated contamination present.
Very Low risk	The possibility of harm to the designated receptor is either not plausible or, if the possibility of harm is plausible, risk is considered to be very unlikely with attenuation along the exposure pathway. Further investigation is not necessarily required and may be considered to confirm that there is no unanticipated contamination present.

Appendix C – Exploratory Hole Logs

Borehole Log

Status: FINAL

CP2AOB29C

Sheet 1 of 2

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 91.768mOD

Coordinates: 467393.00E 225403.00N

Description	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)
MADE GROUND: Dark grey to black sandy angular to subangular fine to coarse GRAVEL of limestone and clinker.	0.20	91.57	B B	0.00-0.20 0.20-0.60		
MADE GROUND: Light orangish brown gravelly slightly clayey fine to coarse SAND. Gravel is angular to rounded fine to coarse of chert and clinker.	0.60	91.17	D	0.60		
			D	1.00		
			UT100	1.50-1.95	17 blows, 60% Recovery	
Firm to stiff greyish brown thinly laminated CLAY with much brown and grey sandy silt and shell partings. Sand is fine. (OXFORD CLAY-STEWARTBY MEMBER) ..from 2mbgl to 2.5mbgl - stiff to hard.			D	2.00		
	2.50	89.27	SPT(S) D	2.50 2.50-2.95	N=20 (2,1/2,6,6,6)	
Very stiff to hard dark brown organic CLAY with orangish brown and grey sandy silt and shell partings. (OXFORD CLAY-STEWARTBY MEMBER) ..from 3mbgl to 4mbgl - with occasional gypsum crystals.			D	3.00		
			UT100	3.50-3.95	60 blows, 80% Recovery	
Hard dark brown silty slightly organic friable CLAY with shell fragments. (OXFORD CLAY-STEWARTBY MEMBER) ..from 4.5mbgl to 5mbgl - with much shell fragments.	4.00	87.77	D	4.00		
			SPT(S) D	4.50 4.50-4.95	N=35 (3,7/6,8,8,13)	
Hard dark greyish brown thinly laminated slightly organic CLAY with silt dusting and shell fragments. (OXFORD CLAY-PETERBOROUGH MEMBER)	5.00	86.77	D	5.00		
			UT100	5.50-5.95	80 blows, 50% Recovery	
			D	6.00		
			SPT(S) D D	7.00 7.00 7.00-7.45	N=37 (3,5/6,8,9,14)	
..from 8mbgl to 9mbgl - iron pyrites mineralisation on shell fragments and hydrocarbon odour.			D	8.00		
			UT100	8.50-8.95	80 blows, 70% Recovery	
			D	9.00		

Borehole continued on next sheet

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	5.00	5.00
150	12.00	6.00
150	17.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)
2.10	2.30	4203

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
11/06/15	2.10	20	1.80	0.00	3.00

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	11/06/2015-16/06/2015
Plant:	Dando 100 (T820-637)
SPT Hammer:	002
Date Printed:	12/02/2016
Drilled By:	SW
Logged By:	NJD
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
11/06/2015	0.00	-	-	Start of Hole
11/06/2015	5.00	3.00	-	End of shift
15/06/2015	5.50	3.00	1.80	Start of shift

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

CP2AOB29C

Sheet 2 of 2

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 91.768mOD

Coordinates: 467393.00E 225403.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
Hard dark greyish brown thinly laminated slightly organic CLAY with silt dusting and shell fragments. (OXFORD CLAY-PETERBOROUGH MEMBER)				SPT(S) D D	10.00 10.00 10.00-10.45	N=43 (4,7/7,9,13,14)		
				D	11.00			
				UT100	11.50-11.95	80 blows, 70% Recovery		
				D	12.00			
..from 13mbgl to 16mbgl - with occasional shell fragments.				SPT(S) D D	13.00 13.00 13.00-13.45	29 (7,14/18,11,0 for 0mm)		
				D UT100	14.00 14.00-14.45	80 blows, 70% Recovery		
				D	15.00			
..from 16mbgl to 17mbgl - with shell fragments.				SPT(S) D D	16.00 16.00 16.00-16.45	33 (6,11/15,18,0 for 0mm)		
		17.00	74.77	D	17.00			
Borehole Complete at 17.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	5.00	5.00
150	12.00	6.00
150	17.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
15/06/2015	13.00	6.00	-	End of shift
16/06/2015	13.00	6.00	-	Start of shift
16/06/2015	17.00	6.00	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	11/06/2015-16/06/2015
Plant:	Dando 100 (T820-637)
SPT Hammer:	002
Date Printed:	12/02/2016
Drilled By:	SW
Logged By:	NJD
Checked By:	JHS

Remarks:

Borehole Log

Status: FINAL

CP2AOB31C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 93.168mOD

Coordinates: 465719.00E 224925.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Hard brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of chert, limestone and brick. ..from 0mbgl to 2.2mbgl - live roots and probable desiccation.		0.10	93.07	B B ES	0.00-0.10 0.10-0.60 0.30			
MADE GROUND: Dark orange slightly gravelly fine to coarse SAND.		0.80	92.37	D D ES UT100	0.80 1.00 1.00 1.50-1.95	30 blows, 100% Recovery		
Hard brown mottled orange and grey very sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to rounded fine to medium of chert. (HEAD) ..from 1.5mbgl to 2.2mbgl - with occasional black carbonaceous fragments. ..from 1.8mbgl to 2.2mbgl - becoming slightly sandy.		2.20	90.97	D ES SPT(S) D D ES UT100	2.00 2.00 2.50 2.50-2.95 3.00 3.00 3.50-3.95	N=19 (3,2/3,5,5,6) 80 blows, 50% Recovery		
Hard brown mottled orange and grey very sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to rounded fine to medium of chert. (HEAD) ..from 1.5mbgl to 2.2mbgl - with occasional black carbonaceous fragments. ..from 1.8mbgl to 2.2mbgl - becoming slightly sandy.		4.50	88.67	D B SPT(S) D	4.00 4.30-4.50 4.50 4.50-4.95	31 (5,14/31,0 for 0mm)		
Stiff dark brownish grey CLAY with much orangish brown and yellow silt partings. (OXFORD CLAY-STEWARTBY MEMBER) ..from 3mbgl to 3.8mbgl - with silt partings. ..from 3.5mbgl to 4mbgl - with occasional gypsum crystals. ..from 3.8mbgl to 4mbgl - with much grey silty fine sand partings. No silt partings.								
Borehole Complete at 4.50 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	4.50	2.00

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)
4.30	4.50	1.00

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
22/06/2015	0.00	-	-	Start of Hole
22/06/2015	4.50	-	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	18/06/2015-22/06/2015
Plant:	Dando 100 (T820-637)
SPT Hammer:	002
Date Printed:	12/02/2016
Drilled By:	SW
Logged By:	NJD
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

CP2AUB32CE

Sheet 1 of 2

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 85.229mOD

Coordinates: 464990.00E 224592.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Soft black slightly sandy gravelly CLAY. Sand is medium to coarse. Gravel is angular medium to coarse of crushed rock possibly limestone.		0.50	84.73	B	0.00-0.40			
				ES	0.30			
				B	0.40-1.00			
MADE GROUND: Dark brown gravelly SAND with a high cobble content. Sand is fine to coarse. Gravel is angular fine to coarse concrete and crushed rock possibly limestone. Cobbles are angular concrete.		0.90	84.33	D	1.00			
				B	1.00-1.20			
				ES	1.00			
				SPT(S)	1.50	(1,1/0 for 0mm)		
				D	1.50-1.95			
MADE GROUND: Soft to firm dark grey CLAY with occasional pockets of black organic clay. Organic clay is black amorphous peat.				D	2.00			
				UT100	2.50-2.95	30 blows, 1% Recovery		
				D	2.95-3.10			
				D	3.30			
				SPT(S)	3.50	N=6 (1,0 for 0mm/1,2,1,2)	2.50	
				D	3.50-3.95			
				D	4.00			
				D	4.20			
				UT100	4.50-4.95	34 blows, 100% Recovery		
				D	5.30			
				SPT(S)	5.50	N=22 (3,3/4,5,6,7)	2.50	
				D	5.50-5.95			
Stiff dark grey silty CLAY with occasional shell fragments. Shell fragments are up to 5mm wide. Occasional thin laminations occur. (OXFORD CLAY-PETERBOROUGH MEMBER)		6.00	79.23					
				D	6.40			
				D	7.00			
				UT100	7.00-7.45	74 blows, 100% Recovery		
				D	7.45-7.55			
				SPT(S)	8.50	N=30 (2,5/7,7,7,9)	2.50	
				D	8.50			
				D	8.50-8.95			
				D	9.50			

Borehole continued on next sheet

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	0.00	2.50

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
06/05/2015	0.00	-	-	Start of Hole

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	06/05/2015-07/05/2015
Plant:	Dando 2000 (T820-634)
SPT Hammer:	002
Date Printed:	12/02/2016
Drilled By:	SW
Logged By:	ZR
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

CP2AUB32CE

Sheet 2 of 2

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 85.229mOD

Coordinates: 464990.00E 224592.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
Stiff dark grey silty CLAY with occasional shell fragments. Shell fragments are up to 5mm wide. Occasional thin laminations occur. (OXFORD CLAY-PETERBOROUGH MEMBER)				Ut100	10.00-10.45	110 blows, 50% Recovery		
				D	10.45-10.55			
				D	12.00			
				D	12.00-12.45			
				D	13.00			
				UT100	13.50-13.95	120 blows, 60% Recovery		
				D	14.00			
..at 15mbgl - friable zone with abundant shell fragments and sand sized crystals of possibly pyrite and selenite. crystals are fine to coarse. friable zone is possibly less than 0.5m thick and crumbles under thumb pressure.				D	15.00			
				D	15.00-15.45			
				D	16.00			
				UT100	16.50-16.95	120 blows, 85% Recovery		
				D	17.00			
				D	18.00-18.45			
Very soft dark grey slightly gravelly silty CLAY. Gravel is angular fine to medium siltstone. (OXFORD CLAY-PETERBOROUGH MEMBER)		18.50	66.73	D	18.50			
Borehole Complete at 19.00 m		19.00	66.23	D	19.00			

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	0.00	2.50

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
07/05/15	19.00	5	-	-	

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	06/05/2015-07/05/2015
Plant:	Dando 2000 (T820-634)
SPT Hammer:	002
Date Printed:	12/02/2016
Drilled By:	SW
Logged By:	ZR
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
06/05/2015	11.00	2.50	-	End of shift
07/05/2015	11.00	2.50	-	Start of shift
07/05/2015	19.00	2.50	-	Completion instructed by WSP/PB

Remarks:

Borehole Log

Status: FINAL

CP2AUB32CW

Sheet 1 of 2

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 86.035mOD

Coordinates: 464957.00E 224572.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown sandy slightly silty angular to subangular fine to coarse GRAVEL of limestone clinker and granite.				B	0.00-1.00			
				ES	0.30			
				D	0.50			
MADE GROUND: Black gravelly sandy fine to coarse ASH. Gravel is subangular fine to coarse limestone clinker and granite.		0.70	85.34					
				D	1.00			
				ES	1.00			
MADE GROUND: Soft dark grey silty CLAY with occasional pockets of black organic clay. Organic clay is black amorphous peat. (MADE GROUND)		1.40	84.64	D	1.40			
				UT100	1.50-1.95	17 blows, 100% Recovery		
				D	2.00			
				SPT(S)	2.50	3 (1 for 0mm/0 for 0mm)	2.50	
				D	2.50-2.95			
				D	3.00			
				UT100	3.50-3.95	40 blows, 100% Recovery		
MADE GROUND: Soft to firm dark brown and grey mottled slightly gravelly CLAY. (MADE GROUND)		3.80	82.24	D	3.95-4.10			
				SPT(S)	4.50	N=6 (1,1/1,1,2,2)	2.50	
				D	4.50-4.95			
Firm to stiff dark brown and dark grey thinly laminated CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)		5.00	81.04	D	5.00			
				B	5.00-5.50			
				UT100	5.50-5.95	57 blows, 100% Recovery		
Stiff dark grey gravelly silty CLAY. Gravel is subangular to subrounded fine crystals. (OXFORD CLAY-PETERBOROUGH MEMBER)		5.80	80.24	D	5.95-6.10			
				D	6.50			
..at 7mbgl - dark grey firm clay with scattered shells				SPT(S)	7.00	N=23 (1,3/5,5,6,7)	2.00	
				D	7.00-7.45			
				D	8.00			
				UT100	8.50-8.95	110 blows, 100% Recovery		
				D	8.95-9.10			
				D	9.50			

Borehole continued on next sheet

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	2.50	2.50

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
10/05/15	7.20	20	7.20	-	

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
07/05/2015	0.00	-	-	Start of Hole

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	07/05/2015-11/05/2015
Plant:	Dando 2000 (T820-067)
SPT Hammer:	002
Date Printed:	12/02/2016
Drilled By:	DS
Logged By:	ZR
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

CP2AUB32CW

Sheet 2 of 2

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 86.035mOD

Coordinates: 464957.00E 224572.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
Stiff dark grey gravelly silty CLAY. Gravel is subangular to subrounded fine crystals. (OXFORD CLAY-PETERBOROUGH MEMBER)				SPT(S) D D	10.00 10.00-1045.00 11.00	50 (4,8/10,13,13,14 for 0mm)		
Stiff dark grey silty CLAY with occasional shell fragments. Shell fragments are up to 5mm wide. Occasional thin laminations occur. (OXFORD CLAY-PETERBOROUGH MEMBER)		11.50	74.54	SPT(S) D D D UT100 D D SPT(S) D D	11.50 11.50-11.95 12.00 13.00 13.00-13.45 13.50 14.00 14.50 14.50 15.00	N=33 (4,5/6,8,9,10) 80 blows, 90% Recovery 50 (4,6/11,20,8,11 for 70mm)	3.00 3.00	
..at 15mbgl - friable zone with abundant shell fragments and sand sized crystals of possibly pyrite and selenite. Crystals are fine to coarse. Friable zone is possibly less than 0.5m thick and crumbles under thumb pressure.				D UT100 D D SPT(S) D	16.00 16.00-16.45 16.50 17.00 17.50 17.50-17.95	100 blows, 80% Recovery N=40 (6,7/8,8,10,14)	 3.00	
Very soft dark grey slightly gravelly silty CLAY. Gravel is angular fine to medium siltstone. (OXFORD CLAY-PETERBOROUGH MEMBER)		18.00	68.04	D	18.00			
Borehole Complete at 18.80 m		18.80	67.24	D	18.80			

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	2.50	2.50

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
07/05/2015	10.45	2.50	-	End of shift
11/05/2015	10.45	2.50	10.30	Start of shift
11/05/2015	18.80	2.50	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	07/05/2015-11/05/2015
Plant:	Dando 2000 (T820-067)
SPT Hammer:	002
Date Printed:	12/02/2016
Drilled By:	DS
Logged By:	ZR
Checked By:	JHS

Remarks:

Borehole Log

Status: FINAL

CP2A4C

Sheet 1 of 3

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 87.200mOD

Coordinates: 468096.00E 225585.00N

Description	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: Brownish grey to black slightly clayey SAND & GRAVEL. Sand is fine to coarse. Gravel is angular fine to coarse crushed rock possibly limestone.	0.20	87.00	B B ES	0.00-0.10 0.10-0.50 0.30			
Soft to firm light greyish brown CLAY with occasional sand size crystals. Crystals are fine to medium. Crystals are possibly selenite. (OXFORD CLAY-PETERBOROUGH MEMBER)			D ES	1.00 1.00			
			SPT(S) D	1.50 1.50-1.95	N=10 (1,1/2,3,2,3)		
			D	2.00			
			UT100	2.50-2.95	20 blows, 70% Recovery		
			D	3.00			
			SPT(S) D B	3.50 3.50-3.95 3.50-4.00	N=13 (1,2/2,4,3,4)	2.50	
			D	4.00			
			UT100	4.50-4.95	110 blows, 100% Recovery		
			D B	5.00 5.00-5.50			
Stiff becoming very stiff at 16.00mbgl thinly laminated greyish brown silty CLAY. Low to moderate proportion of fossil fragments. Low organic odour. (OXFORD CLAY-PETERBOROUGH MEMBER)	5.20	82.00	SPT(S) D	5.50 5.50-5.95	N=30 (3,4/5,6,10,9)	2.50	
			D	6.50			
			UT100	7.00-7.45	110 blows, 100% Recovery		
			D	7.45-7.55			
			D	8.00			
			SPT(S) D	8.50 8.50-8.95	N=31 (3,4/6,8,8,9)	3.00	
			D	9.50			

Borehole continued on next sheet

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	0.00	3.00

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	12/05/2015-13/05/2015
Plant:	Dando 2000 (T820-068)
SPT Hammer:	002
Date Printed:	12/02/2016
Drilled By:	SR
Logged By:	ZR
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
12/05/2015	0.00	0.00	-	Start of Hole

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

CP2A4C

Sheet 2 of 3

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 87.200mOD

Coordinates: 468096.00E 225585.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
Stiff becoming very stiff at 16.00mbgl thinly laminated greyish brown silty CLAY. Low to moderate proportion of fossil fragments. Low organic odour. (OXFORD CLAY-PETERBOROUGH MEMBER)				UT100	10.00-1045.00	110 blows, 70% Recovery		
				SPT(S) D	14.50 14.50-14.95	50 (20 for 0mm/22,25,3 for 5mm)	3.00	
				D	15.00			
				SPT(S) D	16.00 16.00-16.45	50 (5,9/12,12,15,11 for 55mm)	3.00	
				D	17.00			
				SPT(S) D	17.50 17.50-17.95	50 (5,9/11,15,20,4 for 10mm)	3.00	
				D	18.00			
				SPT(S) D	19.00 19.00-19.45	50 (6,9/12,20,18 for 65mm)	3.00	

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	0.00	3.00

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks

Client: Network Rail

Consultant: WSP | Parsons Brinckerhoff

Dates Drilled: 12/05/2015-13/05/2015

Plant: Dando 2000 (T820-068)

SPT Hammer: 002

Date Printed: 12/02/2016

Drilled By: SR

Logged By: ZR

Checked By: JHS

Remarks:

Borehole Log

Status: FINAL

CP2A4C

Sheet 3 of 3

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 87.200mOD

Coordinates: 468096.00E 225585.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
Stiff becoming very stiff at 16.00mbgl thinly laminated greyish brown silty CLAY. Low to moderate proportion of fossil fragments. Low organic odour. (OXFORD CLAY-PETERBOROUGH MEMBER)		20.00	67.20	D	20.00			
Borehole Complete at 20.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	0.00	3.00

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
13/05/2015	20.00	3.00	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	12/05/2015-13/05/2015
Plant:	Dando 2000 (T820-068)
SPT Hammer:	002
Date Printed:	12/02/2016
Drilled By:	SR
Logged By:	ZR
Checked By:	JHS

Remarks:

Borehole Log

Status: FINAL

CP2A15CE

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 75.200mOD

Coordinates: 462741.00E
223867.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown sandy slightly silty angular to subangular fine to coarse GRAVEL of basalt clinker and granite. Sand is fine to coarse.				B	0.00-0.50			
		0.30	74.90	D	0.30			
				B	0.50-0.80			
		0.70	74.50	D	0.60			
MADE GROUND: Light orangish brown slightly gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse of chert.				D	1.00			
				UT100	1.20-1.65	20 blows, 70% Recovery		
MADE GROUND: Stiff to very stiff dark brown CLAY clasts in in a firm brown mottled grey clay matrix.				D	2.00			
				SPT(S)	2.50	N=5 (1,1/1,1,2,1)		
				D	2.50-2.95			
MADE GROUND: Firm brownish grey sandy CLAY with black organic partings. Sand is fine to medium.		3.00	72.20	D	3.00			
				UT100	3.50-3.95	18 blows, 80% Recovery		
MADE GROUND: Firm grey slightly sandy CLAY with orangish brown silt partings.		3.70	71.50	D	4.00			
MADE GROUND: Firm light brown mottled orange and grey CLAY with orangish brown silt partings. ..from 4.5mbgl to 7mbgl - firm dark greyish brown thinly laminated slightly organic clay with extremely closely spaced orangish brown and yellow silt and shell laminae with gypsum crystals.		4.50	70.70	SPT(S)	4.50	N=8 (1,2/2,2,2,2)		
				D	4.50-4.95			
		5.00	70.20	D	5.00			
				UT100	5.50-5.95	49 blows, 100% Recovery		
Firm dark greyish brown thinly laminated slightly organic CLAY with extremely closely spaced orangish brown and yellow silt and shell laminae. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 5.5mbgl to 7mbgl - becoming stiff.				D	6.00			
		7.00	68.20	SPT(S)	7.00	N=34 (3,4/7,8,9,10)		
				D	7.00			
				D	7.00-7.45			
Very stiff dark grey thinly laminated CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 7.3mbgl to 7.5mbgl - slightly sandy silty with grey fine to medium sand partings.		7.50	67.70	D	7.50			
		8.00	67.20	D	8.00			
Dark grey clayey silty fine to medium SAND. (OXFORD CLAY-PETERBOROUGH MEMBER)		8.50	66.70	SPT(S)	8.50	29 (9,11/21,8,0 for 0mm)		
				D	8.50-8.95			
Very stiff dark grey very sandy silty CLAY with frequent grey fine to medium Sand partings. (OXFORD CLAY-PETERBOROUGH MEMBER)		8.95	66.25					

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
150	9.00	3.00

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	03/06/2015
Plant:	Dando 100 (T820-637)
SPT Hammer:	002
Date Printed:	12/02/2016
Drilled By:	SW
Logged By:	NC
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
03/06/2015	0.00	-	-	Start of Hole
03/06/2015	9.00	3.00	-	Refusal

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

CP2A15CE

Sheet 1+ of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 75.200mOD

Coordinates: 462741.00E
223867.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test			Casing (Water) Depth (m)	Installations
				Type	Depth (m)	Test Results		
Dark grey clayey silty fine to medium SAND with shell fragments. (KELLAWAYS CLAY)								
Borehole Complete at 9.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
150	9.00	3.00

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	03/06/2015
Plant:	Dando 100 (T820-637)
SPT Hammer:	002
Date Printed:	12/02/2016
Drilled By:	SW
Logged By:	NC
Checked By:	JHS

Remarks:

Borehole Log

Status: FINAL

CP2A15CW

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 75.000mOD

Coordinates: 462710.00E 223859.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown to black sandy angular to subangular fine to coarse GRAVEL of basalt clinker and granite. Sand is fine to coarse.		0.20	74.80	B B	0.00-0.20 0.20-0.80			
MADE GROUND: Light orangish brown gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse of sandstone and chert.		0.80	74.20	D UT100	1.00 1.50-1.95	22 blows, 70% Recovery		
MADE GROUND: Stiff to very stiff dark brown CLAY clasts in in a firm brown mottled grey clay matrix.		2.00	73.00	D	2.00			
MADE GROUND: Stiff brown to light brown mottled orange and grey slightly sandy CLAY with silt partings. Sand is fine.		2.50	72.50	SPT(S) D	2.50 2.50-2.95	N=9 (1,2/2,2,2,3)		
MADE GROUND: Stiff light brown mottled orange and grey CLAY with much silt partings.		3.00	72.00	D UT100	3.00 3.50-3.95	27 blows, 30% Recovery		
Stiff light brown mottled orange and grey slightly sandy slightly gravelly CLAY with orangish brown silt partings and calcareous nodules. Sand is fine. Gravel is rounded fine to medium of chert. (OXFORD CLAY-PETERBOROUGH MEMBER)		4.00	71.00	D	4.00			
Firm grey CLAY with orangish brown silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER)		4.50	70.50	SPT(S) D D	4.50 4.50-4.95 5.00	N=12 (2,2/2,2,4,4)		
Firm dark greyish brown thinly laminated slightly organic CLAY with extremely closely spaced orangish brown and yellow silt and shell laminae. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 5.5mbgl to 7mbgl - stiff with gypsum crystals. ..from 6mbgl to 7mbgl - becoming very stiff.		7.00	68.00	UT100 D SPT(S) D D	5.50-5.95 6.00 7.00 7.00 7.00-7.45	58 blows, 90% Recovery N=46 (4,5/5,11,15,15)		
Very stiff to hard dark grey sandy silty CLAY with much grey fine to medium Sand partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 7.3mbgl to 8mbgl - with occasional shell fragments. ..from 7.8mbgl to 8mbgl - becoming very sandy.		8.00	67.00	D B	8.00 8.00-9.00			
Dark grey clayey silty fine to medium SAND with black carbonaceous fragments. (KELLAWAYS SAND) ..from 9mbgl to 9.85mbgl - becoming very clayey.		9.85	65.15	D SPT(S) D	9.00 9.40 9.40-9.85	(13,12 for 60mm)		
~~Borehole Complete at 9.85 m~~								

Water Level Observations

Hole Diameter Detail			Chiselling / Slow Progress			Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)						
							No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	08/06/2015-10/06/2015
Plant:	Dando 100 (T820-637)
SPT Hammer:	002
Date Printed:	12/02/2016
Drilled By:	SW
Logged By:	NC
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
08/06/2015	0.00	-	-	Start of Hole
08/06/2015	5.50	3.00	-	End of shift
09/06/2015	5.50	3.00	-	Start of shift
09/06/2015	9.85	3.00	-	Refusal

Remarks: Hole refused at 9.6mbgl due to ground conditions. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

CP2AMG-D

Sheet 1 of 2

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 79.860mOD

Coordinates: 463459.00E 224090.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL - Soft black slightly gravelly CLAY. Gravel is angular to subangular fine to medium flint.		0.30	79.56	B PID ES	0.00-1.20 0.30 0.30	 0.10ppm		
Soft to firm light greyish brown occasionally thinly laminated mottled CLAY with rare rootlets. Orangish brown discolouration between partings. Rootlets are up to 5mm thick. (OXFORD CLAY-PETERBOROUGH MEMBER)				PID D ES B SPT(S) D	1.00 1.00 1.00 1.30-1.50 1.50 1.50-1.95	0.10ppm N=6 (1,1/1,1,2,2) 		
Firm light grey to dark grey CLAY with occasional fine to medium sand size crystals and low content of weathered shell fragments. Crystals are possibly selenite. Shell fragments are up to 5mm wide. (OXFORD CLAY-PETERBOROUGH MEMBER)		2.00	77.86	D UT100 D SPT(S) D	2.00 2.50-2.95 3.00 3.50 3.50-3.95	 70 blows, 100% Recovery N=18 (1,3/3,3,5,7) 		
Firm to stiff dark grey silty CLAY with low content of weathered shell fragments. Shell fragments are up to 5mm wide. (OXFORD CLAY-PETERBOROUGH MEMBER)		4.00	75.86	D UT100 D SPT(S) D B D	4.00 4.50-4.95 5.00 6.00 6.00 6.00 6.00-6.45	 120 blows, 70% Recovery N=21 (1,3/4,5,5,7) 		
Stiff dark grey CLAY with a low content of weathered shell fragments. Shell fragments are up to 10mm wide. (OXFORD CLAY-PETERBOROUGH MEMBER)		7.00	72.86	D UT100 D SPT(S) D D	7.00 7.50-7.95 8.00 9.00 9.00 9.00-9.45	 120 blows, 70% Recovery 50 (3,5/8,12,17,13 for 55mm) 		

Borehole continued on next sheet

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	13.70	13.70
150	19.00	19.00

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
05/10/2015	0.00	-	-	Start of Hole

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	02/10/2015-07/10/2015
Plant:	Dando 3000 (T820-632)
SPT Hammer:	006
Date Printed:	12/02/2016
Drilled By:	PM
Logged By:	ZR
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

CP2AMG-D

Sheet 2 of 2

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 79.860mOD

Coordinates: 463459.00E 224090.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Results	Casing (Water) Depth (m)	Installations
Stiff dark grey CLAY with a low content of weathered shell fragments. Shell fragments are up to 10mm wide. (OXFORD CLAY-PETERBOROUGH MEMBER)				D	10.00			
				UT100	10.50-10.95	120 blows, 80% Recovery		
				D	11.00			
Firm dark grey silty CLAY with a low content of weathered shell fragments. Shell fragments are up to 10mm wide. (OXFORD CLAY-PETERBOROUGH MEMBER)		12.00	67.86	SPT(S)	12.00	N=43 (2,5/7,9,13,14)		
				D	12.00			
				D	12.00-12.45			
Soft dark grey sandy CLAY with frequent angular medium to coarse silt gravel. (KELLAWAYS SANDS)		13.00	66.86	D	13.00			
				UT100	13.50-13.95	120 blows, 80% Recovery		
				B	13.70-13.95			
				D	14.00			
				B	14.50			
Dark grey slightly clayey fine SAND. Clay is extremely rare. (KELLAWAYS SANDS)		15.00	64.86	SPT(S)	15.00	50 (9,16/36,14 for 20mm)		
				B	15.00			
				D	15.00			
				D	15.00-15.45			
				D	16.00			
				D	16.30			
Stiff to very stiff dark grey CLAY. (KELLAWAYS CLAY)		16.50	63.36	UT100	16.50-16.95	120 blows, 70% Recovery		
				D	17.00			
				SPT(S)	18.00	N=49 (3,6/9,11,14,15)		
				D	18.00			
				D	18.00-18.45			
Strong to extremely strong light grey SILTSTONE recovered as angular medium to coarse silt gravel. (KELLAWAYS SANDS)		18.50	61.36					
		19.00	60.86	SPT(C)	19.00	50 (25 for 20mm/50 for 35mm)		
				D	19.00-19.45			
Borehole Complete at 19.10 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	13.70	13.70
150	19.00	19.00

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)
13.70	13.95	1.50
18.90	19.10	1.00

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
05/10/2015	14.00	14.00	-	End of shift
06/10/2015	14.00	14.00	13.80	Start of shift
06/10/2015	19.10	19.10	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	02/10/2015-07/10/2015
Plant:	Dando 3000 (T820-632)
SPT Hammer:	006
Date Printed:	12/02/2016
Drilled By:	PM
Logged By:	ZR
Checked By:	JHS

Remarks:

Borehole Log

Status: FINAL

CP2AMG-U

Sheet 1 of 3

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 80.280mOD

Coordinates: 463455.00E 224105.00N

Description	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)
TOPSOIL - Soft black slightly gravelly CLAY. Gravel is angular to subangular fine to medium flint.			B PID ES	0.00-1.20 0.30 0.30	 0.40ppm	
Firm light greyish brown occasionally thinly laminated mottled CLAY. Orangish brown discolouration between partings. (OXFORD CLAY-PETERBOROUGH MEMBER)	1.00	79.28	PID D ES	1.00 1.00 1.00	0.20ppm	
Firm light grey to dark grey CLAY with occasional fine to medium sand size crystals and low content of weathered shell fragments. Crystals are possibly selenite. Shell fragments are up to 5mm wide. (OXFORD CLAY-PETERBOROUGH MEMBER) ..at 2.5mbgl - becoming dark grey.	2.00	78.28	D SPT(S) D D UT100 D B	2.00 2.50 2.50-2.95 3.00 3.50-3.95 4.00 4.00	 N=14 (1,2/2,4,4,4) 100 blows, 85% Recovery 	
..from 4.5mbgl to 6.0mbgl - becoming stiff			SPT(S) D D	4.50 4.50-4.95 5.00	N=23 (2,3/4,5,6,8) 	
Firm to stiff dark grey silty CLAY with low content of weathered shell fragments. Shell fragments are up to 5mm wide. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 6mbgl to 6.5mbgl - silty clay occurs in rare bands.	6.00	74.28	D UT100	6.00 6.00-6.45	 120 blows, 80% Recovery	
Stiff dark grey CLAY with a low content of weathered shell fragments. Shell fragments are up to 10mm wide. (OXFORD CLAY-PETERBOROUGH MEMBER)	7.00	73.28	D SPT(S) D D D UT100	7.00 7.50 7.50-7.95 8.00 9.00 9.00-9.45	 N=30 (2,3/5,7,8,10) 120 blows, 60% Recovery	

Borehole continued on next sheet

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	18.00	18.00
150	21.00	19.50

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
29/09/2015	0.00	-	-	Start of Hole

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	28/09/2015-01/10/2015
Plant:	Dando 3000 (T820-632)
SPT Hammer:	006
Date Printed:	12/02/2016
Drilled By:	PM
Logged By:	ZR
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

CP2AMG-U

Sheet 2 of 3

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 80.280mOD

Coordinates: 463455.00E 224105.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
Stiff dark grey CLAY with a low content of weathered shell fragments. Shell fragments are up to 10mm wide. (OXFORD CLAY-PETERBOROUGH MEMBER)				D	10.00			
				SPT(S)	10.50	N=43 (3,6/7,10,11,15)		
				D	10.50-10.95			
				D	11.00			
				B	11.00			
				D	12.00			
				UT100	12.00-12.45	120 blows, 60% Recovery		
				D	13.00			
				SPT(S)	13.50	N=46 (4,7/9,10,12,15)		
				D	13.50-13.95			
Soft to firm dark grey silty CLAY with low content of weathered shell fragments. Shell fragments are up to 5mm wide. (OXFORD CLAY-PETERBOROUGH MEMBER)		14.00	66.28	D	14.00			
				D	14.50			
				UT100	15.00	75 blows, 75% Recovery		
				D	15.00			
				UT100	15.00-15.45	120 blows, 100% Recovery		
Soft dark grey sandy CLAY. Sand is fine. (KELLAWAYS SANDS)		16.00	64.28	SPT(S)	16.00	50 (6,13/20,26,4 for 2mm)		
				D	16.00			
Dark grey fine SAND. (KELLAWAYS SANDS)		16.50	63.78	D	16.50-16.95			
				D	17.00			
Stiff dark grey silty CLAY. (KELLAWAYS CLAY) ..from 18.3mbgl to 18.5mbgl - possible silt band. extremely low recovery.		18.10	62.18	SPT(S)	18.00	N=49 (4,6/10,10,13,16)		
				D	18.00			
				D	18.00-18.45			
				B	18.50			
Stiff dark grey CLAY. (KELLAWAYS CLAY)		19.00	61.28	D	19.00			
				UT100	19.50-19.95	120 blows, 30% Recovery		

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	18.00	18.00
150	21.00	19.50

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
29/09/2015	16.50	6.00	-	End of shift
30/09/2015	15.50	6.00	7.40	Start of shift

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	28/09/2015-01/10/2015
Plant:	Dando 3000 (T820-632)
SPT Hammer:	006
Date Printed:	12/02/2016
Drilled By:	PM
Logged By:	ZR
Checked By:	JHS

Remarks:

Borehole Log

Status: FINAL

CP2AMG-U

Sheet 3 of 3

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 80.280mOD

Coordinates: 463455.00E
224105.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
Stiff dark grey CLAY. (KELLAWAYS CLAY)		20.00	60.28	D	20.00			
Strong to extremely strong light grey SILTSTONE recovered as angular medium to coarse silt gravel. (KELLAWAYS CLAY)		21.00	59.28	D	21.00			
Borehole Complete at 21.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	18.00	18.00
150	21.00	19.50

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)
20.90	21.00	1.00

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	28/09/2015-01/10/2015
Plant:	Dando 3000 (T820-632)
SPT Hammer:	006
Date Printed:	12/02/2016
Drilled By:	PM
Logged By:	ZR
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
30/09/2015	21.00	19.50	-	Completion instructed by WSP/PB

Remarks:

Borehole Log

Status: FINAL

CP2ALLCDE

Sheet 1 of 2

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 69.917mOD

Coordinates: 461915.00E 223572.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Light orangish brown slightly gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse of chert and clinker.				B	0.00-1.00			
				D	0.30			
				ES	0.30			
MADE GROUND: Hard dark brown and dark grey CLAY clasts in a soft brown mottled orange and grey clay with silt partings matrix.		1.00	68.92	D	1.00			
				ES	1.00			
				UT100	1.50-1.95	20 blows, 100% Recovery		
				D	1.95-2.10			
				SPT(S)	2.50	N=4 (2 for 0mm/1,1,1,1)		
				D	2.50-2.95			
				D	3.00			
				UT100	3.50-3.95	26 blows, 60% Recovery		
				D	4.00			
				SPT(S)	4.50	N=9 (1,1/2,2,2,3)		
				D	4.50-4.95			
Soft dark grey sandy silty CLAY. Sand is fine to coarse. (ALLUVIUM)		5.00	64.92	D	5.00			
				UT100	5.50-5.95	50 blows, 80% Recovery		
Dark grey very clayey silty fine to medium SAND. (ALLUVIUM)		6.00	63.92	D	6.00			
				B	6.00-6.50			
				D	6.00			
				SPT(S)	6.10	33 (8,9/12,13,8,0 for 0mm)		
				D	6.10-6.55			
				D	7.00			
				SPT(S)	7.50	N=21 (2,4/4,5,6,6)	7.50	
		7.60	62.32	D	7.50-7.95			
Stiff dark grey very sandy silty CLAY with grey Sand partings. Sand is fine to medium. (OXFORD CLAY-PETERBOROUGH MEMBER)		7.80	62.12	D	7.60			
Stiff dark grey thinly laminated CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 8.5mbgl to 9.5mbgl - very stiff.				D	8.50			
				UT100	9.00-9.45	90 blows, 100% Recovery		
..from 9.5mbgl to 10mbgl - hard with				D	9.45-9.55			

Borehole continued on next sheet

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	0.00	0.00
200	6.00	7.50
200	7.50	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	17/05/2015-19/05/2015
Plant:	Dando 2000 (T820-067)
SPT Hammer:	002
Date Printed:	12/02/2016
Drilled By:	DS
Logged By:	ZR
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
17/05/2015	0.00	-	-	Start of Hole
17/05/2015	2.10	-	-	End of shift
18/05/2015	2.00	-	-	Start of shift
18/05/2015	6.00	4.50	-	End of shift
19/05/2015	5.40	4.50	-	Start of shift

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

CP2ALLCDE

Sheet 2 of 2

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 69.917mOD

Coordinates: 461915.00E 223572.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
Remaining Detail : 9.50m - 10.00m : occasional iron pyrites crystals.		10.00	59.92	D	10.00			
Borehole Complete at 10.50 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	0.00	0.00
200	6.00	7.50
200	7.50	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)
10.30	10.50	30in

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
19/05/2015	10.50	7.50	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	17/05/2015-19/05/2015
Plant:	Dando 2000 (T820-067)
SPT Hammer:	002
Date Printed:	12/02/2016
Drilled By:	DS
Logged By:	ZR
Checked By:	JHS

Remarks:

Borehole Log

Status: FINAL

CP2ALLCDW

Sheet 1 of 2

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 69.880mOD

Coordinates: 461860.00E 223557.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown slightly sandy slightly silty angular to subangular fine to coarse GRAVEL of basalt limestone and clinker. Sand is fine to coarse.		0.20	69.68	B B	0.00-0.20 0.20-0.70			
MADE GROUND: Light orangish brown slightly gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse of chert and clinker. (MADE GROUND)		0.70	69.18	B D UT100	0.70-1.20 1.00 1.50-1.95	12 blows, 90% Recovery		
MADE GROUND: Hard dark brown and dark grey CLAY clasts in a soft brown mottled orange and grey clay with silt partings matrix.				D SPT(S) D D UT100	2.00 2.50 2.50-2.95 3.00 3.50-3.95	N=4 (1,0 for 0mm/1,1,1,1) 22 blows, 70% Recovery		
Firm light orangish brown mottled grey sandy CLAY. Sand is fine to medium. (ALLUVIUM)		4.00	65.88	D SPT(S) D	4.00 4.50 4.50-4.95	N=5 (1,1/1,1,1,2)		
Light orangish brown mottled grey slightly gravelly very clayey fine to coarse SAND. Gravel is angular to rounded fine to medium of chert. (KELLAWAYS SAND)		4.95 5.00 5.50	64.93 64.88 64.38	D D B UT100	5.00 5.00 5.00-5.50 5.50-5.95	90 blows, 100% Recovery		
Extremely weak to very weak dark grey calcareous fine to medium SANDSTONE with firm light orangish brown sandy clay infill/interbedded. Recovered as angular to subrounded fine to coarse GRAVEL of sandstone in a firm light orangish brown sandy CLAY matrix. Sand is fine to medium. (KELLAWAYS SAND)		6.50	63.38	D SPT(S) D	5.95-6.10 6.50 7.00 7.00-7.45	N=25 (3,4/8,6,5,6)	7.00	
Dark grey slightly gravelly silty fine to medium SAND and shell fragments. Gravels is angular fine of extremely weak Sandstone. (KELLAWAYS SAND)		8.00	61.88	D	8.00			
Soft dark grey very sandy silty CLAY. Sand is fine. (KELLAWAYS CLAY)				UT100	8.50-8.95	110 blows, 100% Recovery		
Very stiff to hard dark grey thinly laminated CLAY with silt dustings and very occasional shell fragments. (KELLAWAYS CLAY)				D D	8.95-9.10 9.50			

Borehole continued on next sheet

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	5.00	0.00
200	7.00	7.00
		7.50

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	19/05/2015-20/05/2015
Plant:	Dando 2000 (T820-067)
SPT Hammer:	002
Date Printed:	12/02/2016
Drilled By:	DS
Logged By:	NC
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
19/05/2015	0.00	-	-	Start of Hole
19/05/2015	5.00	5.00	-	End of shift
20/05/2015	5.00	5.00	-	Start of shift

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

CP2ALLCDW

Sheet 2 of 2

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 69.880mOD

Coordinates: 461860.00E 223557.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Results	Casing (Water) Depth (m)	Installations
Very stiff to hard dark grey thinly laminated CLAY with silt dustings and very occasional shell fragments. (KELLAWAYS CLAY)		10.45	59.43	SPT(S) D D	10.00 10.00-10.45 10.00	50 (1,2/3,4,43 for 50mm)	7.50	
Borehole Complete at 10.45 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	5.00	0.00
200	7.00	7.00
		7.50

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
20/05/2015	10.45	7.50	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	19/05/2015-20/05/2015
Plant:	Dando 2000 (T820-067)
SPT Hammer:	002
Date Printed:	12/02/2016
Drilled By:	DS
Logged By:	NC
Checked By:	JHS

Remarks:

Borehole Log

Status: FINAL

RC2ACBLLCD

Sheet 1 of 2

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 69.232mOD

Coordinates: 460108.00E 222921.00N

Description	Depth (m)	O.D. Level (m)	Type	Depth (m)	Rotary Coring/Test Results	Casing (Water) Depth (m)
CONCRETE	0.20	69.03	B	0.20-0.50		
			ES	0.30		
MADE GROUND: Grey SAND & GRAVEL. Sand is fine to coarse. Gravel is fine to coarse angular to subangular limestone.	0.45	68.78	B	0.45-1.00		
Firm dark greyish brown CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)	1.00	68.23	B	1.00-1.20		
			ES	1.00		
			SPT(S)	1.20	N=11 (1,1/1,3,3,4)	
Firm dark greyish brown silty CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)			D	1.20-1.70		
			PL	1.20-2.70		
			D	1.70		
				1.20-2.70	100.00	
			UT100	2.20-2.65		
			SPT(S)	2.70	~~N=16 (1,1/2,4,5,5)~~	(0.63) 2.70
			D	2.70-3.20		
			PL	2.70-3.30	100.00	
	3.15	66.08	D	2.70-3.30		
				3.20		
Soft to firm dark grey sandy CLAY with occasional shell fragments. Sand is fine. Shell fragments are up to 10mm wide. (OXFORD CLAY-PETERBOROUGH MEMBER)			C	3.30-4.80		
				3.30-4.80	100.00	
	4.80	64.43	C	4.80-6.30		
Dark grey stiff CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)				4.80-6.30	100.00	
	6.30	62.93	C	6.30-7.80		
Stiff thinly laminated dark silty CLAY. (KELLAWAYS CLAY)						0
				6.30-7.80	100.00 73.00 73.00	
	7.45	61.78				
Strong greenish grey LIMESTONE. No evidence of weathering. Discontinuities. Closely spaced, sub horizontal (13 degrees) to sub vertical (75 degrees), undulating, rough, open to locally clay filled. (CORNBRASH LIMESTONE)			C	7.80-9.30		5
				7.80-9.30	100.00 100.00 46.00	
						10
			C	9.30-10.30		
	9.73	59.50		9.30-10.30	100.00 100.00 46.00 5 TCR SCR RQD FI	

Borehole continued on next sheet

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
116	11.60	11.60

Flush and Circulation

Type	From (m)	To (m)	Return %
Water	3.30	4.80	60.00

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
29/10/2015	0.00	-	-	Start of Hole
29/10/2015	2.70	2.70	0.00	End of shift
30/10/2015	2.70	2.70	0.61	Start of shift

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	29/10/2015-30/10/2015
Plant:	COMACCHIO GEO205
SPT Hammer:	ADP02
Core Bit:	PCD Shoe
Core Barrel:	T6-116
Date Printed:	12/02/2016
Drilled By:	SR
Logged By:	ZR+NC
Checked By:	JHS

Remarks: Hole terminated early due to time constraints. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail. Drilling carried out by ADP ground under subcontract to BAM Ritchies.

Borehole Log

Status: FINAL

RC2ACBLLCD

Sheet 2 of 2

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 69.232mOD

Coordinates: 460108.00E
222921.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Rotary Coring/Test Results TCR	SCR	RQD	FI	Casing (Water) Depth (m)	Installations
Stiff thinly laminated dark silty CLAY. Low proportion of fossil fragments. (FOREST MARBLE)				C	10.30-11.60						
		10.75	58.48						4		
Strong light grey LIMESTONE. No evidence of weathering. Discontinuities. Closely spaced, sub horizontal (7 degrees) to sub vertical (80 degrees) planar, open, smooth. (FOREST MARBLE)		11.00	58.23		10.30-11.60	100.00	97.00	71.00			
		11.55	57.68						1		
Stiff thinly laminated grey silty CLAY with rare fossil fragments. (FOREST MARBLE)		11.60	57.63								
Strong grey LIMESTONE. No evidence of weathering. (FOREST MARBLE)											
Borehole Complete at 11.60 m											

TCR SCR RQD FI

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
116	11.60	11.60

Flush and Circulation

Type	From (m)	To (m)	Return %
Water	3.30	4.80	60.00

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
30/10/2015	11.60	-	1.85	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	29/10/2015-30/10/2015
Plant:	COMACCHIO GEO205
SPT Hammer:	ADP02
Core Bit:	PCD Shoe
Core Barrel:	T6-116
Date Printed:	12/02/2016
Drilled By:	SR
Logged By:	ZR+NC
Checked By:	JHS

Remarks:

Borehole Log

Status: FINAL

WS2AFCGF15C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 68.960mOD

Coordinates: 460965.00E 223230.00N

Description	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)
MADE GROUND: Dark brown slightly clayey gravelly SAND with a low cobble content. Cobbles are angular brick and concrete. Sand is fine to coarse. Gravel is angular fine to coarse brick, concrete and crushed rock possibly limestone.			D	0.00-0.30	See DCP Results	
	0.30	68.66	PID	0.30	0.70ppm	
			B	0.30-0.80		
			ES	0.30		
MADE GROUND: Brown gravelly SAND. Sand is fine to coarse. Gravel is subrounded fine to coarse flint.	0.80	68.16	D	0.80		
			B	0.80-1.20		
			PID	1.00	0.60ppm	
			ES	1.00		
			UT100	1.20-1.65		
MADE GROUND: Soft black organic CLAY. Clay is spongy with organic odour. ..at 1.6mbgl - becoming less organic with depth	1.70	67.26	D	1.70		
			D	2.70		
Soft to firm light greyish brown mottled CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)			UT87	3.00-3.45		
	3.45	65.51	D	3.50		
Firm brownish grey CLAY interbedded with occasional lenses of orangish brown discolouration. Discolouration occurs as staining. (OXFORD CLAY-PETERBOROUGH MEMBER) ..at 3.8mbgl - discolouration becoming extremely rare with depth.	4.40	64.56	D	4.40		
Firm dark grey silty CLAY with rare fine angular silt gravel. (OXFORD CLAY-PETERBOROUGH MEMBER) ..at 4.8mbgl - silty gravel band.	5.00	63.96	D	5.00		
Dark grey slightly clayey SILT. (KELLAWAYS SAND)	6.00	62.96	D	6.00		
Borehole Complete at 6.00 m						

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	0.00
87	5.00	
75	6.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
28/05/2015	0.00	-	-	Start of Hole
28/05/2015	6.00	-	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	28/05/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	SW
Logged By:	ZR
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2AFCGF15DA

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 69.180mOD

Coordinates: 460970.00E 223232.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown slightly clayey gravelly SAND with a low cobble content. Cobbles are angular brick and concrete. Sand is fine to coarse. Gravel is angular fine to coarse brick and concrete.		0.40	68.78	B PID ES	0.00 0.30 0.30	1.20ppm		
Borehole Complete at 0.40 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
28/05/2015	0.00	-	-	Start of Hole
28/05/2015	0.40	-	-	Refusal

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	28/05/2015
Plant:	Hand dug pit
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	SR
Logged By:	ZR
Checked By:	JHS

Remarks: Hole finished at 0.4mbgl due to concrete. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2AFCGF15DB

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 69.060mOD

Coordinates: 460975.00E 223232.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown slightly clayey gravelly SAND with a low cobble content. Sand is fine to coarse. Gravel is angular fine to coarse brick, concrete and crushed rock possibly limestone. Cobbles are angular brick and concrete		0.40	68.66	B PID ES	0.00-0.40 0.30 0.30	0.90ppm		
Borehole Complete at 0.40 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	28/05/2015
Plant:	Hand dug pit
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	SR
Logged By:	ZR
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
28/05/2015	0.00	-	-	Start of Hole
28/05/2015	0.40	-	-	Refusal

Remarks: Hole refused to to concrete at 0.4mbgl. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2AFCGF15U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 68.370mOD

Coordinates: 460958.00E 223241.00N

Description	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)
MADE GROUND: Dark brown gravelly very clayey fine to coarse SAND. Gravel is angular rounded fine to coarse of clinker.	0.30	68.07	D	0.00-0.10	See DCP Results	
			PID	0.30	0.20ppm	
			B	0.30-0.60		
MADE GROUND: Stiff to hard dark brown CLAY clasts in a soft to firm brown mottled orange and grey CLAY with silt partings matrix.	0.60	67.77	ES	0.30		
			B	0.60-1.20		
Firm light brown mottled orange and grey CLAY with silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER)			PID	1.00	0.20ppm	
			ES	1.00		
			D	1.90		
			UT100	2.00-2.45	30 blows, 100% Recovery	
Stiff dark greyish brown slightly organic CLAY with orangish brown and yellow silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 2.6mbgl to 2.8mbgl - becoming slightly sandy. sand is fine.	2.40	65.97				
			D	2.90		
	3.10	65.27	D	3.20		
Stiff dark grey thinly laminated CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 4mbgl to 4.5mbgl - becoming silty and slightly sandy. Sand is fine to medium.			D	3.90		
			UT87	4.00-4.45	84 blows, 100% Recovery	
			B	4.45-5.00		
Dark grey clayey silty fine to medium SAND. (KELLAWAYS SAND)	4.50	63.87				
Stiff dark grey thinly laminated CLAY. (KELLAWAYS SAND)	4.90	63.47				
Dark grey clayey silty fine to medium SAND. (KELLAWAYS SAND)	5.00	63.37				
Borehole Complete at 5.00 m						

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	0.00
87	4.00	
75	5.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
27/05/2015	0.00	-	-	Start of Hole
28/05/2015	5.00	-	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	27/05/2015-28/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	PG
Logged By:	NJD
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2AFCGF15UB

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 69.180mOD

Coordinates: 460969.00E 223242.00N

Description	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)
MADE GROUND: Black slightly clayey SAND & GRAVEL. Sand is fine to coarse. Gravel is angular fine to coarse of crushed rock possibly limestone.	0.40	68.78	D PID B ES	0.10 0.30 0.30-0.80 0.30	 0.50ppm 	
MADE GROUND: Brown slightly gravelly SAND. Sand is fine to coarse. Gravel is subangular fine flint with occasional crushed rock possibly limestone.	0.80 1.20	68.38 67.98	D PID ES UT100	0.80 1.00 1.00 1.20-1.65	 0.60ppm 40 blows, 100% Recovery	
MADE GROUND: Soft dark grey organic CLAY. Organic clay is wholly amorphous. Clay is slightly spongy with organic odour.	1.70	67.48	D D	1.65-1.70 1.90-2.00	 	
MADE GROUND: Firm dark greyish brown slightly sandy silty CLAY.						
Firm light brown mottled orange and grey CLAY with occasional silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER)	3.10	66.08	D UT87 D	2.90-3.00 3.00-3.45 3.20-3.30	 	
Very stiff dark greyish brown slightly sandy slightly organic CLAY with orangish brown and yellow silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER)	3.60	65.58	D D	3.80-3.90 4.10-4.20	 	
Stiff dark grey thinly laminated CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 4mbgl to 4.25mbgl - becoming silty and slightly sandy. Sand is fine. ..from 4.35mbgl to 4.5mbgl - silty slightly sandy becoming very sandy with depth. sand is fine to medium.	4.50 4.60	64.68 64.58	D D	4.50-4.60 4.50	 	
Dark grey clayey silty fine to medium SAND. (KELLAWAYS SAND)						
Borehole Complete at 4.60 m						

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	28/05/2015
Plant:	Dart 2 (T820-759)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	DS
Logged By:	NJD
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
28/05/2015	0.00	-	-	Start of Hole
28/05/2015	4.60	-	-	Refusal

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2AFCT2D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 89.958mOD

Coordinates: 466722.00E 225209.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown to black gravelly silty fine to coarse SAND. Gravel is angular to rounded fine to coarse of clinker and chert. ..from 0mbgl to 1.8mbgl - live roots. ..from 0mbgl to 2.2mbgl - decayed roots.				D	0.00-0.10	See DCP Results		
		0.30	89.66	PID	0.30	0.20ppm		
				D	0.30			
				ES	0.30			
				PID	1.00	0.10ppm		
				D	1.00			
				ES	1.00			
MADE GROUND: Firm light brown mottled orange and grey slightly gravelly CLAY. Gravel is angular to rounded fine to coarse and of chert.		1.40	88.56	D	1.40			
				D	1.90			
				UT100	2.00-2.45	21 blows, 100% Recovery		
Firm varying to stiff greyish brown mottled grey thinly laminated CLAY with silt partings and gypsum crystals. (OXFORD CLAY-STEWARTBY MEMBER)				D	2.90			
				D	3.60			
..at 3.6mbgl - light orangish brown silt laminae.		3.80	86.16	D	3.90			
				UT87	4.00-4.45	25 blows, 100% Recovery		
Firm varying to stiff dark brown mottled grey thin cross laminated organic CLAY with shell fragments and gypsum crystals and occasional black organic partings. (OXFORD CLAY-STEWARTBY MEMBER) ..at 3.8mbgl - dark brown silt laminae.		4.20	85.76					
		4.80	85.16	D	4.90			
Firm varying to stiff greyish brown mottled grey thinly laminated CLAY with silt partings and gypsum crystals. (OXFORD CLAY-STEWARTBY MEMBER)				D	5.90			
Stiff varying to very stiff dark greyish brown thinly cross laminated slightly organic CLAY with shell fragments and gypsum crystals. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 5.4mbgl to 6.6mbgl - becoming very stiff to hard.		6.60	83.36					
Very stiff varying hard dark grey thinly laminated CLAY with shell fragments and occasional gypsum crystals. (OXFORD CLAY-PETERBOROUGH MEMBER)		7.00	82.96	D	6.90			
Borehole Complete at 7.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	2.00
87	5.00	
75	6.00	
65	7.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
11/05/2015	0.00	-	-	Start of Hole
11/05/2015	7.00	2.00	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	11/05/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	NJD
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2AFCT2U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 89.103mOD

Coordinates: 466718.00E 225218.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Firm dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of chert and clinker. ..from 0mbgl to 2mbgl - live roots. ..from 0mbgl to 3.6mbgl - decayed roots.				D	0.00-0.10	See DCP Results		
		0.30	88.80	PID ES	0.30 0.30	0.70ppm		
MADE GROUND: Firm light brown mottled orange and grey slightly gravelly CLAY. Gravel is angular to rounded fine to coarse and of chert.		1.20	87.90	PID D ES UT100	1.00 1.00-1.10 1.00 1.20-1.65	0.10ppm		
				D	1.90-2.00			
Firm light brown mottled orange and grey CLAY with occasional shell fragments and gypsum crystals.(OXFORD CLAY-STEWARTBY MEMBER) ..from 2mbgl to 2.3mbgl - with much gypsum crystals.		2.30	86.80					
				D	2.90-3.00			
Firm brown mottled orangish brown and grey thinly cross laminated CLAY with very closely spaced black organic partings with gypsum crystals. (OXFORD CLAY-STEWARTBY MEMBER) ..from 2.7mbgl to 3.7mbgl - becoming stiff. ..from 3.7mbgl to 4.8mbgl - becomig very stiff.				D	3.90-4.00			
		4.80	84.30	D	4.90-5.00			
Very stiff varying to hard dark greyish brown thinly cross laminated slightly organic CLAY with shell fragments and gypsum crystals. (OXFORD CLAY-PETERBOROUGH MEMBER)		5.00	84.10	D	5.00			
Stiff to very stiff dark grey CLAY with rare shell remains. (OXFORD CLAY-PETERBOROUGH MEMBER)				D	6.00			
		7.00	82.10	D	7.00			
Borehole Complete at 7.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	2.00
87	3.00	
75	5.00	
75	6.00	
65	7.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
11/05/2015	0.00	-	-	Start of Hole
11/05/2015	7.00	2.00	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	11/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	SR
Logged By:	JHS
Checked By:	RS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2AOB29D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 94.313mOD

Coordinates: 467379.00E 225378.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: Firm dark brown slightly gravelly silty CLAY. Gravel is angular to rounded fine to coarse of chert. ..from 0mbgl to 2mbgl - live roots. ..from 0mbgl to 3mbgl - decayed roots.		0.20	94.11	D PID D ES B	0.00-0.10 0.30 0.30 0.30 0.50-1.20	See DCP Results 0.20ppm		
MADE GROUND: Firm light orangish brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to rounded fine to coarse and of chert.		0.50	93.81					
MADE GROUND: Firm light brown mottled orange and grey slightly gravelly CLAY. Gravel is angular to rounded fine to coarse and of chert. ..from 0.8mbgl to 1.3mbgl - becoming stiff.		1.30	93.01	PID D ES	1.00 1.00 1.00	0.10ppm		
Stiff light brown mottled orange and grey CLAY with occasional calcareous nodules. (OXFORD CLAY-STEWARTBY MEMBER) ..from 1.5mbgl to 2.4mbgl - becoming very stiff. ..from 1.9mbgl to 2.4mbgl - with much shell fragments.		2.40	91.91	D UT100	1.90 2.00-2.45	111 blows, 70% Recovery		
Hard dark brown mottled reddish brown and grey thinly cross laminated organic CLAY with much shell fragments. (OXFORD CLAY-STEWARTBY MEMBER)		2.90	91.41	D	2.60			
Very stiff brown mottled orange and grey CLAY with shell fragments. (OXFORD CLAY-STEWARTBY MEMBER)		3.20	91.11	D	2.90			
Hard dark brown mottled reddish brown and grey thinly cross laminated organic CLAY with much shell fragments and with gypsum crystals. (OXFORD CLAY-STEWARTBY MEMBER)		4.20	90.11	D UT87	3.90 4.00-4.45	87 blows, 75% Recovery		
Very stiff varying to hard dark brownish grey thinly laminated CLAY with much shell fragments and with gypsum crystals. (OXFORD CLAY-STEWARTBY MEMBER)		5.70	88.61	D	4.90			
Hard dark brown thinly cross laminated organic CLAY with occasional shell fragments. (OXFORD CLAY-STEWARTBY MEMBER)		5.90	88.41	D	5.70			
Very stiff varying to hard dark brownish grey thinly laminated CLAY with much shell fragments and with gypsum crystals. (OXFORD CLAY-STEWARTBY MEMBER)		6.20	88.11	D	5.90			
Stiff light brown mottled orange silty CLAY with much shell fragments and occasional		6.40	87.91	D	6.20			
		7.00	87.31	D	6.90			

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	0.00
87	4.00	
75	6.00	
65	7.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
12/05/2015	0.00	-	-	Start of Hole
12/05/2015	7.00	-	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	12/05/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	NJD
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2AOB29D

Sheet 1+ of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 94.313mOD

Coordinates: 467379.00E 225378.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test			Casing (Water) Depth (m)	Installations
				Type	Depth (m)	Test Results		
6.20m - 6.40m : calcareous nodules. (OXFORD CLAY-STEWARTBY MEMBER) 6.40m - 7.00m : Hard dark grey thinly laminated CLAY with much shell fragments. (OXFORD CLAY-PETERBOROUGH MEMBER) Borehole Complete at 7.00 m						See DCP Results		

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	0.00
87	4.00	
75	6.00	
65	7.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	12/05/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	NJD
Checked By:	JHS

Remarks:

Borehole Log

Status: FINAL

WS2AOB29U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 93.229mOD

Coordinates: 467386.00E 225407.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Firm dark brown slightly gravelly silty CLAY. Gravel is angular to rounded fine to coarse of chert. ..from 0mbgl to 2mbgl - live roots.		0.20	93.03	D	0.00-0.10	See DCP Results		
				PID	0.30	0.20ppm		
				ES	0.30			
				D	0.50			
MADE GROUND: Firm light brown mottled orange and grey slightly gravelly CLAY. Gravel is angular to rounded fine to coarse and of chert.		1.00	92.23	PID	1.00	0.00ppm		
				ES	1.00			
				D	1.10			
		1.40	91.83	D	1.40			
MADE GROUND: Light orangish brown sandy very clayey angular to rounded fine to coarse GRAVEL of chert. Sand is fine to coarse.		1.80	91.43	D	1.70			
MADE GROUND: Very stiff light brown mottled orange and grey slightly sandy slightly gravelly CLAY with occasional black carbonaceous fragments. Sand is fine to coarse. Gravel is angular to rounded fine to coarse and of chert. ..from 1.4mbgl to 2mbgl - probable desiccation.		2.00	91.23					
Very stiff light brown mottled orange and grey CLAY with much calcareous nodules and with gypsum crystals. (OXFORD CLAY-STEWARTBY MEMBER)								
Borehole Complete at 2.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	0.00

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
12/05/2015	0.00	-	-	Start of Hole
12/05/2015	2.00	-	-	Refusal

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	12/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	EK
Logged By:	MO
Checked By:	JHS

Remarks: Barrel stuck in hole at 2.0mbgl, hole moved to WS2AOB29UA (slightly down slope). Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2AOB29UA

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 93.123mOD

Coordinates: 467387.00E 225409.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: Soft dark brown sandy gravelly CLAY with rootlets. Gravel is subangular to rounded fine to coarse flint and chalk. Sand is fine to coarse.		0.15	92.97	D PID ES	0.15 0.30 0.30	 0.20ppm		
MADE GROUND: Firm greenish brown mottled bluish grey slightly sandy slightly gravelly CLAY with rare rootlets. Gravel is subangular to rounded fine and medium chalk. Sand is fine. ..at 1.1mbgl - black ash fine sand.		1.30	91.82	PID D ES D	1.00 1.00 1.00 1.30	0.30ppm		
Firm to stiff dark brown speckled while slightly sandy silty CLAY with frequent shell remains. Sand is fine to coarse. (OXFORD CLAY-STEWARTBY MEMBER) ..from 2.6mbgl to 2.65mbgl - thin band of orange fine to coarse sand ..from 2.9mbgl to 2.95mbgl - thin band of orange fine to coarse sand ..from 3.1mbgl to 3.15mbgl - thin band of orange fine to coarse sand ..from 3.7mbgl to 3.75mbgl - thin band of orange fine to coarse sand				D UT100	2.00 2.00-2.45	 52 blows, 100% Recovery		
				D	3.00			
		4.00	89.12	D UT87	4.00 4.00-4.45	 41 blows, 100% Recovery		
Stiff dark grey silty CLAY with rare shell remains. (OXFORD CLAY-STEWARTBY MEMBER)				D	5.00			
Borehole Complete at 6.00 m		6.00	87.12	D	6.00			

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	2.00
87	5.00	
75	6.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
12/05/15	3.00	5	-	-	

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
12/05/2015	0.00	-	-	Start of Hole
12/05/2015	6.00	2.00	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	12/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	SR
Logged By:	JHS
Checked By:	RS

Remarks: Water seepage 3-4m run. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2AOB31D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 93.936mOD

Coordinates: 465724.00E
224916.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: Very stiff dark brown silty CLAY. ..from 0mbgl to 1.2mbgl - live and decayed roots and probable desiccation.		0.10	93.84	B D PID ES D	0.00-1.20 0.00-0.10 0.30 0.30 0.50	See DCP Results 1.00ppm		
MADE GROUND: Very stiff light brown slightly gravelly CLAY. Gravel is angular to rounded fine to coarse of chert and brick.		0.90	93.04	PID D ES UT100	1.00 1.00 1.00 1.20-1.65	0.20ppm 36 blows, 100% Recovery		
Stiff greyish brown thinly laminated silty CLAY. Moderate proportion of fossil fragments. (OXFORD CLAY-STEWARTBY MEMBER)				D ES	1.80 1.80			
				D ES UT100	2.80 2.80 3.00-3.45	 32 blows, 100% Recovery		
				D ES	3.80 3.80			
Firm to stiff dark brown thinly laminated silty CLAY with thin beds of fine sand and gypsum 5.40mbgl and 6.20mbgl. Moderate proportion of fossil fragments. Moderate to strong organic/ hydrocarbon odour. (OXFORD CLAY-PETERBOROUGH MEMBER)		4.00	89.94	D	4.80			
				D	6.30			
Borehole Complete at 6.50 m		6.50	87.44					

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	1.00
87	5.00	
75	6.50	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
07/05/2015	0.00	-	-	Start of Hole
07/05/2015	6.50	1.00	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	07/05/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	PG
Logged By:	NJD
Checked By:	JHS

Remarks: Hole refused at 6.5mbgl due to ground conditions. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2AOB31U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 93.016mOD

Coordinates: 465724.00E 224942.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: Very stiff dark brown silty CLAY. ..from 0mbgl to 1.2mbgl - live and decayed roots and probable desiccation.		0.10	92.92	D	0.00	See DCP Results		
				PID	0.30	0.50ppm		
		0.40	92.62	D	0.30			
MADE GROUND: Very stiff light brown slightly gravelly CLAY. Gravel is angular to rounded fine to coarse of brick and chert.				PID	1.00	0.10ppm		
		1.20	91.82	D	1.00			
Very stiff light brown CLAY with occasional gypsum crystals.(OXFORD CLAY-STEWARTBY MEMBER)				D	1.70			
				UT100	2.00-2.45	57 blows, 80% Recovery		
Stiff greyish brown thinly laminated silty CLAY with gypsum crystals. Low proportion of fossil fragments. Rare rootlets. (OXFORD CLAY-STEWARTBY MEMBER)				D	2.70			
				D	3.70			
				UT87	4.00-4.45	27 blows, 60% Recovery		
		4.50	88.52					
Firm becoming stiff at 6.50mbgl dark brown mottled bluish grey silty CLAY. Moderate to high proportion of fossil fragments. Strong organic/ hydrocarbon odour. (OXFORD CLAY-PETERBOROUGH MEMBER)				D	4.70			
				D	5.70			
				D	6.70			
				D	7.70			
Borehole Complete at 7.80 m		7.80	85.22					

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	2.00
87	5.00	
75	7.00	
65	7.80	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	07/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	SR
Logged By:	NC
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
07/05/2015	0.00	-	-	Start of Hole
07/05/2015	7.80	2.00	-	Completion instructed by WSP/PB

Remarks: Hole refused at 7.8mbgl due to ground conditions. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A1C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 86.490mOD

Coordinates: 468438.00E 225427.00N

Description	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)
TOPSOIL: Dark brown gravelly fine to coarse SAND with frequent rootlets. Gravel is subangular to angular fine to coarse brick and slag gravel.					See DCP Results	
			PID	0.30	0.00ppm	
			D	0.30		
	0.80	85.69				
MADE GROUND: Dark grey to black gravelly ashy fine to coarse SAND. Gravel is subangular to angular fine to coarse brick and slag.			PID	1.00	0.00ppm	
			B	1.00-1.20		
	1.30	85.19				
MADE GROUND: Soft to firm dark grey mottled sandy silty CLAY with rare rootlets and slight hydrocarbon odour.						
	2.00	84.49	D	2.00		
			UT100	2.00-2.45	45 blows, 100% Recovery	
Firm bluish grey mottled brown silty CLAY with frequent fossil fragments and rare rootlets. (OXFORD CLAY-PETERBOROUGH MEMBER)			D	2.60		
	3.00	83.49				
Firm dark brown thinly laminated silty CLAY with frequent fossil fragments and slight organic odour. (OXFORD CLAY-PETERBOROUGH MEMBER)			D	3.60		
			UT87	4.00-4.45	32 blows, 50% Recovery	
			D	4.60		
	5.00	81.49				
Very stiff dark brown thinly laminated silty CLAY with rare fossil fragments. (OXFORD CLAY-PETERBOROUGH MEMBER)			D	5.60		
	6.00	80.49				
Borehole Complete at 6.00 m						

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	4.00	2.00
87	6.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
12/07/2015	0.00	-	-	Start of Hole
13/07/2015	6.00	2.00	-	Refusal

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	12/07/2015-13/07/2015
Plant:	Dart 2 (T820-759)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	PG
Logged By:	NC
Checked By:	JHS

Remarks: Hole refused at 6.0mbgl due to ground conditions. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A1D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 84.280mOD

Coordinates: 468442.00E 225430.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Brown slightly gravelly SAND with medium cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse coal, flint, brick and concrete. Cobbles are angular brick and concrete.				B	0.00-0.80	See DCP Results		
				PID	0.30	0.60ppm		
				ES	0.30			
		0.80	83.48	B	0.80-1.20			
MADE GROUND: Soft black slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse brick, coal, slag and concrete.				PID	1.00	0.80ppm		
				ES	1.00			
		1.20	83.08	D	1.20			
Soft light greyish brown mottled CLAY with occasional fossil fragments. Fossil fragments are up 5mm wide. (OXFORD CLAY-PETERBOROUGH MEMBER)				UT100	2.00-2.45	20 blows, 100% Recovery		
		2.50	81.78	D	2.50			
				ES	2.70			
Soft dark grey slightly organic silty CLAY with occasional fossil fragments. Fossil fragments are up to 5mm wide. Organic material is black pseudo fibrous peat with a mild organic odour. (OXFORD CLAY-PETERBOROUGH MEMBER)				D	3.00			
		4.00	80.28	D	4.00			
				UT87	4.00-4.45	48 blows, 15% Recovery		
Stiff to very stiff dark brown silty CLAY with rare pockets of crystals. (OXFORD CLAY-PETERBOROUGH MEMBER)				D	4.70			
				D	5.70			
Borehole Complete at 6.00 m		6.00	78.28					

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	2.00
87	4.00	
75	5.00	
65	6.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	12/07/2015-13/07/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	NC
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
12/07/2015	0.00	-	-	Start of Hole
12/07/2015	4.00	2.00	-	End of shift
13/07/2015	4.00	2.00	2.00	Start of shift
13/07/2015	6.00	2.00	2.50	Completion instructed by WSP/PB

Remarks: Slight water seppage at 3 metres. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A1U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 83.790mOD

Coordinates: 468421.00E
225434.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown to black gravelly fine to coarse SAND with frequent cobbles. Cobbles are subangular brick and slag. Gravel is subangular to angular fine to coarse slag and brick.						See DCP Results		
				PID	0.30	1.20ppm		
				D	0.30			
				ES	0.30			
				PID	1.00	0.00ppm		
				D	1.00			
MADE GROUND: Firm grey mottled light brown slightly sandy gravelly CLAY. Gravel is subangular to rounded fine to coarse flint. Sand is fine.		1.25	82.54	ES	1.00			
				D	1.60			
		2.00	81.79					
Firm bluish grey mottled orange and brown CLAY with moderate fossil fragments. (OXFORD CLAY-PETERBOROUGH MEMBER)				D	2.60			
				UT100	3.00-3.45	38 blows, 90% Recovery		
		3.45	80.34					
Firm brownish grey thinly laminated CLAY with pockets of coarse sand. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 3.6mgbl to 3.7mgbl - frequent fossil fragments with strong organic odour.				D	3.60			
				D	4.60			
Borehole Complete at 5.00 m		5.00	78.79					

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	0.00
87	5.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
14/07/15	3.60	20	-	-	

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
14/07/2015	0.00	-	-	Start of Hole
14/07/2015	5.00	-	3.60	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	14/07/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	NC
Checked By:	JHS

Remarks: Water strike at 3.60 metres. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A2C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 86.490mOD

Coordinates: 468464.00E 225556.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark grey to black ashy gravelly fine to coarse SAND with occasional cobbles. Cobbles are subrounded slag. Gravel is angular to subrounded fine coarse chalk, brick and slag.						See DCP Results		
				PID	0.30	0.30ppm		
				D	0.30			
				D	0.30			
				ES	0.30			
				PID	1.00	0.00ppm		
				D	1.00			
				B	1.00-2.00			
				D	1.00			
				ES	1.00			
		3.40	83.09					
MADE GROUND: Soft dark grey mottled black gravelly silty CLAY with strong hydrocarbon odour. Gravel is subrounded fine and medium flint. (Reworked Clay)		3.70	82.79	D	3.60			
				ES	3.60			
				D	3.80			
				UT87	4.00-4.45	42 blows, 100% Recovery		
Firm grey mottled brown gravelly silty CLAY with occasional shell remains and rare rootlets. Gravel is subrounded fine to coarse flint. (OXFORD CLAY-PETERBOROUGH MEMBER)		4.45	82.04					
Borehole Complete at 4.45 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	2.00
87	4.00	3.00

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	12/07/2015-15/07/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	NJD
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
12/07/2015	0.00	-	-	Start of Hole
12/07/2015	2.00	2.00	-	End of shift
15/07/2015	2.00	2.00	-	Start of shift
15/07/2015	4.45	3.00	-	Completion instructed by WSP/PB

Remarks: Hole refused at 2.0mbgl due to un level ground. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A2D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 84.280mOD

Coordinates: 468470.00E 225554.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Brown sandy gravelly CLAY. Gravel is fine to coarse angular to subrounded track ballast.		0.25	84.03	B	0.00-1.20	See DCP Results		
				PID	0.30	0.00ppm		
				ES	0.30			
MADE GROUND: Black and grey ashy slightly silty slightly gravelly fine to coarse SAND with frequent cobbles.				PID	1.00	0.00ppm		
				D	1.00			
				ES	1.00			
				D	1.50			
MADE GROUND: Firm black speckled grey slightly sand silty CLAY.		1.90	82.38	D	1.90			
		2.00	82.28	D	2.00			
MADE GROUND: Firm grey mottled brown slightly sandy slightly gravelly CLAY. Gravel is fine and medium angular brick, chalk and Flint. ..at 2mgbl - red ceramic pipe fragment				UT87	3.00-3.45	49 blows, 100% Recovery		
Firm light grey mottled bluish grey CLAY. OXFORD CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)		3.45	80.83					
		3.60	80.68					
				D	4.00			
Stiff dark grey CLAY with frequent broken shells. OXFORD CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER) ..at 4.2mbgl - becoming slightly sandy thinly laminated clay								
		5.00	79.28	D	5.00			
Borehole Complete at 5.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	2.00
87	3.00	
75	5.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
09/08/15	3.00	5	-	-	

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
09/08/2015	0.00	-	-	Start of Hole
09/08/2015	5.00	2.00	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	09/08/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	NJD
Checked By:	JHS

Remarks: Water seppage between 3 and 3.45 meters. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A2U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 83.790mOD

Coordinates: 468454.00E 225562.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown to black sandy clayey angular to subangular fine to coarse GRAVEL of clinker and coal. Sand is fine to coarse.						See DCP Results		
				PID	0.30	0.10ppm		
				D	0.30			
				ES	0.30			
..from 1mbgl to 1.2mbgl - becoming slightly clayey.				PID	1.00	0.00ppm		
		1.20	82.59	D	1.00			
				ES	1.00			
				D	1.40			
MADE GROUND: Soft light brown mottled orange and grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of chert.		1.65	82.14	D	1.70			
..from 1.2mbgl to 2.8mbgl - decayed roots.		1.80	81.99	D	1.90			
				UT100	2.00-2.45	21 blows, 80% Recovery		
MADE GROUND: Light orangish brown sandy clayey angular to rounded fine to coarse GRAVEL of chert. Sand is fine to coarse.		2.40	81.39	D	2.50			
Stiff light brown mottled orange and grey sandy silty CLAY. Sand is fine. (OXFORD CLAY-PETERBOROUGH MEMBER)		2.90	80.89	D	2.90			
Very stiff brown mottled orange and grey CLAY with much orangish brown silt partings with shell and fossil fragments and occasional gypsum crystals. (OXFORD CLAY-PETERBOROUGH MEMBER)				D	3.90			
				UT87	4.00-4.45	61 blows, 100% Recovery		
..at 2.85mbgl - orangish brown sandy silty clay laminae with much shell fragments. Sand is fine.				D	4.90			
Stiff to very stiff dark brown mottled grey thinly laminated organic CLAY with occasional shell and fossil fragments and gypsum crystals. (OXFORD CLAY-PETERBOROUGH MEMBER)		5.00	78.79					
Borehole Complete at 5.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	2.00
87	4.00	
75	5.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
06/08/15	4.80	20	4.80	-	

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
06/08/2015	0.00	0.00	-	Start of Hole
06/08/2015	5.00	2.00	4.80	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	06/08/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	DB
Logged By:	NJD
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A3C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 85.100mOD

Coordinates: 468593.00E 225708.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Black sandy angular to surrounded fine to coarse GRAVEL of clinker and chert. ..from 0mbgl to 2.8mbgl - live roots.				D	0.00-0.10	See DCP Results		
				PID	0.30	0.50ppm		
				B	0.30-0.50			
				ES	0.30			
				PID	1.00	0.50ppm		
				D	1.00			
				ES	1.00			
MADE GROUND: Soft dark grey mottled black slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of clinker. ..from 1.4mbgl to 2.9mbgl - probable desiccation.		1.40	83.70	D	1.40			
		1.60	83.50					
				D	1.90			
				D	1.90			
				UT100	2.00-2.45	18 blows, 100% Recovery		
MADE GROUND: Firm interbedded light brown mottled orange and grey CLAY and stiff brown CLAY with occasional shell fragments. ..at 2.5mgbl - orangish brown sandy gravelly clay lense. sand is fine to coarse. gravel is angular to surrounded fine to coarse clinker. ..from 2.9mbgl to 3mbgl - with gypsum crystals.		3.00	82.10	D	2.90			
				D	3.10			
				ES	3.20			
		3.40	81.70	D	3.50			
				UT87	4.00-4.45	16 blows, 100% Recovery		
MADE GROUND: Soft dark grey mottled black slightly gravelly CLAY. Gravel is angular to rounded fine to medium of chert and clinker.		4.50	80.60	D	4.50			
Firm light brown mottled orange and grey CLAY with orangish brown silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 3.6mbgl to 4.5mbgl - decayed roots. ..from 3.8mbgl to 4.5mbgl - with occasional silt partings.		5.10	80.00					
				D	5.90			
Firm dark brown mottled grey thinly laminated slightly organic CLAY with extremely closely spaced silty shell laminae with much gypsum crystals and black organic partings. (OXFORD CLAY-PETERBOROUGH MEMBER)				D	6.90			
		7.10	78.00	D	6.90			
				D	7.20			
Firm varying to stiff dark brown thinly laminated organic CLAY with very closely spaced silty shell laminae with much gypsum crystals and black organic partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 5.6mbgl to 6.4mbgl - stiff varying to very stiff. ..from 6.4mbgl to 7.1mbgl - becoming very stiff varying to hard.		8.00	77.10	D	7.90			
Very stiff varying to hard thinly laminated dark grey CLAY with occasional shell								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	2.00
87	5.00	
75	7.00	
65	8.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
14/05/2015	0.00	-	-	Start of Hole
14/05/2015	8.00	2.00	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	14/05/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	ZR
Checked By:	JHS

Remarks: A little water seepage between 5-6 metres. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A3C

Sheet 1+ of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 85.100mOD

Coordinates: 468593.00E 225708.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test			Casing (Water) Depth (m)	Installations
				Type	Depth (m)	Test Results		
fragments and gypsum crystals. (OXFORD CLAY-PETERBOROUGH MEMBER)						See DCP Results		
Borehole Complete at 8.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	2.00
87	5.00	
75	7.00	
65	8.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	14/05/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	ZR
Checked By:	JHS

Remarks:

Borehole Log

Status: FINAL

WS2A3D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 84.300mOD

Coordinates: 468600.00E 225691.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown sandy silty angular to subangular fine to coarse GRAVEL of clinker. Sand is fine to coarse.		0.30	84.00			See DCP Results		
				PID	0.30	0.20ppm		
				D	0.30			
				ES	0.30			
MADE GROUND: Dark grey to black sandy angular to subangular fine to coarse GRAVEL of clinker. Sand is fine to coarse.				PID	1.00	0.00ppm		
				D	1.00			
		1.30	83.00	ES	1.00			
				D	1.30			
Firm dark grey slightly gravelly CLAY with black silty organic partings. Gravel is angular fine to coarse of chert. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 1.3mbgl to 2.7mbgl - decayed roots.		1.60	82.70					
				D	1.90			
				UT100	2.00-2.45	16 blows, 90% Recovery		
Soft light brown mottled orange and grey CLAY with orangish brown silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 2.2mbgl to 2.6mbgl - firm dark brownish grey.		2.60	81.70					
				D	2.90			
Stiff dark brown mottled grey thinly laminated organic CLAY with orangish brown silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 2.9mbgl to 3.5mbgl - firm with gypsum crystals and no silt partings.		3.50	80.80	D	3.60			
		3.80	80.50	D	3.90			
				UT87	4.00-4.45	46 blows, 100% Recovery		
Soft to firm brown slightly sandy silty CLAY with occasional calcareous nodules. Sand is fine to medium. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 3.6mbgl to 3.8mbgl - light orangish brown.				D	4.90			
Firm to stiff dark brown thinly laminated organic CLAY with occasional orangish brown silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 4.65mbgl to 4.8mbgl - becoming brown in colour.		5.00	79.30					
Borehole Complete at 5.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	2.00
87	4.00	
75	5.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
04/08/15	3.50	5	-	-	

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
04/08/2015	0.00	0.00	-	Start of Hole
05/08/2015	5.00	2.00	3.60	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	04/08/2015-05/08/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	DB
Logged By:	NJD
Checked By:	JHS

Remarks: Water sepage at 3.5 meters. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A3U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 84.100mOD

Coordinates: 468590.00E 225724.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: Dark brown clayey slightly gravelly fine to coarse SAND. Gravel is subrounded to rounded fine to coarse flint. Proportion of rootlets.		0.20	83.90			See DCP Results		
				PID D ES	0.30 0.30 0.30	0.00ppm		
Firm thinly laminated dark grey silty slightly gravelly CLAY. Gravel is subrounded coarse flint. Low proportion of rootlets. (ALLUVIUM)		0.70	83.40					
				PID D ES	1.00 1.00 1.00	0.00ppm		
Firm thinly laminated grey mottled orange brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine and medium flint. Low proportion of fossil fragments. (ALLUVIUM)		1.80	82.30	D	1.90			
Soft to firm dark grey silty CLAY with thin lenses of orange fine and medium sand. Rare rootlets. (ALLUVIUM)		2.70	81.40	D UT100	2.90 3.00-3.45	43 blows, 100% Recovery		
Stiff to very stiff dark brown silty CLAY with small gypsum crystals. Moderate organic odour. (ALLUVIUM)				D	3.80			
Borehole Complete at 4.00 m		4.00	80.10					

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	1.00
87	4.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
17/05/15	4.00	5	-	-	

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
17/05/2015	0.00	-	-	Start of Hole
17/05/2015	4.00	1.00	3.50	Refusal

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	17/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	PG
Logged By:	NC
Checked By:	JHS

Remarks: Hole refused due to water strike at 4.0mbgl. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A4D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 90.300mOD

Coordinates: 468066.00E
225558.00N

Description	Depth (m)	O.D. Level (m)	Type	Depth (m)	Test Results
TOPSOIL: Firm dark brown slightly gravelly silty CLAY. Gravel is angular to rounded fine to coarse of chert and brick. ..from 0mbgl to 2.6mbgl - live roots.	0.20	90.10	D	0.00-0.10	See DCP Results
			PID	0.30	0.20ppm
			D	0.30	
	0.60	89.70	ES	0.30	
			B	0.60-1.20	
MADE GROUND: Firm light orangish brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of chert.			PID	1.00	0.00ppm
			D	1.00	
			ES	1.00	
			UT100	1.20-1.65	27 blows, 100% Recovery
MADE GROUND: Firm light brown mottled orange and grey CLAY with very clayey sandy angular to rounded fine to coarse Gravel lenses of chert. Sand is fine to coarse. ..from 1mbgl to 1.4mbgl - becoming stiff. ..from 1.4mbgl to 2mbgl - becoming very stiff. ..from 1.4mbgl to 2.9mbgl - probable desiccation.	2.00	88.30	D	1.90	
			D	2.00	
			D	2.90	
			UT87	3.00-3.45	29 blows, 80% Recovery
Very stiff light orangish brown sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of chert. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 2mbgl to 5.4mbgl - decayed roots. ..from 3.2mbgl to 3.5mbgl - becoming very sandy gravelly.	3.50	86.80	D	3.45	
			B	3.50-3.75	
	3.75	86.55	D	3.90	
	4.70	85.60	D	4.80	
Light orangish brown sandy clayey angular to rounded fine to coarse GRAVEL of chert. Sand is fine to coarse. (OXFORD CLAY-PETERBOROUGH MEMBER)	5.20	85.10	D	5.20	
Very stiff light brown mottled orange and grey CLAY with occasional calcareous nodules. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 4.3mbgl to 4.7mbgl - no calcareous nodules.			D	5.90	
Very stiff greyish brown mottled grey silty CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)	7.00	83.30	D	6.90	
Very stiff brown mottled orangish brown and grey CLAY with occasional gypsum crystals. (OXFORD CLAY-PETERBOROUGH MEMBER)					
Borehole Complete at 7.00 m					

Casing (Water) Depth (m): —

Installations: —

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	0.00
87	4.00	
75	5.00	
65	7.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
13/05/2015	0.00	-	-	Start of Hole
13/05/2015	7.00	-	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	13/05/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	JHS
Checked By:	RS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A4U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 89.700mOD

Coordinates: 468059.00E 225584.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: Very stiff dark brown slightly gravelly silty CLAY. Gravel is angular to rounded fine to coarse of chert and brick. ..from 0mbgl to 2mbgl - live roots.		0.20	89.50	D B PID ES	0.00-0.10 0.20-1.20 0.30 0.30	See DCP Results 0.40ppm		
MADE GROUND: Very stiff light brown mottled orange and grey CLAY with very clayey sandy angular to rounded fine to coarse Gravel lenses of chert brick and clinker.				PID D ES	1.00 1.00-11.00 1.00	0.00ppm		
..at 1.9mgbl - subangular cobble of chert.		2.00	87.70					
Stiff grey mottled orange brown sandy gravelly CLAY. Sand is fine to medium. Gravel is subrounded to rounded fine to coarse flint, chert, chalk and mudstone. Low proportion of rootlets. (GLACIAL DEPOSIST-COHESIVE)				D	2.60			
		3.00	86.70	B	3.00-3.50			
Orange brown clayey gravelly fine to coarse SAND. Gravel is subrounded to rounded fine to coarse quartzite, chert, flint and mudstone.(GLACIAL DEPOSIST-GRANULAR)		3.70	86.00	D UT87	3.60 4.00-4.45	 27 blows, 50% Recovery		
Firm brownish grey silty CLAY. Low proportion of fossil fragments and rootlets. (OXFORD CLAY-PETERBOROUGH MEMBER)				D	4.60			
Firm thinly laminated greyish brown silty CLAY. High proportion of fossil fragments. Moderate organic odour. (OXFORD CLAY-PETERBOROUGH MEMBER)		5.00	84.70	D UT87 D D	5.60 6.00-6.45 6.60	 46 blows, 90% Recovery 		
		7.80	81.90	D	7.60			
Borehole Complete at 7.80 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	2.00
87	6.00	
75	7.00	
65	7.80	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
13/05/2015	0.00	-	-	Start of Hole
13/05/2015	7.80	2.00	-	Refusal

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	13/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	PG
Logged By:	NC
Checked By:	JHS

Remarks: Hole refused at 7.8mbgl due to ground conditions. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlate

Borehole Log

Status: FINAL

WS2A5C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 88.300mOD

Coordinates: 467696.00E
225470.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown sandy slightly silty angular to subangular fine to coarse GRAVEL of limestone clinker and granite.		0.20	88.10	D B D	0.00-0.20 0.20-0.70 0.20-0.70	See DCP Results		
MADE GROUND: Light orangish brown gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse of chert and clinker.		0.70	87.60	PID ES B D PID ES UT100	0.30 0.30 0.70-1.20 0.70-1.20 1.00 1.00 1.20-1.65	0.40ppm 0.00ppm 14 blows, 100% Recovery		
MADE GROUND: Firm light orangish brown mottled orange and grey slightly gravelly CLAY with silt partings and occasional shell and fossil fragments. Gravel is angular to rounded fine to coarse of chert and clinker. ..from 1.7mgbl to 2mgbl - becoming soft. ..from 2mbgl to 2.45mbgl - firm mottled black.		2.45	85.85	D	1.90 2.50			
MADE GROUND: Soft dark brownish grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of chert. ..at 2.45mgbl - black gravelly fine to coarse sand laminae of ash. ..from 2.45mbgl to 4mbgl - probable desiccation. ..from 2.9mbgl to 3.2mbgl - becoming brown mottled orange and grey.		3.20	85.10	UT100 UT87	3.00 3.00-3.45	 21 blows, 60% Recovery		
Firm light brown mottled orange and grey CLAY with silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER)		4.00	84.30	D	3.90			
Firm dark brownish grey thinly laminated CLAY with extremely closely spaced dark orangish brown silt laminae. (OXFORD CLAY-PETERBOROUGH MEMBER)		5.00	83.30	D	4.90			
Borehole Complete at 5.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	0.00
87	3.00	
75	4.00	
65	5.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
20/05/2015	0.00	-	-	Start of Hole
20/05/2015	5.00	-	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	20/05/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	NJD
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A5D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 86.600mOD

Coordinates: 467694.00E 225465.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown gravelly fine SAND with rootlets. Gravel is subangular to rounded fine to coarse flint, ballast and chalk.						See DCP Results		
		0.30	86.30	PID	0.30	0.20ppm		
				D	0.30-0.60			
		0.60	86.00	ES	0.30			
				D	0.60-1.20			
MADE GROUND : Dark brown gravelly fine SAND with rare rootlets. Gravel is subangular to rounded fine to coarse flint, brick, ballast and rare chalk.				PID	1.00	0.10ppm		
		1.20	85.40	ES	1.00			
				UT100	1.20-1.65	34 blows, 100% Recovery		
Soft to firm greenish brown mottled bluish grey slightly gravelly sandy silty CLAY. Sand is fine and medium. Gravel is subangular to rounded fine flint and chalk. (COHESIVE GLACIAL DEPOSITS)				D	2.00			
Firm greenish brown and bluish grey silty CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)				D	3.00			
				UT87	3.00-3.45	16 blows, 50% Recovery		
		3.60	83.00	D	3.60			
Firm dark brownish grey slightly sandy silty CLAY with frequent crystals. Sand is fine to coarse. (OXFORD CLAY-PETERBOROUGH MEMBER)				D	4.00			
		5.00	81.60	D	5.00			
Borehole Complete at 5.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	0.00
87	4.00	
75	5.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
12/05/2015	0.00	-	-	Start of Hole
12/05/2015	5.00	-	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	12/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	PG
Logged By:	JHS
Checked By:	RS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A5U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 87.000mOD

Coordinates: 467690.00E
225483.00N

Description	Depth (m)	O.D. Level (m)	Type	Depth (m)	Test Results	Casing (Water) Depth (m)
TOPSOIL: Dark brown gravelly fine SAND with rootlets. Gravel is subangular to rounded fine to coarse flint and chalk.	0.10	86.90	D	0.10	See DCP Results	
			PID	0.30	0.10ppm	
			ES	0.30		
MADE GROUND: Soft to firm greenish brown mottled bluish grey slightly sandy gravelly CLAY with rare cobbles. Cobbles are subangular brick. Gravel is angular to subrounded fine to coarse flint and brick.	0.80	86.20	D	0.80		
			PID	1.00	0.10ppm	
			ES	1.00		
Soft to firm greenish brown mottled bluish grey slightly sandy CLAY. Sand is fine and medium (GLACIAL DEPOSITS COHESIVE)			D	2.00		
			UT100	2.00-2.45	49 blows, 50% Recovery	
Firm greyish brown mottled grey CLAY with gypsum crystals. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 3mbgl to 3.9mbgl - decayed roots.	3.00	84.00	D	3.00		
	3.30	83.70	D	3.30		
Soft light brown mottled orange and grey CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 3.5mbgl to 4.0mbgl - becoming firm.			D	3.90		
			UT87	4.00-4.45	26 blows, 100% Recovery	
	4.20	82.80				
Very stiff dark greyish brown thinly laminated CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 4.6mbgl to 5mbgl - with light grey silt partings.			D	4.90		
	5.00	82.00				
Borehole Complete at 5.00 m						

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	2.00
87	5.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
12/05/2015	0.00	0.00	-	Start of Hole
12/05/2015	3.00	2.00	-	End of shift
12/05/2015	3.00	2.00	-	Start of shift
13/05/2015	5.00	2.00	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	12/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	EK
Logged By:	NJD
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A6C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 93.100mOD

Coordinates: 467093.00E 225311.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Grey and black sandy slightly silty angular to subangular fine to coarse GRAVEL of limestone, clinker and granite.		0.30	92.80	D B D	0.00-0.10 0.10-0.40 0.20	See DCP Results		
MADE GROUND: Light orangish brown gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse of chert and clinker.		0.70	92.40	PID ES D B PID ES D	0.30 0.30 0.70 0.70-1.20 1.00 1.00 1.20	0.20ppm 0.00ppm		
Soft to firm light grey mottled grey and orange silty CLAY. (GLACIAL DEPOSITS COHESIVE)				UT100 D	2.00-2.45 2.50	43 blows, 100% Recovery		
Stiff to stiff light greyish brown silty CLAY with rare gravel and frequent crystals. Gravel is subrounded to rounded fine and medium flint. (OXFORD CLAY-PETERBOROUGH MEMBER)		3.10	90.00	D UT87	3.10 4.00-4.45	 46 blows, 100% Recovery		
Stiff dark grey occasionally mottled bluish grey silty CLAY. (KELLAWAYS CLAY)		4.50	88.60	D D	4.50 5.00			
Borehole Complete at 6.00 m		6.00	87.10	D	6.00			

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	0.00
87	4.00	
75	5.00	
65	6.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
21/05/2015	0.00	-	-	Start of Hole
21/05/2015	6.00	-	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	21/05/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	JHS
Checked By:	RS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A6D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 91.100mOD

Coordinates: 467090.00E 225305.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: soft dark brown sandy gravelly CLAY with occasional rootlets. Gravel subangular to rounded fine to coarse flint and chalk. Sand is fine to coarse.		0.30	90.80	See DCP Results PID	0.30	0.10ppm		
		0.40	90.70	D ES D	0.30 0.30 0.40			
MADE GROUND: Dark brown gravelly fine to coarse SAND with rare rootlets. Gravel is subangular to rounded fine to coarse flint.				PID ES	1.00 1.00	0.00ppm		
Soft to firm greenish brown mottled bluish grey and orange CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)		2.00	89.10	D	2.00			
Stiff to very stiff dark bluish grey mottled green sandy silty CLAY with rare gravel and frequent crystals . Gravel is subangular to rounded fine and medium flint. Sand is fine to coarse. (OXFORD CLAY-PETERBOROUGH MEMBER)		3.00	88.10	D UT100	3.00 3.00-3.45	110 blows, 50% Recovery		
Stiff to very stiff dark bluish grey mottled green silty CLAY with rare gravel and frequent crystals . Gravel is subangular to rounded fine and medium flint. Sand is fine to coarse. (KELLAWAYS CLAY)				D UT87	4.00 4.00-4.45	51 blows, 50% Recovery		
Stiff dark grey occasionally mottled bluish grey sandy silty CLAY. Sand is fine to coarse. (KELLAWAYS CLAY)		4.50	86.60	D	4.50			
Borehole Complete at 6.00 m		6.00	85.10	D	6.00			

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	0.00
87	4.00	
75	5.00	
65	6.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
11/05/2015	0.00	-	-	Start of Hole
11/05/2015	6.00	-	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	11/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	PG
Logged By:	JHS
Checked By:	RS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A6U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 91.000mOD

Coordinates: 467091.00E 225321.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: Soft dark brown sandy gravelly CLAY with rootlets. Gravel is subangular to rounded fine to coarse flint and chalk. Sand is fine to coarse.		0.20	90.80	See DCP Results PID D ES	 0.30 0.30 0.30	 0.10ppm		
Soft to firm greenish brown mottled brown slightly gravelly silty CLAY with rare rootlets. Gravel is subangular to rounded fine chalk. (GLACIAL DEPOSITS COHESIVE)		1.00	90.00	PID D ES	1.00 1.00 1.00	0.10ppm		
Soft to firm greenish brown mottled bluish grey and orange CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER) ..at 1.6mbgl becoming firm dark bluish grey mottled green		2.50	88.50	D UT100 D	2.00 2.00-2.45 2.50	36 blows, 80% Recovery		
Firm dark bluish grey mottled green sandy silty CLAY with rare gravel and frequent crystals . Gravel is subangular to rounded fine and medium flint. Sand is fine to coarse. (OXFORD CLAY-PETERBOROUGH MEMBER)		4.20	86.80	D D UT87	3.00 4.00 4.00-4.45	 51 blows, 100% Recovery		
Stiff dark grey sandy silty CLAY. Sand is fine to coarse. (KELLAWAYS CLAY)		5.00	86.00	D	5.00			
Very stiff dark grey SILT/CLAY. (KELLAWAYS CLAY)		6.00	85.00					
Borehole Complete at 6.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	2.00
87	5.00	
75	6.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
11/05/15	1.00	5	-	-	

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
11/05/2015	0.00	-	-	Start of Hole
11/05/2015	6.00	2.00	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	11/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	SR
Logged By:	JHS
Checked By:	RS

Remarks: Water seepage at 1.00m. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A7C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 90.000mOD

Coordinates: 466559.00E 225169.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Grey and black sandy slightly silty angular to subangular fine to coarse GRAVEL of limestone clinker and granite.		0.30	89.70	D	0.00-0.10	See DCP Results		
				PID	0.30	1.60ppm		
		0.50	89.50	B	0.30-0.50			
MADE GROUND: Light orangish brown gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse of chert and clinker.				D	0.30			
				ES	0.30			
				B	0.50-1.20			
				D	0.50			
		1.20	88.80	PID	1.00	0.20ppm		
				D	1.00			
MADE GROUND: Soft to firm light grey mottled grey and orange silty CLAY.				ES	1.00			
				UT100	1.20-1.65	29 blows, 100% Recovery		
				D	1.70			
Stiff to stiff dark greyish brown silty CLAY with rare gravel and frequent crystals. Gravel is subrounded to rounded fine and medium flint. (OXFORD CLAY-STEWARTBY MEMBER)		2.20	87.80	D	2.20			
				UT87	3.00-3.45	21 blows, 100% Recovery		
Soft to firm dark brown and black mottled white sandy CLAY with rare shell remains. Sand is fine to coarse. (OXFORD CLAY-STEWARTBY MEMBER)				D	3.20			
				D	4.20			
Borehole Complete at 5.00 m		5.00	85.00	D	5.00			

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	0.00
87	3.00	
75	4.00	
65	5.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
26/05/2015	0.00	-	-	Start of Hole
26/05/2015	5.00	-	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	26/05/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	ZR
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A7D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 89.900mOD

Coordinates: 466561.00E 225163.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: soft dark brown sandy gravelly CLAY with occasional rootlets. Gravel subangular to rounded fine to coarse flint and chalk. Sand is fine to coarse. (TOPSOIL)		0.20	89.70	D PID ES	0.20 0.30 0.30	See DCP Results 0.20ppm		
Soft dark greenish brown and brown mottled bluish grey silty CLAY. (OXFORD CLAY-STEWARTBY MEMBER)		0.90	89.00	D PID ES UT100	0.90 1.00 1.00 1.20-1.65	 0.10ppm 26 blows, 90% Recovery		
Firm dark greenish brown mottled bluish grey CLAY. (OXFORD CLAY-STEWARTBY MEMBER)				D D	1.65 2.00			
Very stiff dark grey laminated CLAY. (OXFORD CLAY-STEWARTBY MEMBER)		2.40	87.50	D D UT100	2.40 2.90 3.00-3.45	 26 blows, 30% Recovery		
				D D	3.90 4.10			
				D	4.90			
Borehole Complete at 5.00 m		5.00	84.90					

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	0.00
87	4.00	
75	5.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
10/05/2015	0.00	-	-	Start of Hole
10/05/2015	2.00	-	-	End of shift

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	11/05/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	JHS
Checked By:	RS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A7U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 90.000mOD

Coordinates: 466558.00E
225176.00N

Description	Depth (m)	O.D. Level (m)	Type	Depth (m)	Test Results	Casing (Water) Depth (m)
TOPSOIL: Soft dark brown sandy gravelly CLAY with occasional rootlets. Gravel subangular to rounded fine to coarse flint and chalk. Sand is fine to coarse.	0.15	89.85	D	0.15	See DCP Results	
			PID	0.30	0.10ppm	
	0.50	89.50	ES	0.30		
Soft dark greenish brown and brown mottled bluish grey silty CLAY. (OXFORD CLAY-STEWARTBY MEMBER)			PID	1.00	0.30ppm	
			D	1.00		
			ES	1.00		
			D	1.40		
Firm dark greenish brown mottled bluish grey CLAY. (OXFORD CLAY-STEWARTBY MEMBER) ..at 1.4mbgl becoming firm to stiff with white mottling			D	2.00		
			UT100	2.00-2.45	49 blows, 75% Recovery	
	2.40	87.60				
Soft to firm brown mottled multicoloured slightly sand CLAY with frequent shell remains. Sand is fine and medium. (OXFORD CLAY-STEWARTBY MEMBER)			D	2.60		
	3.40	86.60	D	3.40		
Soft dark brown and black mottled white sandy CLAY with rare shell remains. Sand is fine to coarse. (OXFORD CLAY-STEWARTBY MEMBER)	3.90	86.10				
Stiff dark greyish green mottled bluish grey and white CLAY. (OXFORD CLAY-STEWARTBY MEMBER)	4.00	86.00				
Borehole Complete at 4.00 m						

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	2.00
87	4.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
11/05/2015	0.00	-	-	Start of Hole
11/05/2015	4.00	-	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	10/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	SR
Logged By:	JHS
Checked By:	RS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A8C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 89.800mOD

Coordinates: 466026.00E
225023.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Light yellowish white slightly sandy subangular to rounded fine to coarse sandstone GRAVEL with frequent cobbles. Cobbles are subangular sandstone. Sand is fine.						See DCP Results		
		0.30	89.50	PID	0.30	2.00ppm		
		0.40	89.40	B	0.30-1.20			
				ES	0.30			
MADE GROUND: Black sandy subangular to rounded fine to coarse flint and slightly GRAVEL with sulphur odour and ash. Sand is fine to coarse. ..at 0.3mbgl geomembrane present.				PID	1.00	0.10ppm		
		1.20	88.60	ES	1.00			
				UT100	1.20-1.65	16 blows, 50% Recovery		
				D	1.70			
MADE GROUND: Dark brown gravelly fine to coarse SAND. Gravel is subangular to rounded fine to coarse flint and rare slag.		2.00	87.80	D	2.00			
Firm dark greenish brown mottled bluish grey slightly gravelly CLAY with occasional bands of fine to coarse SAND. Gravel is subangular to rounded fine and medium chalk. (GLACIAL DEPOSITS-COHESIVE)		3.00	86.80	D	3.00			
				UT87	3.00-3.45	14 blows, 80% Recovery		
				D	3.50			
Soft to firm dark bluish grey mottled green CLAY with frequent shell remains. (OXFORD CLAY-PETERBOROUGH MEMBER)		4.10	85.70	D	4.10			
Firm dark bluish grey CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)								
Firm to stiff dark grey thinly laminated CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)		5.00	84.80	D	5.00			
Borehole Complete at 5.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	2.00
87	4.00	
75	5.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
10/05/2015	0.00	-	-	Start of Hole
10/05/2015	5.00	2.00	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	10/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	PG
Logged By:	JHS
Checked By:	RS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A8U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 89.900mOD

Coordinates: 466023.00E
225033.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: soft dark brown sandy gravelly CLAY with occasional rootlets. Gravel subangular to rounded fine to coarse flint and chalk. Sand is fine to coarse.		0.15	89.75	D PID ES	0.15 0.30 0.30	See DCP Results 0.10ppm		
Soft dark brown sandy gravelly CLAY with rare rootlets and occasional cobbles. Cobbles are subangular chalk. Gravel is subangular to rounded fine to coarse flint and chalk. Sand is fine to coarse. (GLACIAL DEPOSITS-COHESIVE)		0.60	89.30	D PID ES	0.60 1.00 1.00	 0.10ppm		
Soft to firm grey and brown mottled orange and bluish grey slightly gravelly sandy CLAY. Sand is fine and medium. Gravel is subangular to rounded fine and medium flint and chalk. (GLACIAL DEPOSITS-COHESIVE) ..at 1.2mbgl becoming firm to stiff		2.50	87.40	D UT100 D	2.00 2.00-2.45 2.50	 46 blows, 75% Recovery		
Firm to stiff dark grey mottled bluish grey silt CLAY with rare bands of medium and coarse sand. (OXFORD CLAY-PETERBOROUGH MEMBER)				D UT87 D	3.50 4.00-4.45 4.50	 37 blows, 100% Recovery		
Stiff dark grey CLAY with frequent shell remains. (OXFORD CLAY-PETERBOROUGH MEMBER)		4.90 5.00	85.00 84.90	D	5.00			
Borehole Complete at 5.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102 87 75	2.00 4.00 5.00	0.00

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
10/05/2015 10/05/2015	0.00 5.00	- -	- -	Start of Hole Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	10/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	SR
Logged By:	JHS
Checked By:	RS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A9C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 89.100mOD

Coordinates: 465629.00E
224889.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown sandy slightly silty angular to subangular fine to coarse GRAVEL of basalt limestone and clinker.		0.20	88.90	D	0.00-0.10	See DCP Results		
				PID	0.30	1.00ppm		
MADE GROUND: Light brown gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse of chert and clinker.		0.50	88.60	B	0.30-0.50			
				ES	0.30			
				B	0.50-1.20			
				D	0.50-0.60			
		1.00	88.10	PID	1.00	0.00ppm		
				D	1.00-1.10			
				ES	1.00			
Firm greyish brown CLAY with occasional silt partings shell fragments and gypsum crystals. (OXFORD CLAY-PETERBOROUGH MEMBER)				UT100	1.20-1.65	23 blows, 100% Recovery		
		2.00	87.10	D	1.90			
Firm to very stiff greyish brown thinly laminated CLAY with much shell fragments. (OXFORD CLAY-PETERBOROUGH MEMBER)								
				D	2.90			
Stiff to hard thinly interlaminated dark greyish brown mottled orangish brown and grey slightly organic CLAY and dark brown organic CLAY with much orangish brown silt and shell partings and gypsum crystals. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 2.8mbgl to 3.2mbgl - becoming very stiff to hard.				UT87	3.00-3.45	98 blows, 50% Recovery		
		3.20	85.90					
Hard dark grey thinly laminated CLAY with much silt partings and shell fragments. (KELLAWAYS CLAY) ..from 3.6mbgl to 3.7mbgl - occasional shell fragments.								
		3.70	85.40	D	3.60			
Borehole Complete at 3.70 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	0.00
87	3.70	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
26/05/2015	0.00	-	-	Start of Hole
26/05/2015	3.70	-	-	Refusal

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	26/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	PG
Logged By:	NJD
Checked By:	JHS

Remarks: Hole refused at 3.7mbgl due to ground conditions. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A9D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 91.200mOD

Coordinates: 465625.00E 224869.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: Dark brown gravelly clayey fine to coarse SAND. Gravel id subrounded fine to coarse flint.		0.40	90.80	See DCP Results PID D ES	0.30 0.30 0.30	0.00ppm		
Soft to firm bluish grey mottled brown slightly gravelly CLAY. Gravel is subrounded flint. (OXFORD CLAY-PETERBOROUGH MEMBER)		1.65	89.55	PID D ES UT100	1.00 1.00 1.00 1.20-1.65	0.00ppm 51 blows, 100% Recovery		
Stiff grey mottled brown thinly laminated silty CLAY. Low to moderate proportion of fossil fragments. (OXFORD CLAY-PETERBOROUGH MEMBER)		2.00	89.20	D UT100	1.80 2.00-2.45	42 blows, 80% Recovery		
Very stiff to hard dark brown thinly laminated organic CLAY with gypsum crystals and occasional orangish brown silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER)		3.40	87.80	D	2.90			
Firm to stiff dark brown mottled grey thinly laminated organic CLAY with much silt and shell partings and with gypsum crystals. (OXFORD CLAY-PETERBOROUGH MEMBER)				D UT87	3.90 4.00-4.45	26 blows, 100% Recovery		
..from 4.6mbgl to 4.65mbgl - dark brown organic mudstone clast.				D	4.90			
Very stiff to hard dark brown grey to dark brown thinly laminated slightly organic CLAY with shell fragments. (KELLAWAYS CLAY)		5.80	85.40	D	5.90			
Hard dark greyish brown thinly laminated CLAY with much shell fragments. (KELLAWAYS CLAY)		6.20	85.00	D	6.20			
Borehole Complete at 7.00 m		7.00	84.20	D	6.90			

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
65	0.00	2.00
102	2.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	07/05/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	NC+NJD
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
06/05/2015	0.00	-	-	Start of Hole
06/05/2015	2.00	2.00	-	End of shift
07/05/2015	2.00	2.00	-	Start of shift
07/05/2015	7.00	2.00	-	Completion instructed by WSP/PB

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A9U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 91.300mOD

Coordinates: 465618.00E 224898.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Brown gravelly clayey fine to coarse SAND. Gravel iS angular to subrounded fine to coarse brick and flint. Moderate proportion of rootlets.		0.40	90.90			See DCP Results		
				PID	0.30	0.10ppm		
				D	0.30			
				ES	0.30			
Firm becoming stiff at 1.20mbgl bluish grey mottled brown silty slightly gravelly CLAY. Gravel is subrounded flint. (OXFORD CLAY-PETERBOROUGH MEMBER)				PID	1.00	0.00ppm		
				D	1.00			
				ES	1.00			
				D	1.60			
				UT100	2.00-2.45	51 blows, 100% Recovery		
Stiff brown silty CLAY. Moderate to high proportion of fossil fragments. (OXFORD CLAY-PETERBOROUGH MEMBER)		2.40	88.90	D	2.60			
				D	3.60			
				UT87	4.00-4.45	22 blows, 80% Recovery		
Stiff greyish brown silty CLAY. Low proportion of fossil fragments. Strong hydrocarbon/ organic odour. (KELLAWAYS CLAY)		4.50	86.80	D	4.60			
				D	5.60			
Borehole Complete at 6.30 m		6.30	85.00					

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	2.00
87	5.00	
75	6.30	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
06/05/2015	0.00	-	-	Start of Hole
06/05/2015	6.30	2.00	-	Refusal

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	06/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	SR
Logged By:	NC
Checked By:	JHS

Remarks: Hole refused at 6.30mbgl due to ground conditions.Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A10C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 87.800mOD

Coordinates: 465219.00E 224708.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark greyish brown sandy GRAVEL with regular angular slag cobbles. Sand is fine to coarse. Gravel is angular to subrounded slag and basalt.		0.50	87.30	B PID ES B	0.00-0.50 0.30 0.30 0.50-1.20	See DCP Results 1.60ppm		
MADE GROUND: Soft to firm greyish blue silty gravelly CLAY. Gravel is subrounded chalk and siltstone. Low proportion of rootlets.		1.20	86.60	PID ES UT100	1.00 1.00 1.20-1.60	0.20ppm 36 blows, 1% Recovery		
Stiff light brown mottled orange and grey CLAY with occasional silt partings and shell and fossil fragments (OXFORD CLAY-STEWARTBY MEMBER) ..from 1.2mbgl to 2.8mbgl - Decayed roots. ..from 1.8mbgl to 1.95mbgl - With much shell and fossil fragments.		2.30	85.50	D D	1.90 2.30			
Firm greyish brown thickly laminated CLAY with extremely closely spaced dark brown to black organic silt and shell laminae with gypsum crystals (OXFORD CLAY-STEWARTBY MEMBER) ..from 3.2mbgl - becoming stiff		4.20	83.60	D UT87 D	2.90 3.00-3.45 3.90	18 blows, 1% Recovery		
Stiff to hard dark greyish brown thinly laminated CLAY with gypsum crystals (OXFORD CLAY-STEWARTBY MEMBER) ..from 5.2mbgl - becoming hard		6.00	81.80	D D D	4.90 5.20 5.90			
Borehole Complete at 6.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	2.00
87	4.00	
75	5.00	
65	6.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
05/05/2015	0.00	-	-	Start of Hole
05/05/2015	6.00	2.00	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	05/05/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	NC+NJD
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A10U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 87.500mOD

Coordinates: 465215.00E
224716.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown gravelly fine to coarse SAND. Gravel is subangular fine to coarse slag, basalt and chalk. Moderate proportion of rootlets.		0.25	87.25			See DCP Results		
				PID	0.30	0.60ppm		
				D	0.30-0.40			
				ES	0.30			
MADE GROUND: Firm orange mottled blue and grey silty gravelly CLAY. Gravel is subrounded fine to coarse chalk. Low proportion of rootlets.		1.20	86.30	PID	1.00	0.00ppm		
				D	1.00-1.10			
		1.30	86.20	ES	1.00			
				D	1.20-1.30			
				D	1.40-1.50			
Stiff light brown mottled orange and grey slightly gravelly CLAY with occasional silt partings, shell and fossil fragments. Gravel is angular to rounded fine to coarse of chert (OXFORD CLAY-STEWARTBY MEMBER) ..from 1.2mbgl to 2mbgl - live roots. ..from 1.2mbgl to 3mbgl - decayed roots.				D	1.90-2.00			
				UT100	2.00-2.45	17 blows, 100% Recovery		
		2.20	85.30					
				D	2.90-3.00			
				UT87	3.00-3.45	13 blows, 100% Recovery		
Stiff light brown mottled orange and grey CLAY with occasional silt partings, shell and fossil fragments. (OXFORD CLAY-STEWARTBY MEMBER) ..from 1.5mbgl to 1.95mbgl - firm. ..at 1.6mbgl - light orangish brown silty clay laminae. ..from 1.6mbgl to 2.2mbgl - with much shell fragments. ..from 1.95mbgl to 2.2mbgl - becoming stiff.				D	3.50-3.60			
				D	3.80-3.90			
		4.40	83.10					
				D	4.90-5.00			
Soft to firm greyish brown thickly laminated CLAY with extremely closely spaced dark brown to black organic silt and shell laminae with gypsum crystals. (OXFORD CLAY-STEWARTBY MEMBER) ..from 2.8mbgl to 3.7mbgl - fissured.		6.00	81.50	D	5.90-6.00			
Stiff to very stiff dark greyish brown thinly laminated CLAY with gypsum crystals (OXFORD CLAY-STEWARTBY MEMBER) ..from 4.9mbgl to 6mbgl - becoming hard. ..from 5.8mbgl to 6mbgl - occasional shell fragments.								
Borehole Complete at 6.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	0.00
87	5.00	
75	6.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
05/05/2015	0.00	-	-	Start of Hole
05/05/2015	6.00	-	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	05/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	EK
Logged By:	NC
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WSHH2A11C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 86.500mOD

Coordinates: 464729.00E 224470.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown sandy slightly silty angular to subangular fine to coarse GRAVEL of basalt clinker and granite.		0.30	86.20	D B ES	0.00-0.10 0.30-0.80 0.30			
MADE GROUND: Brown very gravelly slightly clayey fine to coarse SAND with low cobble content. Gravel is angular to rounded fine to coarse of chert. Cobble is subrounded siltstone. ..from 0.7mbgl to 0.8mbgl - with timber fragments.		0.80	85.70	B ES	0.80-1.20 1.00			
Very stiff to hard dark greyish brown thinly laminated slightly organic CLAY occasional shell fragments. (OXFORD CLAY-PETERBOROUGH MEMBER)		1.70	84.80	D	1.60-1.70			
Borehole Complete at 1.70 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
08/06/2015	0.00	-	-	Start of Hole
08/06/2015	1.70	-	-	Refusal

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	08/06/2015
Plant:	Hand Held WS
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	PG
Logged By:	NJD
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A11D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 89.200mOD

Coordinates: 464732.00E 224456.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: Soft dark brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is subrounded fine to coarse flint, chert and chalk. Moderate proportion of rootlets.		0.20	89.00			See DCP Results		
				PID	0.30	0.00ppm		
				D	0.30			
				ES	0.30			
Firm greyish brown gravelly CLAY. Gravel is subrounded to rounded chalk and flint. Low proportion of rootlets. (OXFORD CLAY-PETERBOROUGH MEMBER)				PID	1.00	0.00ppm		
		1.20	88.00	D	1.00			
				ES	1.00			
				D	1.60			
Very stiff becoming stiff at 3.00mbgl grey mottled brown thinly laminated silty CLAY. High proportion of fossil fragments. Rare rootlets (<4mm thick) (OXFORD CLAY-PETERBOROUGH MEMBER)				UT100	2.00-2.45			
				D	2.60			
..from 3.0mbgl to 4.0mbgl - gypsum crystal growth								
				D	3.60			
				UT87	4.00-4.45			
Stiff thinly laminated dark brown silty CLAY with small pockets of fine and medium sand. Moderate proporttion of fossil fragments. Moderate organic odour. (OXFORD CLAY-PETERBOROUGH MEMBER)		4.45	84.75	D	4.60			
				D	5.60			
				D	6.30			
Borehole Complete at 6.50 m		6.50	82.70					

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	0.00
87	6.50	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	14/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	PG
Logged By:	NC
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
14/05/2015	0.00	-	-	Start of Hole
14/05/2015	6.50	-	-	Refusal

Remarks: Hole refused at 6.5mbgl due to ground condtions. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A11U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 91.400mOD

Coordinates: 464723.00E 224488.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: Firm dark brown silty CLAY. ..from 0mbgl to 1.2mbgl - live roots and decayed roots				D	0.00-0.10	See DCP Results		
		0.30	91.10	PID	0.30	0.00ppm		
				B	0.30-0.50			
				ES	0.30			
Firm light brown mottled orange and grey CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER) ..at 0.8mbgl - becoming stiff.				PID	1.00	0.00ppm		
				D	1.00-1.10			
				ES	1.00			
		1.40	90.00	UT100	1.20-1.65	33 blows, 100% Recovery		
Very stiff brown mottled grey thinly laminated CLAY with shell fragments and gypsum crystals. (OXFORD CLAY-PETERBOROUGH MEMBER)		1.65	89.75	D	1.80			
Stiff grey mottled brown silty CLAY. Moderate proportion of fossil fragments. Low proportion of rootlets (<2mm thick). (OXFORD CLAY-PETERBOROUGH MEMBER)				D	2.80			
				UT100	3.00-3.45	58 blows, 95% Recovery		
				D	3.80			
				D	4.80			
Stiff thinly laminated dark greyish brown silty CLAY. Low proportion of fossil fragments. Moderate organic odour. (OXFORD CLAY-PETERBOROUGH MEMBER)		5.45	85.95					
				D	6.80			
Borehole Complete at 7.50 m		7.50	83.90	D	7.50			

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	0.00
87	6.00	
75	7.00	
65	7.50	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
14/05/2015	0.00	-	-	Start of Hole
14/05/2015	7.50	-	-	Refusal

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	14/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	EK
Logged By:	NC
Checked By:	JHS

Remarks: Hole refused at 7.5mbgl due to ground conditons. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A12C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 84.200mOD

Coordinates: 464211.00E
224317.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown sandy slightly silty angular to subangular fine to coarse clinker, limestone and granite GRAVEL. Sand is fine to coarse.		0.20	84.00	D B PID ES B D	0.00-0.10 0.20-0.60 0.30 0.30 0.60-1.20 0.60-0.70	See DCP Results 0.60ppm		
MADE GROUND: Light brown very gravelly slightly clayey fine to coarse SAND. Gravel is angular to rounded fine to coarse chert clinker and brick.		0.60	83.60	PID D ES D	1.00 1.00 1.00 1.40	0.40ppm		
MADE GROUND: Soft light brown mottled orange and grey CLAY with occasional silt partings shell fragments and gypsum crystals interbedded with hard dark greyish brown thinly laminated CLAY. ..at 1.65mbgl - hard dark greyish brown thinly laminated clay lense. ..at 1.9mbgl - hard dark greyish brown thinly laminated clay lense. ..from 1.9mbgl to 3.2mbgl - becoming stiff. ..at 2.9mbgl - hard dark greyish brown thinly laminated clay lense. ..at 3.25mbgl - hard dark greyish brown thinly laminated clay lense. ..at 3.5mbgl - hard dark greyish brown thinly laminated clay lense. ..at 3.8mbgl - hard dark greyish brown thinly laminated clay lense. ..from 3.8mbgl to 4.2mbgl - becoming soft. ..at 4.85mbgl - light orangish brown silty shell pocket. ..at 5mbgl - hard dark greyish brown thinly laminated clay lense.				D UT100 D D UT87 D ES	1.90 2.00-2.45 2.90 3.90 4.00-4.45 4.90 5.40-5.60	12 blows, 50% Recovery 12 blows, 100% Recovery		
Firm dark brown clayey SILT.		5.65 5.70	78.55 78.50	D D	5.65 5.80			
Firm grey CLAY with black organic partings. (RELIC TOPSOIL) ..from 5.7mbgl to 8mbgl - decayed roots.		6.30	77.90	D	6.50			
Firm grey mottled orange CLAY with silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 7.4mbgl to 7.7mbgl - slightly sandy. sand fine to medium. ..from 7.7mbgl to 7.9mbgl - sandy slightly gravelly. Gravel is subrounded to rounded fine to coarse of chert.		7.90	76.30	D D	7.70 8.00			
Soft greyish brown mottled grey slightly sandy silty CLAY. Sand is fine. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 8.3mbgl to 8.6mbgl - light orangish		8.60 9.00	75.60 75.20	D	8.90			

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	2.00
87	5.00	
75	7.00	
65	9.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
18/05/2015	0.00	-	-	Start of Hole
19/05/2015	9.00	2.00	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	18/05/2015-19/05/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	NJD
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WSHH2A12D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 84.000mOD

Coordinates: 464214.00E 224308.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Black SAND & GRAVEL with occasional rootlets. Sand is fine to coarse. Gravel is angular fine to coarse brick concrete and crushed rock possibly limestone. Rootlets are up to 5mm thick.				B	0.00-0.80			
				PID	0.30	0.10ppm		
				ES	0.30			
		0.80	83.20	B	0.80			
MADE GROUND: Firm dark grey sandy CLAY. Sand is fine to coarse ..from 0.8mbgl to 1.2mbgl - made ground - firm dark grey sandy clay. sand is fine to coarse				PID	1.00	0.30ppm		
		1.20	82.80	ES	1.00			
				D	1.90-2.00			
		2.00	82.00					
MADE GROUND: Firm light brown mottled orange and grey CLAY with silt partings and occasional shell fragments gypsum crystals and hard dark brown clay pockets.								
Borehole Complete at 2.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	08/06/2015
Plant:	Hand Held WS
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	PG
Logged By:	ZR+NJD
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
08/06/2015	0.00	-	-	Start of Hole
08/06/2015	2.00	-	-	Refusal

Remarks: Hole refused due to ground conditions and hole collapsing. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A12C

Sheet 1+ of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 84.200mOD

Coordinates: 464211.00E
224317.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test			Casing (Water) Depth (m)	Installations
				Type	Depth (m)	Test Results		
						See DCP Results		
7.90m - 8.60m : Remaining Detail : 8.30m - 8.60m : brown mottled grey.;;; 8.50m - 8.60m : ..from 8.5mbgl to 8.6mbgl - sandy slightly gravelly. sand is fine to medium. Gravel is surrounded to rounded fine to coarse chert.								
8.60m - 9.00m : Firm light brown mottled grey thinly laminated CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)								
Borehole Complete at 9.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	2.00
87	5.00	
75	7.00	
65	9.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	18/05/2015-19/05/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	NJD
Checked By:	JHS

Remarks:

Borehole Log

Status: FINAL

WS2A12U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 79.600mOD

Coordinates: 464207.00E
224329.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: Soft dark brown CLAY. ..from 0mbgl to 1.2mbgl - live roots. ..from 0mbgl to 3mbgl - decayed roots.		0.30	79.30	B D PID ES	0.00-1.20 0.00-0.10 0.30 0.30	See DCP Results 0.00ppm		
MADE GROUND: Soft light brown mottled orange and grey CLAY with silt partings and occasional black carboniferous (ash) fragments. ..from 1.2mbgl to 1.5mbgl - becoming firm.		1.50	78.10	PID D ES D	1.00 1.00 1.00 1.50	0.00ppm		
Soft to firm brown mottled orange and grey slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to rounded fine to coarse of chert. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 1.8mbgl to 1.95mbgl - light brown mottled orange grey with dark brown silt partings. ..from 1.95mbgl to 2.2mbgl - light orangish brown mottled grey sandy slightly gravelly.		2.20	77.40	D UT100	1.90 2.00-2.45	29 blows, 100% Recovery		
Firm light orangish brown CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)		3.10 3.30	76.50 76.30	D D ES D	2.90 3.20 3.20 3.50			
Firm light brown mottled orange and grey thinly laminated CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)		4.30	75.30	UT87 D	4.00-4.45 4.50	32 blows, 100% Recovery		
Firm varying to stiff dark brown mottled grey slightly organic CLAY with very closely spaced orangish brown silty shell laminae with occasional gypsum crystals. (OXFORD CLAY-PETERBOROUGH MEMBER)				D	5.50			
Stiff dark grey thinly laminated CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 4.6mbgl to 5.3mbgl - very stiff with occasional shell fragments. ..from 5.1mbgl to 6mbgl - very stiff varying to hard. ..from 5.3mbgl to 5.6mbgl - with shell fragments. ..from 5.6mbgl to 6mbgl - dark brownish grey with much shell fragments.		6.00	73.60					
Borehole Complete at 6.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	2.00
87	4.00	
75	5.00	
65	6.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
19/05/15	0.30	5	0.30	-	

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
19/05/2015	0.00	-	-	Start of Hole
19/05/2015	6.00	2.00	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	19/05/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	ZR
Checked By:	JHS

Remarks: Water strike at 0.3 managed to dig inspection pit to 1.2 metres. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A13C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 82.700mOD

Coordinates: 463941.00E 224235.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
				D	0.00-0.10	See DCP Results		
MADE GROUND: Dark brown sandy angular to subangular fine to coarse GRAVEL of basalt, clinker and granite. Sand is fine to coarse.		0.30	82.40	PID	0.30	1.00ppm		
				B	0.30-0.70			
				ES	0.30			
MADE GROUND: Light brown gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse of chert and clinker.		0.70	82.00	B	0.70-1.20			
				PID	1.00	0.40ppm		
				ES	1.00			
				UT100	1.20-1.65	48 blows, 100% Recovery		
Stiff dark brownish grey thinly laminated CLAY with very occasional shell and fossil fragments and gypsum crystals. (OXFORD CLAY-STEWARTBY MEMBER)				D	1.90-2.00			
..from 1mbgl to 2.4mbgl - becoming very stiff.								
..from 1.5mbgl to 2.6mbgl - very soft grey clay.								
..from 1.8mbgl to 2.4mbgl - with occasional shell and fossil fragments.				D	2.90-3.00			
..from 2.4mbgl to 2.6mbgl - with shell and fossil fragments.				UT87	3.00-3.45	42 blows, 100% Recovery		
..from 2.4mbgl to 4mbgl - very stiff varying to hard.								
..from 2.6mbgl to 3.2mbgl - with very occasional shell and fossil fragments.								
..from 3.2mbgl to 4mbgl - with occasional shell and fossil fragments.								
		4.00	78.70	D	3.90-4.00			
Borehole Complete at 4.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	02/06/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	EK
Logged By:	NJD
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
02/06/2015	0.00	-	-	Start of Hole
02/06/2015	4.00	-	-	Completion instructed by WSP/PB

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A13D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 83.300mOD

Coordinates: 463947.00E
224222.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: Stiff brown mottled dark brown clayey soil with rootlets.		0.20	83.10	D B D	0.00-0.10 0.00-1.20 0.20-0.60	See DCP Results		
Stiff grey brown mottled orange brown CLAY. (OXFORD CLAY-STEWARTBY MEMBER)		0.60	82.70	PID ES D	0.30 0.30 0.60-1.00	0.00ppm		
Stiff grey CLAY with a little brown mottled white silty (chalky?) sand to fine gravel size material. (OXFORD CLAY-STEWARTBY MEMBER)		1.00	82.30	PID D ES UT100	1.00 1.00-1.10 1.00 1.20-1.65	0.00ppm 42 blows, 100% Recovery		
Stiff brown to orange brown CLAY with some white coarse sand to fine gravel size silty material as thin very closely spaced (10-50mm) irregular 1-2mm thick bands, becoming darker brown. At 1.7m becoming mottled orange brown with a little selenite. ((OXFORD CLAY-STEWARTBY MEMBER).		2.00	81.30	D D	1.80-2.00 2.60-2.70			
Stiff brown thickly laminated/horizontally fractured CLAY with traces of sand size crystals. (OXFORD CLAY-STEWARTBY MEMBER) ..from 2.6mbgl to 2.75mbgl - subvertical fissure with 1mm crystals		3.00	80.30	UT87 D	3.00-3.45 3.80-4.00	38 blows, 70% Recovery		
Stiff brown to dark brown CLAY with scattered 1-2mm selenite. At 3.60m-3.8m subvertical tight fissure with selenite 2-3mm and yellow brown silty material. Closely spaced subhorizontal seams of selenite. Traces of thin lamination. (OXFORD CLAY-STEWARTBY MEMBER).		4.40	78.90	D	4.70-4.80			
Stiff dark brownish grey CLAY with some white, pink and iridescent flattened fossil shell fragments to 10-15mm diameter. Thin lamination and fracturing. (OXFORD CLAY-STEWARTBY MEMBER).		6.00	77.30	D	5.80-6.00			
Borehole Complete at 6.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	0.00
87	4.00	
75	5.00	
65	6.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
28/05/2015	0.00	-	-	Start of Hole
28/05/2015	6.00	-	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	28/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	NJD
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A13U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 85.800mOD

Coordinates: 463935.00E 224247.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: Stiff dark brown silty CLAY. ..from 0mbgl to 1.4mbgl - live roots. ..from 0mbgl to 2mbgl - decayed roots.		0.20	85.60	D B PID ES	0.00 0.20-0.50 0.30 0.30	See DCP Results 0.00ppm		
Very stiff brown mottled orangish brown and grey CLAY with occasional silt partings. (OXFORD CLAY-STEWARTBY MEMBER) ..from 0.6mbgl to 1.4mbgl - probable desiccation.				PID D ES UT100	1.00 1.00 1.00 1.20-1.65	0.00ppm 28 blows, 100% Recovery		
Firm to stiff dark greyish brown mottled grey thinly laminated slightly organic CLAY with occasional black organic partings and gypsum crystals. (OXFORD CLAY-STEWARTBY MEMBER) ..at 1.8mbgl - firm light brown sandy silty clay laminae. sand is fine. ..from 2.2mbgl to 4mbgl - stiff to very stiff with very closely spaced light brown silt and shell laminae and gypsum crystals. ..from 3.6mbgl to 4mbgl - becoming very stiff to hard.		1.70	84.10	D D UT87	1.90 2.90 3.00-3.45	 29 blows, 100% Recovery		
Very stiff to hard dark brownish grey thinly laminated CLAY with occasional shell fragments. (OXFORD CLAY-STEWARTBY MEMBER) ..from 4.5mbgl to 6mbgl - becoming very stiff. ..from 5.5mbgl to 5.8mbgl - with shell fragments.		4.00	81.80	D D D	3.90 4.90 5.70			
Borehole Complete at 6.00 m		6.00	79.80					

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	20/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	EK
Logged By:	NJD
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
20/05/2015	0.00	-	-	Start of Hole
20/05/2015	6.00	-	-	Completion instructed by WSP/PB

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A14C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 78.700mOD

Coordinates: 463378.00E 224073.00N

Description	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)
MADE GROUND: Dark brown to black sandy angular to subangular basalt, clinker and granite GRAVEL.	0.30	78.40	D	0.00-0.10	See DCP Results	
			PID	0.30	1.60ppm	
			B	0.30-0.70		
MADE GROUND: Yellow brown slightly gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse chert and sandstone.	0.70	78.00	ES	0.30		
			B	0.70-1.20		
MADE GROUND: Firm grey slightly gravelly CLAY with black organic partings/discoloured silt partings. Gravel is angular to subangular fine to coarse brick and clinker. ..from 0.9mbgl to 1.1mbgl - timber obstruction.			PID	1.00	0.40ppm	
			ES	1.00		
			UT100	1.20-1.65	29 blows, 100% Recovery	
			D	1.80-1.90		
	2.00	76.70	D	2.10-2.20		
Firm light brown mottled orange and grey CLAY with silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 2mbgl to 3.4mbgl decayed roots. ..from 2.7mbgl to 3.4mbgl with gypsum crystals. ..at 3.05mgbl - becoming very stiff.			D	2.90-3.00		
	3.20	75.50	D	3.30-3.40		
			D	3.90-4.00		
	4.00	74.70	UT87	4.00-4.45	44 blows, 100% Recovery	
Firm brownish grey thinly laminated CLAY with orangish brown and yellow silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 3.6mbgl to 4mbgl - stiff silty slightly sandy with grey clayey sand partings. sand fine.	4.60	74.10	D	4.50-4.60		
			D	4.90-5.00		
Very stiff to hard dark greyish brown thinly laminated slightly organic CLAY with orangish brown and yellow silt partings and occasional gypsum crystals. (OXFORD CLAY-PETERBOROUGH MEMBER)			D	5.00-6.00		
	6.00	72.70				
Hard dark grey thinly laminated CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 5.1mbgl to 5.5mbgl - silty slightly sandy with grey sand partings. ..from 5.9mbgl to 6mbgl - silty slightly sandy with grey sand partings.						
Borehole Complete at 6.00 m						

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	03/06/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	EK
Logged By:	NJD
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
03/06/2015	0.00	-	-	Start of Hole
03/06/2015	6.00	-	-	Completion instructed by WSP/PB

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A14D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 77.600mOD

Coordinates: 463382.00E
224066.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: Firm dark brown slightly gravelly silty CLAY. Gravel is angular to subangular fine to medium of clinker. ..from 0mbgl to 1.8mbgl - live roots. ..from 0mbgl to 2mbgl - decayed roots.		0.30	77.30	D PID B ES	0.00 0.30 0.30-1.20 0.30	See DCP Results 0.80ppm		
Firm light brown mottled orange and grey CLAY with silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 1mbgl to 1.8mbgl - becoming stiff. ..at 1.7mgbl - orangish brown silt laminae.		1.80	75.80	PID ES UT100 D D	1.00 1.00 1.20-1.65 1.70 1.90	0.40ppm 24 blows, 100% Recovery		
Stiff brownish grey thinly laminated CLAY with much orangish brown and yellow silt partings and gypsum crystals. (OXFORD CLAY-PETERBOROUGH MEMBER)		2.40	75.20	D	2.50			
Very stiff to hard dark greyish brown thinly laminated slightly organic CLAY orangish brown and yellow silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..at 2.4mgbl - light brown silty fine sand laminae. ..from 2.75mbgl to 2.85mbgl - slightly sandy silty with grey fine sand partings.		3.20	74.40	UT87 D D	3.00-3.45 3.90 4.20	41 blows, 70% Recovery		
Very stiff dark grey thinly laminated CLAY with occasional yellow silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 3.7mbgl to 4mbgl - slightly sandy silty with grey fine sand partings. ..from 4.1mbgl to 4.2mbgl - with very occasional gold iron pyrite crystals. ..from 4.3mbgl to 4.7mbgl - slightly sandy silty with grey fine sand partings. ..from 4.55mbgl to 4.7mbgl - sandy with shell fragments.		4.70	72.90	D	4.60			
Borehole Complete at 4.70 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	2.00
87	4.70	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
27/05/2015	0.00	-	-	Start of Hole
27/05/2015	4.70	2.00	-	Refusal

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	27/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	SR
Logged By:	NJD
Checked By:	JHS

Remarks: Hole refused at 4.7mbgl due to gound conditions. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A14U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 78.500mOD

Coordinates: 463377.00E
224080.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: Firm dark brown gravelly silty CLAY. Gravel is angular to subangular fine to medium of clinker and granite. ..from 0mbgl to 1.8mbgl - live roots.				D	0.00	See DCP Results		
		0.30	78.20	PID	0.30	0.00ppm		
				B	0.30-0.50			
				ES	0.30			
MADE GROUND: Stiff to hard dark brown CLAY clasts in a soft to firm brown mottled orange and grey CLAY matrix.				PID	1.00	0.00ppm		
				D	1.00			
				ES	1.00			
		1.40	77.10	D	1.20			
MADE GROUND: Firm light orangish brown mottled orange and grey slightly gravelly CLAY. Gravel is subrounded to rounded fine to coarse of chert and sandstone. ..from 1.4mbgl to 2.2mbgl - decayed roots.		1.70	76.80	D	1.40			
				D	1.90			
				UT100	2.00-2.45	8 blows, 100% Recovery		
Soft light brown mottled orange and grey CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 1.9mbgl to 3.05mbgl - with much gypsum crystals. ..at 2.8mgbl - orangish brown sandy silty clay laminae. sand is fine. ..from 2.8mbgl to 3.05mbgl - firm with orangish brown silt partings.				D	2.50			
		3.05	75.45	D	3.10			
		3.80	74.70	D	3.90			
				UT87	4.00-4.45	36 blows, 95% Recovery		
		4.20	74.30					
Stiff brownish grey thinly laminated CLAY with extremely closely spaced sandy CLAY laminae and occasional orangish brown and silt partings shell fragments and gypsum crystals. Sand is fine. (OXFORD CLAY-PETERBOROUGH MEMBER) ..at 3.05mgbl - light grey silty clay laminae. ..from 3.2mbgl to 3.65mbgl - no sandy clay laminae. ..from 3.65mbgl to 3.8mbgl - no sandy clay laminae.				D	4.50			
				D	4.90			
				D	5.50			
		5.80	72.70	B	5.80-6.40			
Very stiff to hard dark greyish brown thinly laminated slightly organic CLAY with yellow silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER)		6.40	72.10					
Hard dark grey thinly laminated CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 5.6mbgl to 5.8mbgl - sandy with shell fragments.								
Stiff brownish grey thinly laminated CLAY with much orangish brown and yellow silt partings and gypsum crystals. (OXFORD CLAY-PETERBOROUGH MEMBER)								
Borehole Complete at 6.40 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
26/05/15	0.90	5	-	-	

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
26/05/2015	0.00	-	-	Start of Hole
26/05/2015	6.40	-	-	Refusal

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	26/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	SR+EK
Logged By:	NC
Checked By:	JHS

Remarks: Water seepage at 0.9m. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A15D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 73.300mOD

Coordinates: 462742.00E
223852.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Very stiff brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of chert limestone and brick. ..from 0mbgl to 2.2mbgl - live roots and probable desiccation.						See DCP Results		
				PID B ES	0.30 0.30-1.00 0.30	0.60ppm		
Very stiff brown mottled orange and grey very sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to rounded fine to medium of chert. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 1.5mbgl to 2.2mbgl - with occasional black carbonaceous fragments. ..from 1.8mbgl to 2.2mbgl - becoming slightly sandy.		1.00	72.30	PID D ES	1.00 1.00-1.10 1.00	0.60ppm		
				D UT100	1.90-2.00 2.00-2.45	76 blows, 100% Recovery		
		2.20	71.10					
Very stiff dark brownish grey CLAY with much orangish brown and yellow silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 3mbgl to 3.8mbgl - with silt partings. ..from 3.5mbgl to 4mbgl - with occasional gypsum crystals. ..from 3.8mbgl to 4mbgl - with much grey silty fine sand partings. No silt partings.				D	2.90-3.00			
		4.00	69.30	D	3.90-4.00			
Borehole Complete at 4.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	0.00
87	3.00	
65	4.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
22/04/2015	0.00	-	-	Start of Hole
22/04/2015	4.00	-	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	22/04/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	NJD
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A16C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 72.600mOD

Coordinates: 462366.00E
223734.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown to black sandy angular to subangular fine to coarse GRAVEL of clinker limestone and granite. ..from 0.0mbgl to 1.2mbgl - Live and decayed roots.						See DCP Results		
		0.30	72.30	PID ES	0.30 0.30	0.40ppm		
MADE GROUND: Light brown gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse of chert and clinker.		0.70	71.90					
				PID ES UT100	1.00 1.00 1.20-1.65	0.60ppm 13 blows, 80% Recovery		
		1.35	71.25					
MADE GROUND: Very stiff dark brown CLAY clasts in a firm brown mottled orange grey CLAY with silt partings matrix.		1.40	71.20					
		1.80	70.80					
		2.00	70.60	D	2.00-3.00			
MADE GROUND: Stiff brown to grey brown CLAY with 1no., angular coarse gravel of ballast..		2.10	70.50					
		2.20	70.40					
		2.35	70.25					
Stiff light brown mottled orange brown CLAY with 3mm diameter vertical decayed rootlets persistent for 300mm. Indistinct lamination. (OXFORD CLAY-PETERBOROUGH MEMBER)		2.50	70.10					
				UT87 D	3.00-3.45 3.00-4.00	29 blows, 70% Recovery		
		3.45	69.15					
Stiff light grey to grey brown CLAY with very closely to closely spaced partings with greyish white fine selenite crystals (0.5mm). (OXFORD CLAY-PETERBOROUGH MEMBER)		4.00	68.60					
Firm grey brown CLAY (drill disturbed). (OXFORD CLAY-PETERBOROUGH MEMBER)								
Firm friable pale greyish white sandy CLAY. Sand is fine of selenite crystals. (OXFORD CLAY-PETERBOROUGH MEMBER)								
Friable brown to orange brown oxidised sandy CLAY. Fine pale sand size material, and occasional coarse gravel size indurated fragments (calcite cemented). (OXFORD CLAY-PETERBOROUGH MEMBER)								
Friable brownish grey to dark brown CLAY with extremely closely spaced partings with sand sized selenite, separating 2-10mm layers of dark brown friable clay. (OXFORD CLAY-PETERBOROUGH MEMBER)								
Firm brownish grey to dark brown CLAY with very closely to closely spaced subhorizontal partings and probably closely to medium spaced subvertical tight fissures, both lined with 2-3mm selenite crystals. (OXFORD CLAY-PETERBOROUGH MEMBER)								
Stiff grey CLAY with a little brown discolouration at 3.45m-3.60m with traces of								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	26/05/2015
Plant:	Dart 2 (T820-759)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	SW
Logged By:	NJD+MO
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
26/05/2015	0.00	-	-	Start of Hole
26/05/2015	4.00	-	-	Completion instructed by WSP/PB

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A16C

Sheet 1+ of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 72.600mOD

Coordinates: 462366.00E
223734.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test			Casing (Water) Depth (m)	Installations
				Type	Depth (m)	Test Results		
crystals, and shell fragments to 15mm diameter at 3.70m in sandy brownish matrix. Below 3.7m stiff grey CLAY with occasional shell fragments and impressions, selenite absent. (OXFORD CLAY-PETERBOROUGH MEMBER).						See DCP Results		
Borehole Complete at 4.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	26/05/2015
Plant:	Dart 2 (T820-759)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	SW
Logged By:	NJD+MO
Checked By:	JHS

Remarks:

Borehole Log

Status: FINAL

WS2A16D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 72.400mOD

Coordinates: 462368.00E
223732.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Very stiff dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of chert and clinker. ..from 0mbgl to 2mbgl - live roots. ..from 0mbgl to 2.9mbgl - decayed roots.		0.30	72.10	D PID B	0.00-0.10 0.30 0.30-0.60	See DCP Results 0.40ppm		
Very stiff light brown mottled orange and grey slightly sandy slightly gravelly CLAY with silt partings. Sand is fine to medium. Gravel is angular to rounded fine to coarse of chert. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 0.3mbgl to 3mbgl - probable desiccation.		0.60	71.80	ES B PID ES UT100	0.30 0.60-1.20 1.00 1.00 1.20-1.65	 0.30ppm 16 blows, 100% Recovery		
Very stiff light brown mottled orange and grey CLAY with orangish brown silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 1.7mbgl to 2mbgl - greyish brown mottled orange and grey.		2.00	70.40	D D	1.90-2.00 2.10-2.20			
Hard dark greyish brown mottled grey thinly laminated slightly organic CLAY with extremely closely spaced orangish brown silt and shell laminae with gypsum crystals. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 2.4mbgl to 2.6mbgl - dark brown organic clay. ..at 2.85mbgl - dark brown to black lignite fragment. ..at 3.1mbgl - orangish brown silt and shell laminae.		3.20	69.20	D	2.50-2.60			
Very stiff to hard thinly interlaminated dark greyish brown mottled orangish brown and grey slightly organic CLAY and dark brown organic CLAY with gypsum crystals and occasional orangish brown silt and shell partings. (OXFORD CLAY-PETERBOROUGH MEMBER)		3.70	68.70	D	2.90-3.00			
Hard dark grey thinly laminated CLAY with orangish brown silt partings and occasional shell fragments. (OXFORD CLAY-PETERBOROUGH MEMBER)		4.00	68.40	D	3.90-4.00			
Borehole Complete at 4.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	08/06/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	EK
Logged By:	NJD
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
08/06/2015	0.00	-	-	Start of Hole
08/06/2015	4.00	-	-	Completion instructed by WSP/PB

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A16U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 72.800mOD

Coordinates: 462368.00E 223743.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Very stiff dark brown very sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of chert. ..from 0mbgl to 1.9mbgl - live roots. ..from 0mbgl to 3mbgl - decayed roots.				D	0.00-0.10	See DCP Results		
		0.30	72.50	PID	0.30	0.80ppm		
				B	0.30-0.60			
		0.60	72.20	ES	0.30			
				B	0.60-1.20			
Very stiff light brown mottled orange and grey slightly gravelly silty CLAY. Gravel is angular to rounded fine to coarse of chert. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 0.3mbgl to 2.7mbgl - probable desiccation.				PID	1.00	1.00ppm		
				ES	1.00			
				UT100	1.20-1.65	20 blows, 100% Recovery		
				D	1.90-2.00			
				UT87	2.00-2.45	36 blows, 50% Recovery		
		2.20	70.60					
Very stiff to hard light brown mottled orange and grey CLAY with orangish brown silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 1.8mbgl to 2.2mbgl - greyish brown mottled orange and grey.		2.60	70.20	D	2.50-2.60			
				D	2.90-3.00			
Hard orangish brown sandy SILT with much shell fragments and with extremely closely spaced dark brown organic CLAY laminae. Sand is fine. (OXFORD CLAY-PETERBOROUGH MEMBER)		3.70	69.10					
		4.00	68.80	D	3.90-4.00			
Very stiff to hard thinly interlaminated dark greyish brown mottled orangish brown and grey slightly organic CLAY and dark brown organic CLAY with gypsum crystals and occasional orangish brown silt and shell partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 3mbgl to 3.35mbgl - becoming firm to stiff. ..at 3.35mgbl - yellowish brown silt and shell laminae. ..from 3.35mbgl to 3.7mbgl - becoming stiff to very stiff.								
Very stiff to hard dark grey thinly laminated CLAY with orangish brown silt partings and occasional shell fragments. (OXFORD CLAY-PETERBOROUGH MEMBER)								
Borehole Complete at 4.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	09/06/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	EK
Logged By:	NJD
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
09/06/2015	0.00	-	-	Start of Hole
09/06/2015	4.00	-	-	Completion instructed by WSP/PB

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A17C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 68.800mOD

Coordinates: 461267.00E 223349.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Rail ballast occurring as slightly sandy angular fine to coarse crushed rock GRAVEL. Sand fine to coarse.				B PID ES	0.20-0.50 0.30 0.30	See DCP Results 1.60ppm		
		0.50	68.30					
MADE GROUND: Firm dark greyish brown sandy CLAY. Sand is fine to medium.				PID ES UT100	1.00 1.00 1.20-1.65	0.30ppm		
		2.00	66.80					
Firm dark greyish brown mottled CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)				UT87	3.00-3.45			
		4.00	64.80					
Firm to stiff dark grey slightly sandy CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)								
		4.90	63.90	B	4.90-5.15			
Dark grey clayey silty fine to medium SAND. (KELLAWAYS SAND)		5.15	63.65					
Borehole Complete at 5.15 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	27/05/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	SW
Logged By:	ZR
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
27/05/2015	0.00	-	-	Start of Hole
27/05/2015	5.15	-	-	Refusal

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A17D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 67.800mOD

Coordinates: 461248.00E 223333.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: Firm dark brown gravelly silty CLAY. Gravel is angular to subangular fine to coarse of granite and clinker. ..from 0mbgl to 1.2mbgl - live roots. ..from 0mbgl to 1.8mbgl - decayed roots.		0.20	67.60	D B PID ES	0.00-0.10 0.20-0.90 0.30 0.30	See DCP Results 0.10ppm		
Firm light brown sandy CLAY. Sand is fine to medium. (OXFORD CLAY-PETERBOROUGH MEMBER)		0.90	66.90	B PID ES UT100	0.90-1.20 1.00 1.00 1.20-1.65	 0.10ppm		
Firm light brown mottled orange and grey CLAY with silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER)		1.80	66.00	D D	1.70-1.80 1.90-2.00			
Stiff to hard brownish grey thinly cross laminated CLAY with much orangish brown and yellow sandy silt partings. Sand is fine. (OXFORD CLAY-PETERBOROUGH MEMBER)		2.20	65.60	D D UT87	2.60-2.70 2.90-3.00 3.00-3.45			
Very stiff dark grey thinly laminated CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 2.2mbgl to 2.5mbgl - sandy. Sand is fine to medium. ..from 2.8mbgl to 3.2mbgl - silty slightly sandy. sand is firm to medium.		3.20	64.60	D	3.45-3.60			
Dark grey clayey silty fine to medium SAND with grey sand partings and occasional fossil fragments. (OXFORD CLAY-PETERBOROUGH MEMBER)		3.60	64.20					
Borehole Complete at 3.60 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	04/06/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	DS
Logged By:	NJD
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
04/06/2015	0.00	-	-	Start of Hole
04/06/2015	3.60	-	-	Refusal

Remarks: Refusal at 3.6mbgl due to ground conditions. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A17U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 68.500mOD

Coordinates: 461265.00E 223356.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Soft black slightly gravelly CLAY. Gravel is subangular fine to medium of clinker. ..from 0mbgl to 1.8mbgl - live roots. ..from 0mbgl to 2.6mbgl - decayed roots.						See DCP Results		
		0.40	68.10	PID ES	0.30 0.30	1.20ppm		
MADE GROUND: Soft light greyish brown slightly sandy CLAY. Sand is fine.		1.20	67.30	PID ES UT100	1.00 1.00 1.20-1.65	0.40ppm 18 blows, 100% Recovery		
		1.40	67.10					
Firm light orange brown sandy CLAY. Sand is fine to medium. (OXFORD CLAY-PETERBOROUGH MEMBER)		1.70	66.80	D	1.90-2.00			
Firm light brown mottled orange and grey CLAY with silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER)		2.40	66.10	D	2.70-2.80			
Firm grey thinly cross laminated CLAY with much orangish brown hard clayey silt clasts and partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 2.1mbgl to 2.4mbgl - becoming stiff.		2.95	65.55	B UT87	2.95-4.00 3.00-3.50	41 blows, 100% Recovery		
Stiff dark grey thinly laminated CLAY with orangish brown and yellow silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 2.7mbgl to 2.95mbgl - no silt partings. ..from 2.85mbgl to 2.95mbgl - silty sandy. sand is fine to medium.		4.00	64.50					
Dark grey clayey silty fine to medium SAND. (KELLAWAYS SAND) ..from 3.7mbgl to 3.8mbgl - with shell fragments.								
Borehole Complete at 4.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	0.00
87	4.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
27/05/2015	0.00	-	-	Start of Hole
27/05/2015	4.00	-	-	Refusal

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	27/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	PG
Logged By:	NJD
Checked By:	JHS

Remarks: Hole refused at 4.0mbgl due to ground conditions. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WSHH2A18D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 68.800mOD

Coordinates: 460787.00E
223182.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown very gravelly silty fine to coarse SAND. Gravel is angular to rounded fine to coarse chert and clinker.				B	0.00-0.50			
				ES	0.30			
..from 0mbgl to 1.4mbgl - live roots.		0.50	68.30	B	0.50-1.20			
Very stiff light brown mottled orange and grey CLAY with orangish brown sandy silt partings. Sand is fine. (OXFOD CLAY-PETERBOROUGH MEMBER)				D	1.00-1.10			
				ES	1.00			
..from 0.5mbgl to 1.0mbgl - probable desiccation.								
..from 1mbgl to 1.8mbgl - stiff		1.80	67.00	D	1.80-2.00			
.. from 1.4mbgl to 1.8mbgl - with orangish brown silty fine to coarse sand partings.								
Stiff brown organic CLAY with orangish brown and yellow silt and shell partings. (OXFOD CLAY-PETERBOROUGH MEMBER)				D	2.80-3.00			
.. from 2.1mbgl to 3mbgl - becoming very stiff dark brown		3.00	65.80					
.. from 2.7mbgl to 3mbgl - occasional orangish brown sandy silt and shell partings and crystals. Sand is fine.				D	3.60-3.80			
		3.80	65.00	D	3.80-3.90			
Very stiff dark grey CLAY with occasional crystal and grey silty sand partings. (OXFOD CLAY-PETERBOROUGH MEMBER)		3.90	64.90					
..from 3.6mbgl to 3.8mbgl _ becoming stiff								
Dark grey clayey fine to medium SAND. (KELLAWAYS SAND)								
Borehole Complete at 3.90 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	24/06/2015
Plant:	Hand Held WS
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	NJD
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
24/06/2015	0.00	-	-	Start of Hole
24/06/2015	3.90	-	-	Refusal

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A18U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 69.100mOD

Coordinates: 460787.00E 223182.00N

Description	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Results	Casing (Water) Depth (m)
MADE GROUND: Black slightly clayey slightly gravelly SAND with occasional rootlets. Sand is fine to coarse. Gravel is surrounded fine chalk.			D	0.00-0.40	See DCP Results	
	0.40	68.70	PID	0.30	0.20ppm	
			ES	0.30		
			B	0.40-0.90		
MADE GROUND: Soft brown slightly sandy gravelly CLAY with a low cobble content. Sand is fine to coarse. Gravel is subrounded fine to coarse flint and chalk. Cobbles are rounded flint.	0.90	68.20	D	0.90		
			PID	1.00	0.20ppm	
			ES	1.00		
			UT100	1.20-1.65		
			D	1.70		
Firm light greyish brown mottled CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER) ..at 1.8mgbl - mottling becoming less frequent with depth.	2.00	67.10	D	2.00		
Firm brownish grey fissile CLAY interbedded with occasional lenses of orangish brown discolouration. Discolouration occurs as staining. (OXFORD CLAY-PETERBOROUGH MEMBER) ..at 2.7mgbl - discolouration becoming extremely rare with depth.	2.80	66.30	D	2.80		
			UT87	3.00-3.45		
			D	3.80		
	4.00	65.10	D	4.00		
Firm dark grey silty CLAY with rare subangular fine gravel size crystals possibly selenite. (OXFORD CLAY-PETERBOROUGH MEMBER)	4.50	64.60	D	4.50		
Dark grey slightly clayey SILT with extremely rare subangular fine silt gravel and occasional shell fragments. Shell fragments are up to 10mm wide. (OXFORD CLAY-PETERBOROUGH MEMBER)						
Borehole Complete at 4.50 m						

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	01/06/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	ZR
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
01/06/2015	0.00	-	-	Start of Hole
01/06/2015	4.50	-	-	Completion instructed by WSP/PB

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A19C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 69.200mOD

Coordinates: 460262.00E 222991.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Black slightly clayey gravelly SAND with a low cobble content and occasional rootlets. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse concrete and brick. Cobbles are subangular brick. Rootlets are up to 5mm thick.				B	0.00-0.40	See DCP Results		
		0.40	68.80	PID	0.30	0.10ppm		
				ES	0.30			
				B	0.40-0.80			
MADE GROUND: Dark brownish red slightly clayey sandy GRAVEL with a high cobble content. Sand is fine to medium. Gravel is subangular fine to coarse brick. Cobbles are subangular brick.		0.80	68.40	D	0.80			
				PID	1.00	0.20ppm		
				ES	1.00			
				UT100	1.20-1.65			
		1.80	67.40	D	1.70			
				D	1.80			
				B	2.00-2.90			
Firm dark grey CLAY inter bedded with frequent lenses of orangish brown discolouration / staining and occasional silty lenses. Silt occurs within the discoloured lenses. (OXFORD CLAY-PETERBOROUGH MEMBER)		2.90	66.30	D	2.90-3.00			
Dark grey clayey SILT with extremely rare subangular fine siltstone gravel. (KELLAWAYS CLAY)		3.00	66.20					
Dark grey clayey fine SAND.(KELLAWAYS SAND)								
Borehole Complete at 3.00 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	0.00
87	3.00	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
03/06/2015	0.00	-	-	Start of Hole
03/06/2015	3.00	-	-	Refusal

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	03/06/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	DS
Logged By:	ZR
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A19D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 72.100mOD

Coordinates: 460286.00E 222987.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Soft dark greyish brown CLAY with rare gravel, rare pockets of silt and occasional rootlets. Gravel is subrounded fine brick and concrete. Rootlets are up to 5mm thick.				D B PID ES	0.00-0.30 0.00-1.20 0.30 0.30	See DCP Results 0.40ppm		
..from 1.5mbgl to 2mbgl - pockets of silt occur in thin 10mm bands.				PID D ES D	1.00 1.00 1.00 1.20	0.20ppm		
				D UT100	2.00 2.00-2.45			
MADE GROUND: Dark brownish grey silty CLAY with rare subangular fine concrete gravel.		2.50	69.60	D	2.50			
Firm light greyish brown mottled CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)		3.30	68.80	D	3.30			
..from 4mbgl to 4.5mbgl - mottling becomes less frequent with depth				UT87	4.00-4.45			
Firm brownish grey fissile CLAY interbedded with occasional lenses of orangish brown discolouration. Discolouration occurs as staining. (OXFORD CLAY-PETERBOROUGH MEMBER)		4.50	67.60	D	4.50			
				D	5.50			
Firm dark grey silty CLAY with occasional fossil fragments and occasional subangular medium gravel possibly selenite crystals and pyrite. Fossil fragments comprise shell nodules up to 20mm wide. (OXFORD CLAY-PETERBOROUGH MEMBER)		5.80	66.30	D	5.80			
				D	6.80			
..from 5.8mbgl to 6mbgl - fossil fragments, crystals and pyrite observed.		7.00	65.10	D	7.00			
..from 6.8mbgl to 7mbgl - pyrite observed.				D	7.50			
Dark grey clayey SILT with bands of dark grey fine sand. (KELLAWAYS SAND)		7.80	64.30	D	7.80			
..at 7.5mgbl - 50mm sand band with abundant fossils. fossils comprise nodules and shell fragments up to 20mm wide								
Borehole Complete at 7.80 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	0.00
87	5.00	
75	7.80	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	02/06/2015-03/06/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	DS
Logged By:	ZR
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
02/06/2015	0.00	-	-	Start of Hole
03/06/2015	7.80	-	-	Completion instructed by WSP/PB
02/06/2015	1.20	-	-	End of shift
03/06/2015	1.20	-	-	Start of Shift

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A19U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 70.000mOD

Coordinates: 460265.00E 223000.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Black slightly clayey slightly gravelly SAND with a low cobble content. Sand is fine to coarse. Gravel is subangular fine to coarse brick concrete and rare flint. Cobbles are subangular brick.				D B PID ES	0.00-0.10 0.00-1.20 0.30 0.30	See DCP Results 0.40ppm		
MADE GROUND: Soft slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine brick and concrete.		1.20	68.80	PID ES D UT100	1.00 1.00 1.20 1.20-1.65	0.20ppm		
Firm light greyish brown mottled CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 1.7mgbl to 1.9mgbl - mottling becomes less frequent with depth		1.70 1.90	68.30 68.10	D D	1.70 1.90			
Firm brownish grey fissile CLAY interbedded with occasional lenses of orangish brown discolouration. Discolouration occurs as staining. (OXFORD CLAY-PETERBOROUGH MEMBER)		3.10	66.90	D D	2.90 3.10			
Firm dark grey silty CLAY with occasional fossil fragments and occasional subangular medium gravel possibly selenite crystals. Fossil fragments comprise shell nodules up to 20mm wide. (OXFORD CLAY-PETERBOROUGH MEMBER)		4.90	65.10	UT87 B	4.00-4.45 4.50-4.90			
Borehole Complete at 4.90 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	0.00
87	4.90	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
02/06/2015	0.00	-	-	Start of Hole
02/06/2015	4.90	-	-	Completion instructed by WSP/PB

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	02/06/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	DS
Logged By:	ZR
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A20C

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 68.800mOD

Coordinates: 459862.00E 222842.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown sandy angular to subangular clinker and limestone GRAVEL. ..from 0mbgl to 2.8mbgl - live roots. ..from 0mbgl to 3.8mbgl - decayed roots.		0.30	68.50	D PID D ES	0.00-0.10 0.30 0.30-0.80 0.30	See DCP Results 0.20ppm		
MADE GROUND: Light brown gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse of chert sandstone and brick.		0.80	68.00	D PID D ES	0.80-1.20 1.00 1.00-1.10 1.00	 0.10ppm		
Firm grey slightly sandy slightly gravelly CLAY with orangish brown sandy silt partings. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of limestone and chert. (KELLAWAYS SAND) ..from 1.3mbgl to 1.4mbgl - no sand and gravel.		1.40	67.40	D B	1.30-1.40 1.40-2.00			
Light grey angular to rounded fine to coarse GRAVEL of limestone and chert with medium cobble content in a firm light brown mottled orangish brown and grey very sandy CLAY matrix. Cobbles are subangular of limestone. (KELLAWAYS CLAY)		2.00	66.80	UT100	2.00-2.45	19 blows, 100% Recovery		
Firm grey mottled orange CLAY with orangish brown silt partings. (KELLAWAYS CLAY)		3.20	65.60	D UT87 D	2.90-3.00 3.00-3.45 3.90-4.00	 22 blows, 100% Recovery		
Firm to stiff dark grey thinly laminated CLAY with occasional brown silt partings. (KELLAWAYS CLAY) ..at 3.5mgbl - iron pyrites crystals. ..from 3.7mbgl to 4.7mbgl - becoming stiff to very stiff dark grey. ..from 4.5mbgl to 4.7mbgl - becoming very stiff to hard.		4.70	64.10	D	4.60-4.70			
Borehole Complete at 4.70 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	0.00
87	4.70	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	11/06/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	NJD
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
11/06/2015	0.00	-	-	Start of Hole
11/06/2015	4.70	-	-	Refusal

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A20D

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 68.600mOD

Coordinates: 459845.00E 222835.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Brown sandy gravelly angular to subangular COBBLES of brick and limestone. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of brick and mortar. ..from 0mbgl to 1.2mbgl - live roots.				B PID ES	0.00-0.90 0.30 0.30	See DCP Results 0.80ppm		
MADE GROUND: Light brown very gravelly clayey fine to coarse SAND. Gravel is angular to rounded fine to coarse of brick and chert.		0.90 1.20 1.40	67.70 67.40 67.20	B PID ES UT100 D	0.90-1.20 1.00 1.00 1.20-1.65 1.20-1.40	0.20ppm 49 blows, 90% Recovery		
MADE GROUND: Firm light brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to rounded fine to medium of brick clinker and chert.		1.80 2.60	66.80 66.00	D UT87 UT87	1.70-1.80 1.90-2.00 2.00-2.45	19 blows, 50% Recovery		
Firm light brown mottled orange and grey slightly sandy slightly gravelly CLAY. Sand is fine to medium. Gravel is angular to rounded fine to coarse of chert. (ALLUVIUM) ..from 1.4mbgl to 3.4mbgl - decayed roots. ..from 1.65mbgl to 1.8mbgl - becoming gravelly.		3.00	65.60	D	2.90-3.00			
Firm light brown mottled orange and grey CLAY with silt partings and calcareous nodules. (KELLAWAYS CLAY)		4.20 4.30	64.40 64.30	D D D D	3.90-4.00 4.15-4.25 4.25-4.30 4.25 4.25			
Firm greyish brown mottled orange and grey CLAY with orangish brown silt partings and occasional calcareous nodules and gypsum crystals. (KELLAWAYS CLAY)								
Firm dark grey CLAY with orangish brown and yellow silt partings. (KELLAWAYS CLAY) ..from 3.2mbgl to 3.8mbgl - becoming stiff to very stiff. ..from 3.8mbgl to 4.25mbgl - becoming very stiff to hard.								
Very weak dark grey clayey silty LIMESTONE. Recovered as sandy angular and tabular fine to coarse Gravel. Sand is fine to coarse. CORNBRASH LIMESTONE								
Borehole Complete at 4.30 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	0.00
87	3.00	
75	4.00	
65	4.30	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
23/04/2015	0.00	-	-	Start of Hole
23/04/2015	4.30	-	-	Refusal

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	23/04/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	NJD
Checked By:	JHS

Remarks: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2A20U

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 69.000mOD

Coordinates: 459864.00E 222853.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown gravelly silty fine to coarse SAND. Gravel is angular to rounded fine to coarse of chert and clinker.		0.30	68.70	D	0.00-0.10	See DCP Results		
				PID	0.30	0.60ppm		
				B	0.30-1.20			
				ES	0.30			
MADE GROUND: Firm brown very sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of chert clinker and brick. MADE GROUND ..from 0.8mbgl to 1.2mbgl - becoming sandy.				PID	1.00	0.00ppm		
		1.20	67.80	D	1.00-1.10			
				ES	1.00			
				UT100	1.20-1.65	32 blows, 100% Recovery		
Firm light brown mottled orange and grey sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to rounded fine to coarse of chert and limestone. (ALLUVIUM) ..from 1.65mbgl to 1.75mbgl - becoming very sandy very gravelly.		1.75	67.25	D	1.65-1.75			
				ES	1.80			
		2.00	67.00	D	1.90-2.00			
				UT87	2.00-2.45	19 blows, 100% Recovery		
				D	2.50-2.60			
				ES	2.80			
Firm light brown mottled orange and grey CLAY with silt partings and occasional calcareous nodules. (KELLAWAYS CLAY)		2.90	66.10	D	2.90-3.00			
Firm grey mottled orangish brown CLAY with silt partings. (KELLAWAYS CLAY)				ES	3.80			
		4.00	65.00	D	3.90-4.00			
Firm dark grey CLAY. (KELLAYWAYS CLAY) ..from 3.3mbgl to 3.8mbgl - becoming firm to stiff. ..from 3.8mbgl to 4mbgl - becoming stiff to very stiff.		4.20	64.80	D	4.00-4.20			
Very weak dark grey clayey silty LIMESTONE. Recovered as sandy angular and tabular fine to coarse gravel. Sand is fine to coarse. (CORNBRASH LIMESTONE)								
Borehole Complete at 4.20 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	2.00	0.00
87	3.00	
75	4.20	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
17/06/2015	0.00	-	-	Start of Hole
17/06/2015	4.20	-	-	Refusal

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	17/06/2015
Plant:	Sherpa 1 (T820-630)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	AB
Logged By:	NJD
Checked By:	JHS

Remarks: Instructed by PB James to take extra ES Samples at 1m intervals. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2ALLCU

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 68.037mOD

Coordinates: 461903.00E 223579.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Dark brown gravelly silty fine to medium SAND. Gravel is angular to rounded fine coarse of clinker chert and brick. ..from 0mbgl to 1.2mbgl live roots.				D	0.00	See DCP Results		
		0.30	67.74	PID	0.30	0.60ppm		
				B	0.30-1.20			
				ES	0.30			
MADE GROUND: Firm dark brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of clinker coal and brick.				PID	1.00	0.20ppm		
				ES	1.00			
				D	1.40			
		1.60	66.44	B	1.60-2.60			
MADE GROUND: Stiff to hard dark brown CLAY clasts in a soft varying to firm brown mottled orange and grey CLAY with silt partings.				D	1.90			
				UT100	2.00-2.45	18 blows, 70% Recovery		
				ES	2.50			
		2.60	65.44	D	2.70			
Firm dark grey slightly gravelly CLAY with black organic partings. Gravel is rounded fine to coarse of chert. (ALLUVIUM) ..from 2.6mbgl to 3.2mbgl decayed roots.		3.00	65.04	UT87	3.00-3.45	13 blows, 100% Recovery		
Firm grey mottled orangish brown CLAY with silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER)				D	3.60			
		3.80	64.24	D	3.90			
Firm light orangish brown mottled grey slightly sandy CLAY. Sand is fine to medium. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 4mbgl to 4.2mbgl - becoming sandy. ..from 4.4mbgl to 4.7mbgl - sandy with very closely spaced light orangish brown sandy clayey angular to subrounded fine to coarse gravel laminae of chert sandstone and fossil fragments.				D	4.50			
		4.70	63.34	D	4.90			
		5.10	62.94	D	5.20			
Extremely to very weak thinly laminated greyish brown silty fine to medium calcareous SANDSTONE with shell fragments. (KELLAWAYS SAND)		5.40	62.64					
Dark grey silty fine to medium SAND with occasional shell fragments. (KELLAWAYS SAND)								
Borehole Complete at 5.40 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	01/06/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	EK
Logged By:	ZR
Checked By:	JHS

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
01/06/2015	0.00	-	-	Start of Hole
01/06/2015	5.40	-	-	Refusal

Remarks: Refusal at 5.4mbgl due to ground conditions. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2AFCMGD

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 79.860mOD

Coordinates: 463459.00E 224090.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Sample / Test Test Results	Casing (Water) Depth (m)	Installations
MADE GROUND: Black slightly clayey SAND & GRAVEL with a low cobble content. Sand is fine to medium. Gravel is subangular to subrounded fine to coarse flint, brick and crushed rock possibly limestone. Cobbles are subrounded concrete and flint.						See DCP Results		
				PID	0.30	0.40ppm		
				ES	0.30			
		0.60	79.26					
Firm dark brownish grey slightly mottled CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)				PID	1.00	0.20ppm		
				ES	1.00			
		1.20	78.66	UT100	1.20-1.65	15 blows, 40% Recovery		
				D	1.70			
Firm light brown mottled orange and grey CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 1.2mbgl to 1.6mbgl - live roots. ..from 1.2mbgl to 2.6mbgl - decayed roots. ..from 1.8mbgl to 2mbgl - with dark orangish brown silt partings.		2.00	77.86	D	2.00			
				D	2.90			
				UT87	3.00-3.45	23 blows, 85% Recovery		
Firm to very stiff greyish brown mottled orange thinly laminated CLAY with much dark orangish brown silt partings. (OXFORD CLAY-PETERBOROUGH MEMBER)		3.20	76.66					
				D	3.90			
Hard dark greyish brown thinly laminated slightly organic CLAY with shell fragments. (OXFORD CLAY-PETERBOROUGH MEMBER) ..at 4mbgl - golden iron pyrites crystals. ..at 4.7mbgl - becoming very shelly laminae.		4.80	75.06	D	4.90			
				D	5.35			
Very stiff dark brownish grey thinly laminated CLAY with occasional shell and fossil fragments. (OXFORD CLAY-PETERBOROUGH MEMBER) ..from 5.35mbgl to 5.45mbgl - with calcareous nodules. ..from 5.45mbgl to 7.5mbgl - bvecoming hard, silty and slightly sandy. Sand is fine. ..from 6.5mbgl to 6.9mbgl - with extremely closely spaced silty fine to medium sand laminae. ..from 7.1mbgl to 7.5mbgl - with extremely closely spaced silty fine to medium sand laminae.				D	5.90			
				D	6.60			
				D	6.90			
		7.50	72.36	D	7.50			
Dark grey silty fine to medium SAND with sandy clay partings. (KELLAWAYS SAND) ..at 7.5mbgl - black shiny coal laminae.		7.60	72.26					
Borehole Complete at 7.60 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.00	2.00
87	5.00	
75	7.00	
65	7.60	

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
26/05/15	1.20	5	-	-	

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
26/05/2015	0.00	-	-	Start of Hole
26/05/2015	7.60	2.00	-	Refusal

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	26/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	SR
Logged By:	ZR+NJD
Checked By:	JHS

Remarks: Water seepage 1.2-1.65m.Hole refused at 7.6mbgl due to ground conditions. Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

Borehole Log

Status: FINAL

WS2AFCMGU

Sheet 1 of 1

Project: East West Rail-Phase 2A

Project No: 5624.2A

Ground Level: 80.283mOD

Coordinates: 463455.00E 224105.00N

Description	Legend	Depth (m)	O.D. Level (m)	Sample / Test Type	Sample / Test Depth (m)	Test Results	Casing (Water) Depth (m)	Installations
TOPSOIL: Dark brown gravelly fine SAND. Gravel is fine to coarse subangular to rounded flint.		0.20	80.08	D PID ES	0.20 0.30 0.30	See DCP Results 0.00ppm		
Soft to firm light greyish brown mottled CLAY. (OXFORD CLAY-PETERBOROUGH MEMBER)				PID D ES D	1.00 1.00 1.00 1.20	0.00ppm		
				D	2.00			
Firm dark greyish brown occasionally mottled CLAY with a slight organic odour. (OXFORD CLAY-PETERBOROUGH MEMBER)		2.50	77.78	D	2.50			
Light grey extremely weak SILTSTONE with occasional shell fragments. Shell fragments are up to 10mm wide. (OXFORD CLAY-PETERBOROUGH MEMBER)		3.00	77.28	D UT100	3.00 3.00-3.45	100 blows, 40% Recovery		
Borehole Complete at 3.45 m		3.45	76.83	D	3.45			

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
102	3.45	0.00

Chiselling / Slow Progress

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Progress

Date	Hole Depth	Casing Depth	Water Depth	Remarks
26/05/2015	0.00	-	-	Start of Hole
26/05/2015	3.45	-	-	Refusal

Client:	Network Rail
Consultant:	WSP | Parsons Brinckerhoff
Dates Drilled:	26/05/2015
Plant:	Sherpa 2 (T820-638)
SPT Hammer:	N/A
Date Printed:	11/02/2016
Drilled By:	EK
Logged By:	ZR
Checked By:	JHS

Remarks: Hole refused at 3.45mbgl due to ground conditions.Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are based on the coordinates taken by WSP/PB and cross-correlated with LiDAR survey information provided by Network Rail.

BOREHOLE LOG

Borehole No: RC2ABROB-D
Sheet 2 of 3

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB	Hole Type:	RC
Project No:	5624	Co-ordinates:	460393.00 mE	Checked By:	JHS
Client:	EWR Alliance		223026.00 mN	Approved By:	RS
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	70.60 mOD	Scale:	1:50
				Log Status:	FINAL
Date Started:	03/05/2016	Orientation:	090 deg.	Print Date:	10/10/2016
Date Completed:	04/05/2016	Inclination:	90 deg.	Final Depth:	20.00m

Stratum Description	Legend	Depth (Thick-ness) (m)	Level (m)	Sampling, Coring and In Situ Testing: Depth (m)	Type	Dia (mm)	Rec %	Blows (mins)	Test	Test Result	Units	TCR SCR RQD %	If min If ave If max (mm)	Water	Well/ Backfill
[CORNBRASH LIMESTONE FORMATION]															
9.60 - 9.90m : High proportion of fossil fragments.															
Strong grey fossiliferous LIMESTONE with a band of grey clayey gravelly coarse SAND from 11.20-11.30. Gravel is subrounded, coarse of limestone. Discontinuities: Widely spaced, subhorizontal (8-13 degrees), planar, open, rough. [CORNBRASH LIMESTONE FORMATION]		(2.10)		10.20 - 11.70 10.20 - 11.70 11.20 - 11.40	C RC C		100					100 62 62	20 160 300		
		12.00	58.60												
Stiff thinly laminated green grey silty CLAY. [CORNBRASH LIMESTONE FORMATION]		(0.60)													
12.00 - 12.60m : Low proportion of fossil fragments.				11.70 - 13.20 11.70 - 13.20	C RC		100					100 24 24			
		12.60	58.00												
Strong light grey fossiliferous LIMESTONE. [CORNBRASH LIMESTONE FORMATION]		12.75	57.85												
Stiff thinly laminated green grey silty CLAY. [CORNBRASH LIMESTONE FORMATION]		13.00	57.60												
12.75 - 13.00m : Low proportion of fossil fragments and pyrite growth.															
Strong grey fossiliferous LIMESTONE. Discontinuities: Widely spaced, subhorizontal (6-9 degrees), open to clay filled, rough to smooth. [CORNBRASH LIMESTONE FORMATION]		(1.06)		13.32 - 13.66	C							100	30 215 400		
		14.06	56.54	13.20 - 14.70 13.20 - 14.70	C RC		100					100 56 53			
Stiff thinly laminated grey silty CLAY. [CORNBRASH LIMESTONE FORMATION]															
14.06 - 15.10m : Low proportion of fossil fragments,		(1.04)													
		15.10	55.50												
Strong light grey fossiliferous LIMESTONE. [CORNBRASH LIMESTONE FORMATION]		15.25	55.35												
Stiff thinly laminated greenish grey silty CLAY. [CORNBRASH LIMESTONE FORMATION]		(0.30)		14.70 - 16.20 14.70 - 16.20	C RC		100					100 40 20			
		15.55	55.05												
Moderately strong dark grey fossiliferous LIMESTONE. [CORNBRASH LIMESTONE FORMATION]		15.82	54.78												
15.55 - 15.82m : High proportion of sand.															
Stiff thickly laminated greyish green silty gravelly CLAY. Gravel is subrounded, fine to medium of limestone. [CORNBRASH LIMESTONE FORMATION]		16.00	54.60	16.20 - 16.45	C								40 320 600		
Strong light grey fossiliferous LIMESTONE. Discontinuities: Widely spaced, subhorizontal (8-10 degrees), undulating to planar, open, rough. [FOREST MARBLE FORMATION]		(1.20)		16.20 - 17.70 16.20 - 17.70	C RC		100					100 55 43			
		17.20	53.40												
Weak grey fossiliferous SILTSTONE. [FOREST MARBLE FORMATION]		17.35	53.25												
Stiff dark green mottled yellow brown gravelly CLAY. Gravel is subrounded, fine of limestone, [FOREST MARBLE FORMATION]		(1.05)													
17.35 - 18.40m : Moderate proportion of fossil fragments and pyrite growth.															
		18.40	52.20									100			
Strong white grey fossiliferous LIMESTONE. Discontinuities: widely spaced, subhorizontal (6-9 degrees) to subvertical (77-84 degrees), undulating to stepped, open, smooth to rough. [WHITE LIMESTONE FORMATION]				17.70 - 19.20 17.70 - 19.20	C RC		100					49 42			
18.40 - 20.00m : Weathering indicated by gypsum growth.		(1.60)											30 265 500		
				19.20 - 20.00 19.20 - 20.00 19.72 - 19.90	C RC C		100					100 56 56			
		20.00	50.60												

Stratum depths measured along borehole axis.

Groundwater levels may be subject to seasonal, tidal and other fluctuations and should not be taken as constant.

Explanation of symbols and abbreviations given in 'Key to Exploratory Holes'

Further details given on appended 'Borehole Information Sheet'.

BOREHOLE LOG

Borehole No: RC2ABROB-D
Sheet 3 of 3

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB	Hole Type:	RC
Project No:	5624	Co-ordinates:	460393.00 mE	Checked By:	JHS
Client:	EWR Alliance		223026.00 mN	Approved By:	RS
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	70.60 mOD	Scale:	1:50
				Log Status:	FINAL
Date Started:	03/05/2016	Orientation:	090 deg.	Print Date:	10/10/2016
Date Completed:	04/05/2016	Inclination:	90 deg.	Final Depth:	20.00m

Stratum Description	Legend	Depth (Thick-ness) (m)	Level (m)	Sampling, Coring and In Situ Testing								TCR SCR RQD %	If min If ave If max (mm)	Water	Well/ Backfill
				Depth (m)	Type	Dia (mm)	Rec %	Blows (mins)	Test	Test Result	Units				
Borehole Terminated at 20.00m				20.00 - 20.04					C	50 / 20					

Stratum depths measured along borehole axis.
Groundwater levels may be subject to seasonal, tidal and other fluctuations and should not be taken as constant.
Explanation of symbols and abbreviations given in 'Key to Exploratory Holes'
Further details given on appended 'Borehole Information Sheet'.

BOREHOLE INFORMATION SHEET

Borehole No
RC2ABROB-D
Sheet 1 of 2

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB
Project No:	5624	Co-ordinates:	460393.00 mE
Client:	EWR Alliance		223026.00 mN
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	70.60 mOD
Date Started:	03/05/2016	Orientation:	090 deg.
Date Completed:	04/05/2016	Inclination:	90 deg.

Hole Type:	RC
Checked By:	JHS
Approved By:	RS
Log Status:	FINAL
Date:	10/10/2016
Final Depth:	20.00m

Depth Related Exploratory Hole Information

From (m)	To (m)	Type	Start	End	Plant	Barrel	Drill Bit	Lead Driller	Logger	Remarks
0.00	1.20	IP	03/05/2016	03/05/2016	Insulated digging tools	N/A	N/A	Simon Roberts	NC	Hand dug inspection pit
1.20	2.70	WLS	03/05/2016	03/05/2016	COMACCHIO GEO205			Simon Roberts	NC	Windowless Sample
2.70	20.04	RC	04/05/2016	04/05/2016	COMACCHIO GEO205			Simon Roberts	NC	Rotary Cored: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are interpolated, exploratory hole drilled outside the LiDAR survey area provided by Network Rail.

Boring-Drilling Progress

Date	Time	Depth (m)	Casing (m)	Depth Water (m)	Remarks
03/05/2016	08:00				Start of shift
03/05/2016	17:00	10.20	2.70	1.73	End of shift
04/05/2016	08:00	10.20	2.70	1.75	Start of shift
04/05/2016	17:00	20.04	2.70	2.01	End of shift

Hole Diameter by Depth

Depth (m)	Dia. (mm)	Remarks

Casing Diameter by Depth

Depth (m)	Dia. (mm)	Remarks

Water Added Records

From (m)	To (m)	Volume (litres)	Remarks

Depth Related Remarks

From (m)	To (m)	Remarks

Chiselling Details

From (m)	To (m)	Duration (hh:mm)	Tool

Drilling Flush Details

From (m)	To (m)	Returns (%)	Flush	Colour
2.70	4.20	80 - 80		brown
4.20	5.70	80 - 80		grey
5.70	7.20	80 - 80		grey
7.20	8.70	80 - 80		grey
8.70	10.20	80 - 80		grey
10.20	11.70	80 - 80		grey
11.70	13.20	80 - 80		grey
13.20	14.70	80 - 80		grey
14.70	16.20	80 - 80		grey
16.20	17.70	80 - 80		grey

Water Strikes

Date	Strike (m)	Casing (m)	Time (mins)	Depth (m)	Sealed (m)	Remarks

Monitoring Installation Pipe Work

Type	Pipe ID	From (m)	To (m)	Dia(mm)	Pipe Type	Remarks

Backfill Details

From (m)	To (m)	Legend	Description
0.00	1.20	905	Arisings
1.20	20.00	903	Bentonite

Standard Penetration Test Results

Depth (m)	Type	N Value	Casing (m)	Water (m)	SWPen(mm)	Blows1	Pen1(mm)	Blows2	Pen2(mm)	Blows3	Pen3(mm)	Blows4	Pen4(mm)	Blows5	Pen5(mm)	Blows6	Pen6(mm)	Hammer	Energy Ratio%
1.20	S	N=7	0.00	Dry	0	1	75	1	75	1	75	1	75	2	75	3	75	TBC	
2.70	S	N=14	2.70	1.00	0	3	75	3	75	3	75	3	75	4	75	4	75	TBC	
20.00	C	50 / 20	2.70	2.01	0	25	75	0	-55	50	75	0	75	0	75	0	-205	TBC	

Reason for Hole Termination: Scheduled depth achieved

Groundwater levels can be subject to seasonal, tidal and other fluctuations and should not be taken as constant.

BOREHOLE INFORMATION SHEET

Borehole No
RC2ABROB-D
Sheet 2 of 2

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB	Hole Type:	RC
Project No:	5624	Co-ordinates:	460393.00 mE	Checked By:	JHS
Client:	EWR Alliance		223026.00 mN	Approved By:	RS
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	70.60 mOD	Log Status:	FINAL
				Date:	10/10/2016
Date Started:	03/05/2016	Orientation:	090 deg.		
Date Completed:	04/05/2016	Inclination:	90 deg.	Final Depth:	20.00m

Depth Related Exploratory Hole Information

From (m)	To (m)	Type	Start	End	Plant	Barrel	Drill Bit	Lead Driller	Logger	Remarks
0.00	1.20	IP	03/05/2016	03/05/2016	Insulated digging tools	N/A	N/A	Simon Roberts	NC	Hand dug inspection pit
1.20	2.70	WLS	03/05/2016	03/05/2016	COMACCHIO GEO205			Simon Roberts	NC	Windowless Sample
2.70	20.04	RC	04/05/2016	04/05/2016	COMACCHIO GEO205			Simon Roberts	NC	Rotary Cored: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are interpolated, exploratory hole drilled outside the LiDAR survey area provided by Network Rail.

Boring-Drilling Progress

Date	Time	Depth (m)	Casing (m)	Depth Water (m)	Remarks

Hole Diameter by Depth

Depth (m)	Dia. (mm)	Remarks

Casing Diameter by Depth

Depth (m)	Dia. (mm)	Remarks

Water Added Records

From (m)	To (m)	Volume (litres)	Remarks

Depth Related Remarks

From (m)	To (m)	Remarks

Chiselling Details

From (m)	To (m)	Duration (hh:mm)	Tool

Drilling Flush Details

From (m)	To (m)	Returns (%)	Flush	Colour
17.70	19.20	80 - 80		grey
19.20	20.00	80 - 80		grey

Water Strikes

Date	Strike (m)	Casing (m)	Time (mins)	Depth (m)	Sealed (m)	Remarks

Monitoring Installation Pipe Work

Type	Pipe ID	From (m)	To (m)	Dia(mm)	Pipe Type	Remarks

Backfill Details

From (m)	To (m)	Legend	Description

Standard Penetration Test Results

Depth (m)	Type	N Value	Casing (m)	Water (m)	SWPen(mm)	Blows1	Pen1(mm)	Blows2	Pen2(mm)	Blows3	Pen3(mm)	Blows4	Pen4(mm)	Blows5	Pen5(mm)	Blows6	Pen6(mm)	Hammer	Energy Ratio%

Reason for Hole Termination: Scheduled depth achieved

Groundwater levels can be subject to seasonal, tidal and other fluctuations and should not be taken as constant.

BOREHOLE LOG

Borehole No: RC2ABROB-U
Sheet 1 of 3

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB	Hole Type:	RC
Project No:	5624	Co-ordinates:	460379.00 mE	Checked By:	JHS
Client:	EWR Alliance		223048.00 mN	Approved By:	RS
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	70.60 mOD	Scale:	1:50
				Log Status:	FINAL
Date Started:	11/05/2016	Orientation:	090 deg.	Print Date:	10/10/2016
Date Completed:	13/05/2016	Inclination:	90 deg.	Final Depth:	20.00m

Stratum Description	Legend	Depth (Thick-ness) (m)	Level (m)	Sampling, Coring and In Situ Testing: Depth (m)	Type	Dia (mm)	Rec %	Blows (mins)	Test	Test Result	Units	TCR SCR RQD %	If min If ave If max (mm)	Water	Well/ Backfill
TOPSOIL: Soft dark brown mottled orange brown silty gravelly very sandy CLAY. Sand is fine to coarse. Gravel is subangular to subrounded, fine of flint and charcoal.		(0.50)		0.30	D										
		0.50	70.10	0.30	ES				PID	1.00	ppm				
Firm blue grey mottled orange brown slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is subangular to subrounded, fine of ironstone and charcoal. [OXFORD CLAY - PETERBOROUGH MEMBER]		(1.00)		1.00	D										
				1.00	ES				PID	0.00	ppm				
				1.20 - 1.65	D										
		1.50	69.10	1.20 - 1.65					S	N=3					
Firm thinly laminated brown mottled yellow brown slightly sandy CLAY. Sand is fine. No recovery from 1.20-1.50m. [OXFORD CLAY - PETERBOROUGH MEMBER]				1.20 - 2.70	L	113	100					80			
		(1.10)		1.20 - 2.70	RC							80			
				1.20 - 2.70	WS	113	100	[0]				-			
		2.60	68.00												
Firm dark grey silty very sandy CLAY. Sand is fine. [OXFORD CLAY - PETERBOROUGH MEMBER] *2.60 - 4.00m : Low proportion of fossil fragments.*				2.70 - 3.15	D										
				2.70 - 3.15					S	N=14					
		(1.40)										64			
				2.70 - 4.20	C		100					64			
				2.70 - 4.20	RC							-			
				3.50	D										
		4.00	66.60												
Dense dark greyish brown silty clayey fine SAND. [KELLAWAYS FORMATION - SAND MEMBER] *4.00 - 7.20m : Low proportion of fossil fragments.*				4.50 - 4.70	B										
												93			
				4.20 - 5.70	C		100					93			
				4.20 - 5.70	RC							-			
				5.50	B										
		(3.20)													
												77			
				5.70 - 7.20	C		100					72			
				5.70 - 7.20	RC							-			
		7.20	63.40												
Stiff thinly laminated dark brown silty CLAY. [KELLAWAYS FORMATION - CLAY MEMBER] *7.20 - 9.60m : Low proportion of fossil fragments.*				7.50	D										
												100			
				7.20 - 8.70	C		100					100			
				7.20 - 8.70	RC							-			
		(2.40)		8.50	D										
												100			
				8.70 - 10.20	C		100					33			
		9.60	61.00	8.70 - 10.20	RC							20			
Strong grey fossiliferous LIMESTONE with >3cm bands of shelly clayey medium SAND. Discontinuities: Widely				9.50	D										

Stratum depths measured along borehole axis.

Groundwater levels may be subject to seasonal, tidal and other fluctuations and should not be taken as constant.

Explanation of symbols and abbreviations given in 'Key to Exploratory Holes'

Further details given on appended 'Borehole Information Sheet'.

BOREHOLE LOG

Borehole No: RC2ABROB-U
Sheet 2 of 3

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB	Hole Type:	RC
Project No:	5624	Co-ordinates:	460379.00 mE	Checked By:	JHS
Client:	EWR Alliance		223048.00 mN	Approved By:	RS
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	70.60 mOD	Scale:	1:50
				Log Status:	FINAL
Date Started:	11/05/2016	Orientation:	090 deg.	Print Date:	10/10/2016
Date Completed:	13/05/2016	Inclination:	90 deg.	Final Depth:	20.00m

Stratum Description	Legend	Depth (Thick-ness) (m)	Level (m)	Sampling, Coring and In Situ Testing: Depth (m)	Type	Dia (mm)	Rec %	Blows (mins)	Test	Test Result	Units	TCR SCR RQD %	If min If ave If max (mm)	Water	Well/ Backfill
spaced, subhorizontal (9-15 degrees) undulating open rough. [CORNBRASH LIMESTONE FORMATION]				10.60 - 10.87 10.20 - 11.70 10.20 - 11.70	C C RC		100					87 69 66	40 305 570		
		(2.80)													
Stiff greenish grey slightly gravelly CLAY. Gravel is subrounded, medium to coarse of limestone. [CORNBRASH LIMESTONE FORMATION]		12.40 (0.50)	58.20	11.70 - 13.20 11.70 - 13.20 12.40 - 12.63	C RC C		100					80 43 41			
Strong grey LIMESTONE. [CORNBRASH LIMESTONE FORMATION]		12.90 13.00	57.70 57.60												
Stiff greenish grey silty CLAY. [CORNBRASH LIMESTONE FORMATION] *13.00 - 13.45m : Low proportion of fossil fragments.*		(0.45) 13.45	57.15												
Moderately strong dark grey fossiliferous LIMESTONE with a 15cm band of soft shelly sandy CLAY from 13.90-14.05m. Sand is fine. Discontinuities: Widely spaced, subhorizontal (10-13 degrees), undulating, open, rough. [CORNBRASH LIMESTONE FORMATION]		(0.75) 14.20	56.40	13.50 - 13.80 13.20 - 14.70 13.20 - 14.70	C C RC		100					100 27 20	45 188 330		
Firm thinly laminated greyish brown silty CLAY. [CORNBRASH LIMESTONE FORMATION]		(1.54)		15.00	D							83 9 7			
		15.74	54.86	14.70 - 16.20 14.70 - 16.20	C RC		100								
Strong brownish grey LIMESTONE. [CORNBRASH LIMESTONE FORMATION]		15.90	54.70												
Firm brownish grey silty CLAY. [FOREST MARBLE FORMATION]		(0.30) 16.20	54.40												
Strong pale green to pale grey fossiliferous LIMESTONE. Discontinuities: Widely spaced, subhorizontal (7-10 degrees) to subvertical (78 degrees), planar to stepped, open, rough. [FOREST MARBLE FORMATION]		(1.25)		16.38 - 16.96 16.20 - 17.70 16.20 - 17.70	C C RC		100					100 80 61	70 325 580		
		17.45	53.15												
Firm grey brown becoming dark brown at 17.60m silty CLAY. [FOREST MARBLE FORMATION] *17.45 - 18.00m : High proportion of fossil fragments.*		(0.55) 18.00	52.60												
Very weak thinly laminated dark green mottled orange brown MUDSTONE. Non-intact from 18.00-18.30m. Weathering indicated by desiccated nature. [FOREST MARBLE FORMATION] *18.00 - 18.30m : Pyrite growth present.*		(0.30) 18.30	52.30	17.70 - 19.20 17.70 - 19.20 18.65 - 18.80	C RC C		100					100 29 29			
Strong white grey mottled green LIMESTONE. Non-intact from 18.90-19.20m. Discontinuities: Widely spaced, subhorizontal (8-13 degrees), planar to undulating, open, rough. [WHITE LIMESTONE FORMATION]		(1.70)											NI 200 400		
		20.00	50.60	19.20 - 20.00 19.20 - 20.00	C RC		100					100 94 94			

Stratum depths measured along borehole axis.

Groundwater levels may be subject to seasonal, tidal and other fluctuations and should not be taken as constant.

Explanation of symbols and abbreviations given in 'Key to Exploratory Holes'

Further details given on appended 'Borehole Information Sheet'.

BOREHOLE LOG

Borehole No: RC2ABROB-U
Sheet 3 of 3

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB	Hole Type:	RC
Project No:	5624	Co-ordinates:	460379.00 mE	Checked By:	JHS
Client:	EWR Alliance		223048.00 mN	Approved By:	RS
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	70.60 mOD	Scale:	1:50
				Log Status:	FINAL
Date Started:	11/05/2016	Orientation:	090 deg.	Print Date:	10/10/2016
Date Completed:	13/05/2016	Inclination:	90 deg.	Final Depth:	20.00m

Stratum Description	Legend	Depth (Thick-ness) (m)	Level (m)	Sampling, Coring and In Situ Testing								TCR SCR RQD %	If min If ave If max (mm)	Water	Well/ Backfill
				Depth (m)	Type	Dia (mm)	Rec %	Blows (mins)	Test	Test Result	Units				
Borehole Terminated at 20.00m				20.00 - 20.03					C	50 / 20					

Stratum depths measured along borehole axis.
Groundwater levels may be subject to seasonal, tidal and other fluctuations and should not be taken as constant.
Explanation of symbols and abbreviations given in 'Key to Exploratory Holes'
Further details given on appended 'Borehole Information Sheet'.

BOREHOLE INFORMATION SHEET

Borehole No
RC2ABROB-U
Sheet 1 of 2

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB	Hole Type:	RC
Project No:	5624	Co-ordinates:	460379.00 mE	Checked By:	JHS
Client:	EWR Alliance		223048.00 mN	Approved By:	RS
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	70.60 mOD	Log Status:	FINAL
				Date:	10/10/2016
Date Started:	11/05/2016	Orientation:	090 deg.		
Date Completed:	13/05/2016	Inclination:	90 deg.	Final Depth:	20.00m

Depth Related Exploratory Hole Information

From (m)	To (m)	Type	Start	End	Plant	Barrel	Drill Bit	Lead Driller	Logger	Remarks
0.00	1.20	IP	11/05/2016	11/05/2016	Insulated digging tools	N/A	N/A	Simon Roberts	NC	Hand dug inspection pit
1.20	2.70	WLS	11/05/2016	11/05/2016	COMACCHIO GEO205			Simon Roberts	NC	Windowless Sample
2.70	20.03	RC	12/05/2016	13/05/2016	COMACCHIO GEO205			Simon Roberts	NC	Rotary Cored: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are interpolated, exploratory hole drilled outside the LiDAR survey area provided by Network Rail.

Boring-Drilling Progress

Date	Time	Depth (m)	Casing (m)	Depth Water (m)	Remarks
11/05/2016	08:00				Start of shift
11/05/2016	17:00	2.70	2.70	1.00	End of shift
12/05/2016	08:00	2.70	2.70	1.00	Start of shift
12/05/2016	17:00	20.00	2.70	4.14	End of shift
13/05/2016	08:00	20.00	2.70	4.14	Start of shift
13/05/2016	11:00	0.00			End of shift

Hole Diameter by Depth

Depth (m)	Dia. (mm)	Remarks

Casing Diameter by Depth

Depth (m)	Dia. (mm)	Remarks

Water Added Records

From (m)	To (m)	Volume (litres)	Remarks

Depth Related Remarks

From (m)	To (m)	Remarks

Chiselling Details

From (m)	To (m)	Duration (hh:mm)	Tool

Drilling Flush Details

From (m)	To (m)	Returns (%)	Flush	Colour
2.70	4.20	80 - 80		grey
4.20	5.70	80 - 80		grey
5.70	7.20	80 - 80		grey
7.20	8.70	80 - 80		grey
8.70	10.20	80 - 80		grey
10.20	11.70	80 - 80		grey
11.70	13.20	80 - 80		grey
13.20	14.70	80 - 80		grey
14.70	16.20	80 - 80		grey
16.20	17.70	80 - 80		grey

Water Strikes

Date	Strike (m)	Casing (m)	Time (mins)	Depth (m)	Sealed (m)	Remarks

Monitoring Installation Pipe Work

Type	Pipe ID	From (m)	To (m)	Dia(mm)	Pipe Type	Remarks

Backfill Details

From (m)	To (m)	Legend	Description
0.00	1.20	905	Arisings
1.20	20.00	903	Bentonite

Standard Penetration Test Results

Depth (m)	Type	N Value	Casing (m)	Water (m)	SWPen(mm)	Blows1	Pen1(mm)	Blows2	Pen2(mm)	Blows3	Pen3(mm)	Blows4	Pen4(mm)	Blows5	Pen5(mm)	Blows6	Pen6(mm)	Hammer	Energy Ratio%
1.20	S	N=3	0.00	Dry	0	1	75	0	75	1	75	0	75	1	75	1	75	TBC	
2.70	S	N=14	2.70	1.00	0	1	75	2	75	2	75	3	75	4	75	5	75	TBC	
20.00	C	50 / 20	2.70	4.14	0	25	75	0	-65	50	75	0	75	0	75	0	-205	TBC	

Reason for Hole Termination: Scheduled depth achieved

Groundwater levels can be subject to seasonal, tidal and other fluctuations and should not be taken as constant.

BOREHOLE INFORMATION SHEET

Borehole No
RC2ABROB-U
Sheet 2 of 2

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB	Hole Type:	RC
Project No:	5624	Co-ordinates:	460379.00 mE	Checked By:	JHS
Client:	EWR Alliance		223048.00 mN	Approved By:	RS
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	70.60 mOD	Log Status:	FINAL
				Date:	10/10/2016
Date Started:	11/05/2016	Orientation:	090 deg.		
Date Completed:	13/05/2016	Inclination:	90 deg.	Final Depth:	20.00m

Depth Related Exploratory Hole Information

From (m)	To (m)	Type	Start	End	Plant	Barrel	Drill Bit	Lead Driller	Logger	Remarks
0.00	1.20	IP	11/05/2016	11/05/2016	Insulated digging tools	N/A	N/A	Simon Roberts	NC	Hand dug inspection pit
1.20	2.70	WLS	11/05/2016	11/05/2016	COMACCHIO GEO205			Simon Roberts	NC	Windowless Sample
2.70	20.03	RC	12/05/2016	13/05/2016	COMACCHIO GEO205			Simon Roberts	NC	Rotary Cored: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are interpolated, exploratory hole drilled outside the LiDAR survey area provided by Network Rail.

Boring-Drilling Progress

Date	Time	Depth (m)	Casing (m)	Depth Water (m)	Remarks

Hole Diameter by Depth

Depth (m)	Dia. (mm)	Remarks

Casing Diameter by Depth

Depth (m)	Dia. (mm)	Remarks

Water Added Records

From (m)	To (m)	Volume (litres)	Remarks

Depth Related Remarks

From (m)	To (m)	Remarks

Chiselling Details

From (m)	To (m)	Duration (hh:mm)	Tool

Drilling Flush Details

From (m)	To (m)	Returns (%)	Flush	Colour
17.70	19.20	80 - 80		grey
19.20	20.00	80 - 80		grey

Water Strikes

Date	Strike (m)	Casing (m)	Time (mins)	Depth (m)	Sealed (m)	Remarks

Monitoring Installation Pipe Work

Type	Pipe ID	From (m)	To (m)	Dia(mm)	Pipe Type	Remarks

Backfill Details

From (m)	To (m)	Legend	Description

Standard Penetration Test Results

Depth (m)	Type	N Value	Casing (m)	Water (m)	SWPen(mm)	Blows1	Pen1(mm)	Blows2	Pen2(mm)	Blows3	Pen3(mm)	Blows4	Pen4(mm)	Blows5	Pen5(mm)	Blows6	Pen6(mm)	Hammer	Energy Ratio%

Reason for Hole Termination: Scheduled depth achieved

Groundwater levels can be subject to seasonal, tidal and other fluctuations and should not be taken as constant.

BOREHOLE LOG

Borehole No: RC2AMF-D
Sheet 1 of 3

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB	Hole Type:	RC
Project No:	5624	Co-ordinates:	460664.00 mE	Checked By:	JHS
Client:	EWR Alliance		223113.00 mN	Approved By:	RS
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	67.00 mOD	Scale:	1:50
				Log Status:	FINAL
Date Started:	05/05/2016	Orientation:	090 deg.	Print Date:	10/10/2016
Date Completed:	09/05/2016	Inclination:	90 deg.	Final Depth:	20.00m

Stratum Description	Legend	Depth (Thick-ness) (m)	Level (m)	Sampling, Coring and In Situ Testing: Depth (m)	Type	Dia (mm)	Rec %	Blows (mins)	Test	Test Result	Units	TCR SCR RQD %	If min If ave If max (mm)	Water	Well/ Backfill
TOPSOIL: Greyish brown, slightly gravelly, slightly clayey fine to coarse SAND. Gravel is subrounded, fine of Quartz.		(0.50)		0.00 - 0.50	B										
0.00 - 0.50m : Low proportion of rootlets.		0.50	66.50	0.30	ES				PID	0.20	ppm				
Firm grey mottled orange brown slightly sandy CLAY. Sand is fine. [OXFORD CLAY - PETERBOROUGH MEMBER]		(1.00)		1.00	D										
				1.00	ES				PID	0.00	ppm				
				1.20 - 1.65	D										
Stiff very thinly laminated brown mottled orange brown silty CLAY. [OXFORD CLAY - PETERBOROUGH MEMBER]		1.50	65.50	1.20 - 1.65					S	N=8					
1.50 - 3.35m : Low proportion of rootlets. Soft from 2.70-3.15m.				1.20 - 2.70	L	113	100					100 - -			
				1.20 - 2.70	RC										
				1.20 - 2.70	WS	113	100	[0]							
		(1.85)													
				2.70 - 3.15	D										
				2.70 - 3.15					S	N=13					
Firm becoming very soft from 4.20m grey silty CLAY. [OXFORD CLAY - PETERBOROUGH MEMBER]		3.35	63.65	2.70 - 4.20	C		100					100 - -			
3.35 - 4.55m : Low proportion of >20mm fossil fragments. Becoming sandy at 3.75m.				2.70 - 4.20	RC										
				3.50	D										
		(1.20)													
Brownish grey silty fine to medium SAND. [KELLAWAYS FORMATION - SAND MEMBER]		4.55	62.45												
4.55 - 6.70m : Moderate proportion of fossil fragments,				4.20 - 5.70	C		100					100 - -			
				4.20 - 5.70	RC										
				5.00 - 5.50	B										
		(2.15)													
				5.70 - 7.20	C		100					100 - -			
				5.70 - 7.20	RC										
Stiff thinly laminated dark brown silty CLAY. [KELLAWAYS FORMATION - CLAY MEMBER]		6.70	60.30												
6.70 - 9.40m : Low proportion of fossil fragments. Infrequent 10mm sized pockets of pyrite growth.				7.00	D										
				7.20 - 8.70	C		100					100 - -			
		(2.70)		7.20 - 8.70	RC										
				8.00	D										
				9.00	D							70 20 10			
		9.40	57.60	8.70 - 10.20	C		100						100 225 350		
Moderately strong dark grey fossiliferous LIMESTONE with >30mm bands of soft CLAY. Discontinuities: Widely spaced, subhorizontal (6-10 degrees), planar, open, rough.		(0.80)		8.70 - 10.20	RC										

Stratum depths measured along borehole axis.

Groundwater levels may be subject to seasonal, tidal and other fluctuations and should not be taken as constant.

Explanation of symbols and abbreviations given in 'Key to Exploratory Holes'

Further details given on appended 'Borehole Information Sheet'.

BOREHOLE LOG

Borehole No: RC2AMF-D
Sheet 2 of 3

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB	Hole Type:	RC
Project No:	5624	Co-ordinates:	460664.00 mE	Checked By:	JHS
Client:	EWR Alliance		223113.00 mN	Approved By:	RS
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	67.00 mOD	Scale:	1:50
				Log Status:	FINAL
Date Started:	05/05/2016	Orientation:	090 deg.	Print Date:	10/10/2016
Date Completed:	09/05/2016	Inclination:	90 deg.	Final Depth:	20.00m

Stratum Description	Legend	Depth (Thick-ness) (m)	Level (m)	Sampling, Coring and In Situ Testing: Depth (m)	Type	Dia (mm)	Rec %	Blows (mins)	Test	Test Result	Units	TCR SCR RQD %	If min If ave If max (mm)	Water	Well/ Backfill
[CORNBRASH LIMESTONE FORMATION]		10.20	56.80												
Strong grey becoming white grey at 10.90m fossiliferous LIMESTONE. Discontinuities: Widely spaced, subhorizontal (9-13 degrees), stepped to undulating, open, rough. [CORNBRASH LIMESTONE FORMATION]		(1.00)		10.20 - 11.70 10.20 - 11.70 10.86 - 11.06	C RC C		100					100 80 72	80 440 800		
Soft dark grey silty gravelly CLAY. Gravel is subrounded, coarse of limestone. [FOREST MARBLE FORMATION]		11.20	55.80												
11.20 - 11.70m : High proportion of fossil fragments.		(0.50)													
Strong light grey fossiliferous LIMESTONE. Discontinuities: Widely spaced, subhorizontal (8-10 degrees) to subvertical (80-84 degrees), planar to undulating, open, smooth. [FOREST MARBLE FORMATION]		11.70	55.30										40 170 300		
		(0.40)													
		12.10	54.90												
		12.30	54.70									100 35 23			
Very stiff dark brownish grey CLAY. [FOREST MARBLE FORMATION]		12.50	54.50	11.70 - 13.20 11.70 - 13.20	C RC		100								
		(0.50)													
Moderately strong light grey calcareous MUDSTONE. [FOREST MARBLE FORMATION]		13.00	54.00												
Stiff thinly laminated dark grey silty CLAY. [FOREST MARBLE FORMATION]															
Strong grey fossiliferous LIMESTONE with >50mm bands of soft grey shelly CLAY. Discontinuities: Medium spaced, subhorizontal (8-11 degrees), planar, open, rough. [FOREST MARBLE FORMATION]		(1.10)		13.28 - 13.50	C								20 235 450		
13.50 - 13.70m : No recovery.		14.10	52.90	13.20 - 14.70 13.20 - 14.70	C RC		100					87 43 24			
Stiff thinly laminated dark grey silty CLAY. [FOREST MARBLE FORMATION]		(1.10)													
		15.20	51.80												
Strong light grey fossiliferous LIMESTONE. [WHITE LIMESTONE FORMATION]		(0.30)		15.23 - 15.47	C							100			
Dense dark grey clayey fine to coarse SAND. [WHITE LIMESTONE FORMATION]		15.50	51.50	14.70 - 16.20 14.70 - 16.20	C RC		100					25 23			
15.50 - 16.00m : Moderate proportion of fossil fragments.		(0.50)													
Strong white grey LIMESTONE. Discontinuities: Widely spaced, subhorizontal (10-15 degrees) to subvertical (70-80 degrees), planar to undulating, open, rough. [WHITE LIMESTONE FORMATION]		16.00	51.00												
		(1.30)											10 230 450		
				16.20 - 17.70 16.20 - 17.70	C RC		100					100 38 33			
Dense dark green clayey fine SAND. [WHITE LIMESTONE FORMATION]		17.30	49.70												
		(1.15)													
		18.45	48.55	17.70 - 19.20 17.70 - 19.20	C RC		100					100 30 30			
Light brown silty clayey GRAVEL. Gravel is subangular, coarse of mudstone. [WHITE LIMESTONE FORMATION]		18.70	48.30	18.74 - 19.00	C										
Strong light grey fossiliferous LIMESTONE. Discontinuities: Medium spaced, subhorizontal (6-8 degrees), planar, open, rough. [WHITE LIMESTONE FORMATION]		(1.30)											250 325 800		
				19.20 - 20.00 19.20 - 20.00	C RC		100					100 100 100			
		20.00	47.00												

Stratum depths measured along borehole axis.

Groundwater levels may be subject to seasonal, tidal and other fluctuations and should not be taken as constant.

Explanation of symbols and abbreviations given in 'Key to Exploratory Holes'

Further details given on appended 'Borehole Information Sheet'.

BOREHOLE LOG

Borehole No: RC2AMF-D
Sheet 3 of 3

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB	Hole Type:	RC
Project No:	5624	Co-ordinates:	460664.00 mE	Checked By:	JHS
Client:	EWR Alliance		223113.00 mN	Approved By:	RS
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	67.00 mOD	Scale:	1:50
				Log Status:	FINAL
Date Started:	05/05/2016	Orientation:	090 deg.	Print Date:	10/10/2016
Date Completed:	09/05/2016	Inclination:	90 deg.	Final Depth:	20.00m

Stratum Description	Legend	Depth (Thick-ness) (m)	Level (m)	Sampling, Coring and In Situ Testing								TCR SCR RQD %	If min If ave If max (mm)	Water	Well/ Backfill
				Depth (m)	Type	Dia (mm)	Rec %	Blows (mins)	Test	Test Result	Units				
Borehole Terminated at 20.00m				20.00 - 20.05					C	50 / 30					

Stratum depths measured along borehole axis.
Groundwater levels may be subject to seasonal, tidal and other fluctuations and should not be taken as constant.
Explanation of symbols and abbreviations given in 'Key to Exploratory Holes'
Further details given on appended 'Borehole Information Sheet'.

BOREHOLE INFORMATION SHEET

Borehole No
RC2AMF-D
Sheet 1 of 2

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB	Hole Type:	RC
Project No:	5624	Co-ordinates:	460664.00 mE	Checked By:	JHS
Client:	EWR Alliance		223113.00 mN	Approved By:	RS
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	67.00 mOD	Log Status:	FINAL
				Date:	10/10/2016
Date Started:	05/05/2016	Orientation:	090 deg.		
Date Completed:	09/05/2016	Inclination:	90 deg.	Final Depth:	20.00m

Depth Related Exploratory Hole Information

From (m)	To (m)	Type	Start	End	Plant	Barrel	Drill Bit	Lead Driller	Logger	Remarks
0.00	1.20	IP	05/05/2016	05/05/2016	Insulated digging tools	N/A	N/A	Simon Roberts	NC	Hand dug inspection pit
1.20	2.70	WLS	05/05/2016	05/05/2016	COMACCHIO GEO205			Simon Roberts	NC	Windowless Sample
2.70	20.05	RC	05/05/2016	09/05/2016	COMACCHIO GEO205			Simon Roberts	NC	Rotary Cored: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are interpolated, exploratory hole drilled outside the LiDAR survey area provided by Network Rail.

Boring-Drilling Progress

Date	Time	Depth (m)	Casing (m)	Depth Water (m)	Remarks
05/05/2016	07:30				Start of shift
05/05/2016	17:00	11.70	2.70	2.22	End of shift
06/05/2016	08:00	11.70	2.70	2.00	Start of shift
06/05/2016	14:00	16.20	2.70	2.89	End of shift
09/05/2016	08:00	16.20	2.70	3.02	Start of shift
09/05/2016	17:00	20.05	2.70	4.44	End of shift

Hole Diameter by Depth

Depth (m)	Dia. (mm)	Remarks

Casing Diameter by Depth

Depth (m)	Dia. (mm)	Remarks

Water Added Records

From (m)	To (m)	Volume (litres)	Remarks

Depth Related Remarks

From (m)	To (m)	Remarks

Chiselling Details

From (m)	To (m)	Duration (hh:mm)	Tool

Drilling Flush Details

From (m)	To (m)	Returns (%)	Flush	Colour
2.70	4.20	80 - 80		grey
4.20	5.70	80 - 80		grey
5.70	7.20	80 - 80		grey
7.20	8.70	80 - 80		grey
8.70	10.20	80 - 80		grey
10.20	11.70	80 - 80		grey
11.70	13.20	80 - 80		grey
13.20	14.70	80 - 80		grey
14.70	16.20	80 - 80		grey
16.20	17.70	80 - 80		grey

Water Strikes

Date	Strike (m)	Casing (m)	Time (mins)	Depth (m)	Sealed (m)	Remarks

Monitoring Installation Pipe Work

Type	Pipe ID	From (m)	To (m)	Dia(mm)	Pipe Type	Remarks

Backfill Details

From (m)	To (m)	Legend	Description
0.00	1.20	905	Arisings
1.20	20.00	903	Bentonite

Standard Penetration Test Results

Depth (m)	Type	N Value	Casing (m)	Water (m)	SWPen(mm)	Blows1	Pen1(mm)	Blows2	Pen2(mm)	Blows3	Pen3(mm)	Blows4	Pen4(mm)	Blows5	Pen5(mm)	Blows6	Pen6(mm)	Hammer	Energy Ratio%
1.20	S	N=8	0.00	0.00	0	1	75	1	75	2	75	2	75	2	75	2	75	TBC	
2.70	S	N=13	2.70	Dry	0	5	75	4	75	3	75	4	75	3	75	3	75	TBC	
20.00	C	50 / 30	2.70	4.44	0	25	75	0	-55	50	75	0	75	0	75	0	-195	TBC	

Reason for Hole Termination: Scheduled depth achieved

Groundwater levels can be subject to seasonal, tidal and other fluctuations and should not be taken as constant.

BOREHOLE INFORMATION SHEET

Borehole No
RC2AMF-D
Sheet 2 of 2

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB	Hole Type:	RC
Project No:	5624	Co-ordinates:	460664.00 mE	Checked By:	JHS
Client:	EWR Alliance		223113.00 mN	Approved By:	RS
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	67.00 mOD	Log Status:	FINAL
				Date:	10/10/2016
Date Started:	05/05/2016	Orientation:	090 deg.		
Date Completed:	09/05/2016	Inclination:	90 deg.	Final Depth:	20.00m

Depth Related Exploratory Hole Information

From (m)	To (m)	Type	Start	End	Plant	Barrel	Drill Bit	Lead Driller	Logger	Remarks
0.00	1.20	IP	05/05/2016	05/05/2016	Insulated digging tools	N/A	N/A	Simon Roberts	NC	Hand dug inspection pit
1.20	2.70	WLS	05/05/2016	05/05/2016	COMACCHIO GEO205			Simon Roberts	NC	Windowless Sample
2.70	20.05	RC	05/05/2016	09/05/2016	COMACCHIO GEO205			Simon Roberts	NC	Rotary Cored: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are interpolated, exploratory hole drilled outside the LiDAR survey area provided by Network Rail.

Boring-Drilling Progress

Date	Time	Depth (m)	Casing (m)	Depth Water (m)	Remarks

Hole Diameter by Depth

Depth (m)	Dia. (mm)	Remarks

Casing Diameter by Depth

Depth (m)	Dia. (mm)	Remarks

Water Added Records

From (m)	To (m)	Volume (litres)	Remarks

Depth Related Remarks

From (m)	To (m)	Remarks

Chiselling Details

From (m)	To (m)	Duration (hh:mm)	Tool

Drilling Flush Details

From (m)	To (m)	Returns (%)	Flush	Colour
17.70	19.20	80 - 80		grey
19.20	20.00	80 - 80		grey

Water Strikes

Date	Strike (m)	Casing (m)	Time (mins)	Depth (m)	Sealed (m)	Remarks

Monitoring Installation Pipe Work

Type	Pipe ID	From (m)	To (m)	Dia(mm)	Pipe Type	Remarks

Backfill Details

From (m)	To (m)	Legend	Description

Standard Penetration Test Results

Depth (m)	Type	N Value	Casing (m)	Water (m)	SWPen(mm)	Blows1	Pen1(mm)	Blows2	Pen2(mm)	Blows3	Pen3(mm)	Blows4	Pen4(mm)	Blows5	Pen5(mm)	Blows6	Pen6(mm)	Hammer	Energy Ratio%

Reason for Hole Termination: Scheduled depth achieved

Groundwater levels can be subject to seasonal, tidal and other fluctuations and should not be taken as constant.

BOREHOLE LOG

Borehole No: RC2AMF-U
Sheet 1 of 3

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB	Hole Type:	RC
Project No:	5624	Co-ordinates:	460672.00 mE	Checked By:	JHS
Client:	EWR Alliance		223149.00 mN	Approved By:	RS
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	67.80 mOD	Scale:	1:50
				Log Status:	FINAL
Date Started:	10/05/2016	Orientation:	090 deg.	Print Date:	10/10/2016
Date Completed:	11/05/2016	Inclination:	90 deg.	Final Depth:	20.00m

Stratum Description	Legend	Depth (Thick-ness) (m)	Level (m)	Sampling, Coring and In Situ Testing: Depth (m)	Type	Dia (mm)	Rec %	Blows (mins)	Test	Test Result	Units	TCR SCR RQD %	If min If ave If max (mm)	Water	Well/ Backfill
TOPSOIL: Soft dark brown mottled orange brown silty gravelly sandy CLAY. Sand is fine to medium. Gravel is subangular to subrounded, fine to medium of charcoal and flint.		(0.50)		0.30	ES										
		0.50	67.30	0.50	D				PID	0.40	ppm				
Soft blue grey mottled orange brown silty sandy gravelly CLAY. Sand is fine. Gravel is subrounded, fine of ironstone and charcoal. [OXFORD CLAY - PETERBOROUGH MEMBER]				1.00	D										
				1.00	ES										
		(1.40)							PID	0.00	ppm				
				1.20 - 1.65	D										
				1.20 - 1.65					S	N=8					
		1.90	65.90									100			
Firm thinly laminated silty sandy CLAY. Sand is medium. [OXFORD CLAY - PETERBOROUGH MEMBER]				1.20 - 2.70	L	113	100					-			
1.90 - 2.70m : Small pockets of gypsum growth.				1.20 - 2.70	RC							-			
		(0.80)		1.20 - 2.70	WS	113	100	[0]							
		2.70	65.10												
Soft grey mottled orange brown silty sandy CLAY. Sand is fine. [OXFORD CLAY - PETERBOROUGH MEMBER]				2.70 - 3.15	D										
		(0.70)		2.70 - 3.15					S	N=13					
		3.40	64.40									100			
Firm brownish grey very sandy CLAY. Sand is fine to medium. [OXFORD CLAY - PETERBOROUGH MEMBER]				2.70 - 4.20	C		100					-			
3.40 - 4.20m : Low proportion of fossil fragments.				2.70 - 4.20	RC							-			
		(0.80)		4.00	D										
		4.20	63.60												
Dense dark brown silty clayey fine to medium SAND. [KELLAWAYS FORMATION - SAND MEMBER]												100			
4.20 - 6.40m : Low proportion of fossil fragments.				4.20 - 5.70	C		100					-			
				4.20 - 5.70	RC							-			
		(2.20)		5.00 - 6.00	B										
		6.40	61.40									100			
Stiff very thinly laminated dark brown silty CLAY. [KELLAWAYS FORMATION - CLAY MEMBER]				5.70 - 7.20	C		100					-			
				5.70 - 7.20	RC							-			
				7.00	D										
		(2.80)										100			
				7.20 - 8.70	C		100					-			
				7.20 - 8.70	RC							-			
				8.00	D										
				9.00	D										
		9.20	58.60									100			
Strong grey fossiliferous LIMESTONE with >10cm bands shelly clayey GRAVEL. Gravel is subrounded, fine to medium of limestone. Discontinuities: Widely spaced, subhorizontal (8-13 degrees), planar, open, rough. [CORNBRASH LIMESTONE FORMATION]				8.70 - 10.20	C		100					26			
				8.70 - 10.20	RC							18			

Stratum depths measured along borehole axis.

Groundwater levels may be subject to seasonal, tidal and other fluctuations and should not be taken as constant.

Explanation of symbols and abbreviations given in 'Key to Exploratory Holes'

Further details given on appended 'Borehole Information Sheet'.

BOREHOLE LOG

Borehole No: RC2AMF-U
Sheet 2 of 3

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB	Hole Type:	RC
Project No:	5624	Co-ordinates:	460672.00 mE	Checked By:	JHS
Client:	EWR Alliance		223149.00 mN	Approved By:	RS
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	67.80 mOD	Scale:	1:50
				Log Status:	FINAL
Date Started:	10/05/2016	Orientation:	090 deg.	Print Date:	10/10/2016
Date Completed:	11/05/2016	Inclination:	90 deg.	Final Depth:	20.00m

Stratum Description	Legend	Depth (Thick-ness) (m)	Level (m)	Sampling, Coring and In Situ Testing: Depth (m)	Type	Dia (mm)	Rec %	Blows (mins)	Test	Test Result	Units	TCR SCR RQD %	If min If ave If max (mm)	Water	Well/ Backfill
Strong grey fossiliferous LIMESTONE with >10cm bands shelly clayey GRAVEL. Gravel is subrounded, fine to medium of limestone. Discontinuities: Widely spaced, subhorizontal (8-13 degrees), planar, open, rough. [CORNBRASH LIMESTONE FORMATION]		(2.80)		10.65 - 10.95 10.20 - 11.70 10.20 - 11.70	C C RC		100					100 73 69	20 320 620		
Firm thinly laminated brownish grey silty CLAY. [FOREST MARBLE FORMATION] *12.00 - 13.00m : Low proportion of fossil fragments.*		12.00 (1.00)	55.80	11.70 - 13.20 11.70 - 13.20	C RC		100					89 17 13			
Moderately strong light grey fossiliferous LIMESTONE. Discontinuities: Closely spaced, subhorizontal (10-12 degrees), planar to stepped, open, rough. [FOREST MARBLE FORMATION]		13.00 (0.55)	54.80										40 55 70		
Stiff thinly laminated dark brown silty CLAY. [FOREST MARBLE FORMATION] *13.55 - 13.90m : Low proportion of fossil fragments.*		13.55 (0.35) 13.90	54.25 53.90	13.20 - 14.70 13.20 - 14.70	C RC		100					100 20 8	10 85 160		
Very strong grey LIMESTONE. Discontinuities: Closely spaced, subhorizontal (10-14 degrees), stepped to undulating, tight, rough. [FOREST MARBLE FORMATION]		14.10 (0.60)	53.70												
Stiff thinly laminated dark brown silty CLAY. [FOREST MARBLE FORMATION] *14.40 - 14.70m : Low proportion of fossil fragments.*		14.70 14.80	53.10 53.00												
Very strong dark grey fossiliferous LIMESTONE. [FOREST MARBLE FORMATION]		15.05	52.75												
Stiff thinly laminated dark brown silty CLAY. [WHITE LIMESTONE FORMATION]		(0.95)		15.20 - 15.50 14.70 - 16.20 14.70 - 16.20	C C RC		100					100 51 35	50 100 150		
Strong light grey fossiliferous LIMESTONE with >5cm bands of shelly clayey fine SAND. Discontinuities: Medium spaced, subhorizontal (10-15 degrees), undulating to planar, open to clay filled, smooth to rough. [WHITE LIMESTONE FORMATION]		16.00 (0.65)	51.80												
Stiff thinly laminated dark brown silty CLAY. No recovery 16.20-16.50m. [WHITE LIMESTONE FORMATION] *16.00 - 16.65m : Moderate proportion of fossil fragments.*		16.65	51.15												
Strong white grey fossiliferous LIMESTONE. Discontinuities: Closely spaced, subvertical (80-85 degrees), tight to open, rough. [WHITE LIMESTONE FORMATION]		(0.75)		16.20 - 17.70 16.20 - 17.70	C RC		100					80 40 37	NI 15 30		
Dense dark green slightly clayey fine SAND. [WHITE LIMESTONE FORMATION]		17.40 (0.50)	50.40												
Strong green to white grey fossiliferous LIMESTONE. Discontinuities: Medium spaced, subhorizontal (7-13 degrees), planar to undulating, open, rough. [WHITE LIMESTONE FORMATION]		17.90 (2.10)	49.90	17.97 - 18.17 17.70 - 19.20 17.70 - 19.20	C C RC		100					100 54 50	40 140 240		
		20.00	47.80	19.20 - 19.85 19.20 - 20.00 19.20 - 20.30	C C RC		100					100 100 100			

Stratum depths measured along borehole axis.

Groundwater levels may be subject to seasonal, tidal and other fluctuations and should not be taken as constant.

Explanation of symbols and abbreviations given in 'Key to Exploratory Holes'

Further details given on appended 'Borehole Information Sheet'.

BOREHOLE LOG

Borehole No: RC2AMF-U
Sheet 3 of 3

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB	Hole Type:	RC
Project No:	5624	Co-ordinates:	460672.00 mE	Checked By:	JHS
Client:	EWR Alliance		223149.00 mN	Approved By:	RS
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	67.80 mOD	Scale:	1:50
				Log Status:	FINAL
Date Started:	10/05/2016	Orientation:	090 deg.	Print Date:	10/10/2016
Date Completed:	11/05/2016	Inclination:	90 deg.	Final Depth:	20.00m

Stratum Description	Legend	Depth (Thick-ness) (m)	Level (m)	Sampling, Coring and In Situ Testing								TCR SCR RQD %	If min If ave If max (mm)	Water	Well/ Backfill
				Depth (m)	Type	Dia (mm)	Rec %	Blows (mins)	Test	Test Result	Units				
Very dense dark grey silty fine SAND. [WHITE LIMESTONE FORMATION] *20.00 - 20.30m : High proportion of fossil fragments.*		(0.30)		20.00 - 20.04					C	50 / 20					
Borehole Terminated at 20.00m		20.30	47.50												

Stratum depths measured along borehole axis.
Groundwater levels may be subject to seasonal, tidal and other fluctuations and should not be taken as constant.
Explanation of symbols and abbreviations given in 'Key to Exploratory Holes'
Further details given on appended 'Borehole Information Sheet'.

BOREHOLE INFORMATION SHEET

Borehole No
RC2AMF-U
Sheet 1 of 2

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB	Hole Type:	RC
Project No:	5624	Co-ordinates:	460672.00 mE	Checked By:	JHS
Client:	EWR Alliance		223149.00 mN	Approved By:	RS
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	67.80 mOD	Log Status:	FINAL
				Date:	10/10/2016
Date Started:	10/05/2016	Orientation:	090 deg.		
Date Completed:	11/05/2016	Inclination:	90 deg.	Final Depth:	20.00m

Depth Related Exploratory Hole Information

From (m)	To (m)	Type	Start	End	Plant	Barrel	Drill Bit	Lead Driller	Logger	Remarks
0.00	1.20	IP	10/05/2016	10/05/2016	Insulated digging tools	N/A	N/A	Simon Roberts	NC	Hand dug inspection pit
1.20	2.70	WLS	10/05/2016	10/05/2016	COMACCHIO GEO205			Simon Roberts	NC	Windowless Sample
2.70	20.04	RC	10/05/2016	11/05/2016	COMACCHIO GEO205			Simon Roberts	NC	Rotary Cored: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are interpolated, exploratory hole drilled outside the LiDAR survey area provided by Network Rail.

Boring-Drilling Progress

Date	Time	Depth (m)	Casing (m)	Depth Water (m)	Remarks
10/05/2016	08:00				Start of shift
10/05/2016	17:00	14.70	2.70	2.34	End of shift
11/05/2016	08:00	14.70	2.70	2.37	Start of shift
11/05/2016	17:00	0.00			End of shift

Hole Diameter by Depth

Depth (m)	Dia. (mm)	Remarks

Casing Diameter by Depth

Depth (m)	Dia. (mm)	Remarks

Water Added Records

From (m)	To (m)	Volume (litres)	Remarks

Depth Related Remarks

From (m)	To (m)	Remarks

Chiselling Details

From (m)	To (m)	Duration (hh:mm)	Tool

Drilling Flush Details

From (m)	To (m)	Returns (%)	Flush	Colour
2.70	4.20	80 - 80		grey
4.20	5.70	80 - 80		grey
5.70	7.20	80 - 80		grey
7.20	8.70	80 - 80		grey
8.70	10.20	80 - 80		grey
10.20	11.70	80 - 80		grey
11.70	13.20	80 - 80		grey
13.20	14.70	80 - 80		grey
14.70	16.20	80 - 80		grey
16.20	17.70	80 - 80		grey

Water Strikes

Date	Strike (m)	Casing (m)	Time (mins)	Depth (m)	Sealed (m)	Remarks

Monitoring Installation Pipe Work

Type	Pipe ID	From (m)	To (m)	Dia(mm)	Pipe Type	Remarks

Backfill Details

From (m)	To (m)	Legend	Description
0.00	1.20	905	Arisings
1.20	20.00	903	Bentonite

Standard Penetration Test Results

Depth (m)	Type	N Value	Casing (m)	Water (m)	SWPen(mm)	Blows1	Pen1(mm)	Blows2	Pen2(mm)	Blows3	Pen3(mm)	Blows4	Pen4(mm)	Blows5	Pen5(mm)	Blows6	Pen6(mm)	Hammer	Energy Ratio%
1.20	S	N=8	0.00	Dry	0	1	75	1	75	2	75	2	75	2	75	2	75	TBC	
2.70	S	N=13	2.70	1.00	0	2	75	1	75	2	75	3	75	4	75	4	75	TBC	
20.00	C	50 / 20	2.70	2.40	0	25	75	0	-55	50	75	0	75	0	75	0	-205	TBC	

Reason for Hole Termination: Scheduled depth achieved

Groundwater levels can be subject to seasonal, tidal and other fluctuations and should not be taken as constant.

BOREHOLE INFORMATION SHEET

Borehole No
RC2AMF-U
Sheet 2 of 2

Project Name:	East West Rail GRIP 3	Survey Grid System:	OSGB	Hole Type:	RC
Project No:	5624	Co-ordinates:	460672.00 mE	Checked By:	JHS
Client:	EWR Alliance		223149.00 mN	Approved By:	RS
Engineer:	WSP|Parsons Brinckerhoff	Ground Level:	67.80 mOD	Log Status:	FINAL
				Date:	10/10/2016
Date Started:	10/05/2016	Orientation:	090 deg.		
Date Completed:	11/05/2016	Inclination:	90 deg.	Final Depth:	20.00m

Depth Related Exploratory Hole Information

From (m)	To (m)	Type	Start	End	Plant	Barrel	Drill Bit	Lead Driller	Logger	Remarks
0.00	1.20	IP	10/05/2016	10/05/2016	Insulated digging tools	N/A	N/A	Simon Roberts	NC	Hand dug inspection pit
1.20	2.70	WLS	10/05/2016	10/05/2016	COMACCHIO GEO205			Simon Roberts	NC	Windowless Sample
2.70	20.04	RC	10/05/2016	11/05/2016	COMACCHIO GEO205			Simon Roberts	NC	Rotary Cored: Coordinates were provided by WSP/PB using a hand held GPS (Gamin etrex 10) with an accuracy of +/-4metres. Ground levels are approximate and are interpolated, exploratory hole drilled outside the LiDAR survey area provided by Network Rail.

Boring-Drilling Progress

Date	Time	Depth (m)	Casing (m)	Depth Water (m)	Remarks

Hole Diameter by Depth

Depth (m)	Dia. (mm)	Remarks

Casing Diameter by Depth

Depth (m)	Dia. (mm)	Remarks

Water Added Records

From (m)	To (m)	Volume (litres)	Remarks

Depth Related Remarks

From (m)	To (m)	Remarks

Chiselling Details

From (m)	To (m)	Duration (hh:mm)	Tool

Drilling Flush Details

From (m)	To (m)	Returns (%)	Flush	Colour
17.70	19.20	80 - 80		grey
19.20	20.00	80 - 80		grey

Water Strikes

Date	Strike (m)	Casing (m)	Time (mins)	Depth (m)	Sealed (m)	Remarks

Monitoring Installation Pipe Work

Type	Pipe ID	From (m)	To (m)	Dia(mm)	Pipe Type	Remarks

Backfill Details

From (m)	To (m)	Legend	Description

Standard Penetration Test Results

Depth (m)	Type	N Value	Casing (m)	Water (m)	SWPen(mm)	Blows1	Pen1(mm)	Blows2	Pen2(mm)	Blows3	Pen3(mm)	Blows4	Pen4(mm)	Blows5	Pen5(mm)	Blows6	Pen6(mm)	Hammer	Energy Ratio%

Reason for Hole Termination: Scheduled depth achieved

Groundwater levels can be subject to seasonal, tidal and other fluctuations and should not be taken as constant.

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WINDOWLESS SAMPLE LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Borehole No. **WS2A101_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 467288 N 225360	Hole Type WLS
Location: Section 2A		Level: 88.80mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 31/07/2017 End: 31/07/2017	Logged By TH

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		B	0.20				BALLAST: Light grey angular to sub-rounded coarse GRAVEL of igneous material and clinker. Approximately 5% undersized. [CLEAN BALLAST]	0.05	88.75	
								0.20	88.60	
		B ES	0.50				BALLAST: Dark grey very sandy angular to sub-angular fine to coarse GRAVEL of igneous material, clinker and slag. Approximately 50% undersized with fines of ash and degraded ballast. [VERY DIRTY BALLAST non-cohesive]	(0.45) 0.65	88.15	
1		B D ES UT100	1.00 1.20 - 1.60				TRACK BED LAYERS: Light brown gravelly slightly clayey calcareous SAND. Gravel is angular to sub-rounded fine to coarse of igneous material, limestone and siliceous material.	(0.95)		1
		D H D H H D H D H	1.60 - 1.70 1.60 1.70 - 1.80 1.70 1.80 1.90 2.20 2.30 2.40	H 90 H 82 H 82 H 100 H 112			Firm greenish grey locally dark grey slightly gravelly slightly sandy calcareous CLAY with moderate hydrocarbon odour and occasional comminuted shell fragments (<3mm) with rare partially decomposed organic material (5mm). Gravel is angular to sub-rounded fine to coarse of limestone and siliceous material. (STEWARTBY MEMBER)	1.60 (0.90)	87.20	
2	1						Firm becoming stiff greenish grey slightly sandy calcareous CLAY with occasional shell fragments (<3mm) and slight hydrocarbon odour. (STEWARTBY MEMBER) 2.30-2.45m: Very closely fissured slightly gravelly. Gravel is angular to sub-angular fine to medium of carbonaceous mudstone. 2.45-2.50m: Light brown gravelly slightly clayey sand. Gravel is angular to sub-angular fine to coarse of limestone.	2.50	86.30	2
3							Borehole completed at 2.50m			3
4										4
5										5
6										6
7										7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 101mm and 86mm sample barrels: 1.20-2.50m.
CASING: 113mm to 2.00m.
GROUNDWATER: Groundwater struck at 2.20m. Driller notes groundwater seepage at 0.40m.
BACKFILL: Hole backfilled with bentonite pellets: 1.20-2.50m. Inspection pit backfilled with arisings: 0.00-1.20m and surface reinstated.
REMARKS: Dynamic Probe undertaken prior to sampling - see separate sheet. Window sample barrel refused further penetration at 2.50m.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
31/07/17	2.20	2.00	

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
31/07/2017 17:00	2.50	2.00	2.20

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DYNAMIC PROBE LOG

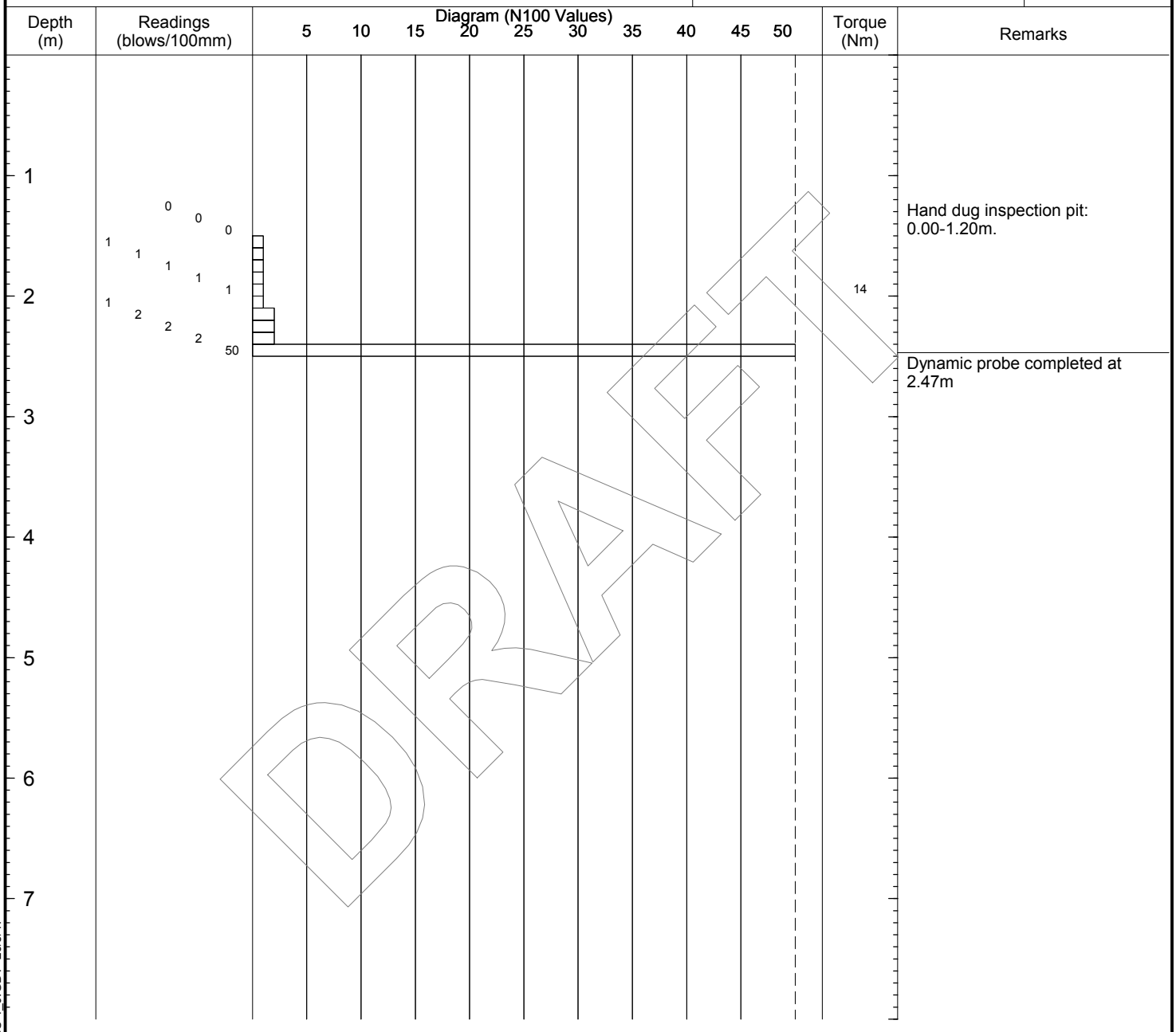
EN ISO 22476-2

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Probe No **DP2A101_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 467288 N 225360 Level: 88.80mAD	Date 31/07/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg Drop Height: 750mm Cone Base Diameter: 50mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-2.47m.

REMARKS: Probing undertaken prior to windowless sampling - see separate sheet.

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WINDOWLESS SAMPLE LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Borehole No. **WS2A102_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 466904 N 225256	Hole Type WLS
Location: Section 2A		Level: 89.30mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 07/08/2017 End: 07/08/2017	Logged By TH

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		B	0.20				BALLAST: Grass over dark grey very sandy slightly clayey angular to sub-angular fine to coarse GRAVEL of igneous material, clinker, slag and limestone. Approximately 70% undersized with fines of degraded ballast and clay. [VERY DIRTY BALLAST non cohesive] 0.00-0.05m: With occasional roots and rootlets (<2mm).	0.25	89.05	
		B ES	0.50					(0.40)		
								0.65	88.65	
1		B	1.00				TRACK BED LAYERS: Light brown very gravelly clayey SAND. Gravel is angular to sub-rounded fine to coarse of siliceous material, clinker, chalk and limestone. 0.40-0.65m: 1No. wooden rail sleeper. 0.50-0.65m: With occasional pockets (<70mm) of soft grey clay.			1
		D ES UT100	1.20 - 1.60					(1.25)		
		D	1.60 - 1.70				EMBANKMENT FILL: Soft greyish brown mottled greenish grey and orangish brown slightly gravelly slightly sandy CLAY. Gravel is angular to rounded fine to medium of limestone, clinker, mudstone and siliceous material with rare partially decomposed organic material (<5mm).			
		D	1.70 - 1.80							
2		D	1.90					1.90	87.40	2
		H	2.20	H 63			Firm greenish grey mottled dark grey slightly gravelly slightly sandy CLAY with a moderate organic odour and frequent partially decomposed organic material (<5mm). Gravel is sub-rounded to rounded fine to coarse of siliceous material. (ALLUVIUM)			
		ES H	2.50	H 75				(1.40)		
		H	2.80	H 94						
3		D	2.90							3
		U70	3.00 - 3.40					3.30	86.00	
		D	3.40 - 3.50				Firm light grey mottled greenish brown slightly sandy calcareous CLAY. (STEWARTBY MEMBER)	3.60	85.70	
		H	3.70	H 51			Firm greenish brown mottled dark grey and light bluish grey slightly sandy calcareous CLAY with a moderate organic odour and occasional locally frequent partially decomposed organic material (<5mm). (STEWARTBY MEMBER) 3.60-4.35m: Locally off white.			
4		D H	3.90	H 58						4
		H	4.20	H 64						
		H	4.40	H 62						
		H	4.70	H 71				(2.40)		
5		D	4.90				5.00-6.00m: With occasional comminuted shell fragments (<5mm).			5
6	Dry	D	5.90				Borehole completed at 6.00m	6.00	83.30	6
7										7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 101mm, 86mm and 76mm sample barrels: 1.20-6.00m.
CASING: 113mm to 2.00m.
GROUNDWATER: Not encountered. Dry on completion.
BACKFILL: Hole backfilled with bentonite pellets: 1.20-6.00m. Inspection pit backfilled with arisings: 0.00-1.20m and surface reinstated.
REMARKS: Dynamic Probe undertaken prior to sampling - see separate sheet.

Groundwater: Dry

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
07/08/2017 17:00	6.00	2.00	

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DYNAMIC PROBE LOG

EN ISO 22476-2

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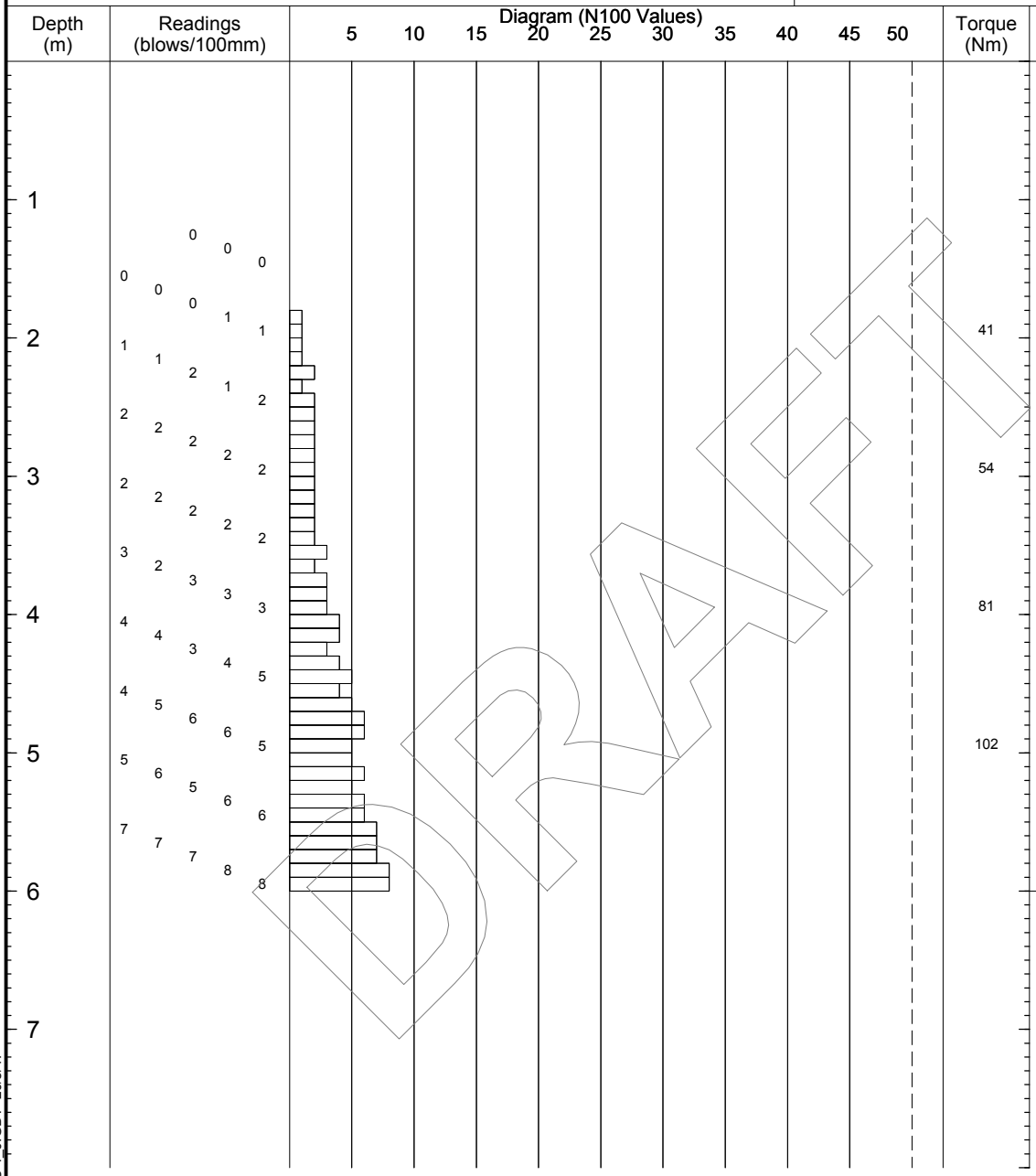
Probe No **DP2A102_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 466904 N 225256 Level: 89.30mAD	Date 07/08/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-6.00m.

REMARKS: Probing undertaken prior to windowless sampling - see separate sheet.

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WINDOWLESS SAMPLE LOG

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Borehole No. **WS2A105_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 464894 N 224534	Hole Type WLS
Location: Section 2A		Level: 86.36mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 01/08/2017 End: 01/08/2017	Logged By TH

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		B	0.20				BALLAST: Grass over dark grey very sandy angular to sub-rounded fine to coarse GRAVEL of igneous material and clinker. Approximately 50% undersized with fines of ash and degraded ballast with a slight hydrocarbon odour. [VERY DIRTY BALLAST non cohesive]	(0.45)		
		B ES	0.50				0.00-0.20m: With frequent rootlets and roots (<2mm).	0.45 (0.40)	85.91	
1		B	1.00				TRACK BED LAYERS: Light brown gravelly slightly clayey calcareous SAND. Gravel is angular to rounded fine to coarse of igneous material and siliceous material.	0.85	85.51	1
		D ES UT100	1.20 - 1.60				EMBANKMENT FILL: Soft bluish grey mottled brown and locally dark grey slightly gravelly slightly sandy CLAY with occasional partially decomposed organic material (<5mm) and slight organic odour. Gravel is sub-rounded to rounded fine to medium of siliceous material.	(1.65)		
		D	1.60 - 1.70							
		D	1.70 - 1.80							
2		D	1.90				1.80-2.50m: With frequent partially decomposed organic material (<5mm) and a moderate organic odour.			2
		ES	2.50				Firm greyish brown mottled dark grey slightly gravelly slightly sandy CLAY. Gravel is sub-angular to rounded fine to coarse of siliceous material and sandstone with rare partially decomposed organic material (<5mm) with a slight organic odour. (ALLUVIUM)	2.50 (0.70)	83.86	
3		D	2.90				Firm light bluish grey mottled light brown CLAY. (STEWARTBY MEMBER)	3.20	83.16	3
							3.50-3.90m: With occasional gypsum crystals (<1mm)	(0.80)		
4		D	3.90				3.90-4.00m: With frequent partially decomposed organic material.	4.00	82.36	4
							Firm to stiff greyish brown locally mottled orangish brown and light brown slightly sandy CLAY with occasional gypsum crystals (<2mm). (STEWARTBY MEMBER)			
5		D	4.90					(2.00)		5
							5.15-5.25m: Very closely fissured light brown and greyish brown.			
							5.70-6.00m: With occasional gypsum crystals (<10mm).			
6	Dry	D	5.90				Borehole completed at 6.00m	6.00	80.36	6
7										7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 101mm, 86mm and 76mm sample barrels: 1.20-6.00m.
CASING: 113mm to 2.00m.
GROUNDWATER: Not encountered. Dry on completion.
BACKFILL: Hole backfilled with bentonite pellets: 1.20-6.00m. Inspection pit backfilled with arisings: 0.00-1.20m and surface reinstated.
REMARKS: Dynamic Probe undertaken prior to sampling - see separate sheet.

Groundwater: Dry

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
01/08/2017 17:00	6.00	2.00	

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DYNAMIC PROBE LOG

EN ISO 22476-2

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Probe No **DP2A105_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 464894 N 224534 Level: 86.36mAD	Date 01/08/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values) 5 10 15 20 25 30 35 40 45 50	Torque (Nm)	Remarks
1	0 0 0 0 0 0 0 0 0 0			Hand dug inspection pit: 0.00-1.20m.
2	0 0 0 0 0 0 0 0 1 1		7	
3	0 1 1 0 0 0 0 1 0 1		20	
4	1 1 0 1 2 3 3 3 3 3		47	
5	2 3 3 3 3 3 4 5 5 5		68	
6	4 4 4 5 5			Dynamic probe completed at 6.00m
7				

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-6.00m.

REMARKS: Probing undertaken prior to windowless sampling - see separate sheet.

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WINDOWLESS SAMPLE LOG

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Borehole No. **WS2A107_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 464647 N 224439	Hole Type WLS
Location: Section 2A		Level: 85.83mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 01/08/2017 End: 01/08/2017	Logged By TH

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
	1.1	B ES	0.20				BALLAST: Dark grey very sandy clayey angular to sub-angular fine to coarse GRAVEL of igneous material, clinker, slag and limestone. Approximately 70% undersized with fines of ash, clay and degraded ballast. [VERY DIRTY BALLAST cohesive]	(0.60)		
							TRACK BED LAYERS: Greyish brown very sandy slightly clayey angular to rounded fine to coarse GRAVEL of siliceous material, slag and limestone.	0.60 0.75	85.23 85.08	
1		D ES	0.90 1.10				Stiff indistinctly extremely closely to very closely fissured dark brownish grey slightly sandy silty calcareous CLAY with occasional shell fragments (<40mm). (PETERBOROUGH MEMBER) 0.75-1.00m: Locally tending to slightly sandy clayey silt. 1.10-1.50m: With frequent shell fragments (<30mm). 1.20-1.70m: With rare lenses (<2mm) of light brown sand. 1.50-2.15m: Very closely fissured.	(1.90)		1
2		D	1.90							2
		D	2.55				2.45-2.65m: With frequent comminuted shell fragments (<30mm).	2.65	83.18	
3							Borehole completed at 2.65m			3
4										4
5										5
6										6
7										7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-0.45m. Continuous disturbed sampling using 101mm and 86mm sample barrels: 0.45-2.65m.
CASING: 113mm to 1.00m.
GROUNDWATER: Groundwater struck at 0.45m. Rose to 0.40m in 10mins. Dry on completion.
BACKFILL: Hole backfilled with bentonite pellets: 0.45-2.65m. Inspection pit backfilled with arisings: 0.00-0.45m and surface reinstated.
REMARKS: Dynamic Probe undertaken prior to sampling - see separate sheet. Window sample barrel refused further penetration at 2.65m.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
01/08/17	0.45		0.40

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
01/08/2017 17:00	2.65	1.00	

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DYNAMIC PROBE LOG

EN ISO 22476-2

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Probe No **DP2A107_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 464647 N 224439 Level: 85.83mAD	Date 01/08/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values) 5 10 15 20 25 30 35 40 45 50	Torque (Nm)	Remarks
0	10 6 6 13			Hand dug inspection pit: 0.00-0.45m.
1	8 6 6 6		75	
	6 5 5 4 5			
2	5 6 6 5 5		41	
3	50			Dynamic probe completed at 2.65m
4				
5				
6				
7				

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-0.45m. Dynamic probing superheavy (DPSH-B): 0.45-2.65m.

REMARKS: Probing undertaken prior to windowless sampling - see separate sheet.

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WINDOWLESS SAMPLE LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Borehole No. **WS2A110_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 464211 N 224312	Hole Type WLS
Location: Section 2A		Level: 83.66mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 02/08/2017 End: 02/08/2017	Logged By TH

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		B	0.20				BALLAST: Grass over brown very sandy angular to sub-rounded fine to coarse GRAVEL of igneous material and clinker with frequent roots and rootlets (<2mm). Approximately 70% undersized with fines of ash and degraded ballast. [VERY DIRTY BALLAST non cohesive]	0.10	83.56	
		B	0.50					0.25	83.41	
		ES						(0.50)		
							BALLAST: Dark grey very sandy ashy angular to sub-angular fine to coarse GRAVEL of igneous material and clinker. Approximately 70% undersized with fines of ash and degraded ballast. [VERY DIRTY BALLAST non cohesive]	0.75	82.91	
1		B	1.00					(0.65)		1
		D								
		ES								
							TRACK BED LAYERS: Light brown very gravelly slightly clayey SAND. Gravel is angular to sub-rounded fine to coarse of limestone, chalk, siliceous material and red brick. 0.25-0.60m: 1No. Angular cobble of red brick. 0.60-0.75m: With medium cobble content. Cobbles are angular of red brick.	1.40	82.26	
		H	1.60	H 44						
		H	1.70	H 65						
2		D	1.90							2
							EMBANKMENT FILL: Soft light grey and bluish grey slightly gravelly slightly sandy CLAY with rare gypsum crystals (<5mm). Gravel is angular to rounded fine to coarse of siliceous material, limestone and red brick.			
		H	2.40	H 58						
		ES	2.50	H 46						
		H	2.70	H 31						
		H					EMBANKMENT FILL:: Soft light greyish brown mottled light grey and dark grey slightly gravelly slightly sandy CLAY with a slightly organic odour and rare partially decomposed organic material (<5mm). Gravel is angular to rounded fine to coarse of siliceous material, mudstone and limestone.			
3		D	2.90							3
		H	3.20	H 45						
		H	3.40	H 30				(4.00)		
		ES	3.50							
4		D	3.90							4
		ES	4.50							
5		D	4.90							5
		ES	5.40					5.40	78.26	
							Very soft dark grey mottled orangish brown and brown CLAY with a slight organic odour and frequent partially decomposed organic material (<2mm). (ALLUVIUM)	(0.60)		
6	Dry	D	5.90					6.00	77.66	6
							Borehole completed at 6.00m			
7										7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 101mm, 86mm, 76mm and 66mm sample barrels: 1.20-6.00m.
CASING: 113mm to 2.00m.
GROUNDWATER: Not encountered.
BACKFILL: Borehole backfilled with bentonite pellets: 1.20-6.00m. Inspection pit backfilled with arisings: 0.00-1.20m and surface reinstated.
REMARKS: Dynamic Probe undertaken prior to sampling - see separate sheet.

Groundwater: Dry

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
02/08/2017 17:00	6.00	2.00	

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DYNAMIC PROBE LOG

EN ISO 22476-2

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Probe No **DP2A110_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 464211 N 224312 Level: 83.66mAD	Date 02/08/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values) 5 10 15 20 25 30 35 40 45 50	Torque (Nm)	Remarks
1	0 0 0 0 0 0 0 0 0 0			Hand dug inspection pit: 0.00-1.20m.
2	0 0 0 0 0 0 0 0 0 0		0	
3	0 0 0 0 0 0 0 0 0 0		7	
4	1 1 1 1 1 2 2 3 3 3		27	
5	3 3 3 4 4 4 5 5 5 5		61	
6				Dynamic probe completed at 6.00m
7				

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-6.00m.

REMARKS: Probing undertaken prior to windowless sampling - see separate sheet.

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WINDOWLESS SAMPLE LOG

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Borehole No. **WS2A113_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 463089 N 223982	Hole Type WLS
Location: Section 2A		Level: 76.90mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 02/08/2017 End: 02/08/2017	Logged By TH

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		B	0.20				BALLAST: Dark grey very sandy slightly clayey angular to sub-angular fine to coarse GRAVEL of igneous material, clinker, slag and limestone. Approximately 50% undersized with fines of degraded ballast and clay. [VERY DIRTY BALLAST non cohesive]	0.30	76.60	
		B ES	0.50					(0.40)		
							TRACK BED LAYERS: Light brown very gravelly slightly clayey SAND. Gravel is angular to sub-rounded fine to coarse of limestone, chalk, siliceous material and red brick.	0.70	76.20	
1		B D ES UT100	1.00 1.20 - 1.60				EMBANKMENT FILL: Very soft bluish grey mottled greenish brown and orangish brown slightly gravelly slightly sandy CLAY with a slight organic odour and occasional partially decomposed organic material (<5mm). Gravel is sub-angular to rounded fine to coarse of limestone, siliceous material and clinker.			1
		D D	1.60 - 1.70 1.70 - 1.80					(2.25)		
2		D H H H H ES H	1.90 2.20 2.40 2.50	H 54 H 85 H 62 H 44			1.60-2.40m: With occasional comminuted shell fragments (5mm).			2
		H H	2.60 2.70	H 38						
3		H D H H H ES H	2.90 3.20 3.40 3.50 3.70	H 30 H 40 H 45 H 48			Very soft dark grey becoming light bluish grey mottled greenish brown and light brown slightly sandy CLAY with a slightly organic odour and frequent partially decomposed organic material (<5mm). (ALLUVIUM)	2.95	73.95	3
								(1.55)		
4	Dry	D U70	3.90 4.00 - 4.50				3.90-4.00m: Sandy.			4
							Borehole completed at 4.50m	4.50	72.40	
5										5
6										6
7										7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 101mm, 86mm, 76mm and 66mm sample barrels: 1.20-4.00m.
CASING: 113mm to 2.00m.
GROUNDWATER: Not encountered.
BACKFILL: Borehole backfilled with bentonite pellets: 1.20-6.00m. Inspection pit backfilled with arisings: 0.00-1.20m and surface reinstated.
REMARKS: Dynamic Probe undertaken prior to sampling - see separate sheet.

Groundwater: Dry

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
02/08/2017 17:00	4.50	2.00	

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DYNAMIC PROBE LOG

EN ISO 22476-2

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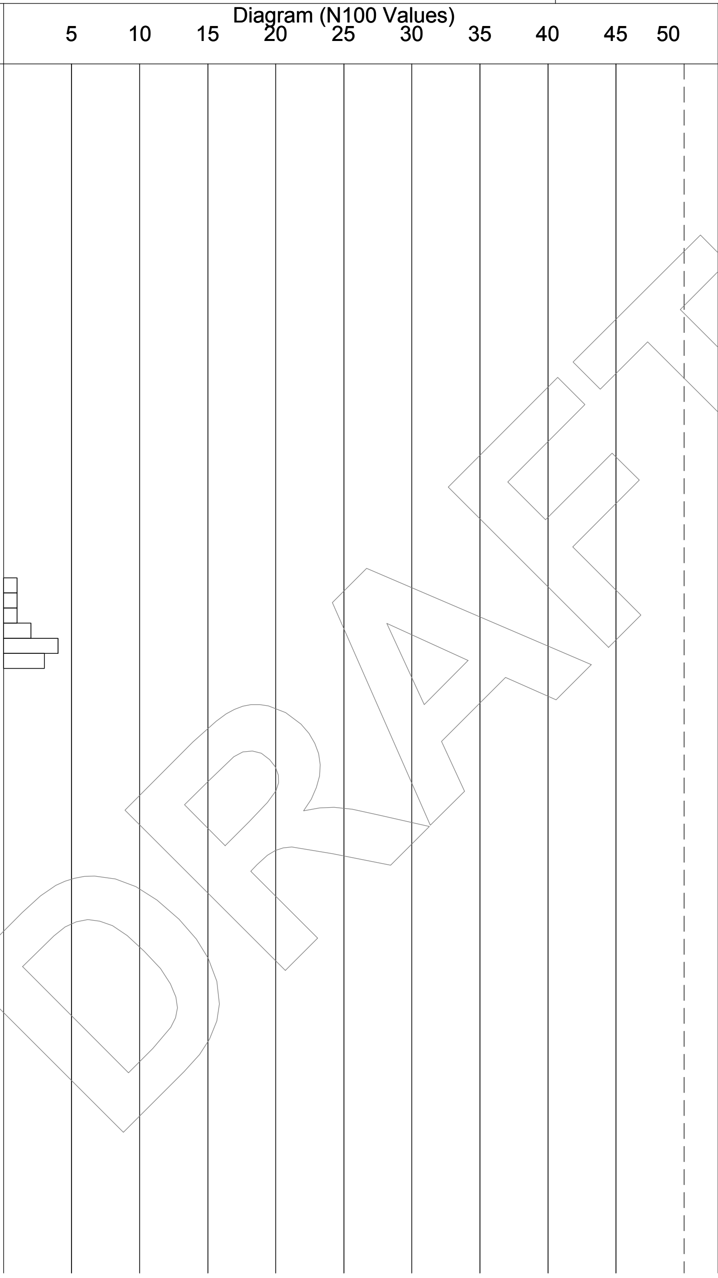
Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 463089 N 223982 Level: 76.90mAD	Probe No **DP2A113_C** Sheet 1 of 1 Date 02/08/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg	Scale 1 : 50
Client: East West Rail Alliance		Drop Height: 750mm Cone Base Diameter: 51mm	Rig No. T07

Depth (m)	Readings (blows/100mm)	Torque (Nm)	Remarks
1.20-1.30	0		Hand dug inspection pit: 0.00-1.20m.
1.30-1.40	0		
1.40-1.50	0		
1.50-1.60	0		
1.60-1.70	0		
1.70-1.80	0		
1.80-1.90	0		
1.90-2.00	0	0	
2.00-2.10	0		
2.10-2.20	0		
2.20-2.30	0		
2.30-2.40	0		
2.40-2.50	0		
2.50-2.60	0		
2.60-2.70	0		
2.70-2.80	0		
2.80-2.90	0		
2.90-3.00	0	7	
3.00-3.10	0		
3.10-3.20	0		
3.20-3.30	0		
3.30-3.40	0		
3.40-3.50	1		
3.50-3.60	1		
3.60-3.70	1		
3.70-3.80	2		
3.80-3.90	4		
3.90-4.00	3		Dynamic probe completed at 4.00m

Diagram (N100 Values)



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-4.00m.

REMARKS: Probing undertaken prior to windowless sampling - see separate sheet.

CC GROUND INVESTIGATIONS LTD

WINDOWLESS SAMPLE LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Borehole No. **WS2A116_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 462622 N 223822	Hole Type WLS
Location: Section 2A		Level: 73.99mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 02/08/2017 End: 03/08/2017	Logged By TH

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		B	0.20				BALLAST: Dark grey very sandy slightly clayey angular to sub-angular fine to coarse GRAVEL of igneous material, clinker, slag and limestone. Approximately 50% undersized with fines of degraded ballast and clay. [VERY DIRTY BALLAST non cohesive]	0.30	73.69	
		B ES	0.50					(0.45)		
							TRACK BED LAYERS: Light brown very gravelly slightly clayey calcareous SAND. Gravel is angular to sub-rounded fine to coarse of limestone, chalk, siliceous material and red brick.	0.75	73.24	
1		B D ES UT100	1.00 1.20 - 1.60				EMBANKMENT FILL: Soft locally firm greyish brown mottled dark grey and orangish brown slightly gravelly slightly sandy CLAY with slight hydrocarbon odour and occasional partially decomposed organic material (<5mm). Gravel is angular to rounded fine to coarse of clinker, limestone and siliceous material.			1
		D D	1.60 - 1.70 1.70 - 1.80					(2.25)		
2		D	1.90				0.90-1.05m: Timber rail sleeper. 1.80-2.10m: With rare comminuted shell fragments (<5mm).			2
		H	2.20	H 40						
		ES H	2.50	H 46						
		H	2.80	H 49						
3		H D	2.90 3.10				Firm light bluish grey mottled orangish brown and dark grey slightly sandy CLAY with a slightly organic odour and rare partially decomposed organic material (<5mm). (ALLUVIUM)	3.00	70.99	3
		H ES H H	3.40 3.50 3.60 3.80	H 78 H 55 H 60			3.00-3.35m: Dark grey with frequent partially decomposed organic material (<5mm) and moderate organic odour.	(1.00)		
4	Dry						Borehole completed at 4.00m	4.00	69.99	4
5										5
6										6
7										7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 101mm and 86mm sample barrels: 1.20-4.00m.
CASING: 113mm to 2.00m.
GROUNDWATER: Not encountered.
BACKFILL: Borehole backfilled with bentonite pellets: 1.20-4.00m. Inspection pit backfilled with arisings: 0.00-1.20m and surface reinstated.
REMARKS: Dynamic Probe undertaken prior to sampling - see separate sheet.

Groundwater: Dry

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
02/08/2017 17:00	1.80	2.00	
03/08/2017 17:00	4.00	2.00	

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DYNAMIC PROBE LOG

EN ISO 22476-2

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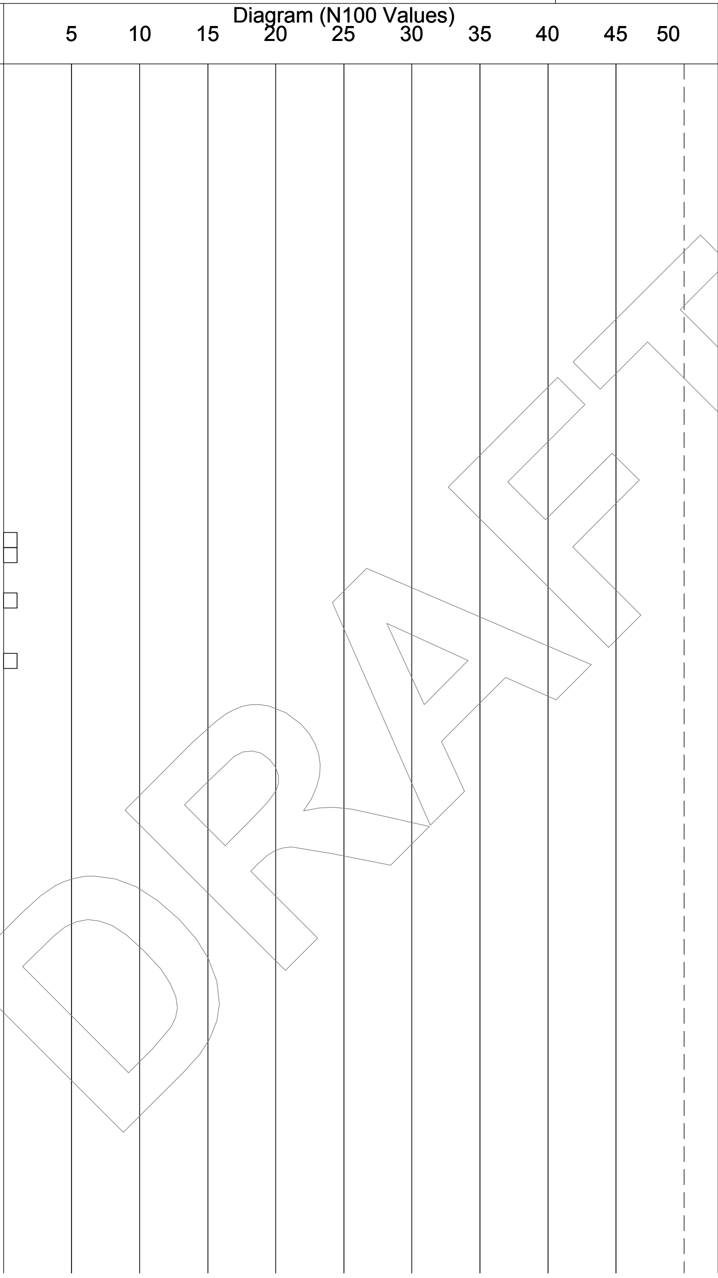
Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 462622 N 223822 Level: 73.99mAD	Probe No **DP2A116_C** Sheet 1 of 1 Date 02/08/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07

Depth (m)	Readings (blows/100mm)	Torque (Nm)	Remarks
1.20-1.50	0 0 0		Hand dug inspection pit: 0.00-1.20m.
1.50-2.00	0 0 0 0 0	0	
2.00-2.50	0 0 0 0 0		
2.50-3.00	0 0 0 0 0	0	
3.00-3.50	0 1 1 0 0		
3.50-4.00	1 0 0 0 1		Dynamic probe completed at 4.00m

Diagram (N100 Values)



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-4.00m.

REMARKS: Probing undertaken prior to windowless sampling - see separate sheet.

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WINDOWLESS SAMPLE LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Borehole No. **WS2A119_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 461701 N 223493	Hole Type WLS
Location: Section 2A		Level: 68.83mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 03/08/2017 End: 03/08/2017	Logged By TH

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		B	0.20				BALLAST: Grass over dark grey sandy slightly clayey angular to sub-angular fine to coarse GRAVEL of clinker, igneous material and limestone. Approximately 50% undersized with fines of clay and degraded ballast. [VERY DIRTY BALLAST non cohesive] 0.00-0.10m: With occasional roots and rootlets (<3mm).	0.35	68.48	
		B ES	0.50					(0.60)		
1		B D ES UT100	1.00 1.20 - 1.60				TRACK BED LAYERS: Light brown very gravelly slightly clayey SAND. Gravel is angular to rounded fine to coarse of red brick, clinker, limestone, igneous material and siliceous material. 0.60-0.95m: With medium cobble content. Cobbles are angular of red brick.	0.95	67.88	1
		D D D	1.60 - 1.70 1.70 - 1.80 1.90					(0.85)		
2		H	2.10	H 30			EMBANKMENT FILL: Firm greenish grey mottled reddish brown, bluish grey and brown slightly gravelly slightly sandy CLAY with a slight hydrocarbon odour and rare partially decomposed roots and rootlets (<3mm). Gravel is angular to rounded fine to coarse of red brick, clinker, siliceous material and limestone.	1.80	67.03	2
		H ES H	2.40 2.50 2.60	H 50 H 38			EMBANKMENT FILL: Firm bluish grey mottled light brown locally dark grey slightly sandy CLAY. 2.20-2.50m: With occasional gypsum crystals (<1mm).	(1.60)		
3		D H H H	2.90 3.20	H 46 H 28						3
		H ES H	3.30 3.50	H 44 H 63			Firm dark grey slightly sandy CLAY with slight organic odour and rare partially decomposed organic material (<5mm). (ALLUVIUM)	3.40	65.43	
4		H D U70	3.80 3.90 4.00 - 4.40	H 71			3.40-3.50m: Dark grey with frequent partially decomposed organic material (<5mm). 3.50-3.65m: With occasional partially decomposed organic material (<3mm).	(1.00)		4
		D	4.40 - 4.50				3.80-3.90m: Slightly gravelly. Gravel is medium to coarse rounded of siliceous material.	4.40	64.43	
		H D	4.70 4.90	H 38			Soft greenish brown mottled orangish brown and grey sandy CLAY with moderate organic odour. (PETERBOROUGH MEMBER)	(0.60) 5.00	63.83	5
							Firm grey sandy calcareous CLAY tending to very clayey calcareous SAND with a slight organic odour. (KELLAWAYS SAND MEMBER)	(0.80)		
6	Dry	D	5.70				5.75-5.80m: Slightly gravelly. Gravel is sub-angular fine to medium of calcareous sandstone. Borehole completed at 5.80m	5.80	63.03	6
7										7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 101mm, 86mm and 76mm sample barrels: 1.20-5.80m.
CASING: 113mm to 2.00m.
GROUNDWATER: Not encountered.
BACKFILL: Borehole backfilled with bentonite pellets: 1.20-5.80m. Inspection pit backfilled with arisings: 0.00-1.20m and surface reinstated.
REMARKS: Dynamic Probe undertaken prior to sampling - see separate sheet. Sample barrel refused further penetration at 5.80m.

Groundwater: Dry

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
03/08/2017 17:00	5.80	2.00	

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DYNAMIC PROBE LOG

EN ISO 22476-2

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Probe No **DP2A119_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 461701 N 223493 Level: 68.83mAD	Date 03/08/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values) 5 10 15 20 25 30 35 40 45 50	Torque (Nm)	Remarks
1	0 0 0 0 0 0 0 0 0 0			Hand dug inspection pit: 0.00-1.20m.
2	0 0 0 0 0 0 0 0 2 1		0	
3	0 0 1 1 2 2 2 3 3 3		0	
4	3 4 4 4 3 4 4 5 5 6		61	
5	5 5 6 10 13 14 21 43 50		75	
6				Dynamic probe completed at 5.88m
7				

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-5.88m.

REMARKS: Probing undertaken prior to windowless sampling - see separate sheet.

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WINDOWLESS SAMPLE LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Borehole No. **WS2A122_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 461577 N 223451	Hole Type WLS
Location: Section 2A		Level: 68.73mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 03/08/2017 End: 03/08/2017	Logged By TH

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		B	0.20				TRACK BED LAYERS: Grass over brown very gravelly slightly clayey calcareous SAND with occasional roots and rootlets (<3mm). Gravel is angular to rounded fine to coarse of red brick, igneous material, chalk, siliceous material and limestone.	(0.40) 0.40	68.33	
		B ES	0.50				TRACK BED LAYERS: Light brown very gravelly slightly clayey SAND. Gravel is angular to rounded fine to coarse of limestone, siliceous material and chalk.	0.70	68.03	
1		B D ES	1.00				EMBANKMENT FILL: Firm greyish brown mottled dark grey, light grey and orangish brown slightly sandy CLAY with rare partially decomposed organic material (<5mm). Gravel is angular to sub-rounded fine to coarse of mudstone, limestone, chalk, igneous material and siliceous material.			1
		H	1.40	H 50						
		H	1.80	H 55			1.80-1.90m: With frequent comminuted shell fragments (<5mm).			
2		D	1.90							2
		H	2.10	H 34				(2.95)		
		ES H	2.50	H 38						
3		D H	2.90	H 38						3
		H	3.30	H 50			3.35-3.65m: With frequent comminuted shell fragments (<3mm).			
		D ES	3.50 3.65					3.65	65.08	
		H	3.80	H 53			Firm greenish grey mottled dark grey slightly sandy CLAY with frequent partially decomposed organic material (<5mm) and a moderate organic odour. (ALLUVIUM)	(0.80)		
4		D	4.20	H 70			4.25-4.45m: Light bluish grey mottled light brown.			4
		H H	4.40	H 64				4.45	64.28	
		H	4.60	H 61			Firm orangish brown mottled light grey locally bluish grey sandy CLAY. (PETERBOROUGH MEMBER)			
5		D H	4.90	H 37			5.00-5.30m: Tending to very clayey sand.	(1.50)		5
6	Dry	D	5.90				5.80-5.95m: Grey. Calcareous. Borehole completed at 5.95m	5.95	62.78	6
7										7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 101mm, 86mm and 76mm sample barrels: 1.20-5.95m.
CASING: 113mm to 3.00m.
GROUNDWATER: Not encountered.
BACKFILL: Borehole backfilled with bentonite pellets: 1.20-5.95m. Inspection pit backfilled with arisings: 0.00-1.20m and surface reinstated.
REMARKS: Dynamic Probe undertaken prior to sampling - see separate sheet. Sample barrel refused further penetration at 5.95m.

Groundwater: Dry

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
03/08/2017 17:00	5.95	3.00	

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DYNAMIC PROBE LOG

EN ISO 22476-2

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Probe No **DP2A122_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 461577 N 223451 Level: 68.73mAD	Date 03/08/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values) 5 10 15 20 25 30 35 40 45 50	Torque (Nm)	Remarks
1	0 0 0 0 0 0 0 0 0 0			Hand dug inspection pit: 0.00-1.20m.
2	0 0 0 0 0 0 0 0 0 2		0	
3	1 1 1 2 2 2 2 1 1 1		34	
4	3 3 4 5 5 6 7 8 10 20		68	
5	6 5 5 6 7 9 9 10 14 33		95	
6	7 10 50			Dynamic probe completed at 5.94m
7				

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-5.94m.

REMARKS: Probing undertaken prior to windowless sampling - see separate sheet.

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WINDOWLESS SAMPLE LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Borehole No. **WS2A125_C**

Sheet 1 of 2

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 461476 N 223414	Hole Type WLS
Location: Section 2A		Level: 68.76mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 04/08/2017 End: 04/08/2017	Logged By TH

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		B	0.20				BALLAST: Grass over dark grey very sandy angular to sub-angular fine to coarse GRAVEL of igneous material, clinker and limestone with occasional roots and rootlets (<3mm). Approximately 50% undersized with fines of degraded ballast. [VERY DIRTY BALLAST non cohesive]	0.30	68.46	
		B ES	0.50					(0.80)		
1		B	1.00				TRACK BED LAYERS: light brown very gravelly slightly clayey SAND. Gravel is angular to rounded fine to coarse of limestone, clinker, siliceous material and chalk. 0.90-1.10m: Clayey tending to very clayey.	1.10	67.66	1
		ES	1.15							
		D UT100	1.20 - 1.60				EMBANKMENT FILL: Soft locally firm grey mottled light bluish grey and orangish brown locally dark grey slightly gravelly slightly sandy CLAY with a slight organic odour and occasional comminuted shell fragments (<3mm). Gravel is angular to rounded fine to coarse of limestone, clinker, siliceous material and mudstone.			
		D	1.60 - 1.70							
		D	1.70 - 1.80							
2		D	1.90	H 34						2
		H	2.10	H 38				(2.10)		
		H								
		ES	2.50	H 35						
		H								
		H	2.80	H 43						
3		D	2.90							3
		H	3.20	H 34			Firm grey mottled dark grey locally orangish brown slightly sandy CLAY with moderate locally strong organic odour and occasional partially decomposed organic material (<5mm). (ALLUVIUM) 3.20-3.40m: Dark grey mottled light grey with frequent partially decomposed organic material (<5mm). 3.40-3.53m: Slightly sandy gravelly clay.	3.20	65.56	
		ES	3.50							
		H	3.60	H 54						
4		D	3.90					(1.34)		4
		H	4.20	H 67			4.30-4.54m: Sandy.			
		H	4.50	H 25			Greenish brown mottled orangish brown and light grey slightly gravelly sandy calcareous CLAY tending to slightly gravelly very clayey sand with rare comminuted shell fragments (<5mm). Gravel is angular to sub-rounded fine to medium of limestone. (PETERBOROUGH MEMBER)	4.54	64.22	
5		D	4.90					(0.61)		5
		B	5.15 - 6.00				Grey very clayey SAND. (KELLAWAYS SAND MEMBER) 5.15-5.40m: Light brown.	5.15	63.61	
6		B	6.00 - 7.00					(2.15)		6
7							6.70-7.30m: Tending to stiff sandy clay.			7
	1	D	7.40				Stiff grey CLAY with rare comminuted shell fragments (<3mm). (KELLAWAYS SAND MEMBER)	7.30	61.46	
	1							(0.70)		
8							~~Borehole completed at 8.00m~~			8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 101mm, 86mm, 76mm and 66mm sample barrels: 1.20-8.00m.
CASING: 113mm to 4.00m.
GROUNDWATER: Groundwater encountered at 7.80m. Rose to 7.50m in 5mins.
BACKFILL/REINSTATEMENT: Bole backfilled with bentonite pellets: 1.20-8.00m. Inspection pit backfilled with arisings: 0.00-1.20m and surface reinstated.
REMARKS: Dynamic Probe undertaken prior to sampling - see separate sheet. Driller notes collapse on completion back to 5.50m.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
04/08/17	7.80	4.00	7.50

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
04/08/2017 17:00	8.00	4.00	7.50

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WINDOWLESS SAMPLE LOG

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Borehole No. **WS2A125_C**

Sheet 2 of 2

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 461476 N 223414	Hole Type WLS
Location: Section 2A		Level: 68.76mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 04/08/2017 End: 04/08/2017	Logged By TH

(m)	Water Levels	Samples & In Situ Testing			Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		No/Type	Depth (m)	Result				8.00	60.76	

9 10 11 12 13 14 15 16 17

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)

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DYNAMIC PROBE LOG

EN ISO 22476-2

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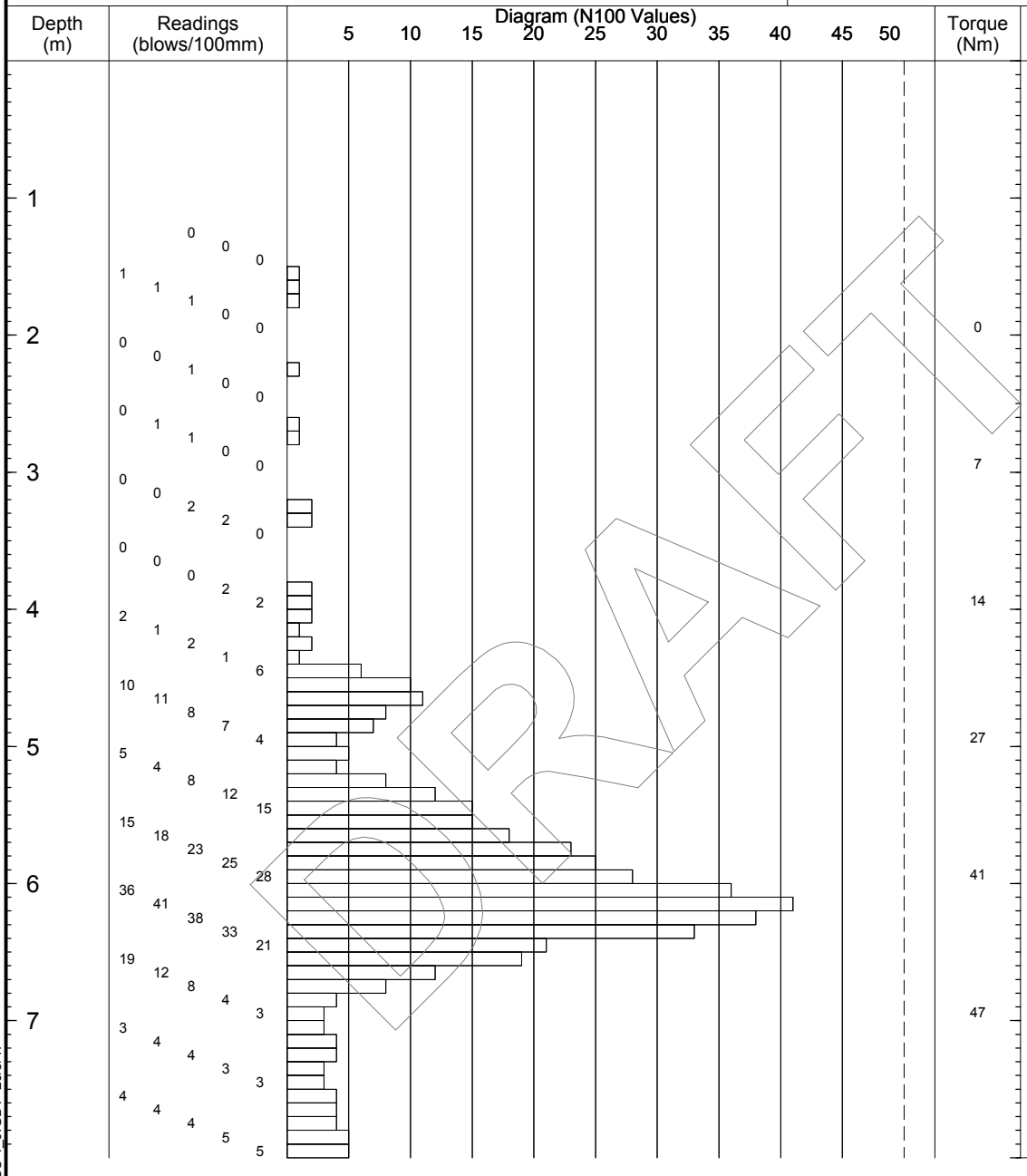
Probe No **DP2A125_C**

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 461476 N 223414 Level: 68.76mAD	Date 04/08/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07



Remarks

Hand dug inspection pit: 0.00-1.20m.

Dynamic probe completed at 8.00m

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-8.00m.

REMARKS: Probing undertaken prior to windowless sampling - see separate sheet.

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WINDOWLESS SAMPLE LOG

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Borehole No. **WS2A100U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type WLS
Location: Section 2A		Level: mAOD	Scale 1 : 40.63
Client: East West Rail Alliance		Dates: Start: 06/09/2017 End: 06/09/2017	Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		B ES D	0.20 - 0.30 0.20 0.25				MADE GROUND: Dark brown slightly sandy SILT with frequent roots and rootlets.	0.05		
		B ES D	0.50 - 0.60 0.50 0.60				MADE GROUND: Stiff friable brown slightly gravelly slightly sandy CLAY with occasional roots. Gravel is angular to rounded fine to coarse of siliceous material and calcareous nodules.	0.30		
							Very stiff brown mottled light bluish grey slightly gravelly slightly sandy CLAY with occasional roots. Gravel is angular to rounded fine to coarse of siliceous material.	0.60		
1		B ES D	1.00 - 1.20 1.00 1.10				Stiff to very stiff very closely to closely fissured light brown mottled bluish grey CLAY with occasional roots and pockets (<10mm) of off white silt.	(1.90)		1
		D	1.70							
2		U70	2.00 - 2.40					2.50		2
		D	2.70				Stiff very closely fissured brown mottled greenish brown CLAY with frequent pockets (<40mm) of off white silt and occasional fossils.			
3							3.00-3.50m: Occasional pockets (<25mm) of off white silt.	(1.00)		3
		D	3.70				Stiff laminated and very closely fissured dark brown CLAY with occasional fossils.	3.50		
4		U70	4.00 - 4.40					(1.50)		4
		D	4.70							
5							Stiff to very stiff very closely fissured grey CLAY with occasional fossils.	5.00		5
		D	5.40					(0.60)		
	Dry.						Borehole completed at 5.60m	5.60		
6										6

EQUIPMENT: Hand digging tools. LMSR-H Modular Dynamic Sampling and Probing rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 101mm, 86mm and 76mm sample barrels: 1.20-5.60m.
CASING: None used.
GROUNDWATER: Not encountered.
INSTALLATION: 50mm ID HDPE slotted pipe with washed gravel response zone: 1.00-5.60m. 50mm ID HDPE plain pipe with bentonite pellet seal: 0.10-1.00m. Raised borehole helmet set in concrete: 0.00-0.10m. Gas valve fitted.

Groundwater: Dry.

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
06/09/2017 17:00	5.60	0.00	

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DYNAMIC PROBE LOG

EN ISO 22476-2

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Probe No **DPSH2A100_U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N Level: mAD	Date 06/09/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg Drop Height: 750mm Cone Base Diameter: 50mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. GO2

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values) 5 10 15 20 25 30 35 40 45 50	Torque (Nm)	Remarks
1	3 3 3 3 3 3 3 3 3 3			0.00-1.20m: Dynamic probe undertaken from base of hand dug pit.
2	3 3 3 3 3 3 3 3 3 2		0	
3	4 4 4 4 4 4 4 4 4 4		0	
4	3 2 2 2 2 2 2 2 2 3		0	
5	3 3 3 3 3 2 2 2 2 3		27	
6	3 3 3 3 5 5 5 4 4 5	11		Dynamic probe completed at 6.00m
7				

EQUIPMENT: Hand digging tools. LMSR-H Modular Dynamic Sampling and Probing rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-6.00m.

REMARKS: Probing undertaken adjacent to windowless sample borehole WS2A100U - see separate sheet.

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WINDOWLESS SAMPLE LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Borehole No. **WS2A103U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type WLS
Location: Section 2A		Level: mAOD	Scale 1 : 40.63
Client: East West Rail Alliance		Dates: Start: 05/09/2017 End: 05/09/2017	Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		D ES	0.20				MADE GROUND: Firm friable dark brown slightly gravelly slightly sandy CLAY with frequent roots. Gravel is sub-angular to rounded fine to coarse siliceous material.	0.30		
		B D ES	0.50 - 0.70 0.50				MADE GROUND: Stiff light brown mottled brown and grey slightly gravelly slightly sandy CLAY with occasional roots. Gravel is angular to rounded fine to coarse of siliceous material.	(0.40) 0.70		
1		B D ES	1.00 - 1.20 1.00				Stiff to very stiff locally closely fissured light brown mottled brown and light bluish grey slightly gravelly CLAY with occasional roots. Gravel is sub-angular to rounded fine to coarse of siliceous material.	(0.85)		1
		D ES	1.70				Stiff extremely closely to very closely fissured brown mottled light grey CLAY with occasional pockets (<30mm) of gypsum crystals and occasional fossils. 1.90-2.85m: Thinly laminated.	1.55 (1.30)		
2										2
		D D U70	2.80 2.90 3.00 - 3.40				Firm thinly laminated very closely fissured brown mottled greenish brown CLAY with occasional fossils.	2.85		
3										3
		D	3.70					(1.85)		
4										4
	Dry.	D	4.60				Borehole completed at 4.70m	4.70		
5										5
6										6

EQUIPMENT: Hand digging tools. LMSR-H Modular Dynamic Sampling and Probing rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 101mm, 86mm and 76mm sample barrels: 1.20-4.70m.
CASING: 113mm diameter to 2.00m.
GROUNDWATER: Not encountered.
INSTALLATION: 50mm ID HDPE slotted pipe with washed gravel response zone: 1.00-4.70m. 50mm ID HDPE plain pipe with bentonite pellet seal: 0.10-1.00m. Raised borehole helmet set in concrete: 0.00-0.10m. Gas valve fitted.

Groundwater: Dry.

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
05/09/2017 17:00	4.70	2.00	

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DYNAMIC PROBE LOG

EN ISO 22476-2

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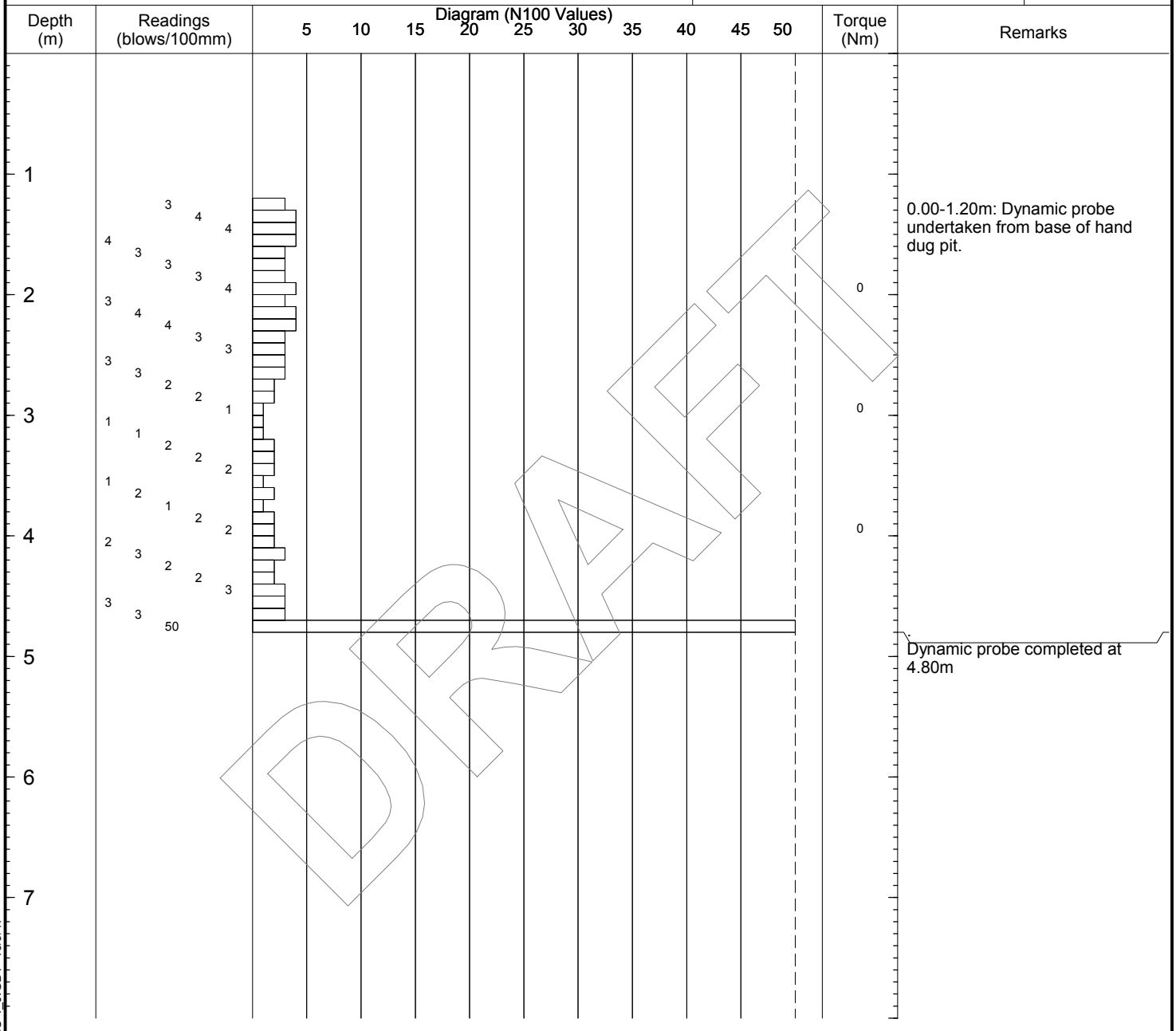
Probe No **DPSH2A103_U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N Level: mAD	Date 05/09/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg Drop Height: 750mm Cone Base Diameter: 50mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. GO2



EQUIPMENT: Hand digging tools. LMSR-H Modular Dynamic Sampling and Probing rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-4.80m.

REMARKS: Probing undertaken adjacent to windowless sample borehole WS2A103U - see separate sheet.

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WINDOWLESS SAMPLE LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Borehole No. **WS2A106D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type WLS
Location: Section 2A		Level: mAOD	Scale 1 : 40.63
Client: East West Rail Alliance		Dates: Start: 11/09/2017 End: 11/09/2017	Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		D	0.20				TOPSOIL: Soft dark brown slightly sandy CLAY with occasional roots.	0.15		
		B	0.50 - 0.70	H 61			Soft to firm brown mottled light brown and light grey CLAY with occasional roots and occasional pockets (<30mm) of off white silt.	(0.65)		
		D	0.50					0.80		
		ES					Firm light brown mottled light grey and locally light orangish brown CLAY with occasional pockets (<30mm) of off white silt and rare gypsum crystals (<2mm).			
1		H	0.80	H 67						1
		H	1.00 - 1.20					(0.70)		
		B	1.00	H 86						
		D	1.10					1.50		
		ES					Firm very closely fissured greyish brown mottled orangish brown CLAY with occasional gypsum crystals (<2mm), occasional pockets (<20mm) of off white silt and occasional fossils and shell fragments.			
		H								
		D	1.70							
2		U70	2.00 - 2.40							2
								(1.90)		
		D	2.70							
3										3
							Firm to stiff very closely fissured locally laminated dark greyish brown CLAY with occasional fossils and shell fragments (<10mm).	3.40		
		D	3.70					(0.60)		
4		U70	4.00 - 4.40				Stiff very closely to closely fissured dark grey CLAY with occasional fossil and shell fragments (<10mm).	4.00		4
		D	4.70							
5								(2.00)		5
		D	5.70							
6	Dry.						Borehole completed at 6.00m	6.00		6

EQUIPMENT: Hand digging tools. LMSR-H Modular Dynamic Sampling and Probing rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 101mm, 86mm and 76mm sample barrels: 1.20-6.00m.
CASING: 113mm diametre to 4.00m.
GROUNDWATER: Groundwater seepage at 2.00m.
INSTALLATION: 50mm ID HDPE slotted pipe with washed gravel response zone: 1.00-6.00m. 50mm ID HDPE plain pipe with bentonite pellet seal: 0.10-1.00m. Raised borehole helmet set in concrete: 0.00-0.10m. Gas valve fitted.

Groundwater: Dry.

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
11/09/2017 17:00	6.00	4.00	

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DYNAMIC PROBE LOG

EN ISO 22476-2

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Probe No **DPSH2A106_D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N Level: mAD	Date 11/09/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg Drop Height: 750mm Cone Base Diameter: 50mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. GO2

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values) 5 10 15 20 25 30 35 40 45 50	Torque (Nm)	Remarks
1	0 1 0 / 1 4 4 / 4 4 4 / 2 2 2 / 2 2 3 / 3 2 3 / 3 3 3 / 2 3 3 / 2 3 2 / 2 3 3 / 2 2 3 / 2 2 2 / 2 2 2 / 3 4 3 / 2 4 4 / 4 4 6 / 5 5		0	0.00-1.20m: Dynamic probe undertaken from base of hand dug pit.
2				
3			14	
4			14	
5			27	
6				Dynamic probe completed at 6.00m
7				

EQUIPMENT: Hand digging tools. LMSR-H Modular Dynamic Sampling and Probing rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-6.00m.

REMARKS: Probing undertaken adjacent to windowless sample borehole WS2A106D - see separate sheet.

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WINDOWLESS SAMPLE LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Borehole No. **WS2A104_U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type WS
Location: Section 2A		Level: mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 02/11/2017 End: 02/11/2017	Logged By EC

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		D	0.10				TOPSOIL: Soft dark brown slightly sandy CLAY with frequent rootlets (<3mm).	0.20		
		D	0.30				EMBANKMENT FILL: Firm to stiff brown mottled dark orangish brown slightly sandy slightly gravelly CLAY with occasional roots. Gravel is angular to rounded fine to coarse of siliceous material.	0.45		
		ES								
		B	0.50 - 0.70	H 124				0.70		
		D	0.50							
1		ES					EMBANKMENT FILL: Stiff lightly brown mottled light grey and orangish brown slightly gravelly CLAY with occasional roots. Gravel is sub-angular to rounded fine to coarse of siliceous material.	(0.70)		1
		H	1.00 - 1.20	H 124						
		B	1.00							
		D								
		ES								
		H	1.50				Stiff fissured lightly brown mottled light grey CLAY with occasional roots. [AMPTHILL CLAY FORMATION].	1.40		
		D								
		D	1.90				Stiff fissured orangish brown mottled dark orangish brown CLAY. [STEWARTBY MEMBER].	1.70		
2		UT100	2.00 - 2.45							2
							Stiff fissured locally laminated brown CLAY with occasional sand sized gypsum crystals and with occasional yellow silt laminae. [STEWARTBY MEMBER].			
		D	2.55							
								(2.30)		
3										3
		D	3.50							
4		UT100	4.00 - 4.45				Stiff to very stiff fissured dark brown CLAY with occasional shells. [PETERBOROUGH MEMBER].	4.00		4
		D	4.55							
5								(2.30)		5
		D	5.50							
6		U70	6.00 - 6.45							6
							Stiff to very stiff fissured dark brownish grey CLAY. [PETERBOROUGH MEMBER].	6.30		
		D	6.50							
								(0.70)		
7	Dry.	D	6.90				Borehole completed at 7.00m	7.00		7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 113mm, 101mm, 86mm and 76mm sample barrels: 1.20-7.00m.
CASING: 128mm to 4.00m.
GROUNDWATER: None encountered.
BACKFILL: Borehole backfilled with bentonite pellets: 1.20-7.00m. Inspection pit backfilled with arisings: 0.00-1.20m and surface reinstated.
REMARKS: PID testing undertaken: 0.00m - 0.00ppm, 0.50m - 0.00ppm.
REMARKS: Dynamic Probe undertaken adjacent to sampling - see separate sheet.

Groundwater: Dry.

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
02/11/2017 17:00	7.00		

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WINDOWLESS SAMPLE LOG

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Borehole No. **WS2A108_D**

Sheet 1 of 2

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type WS
Location: Section 2A		Level: mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 01/11/2017 End: 01/11/2017	Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		D ES	0.20				MADE GROUND: Soft to firm dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Sand is fine. Gravel is sub-angular to rounded fine to medium of siliceous material.	0.25		
		B D ES	0.50 - 0.60 0.50				MADE GROUND: Stiff to very stiff light brown mottled light grey slightly sandy slightly gravelly CLAY with occasional rootlets. Gravel is sub-angular to rounded fine to coarse of limestone and siliceous material.	0.60		
1		D ES	1.00					(0.75)		1
		D	1.50				MADE GROUND: Stiff to very stiff locally fissured light brown mottled light grey slightly sandy slightly gravelly CLAY with rare sand sized gypsum crystals and occasional roots. Gravel is angular fine of siliceous material. 1.35m: 1no lense of orange sandy silt (<20mm). Sand is fine.	1.35		
2		B UT100	2.00 2.00 - 2.45				Very stiff fissured light brown mottled light grey CLAY with occasional sand sized gypsum crystals and with trace roots.	(2.15)		2
		D	2.55							
3										3
		D	3.50				Stiff fissured light brown locally mottled light grey CLAY with occasional sand sized gypsum crystals.	3.50		
4		UT100	4.00 - 4.45					(1.40)		4
		D	4.55							
5							Stiff locally very stiff fissured dark greyish brown locally grey CLAY with occasional shells and with rare fine sand sized gypsum crystals.	4.90		5
		D	5.20							
		D	5.50							
6		U70	6.00					(2.85)		6
		D	6.50							
7										7
		D	7.50							
8							*(continued on next sheet)*	7.75		8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 113mm, 101mm, 86mm and 76mm sample barrels: 1.20-11.20m.
CASING: 128mm to 4.00m.
GROUNDWATER: None encountered.
BACKFILL: Bole backfilled with bentonite pellets: 1.20-11.20m. Inspection pit backfilled with arisings: 0.00-1.20m and surface reinstated.
REMARKS: PID testing undertaken at: 0.20m - 0.00ppm, 0.50m - 0.00ppm, 1.00m - 0.00ppm.
REMARKS: Dynamic Probe undertaken adjacent to sampling - see separate sheet.

Groundwater: Dry.

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)

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WINDOWLESS SAMPLE LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Borehole No. **WS2A108_D**

Sheet 2 of 2

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type WS
Location: Section 2A		Level: mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 01/11/2017 End: 01/11/2017	Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		U70	8.00 - 8.45				Very stiff fissured dark greyish brown CLAY with occasional shells. *(continued from previous sheet)*	(1.15)		
		D	8.50					8.90		
9							Very stiff fissured dark brownish grey CLAY with occasional shells.			
		D	9.50					(2.30)		
10										
		D	10.50							
11	Dry.	D	11.10				Borehole completed at 11.20m	11.20		
12										
13										
14										
15										
16										
17										

Groundwater: Dry.

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
01/11/2017 17:00	11.20		

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WINDOWLESS SAMPLE LOG

Borehole No. WS2AMGOB_1U

Sheet 1 of 1

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type WS
Location: Section 2A		Level: mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 19/10/2017 End: 20/10/2017	Logged By EC

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		B ES	0.20				TOPSOIL: Grass over: Light brown slightly gravelly slightly sandy clayey SILT. Gravel is sub-angular to rounded fine to coarse of siliceous material.	(0.70)		
		B	0.50				0.00-0.10m: Occasional roots and rootlets (<3mm). 0.40-0.70m: Light brown mottled orangish brown silty clay.	0.70		
1		B ES ES UT100	1.00 1.20 1.20 - 1.65				Firm grey mottled orangish brown slightly sandy silty CLAY.	(1.90)		1
		D H D H H D H H D H	1.65 - 1.70 1.65 1.70 1.75 1.85 1.90 2.40 2.55 2.70 2.80	H 41 H 49 H 41 H 48 H 55 H 87			2.50-2.60m: With rare locally occassional gypsum crystals (<2mm).	2.60		
2							Stiff locally stiff dark brown thinly laminated slightly sandy silty CLAY. 2.63-2.80m: Sandy.	2.90		2
3		UT100	3.00 - 3.45				Stiff thinly laminated dark grey silty CLAY. 2.90-4.60m: Occasional locally frequent greyish brown fine sand and silt lenses (<1mm).			3
		D	3.45 - 3.50							
		H	3.70	H 101						
4		D	3.90							4
5		D U70	4.90 5.00 - 5.40					(4.10)		5
6		D	5.90				6.00-7.00m: With rare shell fragments (<3mm) and rare greyish brown fine sand and silt lenses (<1mm).			6
7	Dry	D	6.90				Borehole completed at 7.00m	7.00		7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 113mm, 101mm, 86mm and 76mm sample barrels: 1.20-7.00m.
CASING: 128mm to 3.00m.
GROUNDWATER: None encountered.
BACKFILL: Bole backfilled with bentonite pellets: 1.00-7.00m. Inspection pit backfilled with arisings: 0.00-1.00m and surface reinstated.
REMARKS: Dynamic Probe undertaken prior to sampling - see separate sheet. Driller notes 76mm barrel refusal at 7.00m

Groundwater: Dry

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
20/10/2017 17:00	7.00	3.00	

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DYNAMIC PROBE LOG

EN ISO 22476-2

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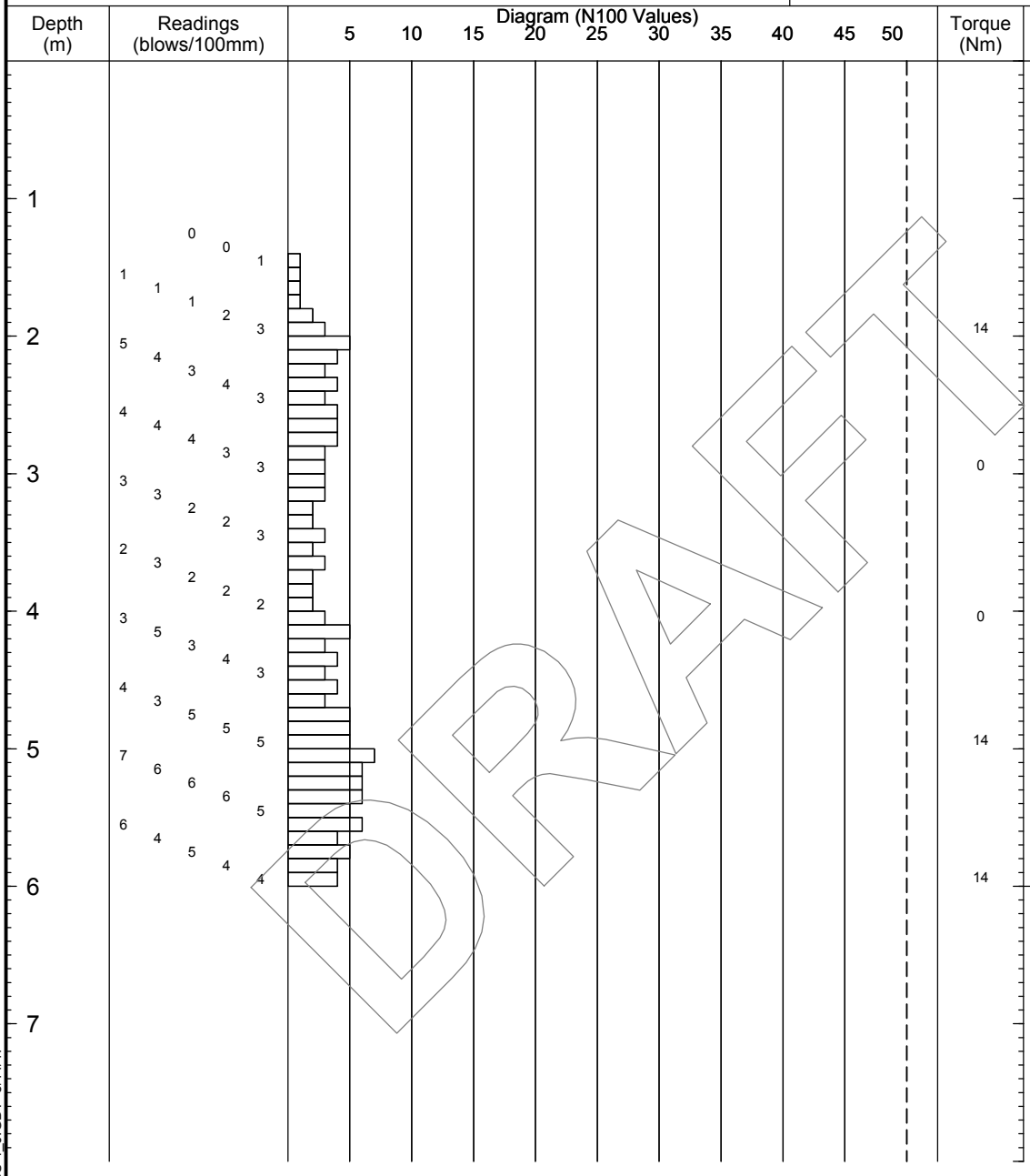
Probe No **SHDP2A104_U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N Level: mAD	Date 01/11/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-4.00m.

REMARKS: Probing undertaken adjacent to windowless sampling - see separate sheet.

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DYNAMIC PROBE LOG

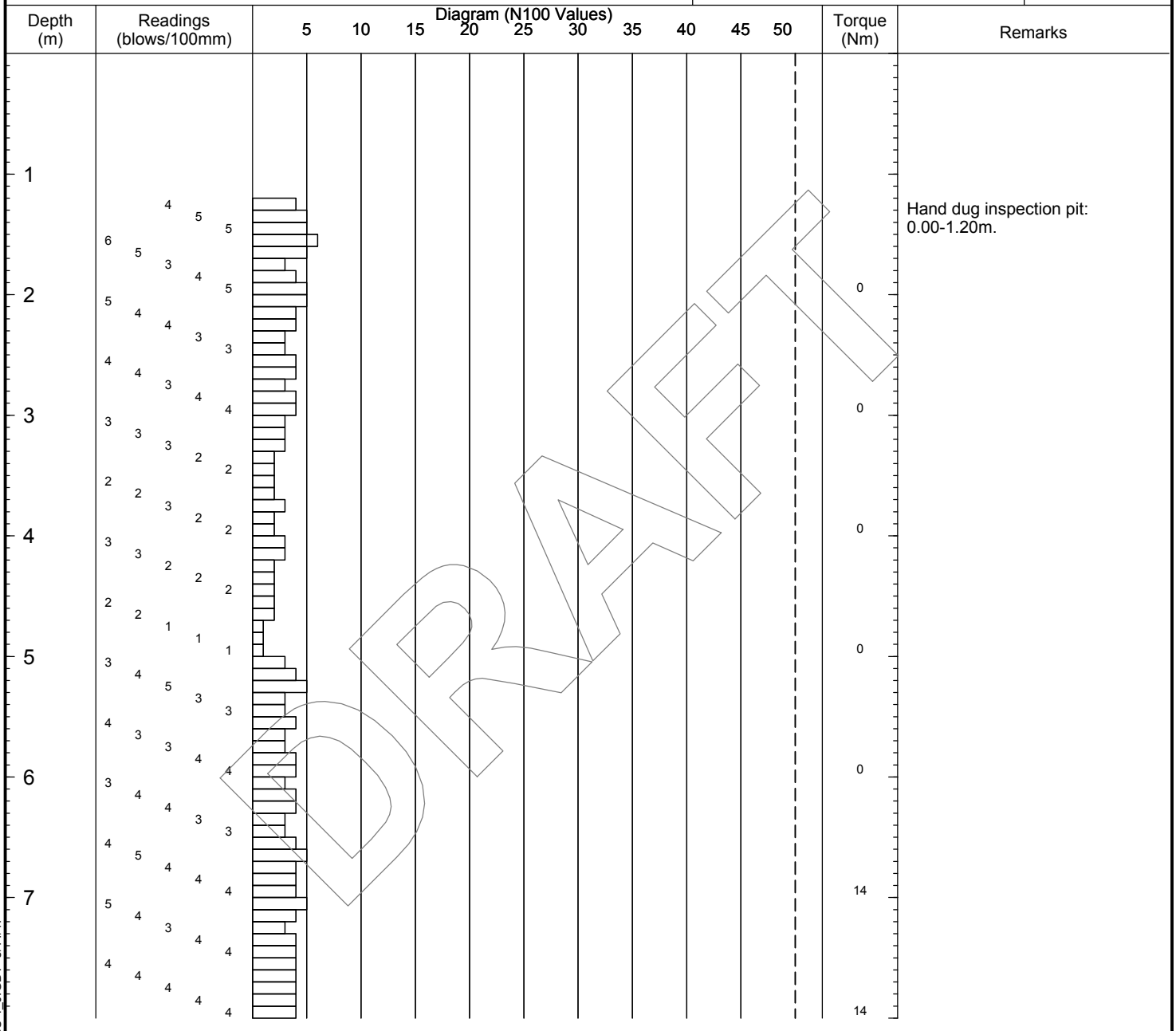
EN ISO 22476-2

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Probe No **SHDP2A108_D**

Sheet 1 of 2

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N Level: mAD	Date 01/11/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-6.00m.

REMARKS: Probing undertaken adjacent to windowless sampling - see separate sheet.

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DYNAMIC PROBE LOG

EN ISO 22476-2

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Probe No **SHDP2A108_D**

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N Level: mAD	Date 01/11/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values) 5 10 15 20 25 30 35 40 45 50	Torque (Nm)	Remarks
9	6 6 7 7 8 / 9 10 9 7 7 / 9 8 5 8 7 / 8 9 9 9 9 / 10 7 7 6 7 / 9 8 8 6 6 / 11 15 50		27 27 27	
10				
11				
12				Dynamic probe completed at 12.20m
13				
14				
15				

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-6.00m.

REMARKS: Probing undertaken adjacent to windowless sampling - see separate sheet.

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DYNAMIC PROBE LOG

EN ISO 22476-2

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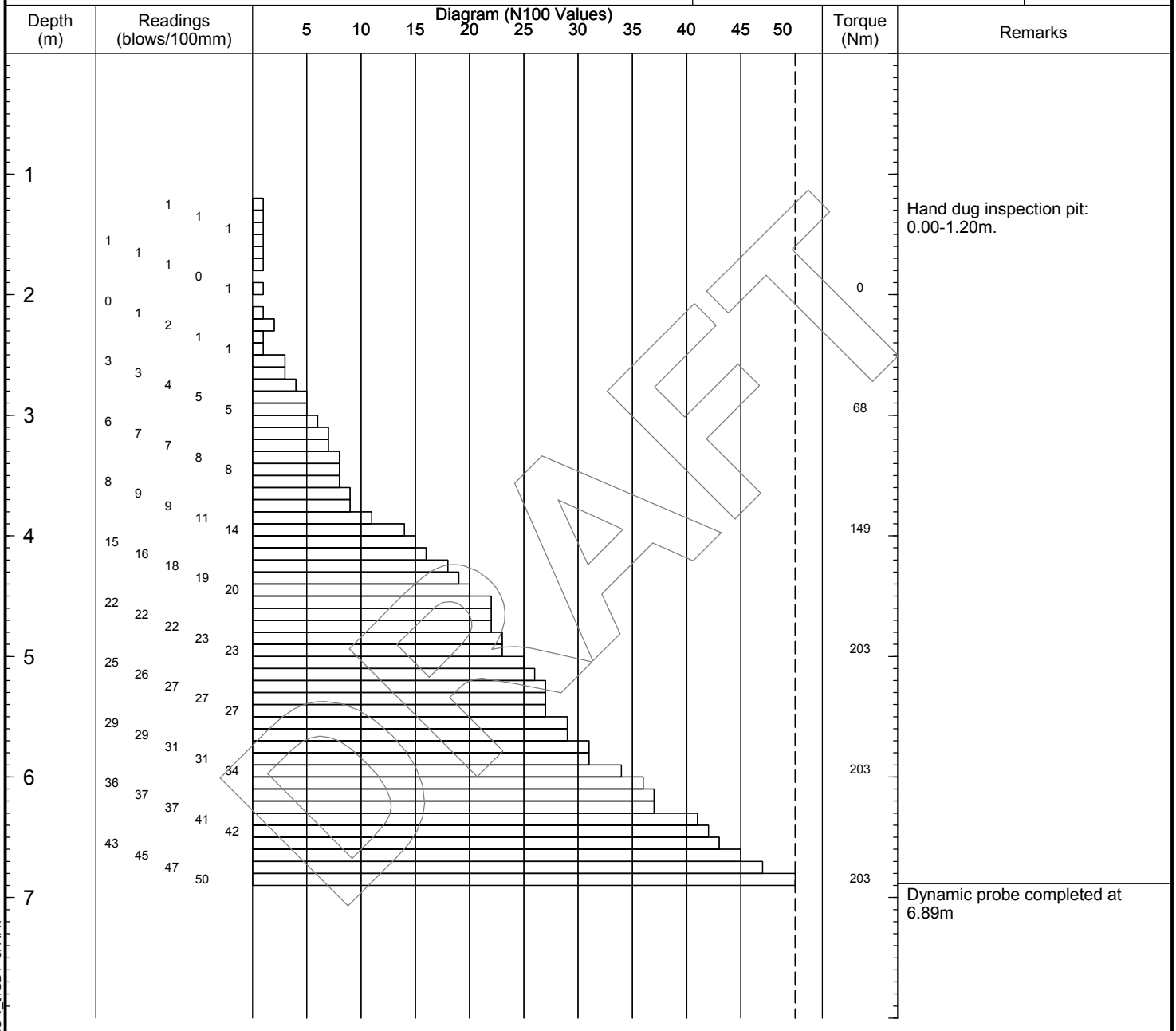
Probe No **SHDP2AMGOB_1U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N Level: mAD	Date 19/10/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 64Kg Drop Height: 750mm Cone Base Diameter: 50mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T06



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-6.98m.

REMARKS: Probing undertaken adjacent to windowless sampling - see separate sheet.

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INSPECTION PIT LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Pit No
CP2ATFB_2U
Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N Level: mAOD	Date 09/11/2017
Location: Section 2A		Dimensions: m Depth 0.80m m	Scale 1 : 12.5
Client: East West Rail Alliance			Logged By EC

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
					TOPSOIL (Grass over): Firm brown slightly sandy silty CLAY with occasional roots and rootlets (<5mm).	(0.20)		
					Firm orangish brown mottled grey slightly sandy silty CLAY with occasional gypsum crystals (<1mm).	0.20		
						(0.60)		
	Dry				Inspection pit completed at 0.80m	0.80		
1								1
2								2

EQUIPMENT: Hand digging tools.
METHOD: Hand dug inspection pit: 0.00-0.80m.
CASING: None used.
GROUNDWATER: None encoutered.
BACKFILL: Borehole was backfilled with arisings.
REMARKS: Borehole was terminated due to possible land drain, south-west/north-east orientation. Borehole moved approximately 1.00m south.

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ROTARY BOREHOLE LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Borehole No. **CP2ATFB_2U (A)**

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type DS+RC
Location: Section 2A		Level: mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 09/11/2017 End: 15/11/2017	Logged By EC

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
		B	0.20					TOPSOIL: Grass over firm brown slightly sandy silty CLAY with occasional roots and rootlets (<5mm).	0.20		
		ES						Firm orangish brown mottled grey slightly sandy silty CLAY with occasional gypsum crystals (<1mm).			
		B	0.50						(1.50)		
1		B	1.00								1
		ES									
		SPT	1.20 - 1.65	S 5				1.20-1.70m: Locally soft with frequent gypsum crystals (<1mm).			
									1.70		
2		D	1.90					Firm grey locally mottled orangish brown silty CLAY with occasional locally frequent gypsum crystals.			2
		UT100	2.00 - 2.45								
		D	2.45 - 2.55					2.40-2.55m: Slightly sandy.			
		D	2.50					2.65-2.75m: Slightly sandy.			
3		D	2.90						(2.90)		3
		SPT	3.00 - 3.45	S 6							
4		D	3.90								4
		UT100	4.00 - 4.45								
		D	4.45 - 4.55						4.60		
		H	4.80	H 91				Stiff becoming very stiff indistinctly fissured dark brown silty CLAY with occasional locally frequent shells and shell fragments (<5mm).			
5		H	4.85	H 91							5
		D	4.90	H 71							
		H	4.93	S 37							
		SPT	5.00 - 5.45					5.39-5.80m: Thinly laminated friable.	(1.70)		
		D	5.50								
6		D	5.90								6
		C	6.00 - 7.10	C*60	C	66% 0% 0%					
		SPT C	6.00 - 6.45						6.30		
								Very stiff locally thinly laminated dark brownish grey silty CLAY locally tending to extremely weak mudstone. Frequent shells and shell fragments (<20mm).			
7		D	7.00								7
		C	7.10 - 8.60	C 39	C	73% 0% 0%					
		SPT C	7.10 - 7.55								
									(2.70)		
		D	7.80								
8											8

EQUIPMENT: Hand digging tools. Comacchio Geo 205 Multi-drill track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic sampling using 128mm and 113mm sample barrels: 1.20-6.00m. Waterflush rotary coring using T6-116 coring barrel: 6.00-14.60m.
CASING: PW 140mm diameter to 4.50m.
GROUNDWATER: None encountered prior to using water flush to advance casing to 4.60m.
BACKFILL: Borehole was backfilled with bentonite pellets: 14.60-0.00m.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
09/11/2017 17:00	1.20		
10/11/2017 08:00	1.20		
10/11/2017 17:00	6.00		
11/11/2017 08:00	6.00		

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ROTARY BOREHOLE LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Borehole No. **CP2ATFB_2U (A)**

Sheet 2 of 2

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type DS+RC
Location: Section 2A		Level: mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 09/11/2017 End: 15/11/2017	Logged By EC

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
9		D C SPT C	8.50 8.60 - 10.10 8.60 - 8.95	C*71	C	95% 0% 0%		Very stiff locally thinly laminated dark brownish grey silty CLAY locally tending to extremely weak mudstone. Frequent shells and shell fragments (<20mm). *(continued from previous sheet)*			
		D	9.35		C			Very stiff thinly laminated dark grey silty CLAY locally tending to extremely weak mudstone with occasional shells (<20mm).	9.00		
10		D C SPT C	10.00 10.10 - 11.60 10.10 - 10.48	C*65	C	91% 0% 0%					
11		D	10.80		C						
12		D C SPT C	11.50 11.60 - 13.10 11.60 - 12.05	C 45	C	100% 0% 0%			(5.60)		
13		D D C SPT C D	12.85 13.00 13.10 - 14.60 13.10 - 13.49 13.30	C*63	C	99% 0% 0%					
14		D SPT C	14.50 14.60 - 15.03	C*54				Borehole completed at 14.60m	14.60		
15											
16											
17											

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
11/11/2017 17:00	13.10	4.50	3.50
14/11/2017 08:00	13.10	4.50	2.20
14/11/2017 17:00	14.60	4.50	2.30

CC GROUND INVESTIGATIONS LTD

WINDOWLESS SAMPLE LOG

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Borehole No. **WS2ACLOB_1D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type WS
Location: Section 2A		Level: mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 25/10/2017 End: 25/10/2017	Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		D	0.15				MADE GROUND: Soft to firm dark brown slightly sandy slightly gravelly CLAY with frequent roots (<2mm). Gravel is angular to sub-rounded fine to coarse of limestone, flint and brick.	0.20		
		ES						0.45		
		B	0.40				MADE GROUND: Firm to stiff friable dark brown slightly sandy slightly gravelly CLAY with occasional roots (<2mm). Gravel is angular to sub-rounded fine to coarse of flint, limestone, brick.	0.60		
		D	0.50	H >130						
		ES	0.55 - 0.60	H 101			Stiff friable light greyish brown mottled light orangish brown sandy CLAY.	(0.90)		
1		H	0.55	H 92						1
		B	0.70				Stiff light brownish grey mottled light orangish brown CLAY with occasional roots (<2mm).			
		D	0.90					1.50		
		ES	1.00 - 1.20				Stiff laminated and fissured brown mottled yellowish brown and orangish brown CLAY with occasional partings of brown and yellow silt.			
		H	1.00					(0.95)		
		H	1.60							
		B						2.45		
2		D								2
		ES	2.00 - 2.45				Stiff laminated and fissured grey CLAY with occasional partings of grey silt and fine sand.			
		D								
		UT100						(1.15)		
		D	2.60							
3										3
								3.60		
		D	3.70				Stiff laminated and fissured grey CLAY with frequent partings of grey silt and fine sand (<80mm) and occasional shells (<10mm).			
4								(0.65)		4
	Dry	D	4.15 - 4.30					4.25		
							Weak grey fossiliferous fine grained SANDSTONE.	4.30		
							Borehole completed at 4.30m			
5										5
6										6
7										7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 113mm, 101mm and 86mm sample barrels: 1.20-4.30m.
CASING: 113mm to 2.00m.
GROUNDWATER: None encountered.
BACKFILL: Borehole backfilled with bentonite pellets: 0.50-4.30m and arisings: 0.00-0.50m.
REMARKS: Dynamic Probe undertaken adjacent to borehole prior to sampling - see separate sheet. Window sampling refused at 4.30m.

Groundwater: Dry

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
25/10/2017 17:00	4.30	2.00	

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DYNAMIC PROBE LOG

EN ISO 22476-2

Telephone: 01452 739165 , Fax: 01452 739220 , Email: info@ccground.co.uk

Probe No **HDP2ACLOB_1D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N Level: mAD	Date 25/10/2017
Location: Section 2A		**Specification: DPH** Hammer Mass: 50Kg Drop Height: 500mm Cone Base Diameter: 44mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T06

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values) 5 10 15 20 25 30 35 40 45 50	Torque (Nm)	Remarks
1	1 2 2 2 1 1			Hand dug inspection pit: 0.00-1.20m.
2	3 4 3 3 2 3		0	
3	3 6 7 5 5 3		0	
4	12 30 24 19 21 29 38 50		27 27	50/50mm. Dynamic probe completed at 4.35m
5				
6				
7				

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing Heavy (DPH): 1.20-4.35m.

REMARKS: Probing undertaken adjacent to window sample - see separate sheet.

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BOREHOLE LOG

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Borehole No. **CP2ACLOB_1D**

Sheet 1 of 4

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type DS+RC
Location: Section 2A		Level: mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 01/11/2017 End: 08/11/2017	Logged By TB/EC

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		B ES	0.20				TOPSOIL: Soft dark brown slightly sandy SILT with frequent roots and rootlets (<5mm).	0.15		
		B ES	0.50				Firm brownish grey mottled orangish brown slightly sandy silty CLAY with occasional roots and rootlets (<4mm).	(0.50) 0.65		
1		B ES UT100	1.00 1.20 - 1.65				Firm becoming stiff thinly laminated brownish grey mottled orangish brown CLAY with frequent lenses of light orangish brown clayey silt (<15mm)	(1.65)		1
		D SPT	1.65 - 1.75 1.75 - 2.20	S 9						
2		D H UT100	2.20 2.30 2.30 - 2.75	H 63			Firm becoming stiff grey CLAY with rare angular medium sized gypsum crystals (<30mm).	2.30		2
		D SPT	2.75 - 2.85 2.85 - 3.30	S 16				(1.30)		
3		D D H	3.10 3.30 - 3.75 3.30	H 75			3.30m: Firm to stiff.			3
		D SPT D H D C	3.75 - 3.85 3.85 - 4.30 3.90 4.00 4.10 4.30 - 5.30	S 38 H 77			Stiff becoming very stiff thinly laminated grey silty CLAY with frequent comminuted bivalve shells (<15mm). 3.75-4.15m: Occasional thin beds of silt and fine sand (<3mm). 4.20m: Well preserved belemnite fossil (22mm).	3.60 (0.70) 4.30		4
5		B	4.90		C		Very dense grey clayey SAND with frequent comminuted bivalve shells (2mm-20mm).	(1.90)		5
		C SPT	5.30 - 6.80 5.30 - 5.54	S*136						
6		H	6.10		C		Stiff becoming very stiff thinly laminated dark grey silty CLAY with occasional comminuted bivalve shells (3mm-25mm) and occasional silt lenses (<2mm).	6.20		6
		D	6.50							
7		C SPT	6.80 - 8.30 6.80 - 7.25	S 27						7
		D	7.20		C			(2.15)		
8		CS	7.69 - 7.90							8

EQUIPMENT: Hand digging tools. Comacchio MC305 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic sampling using 128mm and 113mm sample barrels: 1.20-4.30m. Waterflush rotary coring using T6-116 coring barrel: 4.30-28.70m.
CASING: SW to 4.30m.
GROUNDWATER: None encountered prior to using water flush to advance casing.
BACKFILL: Borehole was backfilled with bentonite pellets: 28.70-1.20m and arisings: 1.20-0.00m.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
01/11/2017 17:00	4.30		
02/11/2017 08:00	4.30	4.30	

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BOREHOLE LOG

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Borehole No. **CP2ACLOB_1D**

Sheet 2 of 4

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type DS+RC
Location: Section 2A		Level: mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 01/11/2017 End: 08/11/2017	Logged By TB/EC

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		C SPT	8.30 - 9.80 8.30 - 8.48	S*115	C		Medium strong thinly bedded light grey fossiliferous LIMESTONE. Discontinuities are closely spaced stepped rough with fine sand infill (<6mm).	8.35		
9		CS	9.28 - 9.59		C		9.60m: Light grey frequent comminuted bivalve shells (5mm-23mm).			9
		C SPT C CS	9.80 - 11.30 9.80 - 9.98 10.02 - 10.26	C*286				(3.45)		
10										10
11		C SPT C	11.30 - 11.80 11.30 - 11.65	C*150	C					11
12		C	11.80 - 13.10				Very stiff thinly laminated grey silty CLAY locally tending to extremely weak mudstone with medium spaced beds (<300mm) strong light grey LIMESTONE.	11.80		12
		D CS	12.30 12.41 - 12.60		C					
13		D C SPT C	13.00 13.10 - 14.60 13.10 - 13.14	C**				(3.20)		13
14		D	13.80		C					14
		CS C SPT C	14.45 - 14.60 14.60 - 16.10 14.60 - 14.66	C*750						
15		CS	15.41 - 15.67		C		Very strong very light grey shelly LIMESTONE. Discontinuities are horizontal medium locally closely spaced undulating rough locally stained orangish brown.	15.00		15
								(1.35)		
16		D C SPT C	15.90 16.10 - 17.60 16.10 - 16.14	C**						16
							Very stiff dark grey mottled dark green slightly sandy silty CLAY.	16.35		
		D	16.60					(0.65)		
17		D	16.90		C			17.00		17
		CS	17.21 - 17.45				17.00-17.05m: Extremely closely spaced. Very strong locally strong light grey locally grey shelly LIMESTONE. Discontinuities are sub-horizontal closely spaced locally medium spaced undulating rough. 17.40-17.55m: Very stiff light grey mottled grey slightly sandy			
					C					

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
02/11/2017 17:00	11.30	4.30	3.08
06/11/2017 08:00	11.30	4.30	1.70
06/11/2017 17:00	17.60	4.30	2.40
07/11/2017 08:00	17.60	4.30	2.02

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BOREHOLE LOG

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Borehole No. **CP2ACLOB_1D**

Sheet 3 of 4

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type DS+RC
Location: Section 2A		Level: mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 01/11/2017 End: 08/11/2017	Logged By TB/EC

(m)	Water Levels	Samples & In Situ Testing: No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		C	17.60 - 19.10	C*429			silty clay.			
18		SPT C	17.60 - 17.69				Very strong locally strong light grey locally grey shelly LIMESTONE. Discontinuities are sub-horizontal closely spaced locally medium spaced undulating rough. *(continued from previous sheet)*			18
					C		17.90-18.25m: 1no discontinuity sub-vertical stepped rough.			
		D	18.70							
19		CS	18.88 - 19.10				18.90-18.95m: Grey.			19
		C	19.10 - 20.60	C**						
		SPT C	19.10 - 19.14				19.20-19.40m: Extremely weak grey.			
		D	19.40							
		D	19.80		C		19.70-19.75m: Stiff light grey sandy clay.			
20							19.85-20.15m: Non intact, recovered as slightly clayey sandy angular fine to coarse gravel fragments.			20
		CS	20.37 - 20.60							
		D	20.40							
		C	20.60 - 22.10	C*500						
		SPT C	20.60 - 20.65							
21					C					21
		D	21.60							
		CS	21.68 - 21.95							
22		C	22.10 - 23.60							22
							22.25-22.30m: Extremely closely spaced discontinuities.			
		D	22.70		C		22.70-22.75m: Extremely closely spaced discontinuities.	(11.70)		
23							22.85-23.45m: 1no sub-vertical incipient discontinuity.			23
		D	23.30				23.25-23.30m: Extremely closely spaced.			
		CS	23.36 - 23.60							
		C	23.60 - 25.10	C*750						
		SPT C	23.60 - 23.63							
24					C		24.40-24.45m: Grey.			24
		CS	24.81 - 25.04							
25		C	25.10 - 26.60				25.05-25.40m: Very weak dark grey mottled grey.			25
							25.40-25.50m: Firm to stiff slightly gravelly sandy clay.			
					C					
26							26.00-26.10m: Dark grey.			26
		CS	26.38 - 26.60							
		C	26.60 - 28.00	C*600						
		SPT C	26.60 - 26.63							
27					C					27

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
07/11/2017 17:00	26.60	4.30	2.68
08/11/2017 08:00	26.60	4.30	2.90

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BOREHOLE LOG

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Borehole No. **CP2ACLOB_1D**

Sheet 4 of 4

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type DS+RC
Location: Section 2A		Level: mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 01/11/2017 End: 08/11/2017	Logged By TB/EC

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
28		CS	27.67 - 27.90		C		Very strong locally strong light grey locally grey shelly LIMESTONE. Discontinuities are sub-horizontal closely spaced locally medium spaced undulating rough. *(continued from previous sheet)*			
		C	28.00 - 28.70							
		CS	28.43 - 28.59		C					
							Borehole completed at 28.70m	28.70		
29										
30										
31										
32										
33										
34										
35										
36										
37										

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
08/11/2017 17:00	28.70	4.30	

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BOREHOLE LOG

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Borehole No. **CP2AJLFB_2U**

Sheet 1 of 2

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type DS+RC
Location: Section 2A		Level: mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 16/11/2017 End: 21/11/2017	Logged By EC/JE

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		B ES	0.20				TOPSOIL: Soft dark brown slightly sandy clayey SILT with frequent roots and rootlets (<30mm).	(0.40)		
	1	B ES	0.50				Firm light brown slightly sandy silty CLAY.	0.40		
1		B	1.00					(0.80)		1
		SPT C	1.20 - 1.65	S 3			Firm brown mottled grey silty CLAY with occasional decomposed roots and rootlets (<5mm).	1.20		
2		D UT100	1.90 2.00 - 2.45				2.20-3.00m: Grey.	(1.80)		2
		D	2.45 - 2.55							
3		C SPT C	3.00 - 4.00 3.00 - 3.45	C*429	C		Medium strong grey shelly LIMESTONE. Discontinuities are horizontal medium spaced locally closely spaced undulating rough.	3.00		3
4		C SPT C	4.00 - 5.00 4.00 - 4.18	C*500	C			(3.00)		4
		CS	4.72 - 5.00							
5		C SPT C	5.00 - 6.00 5.00 - 5.04	C*750	C		5.40-5.50m: 1no. open fracture (100mm) infilled with firm grey clay.			5
		CS	5.74 - 5.89				5.80-6.00m: Black.			
6		C SPT C	6.00 - 7.50 6.00 - 6.45	C*23	C		Stiff to very stiff indistinctly laminated grey silty CLAY with occasional fine to medium sand sized comminuted shell fragments (2-20mm) and calcareous nodules.	6.00		6
								(1.25)		
7		D	6.90							7
							Medium strong locally strong grey mottled dark grey shelly LIMESTONE. Discontinuities are closely spaced stepped rough with fine sand infill (30mm).	7.25 (0.50)		
		C CS D	7.50 - 8.50 7.50 - 7.70 7.50		C		*(continued on next sheet)*	7.75		
8										8

EQUIPMENT: Hand digging tools. Fraste multi-purpose ML track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic sampling using 128mm sample barrel: 1.20-3.00m. Waterflush rotary coring using T6-116 coring barrel: 3.00-14.00m.
CASING: SW to 3.00m.
GROUNDWATER: Encountered at 0.60m, no rise recorded. Artesian water encountered 12.50-14.00m. Rose to 2.85m above headworks.
BACKFILL: Borehole backfilled with bentonite pellets: 14.00-0.50m and arisings 0.50-0.00m. Hand shear vane testing not possible due to strength of clay.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
16/11/17	0.60		

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
16/11/2017 17:00	1.20		0.60
17/11/2017 17:00	7.00	3.00	1.80
20/11/2017 08:00	7.00	3.00	0.60

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BOREHOLE LOG

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Borehole No. **CP2AJLFB_2U**

Sheet 2 of 2

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type DS+RC
Location: Section 2A		Level: mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 16/11/2017 End: 21/11/2017	Logged By EC/JE

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		D	8.00				Very stiff thinly laminated grey silty CLAY with occasional fine gravel sized comminuted shell fragments (2-6mm). *(continued from previous sheet)*	(0.75)		
		C	8.50 - 9.50				8.30-8.40m: Medium strong light grey limestone.	8.50		
							Very stiff grey calcareous silty CLAY.			
9		D	9.00					(0.90)		9
		CS	9.35 - 9.50					9.40		
		C	9.50 - 11.00				Medium strong light grey oolitic LIMESTONE with frequent coarse sand sized comminuted shell fragments (<2mm). Discontinuities are closely spaced undulating rough locally stained orangish brown.			
10							10.00-10.30m: Occasional fine to medium gravel sized shell fragments.			10
11		C	11.00 - 12.50				11.00-11.60m: Weak grey.			11
		CS	11.30 - 11.55					(4.10)		
12							12.00m: Locally non intact, recovered as angular to sub-angular fine to medium gravel.			12
		C	12.50 - 14.00							
13										13
							Firm (drilling disturbed) grey silty CLAY with frequent fine gravel sized comminuted shell fragments (<6mm).	13.50 (0.50)		
14							Borehole completed at 14.00m	14.00		14
15										15
16										16
17										17

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
20/11/2017 17:00	14.00	3.00	2.85

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WINDOWLESS SAMPLE LOG

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Borehole No. **WS2A109_U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type WS
Location: Section 2A		Level: mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 03/11/2017 End: 03/11/2017	Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		D ES	0.20				TOPSOIL: Stiff friable dark brown slightly sandy slightly gravelly CLAY with frequent roots (<3mm). Gravel is angular to sub-rounded fine to coarse of siliceous material.	0.30		
		B D ES	0.50 - 0.60 0.50				Stiff brown mottled grey slightly sandy slightly gravelly CLAY with occasional roots (<3mm). Gravel is sub-angular to sub-rounded fine to coarse of siliceous material.	(0.60) 0.90		
1		B D ES	1.00 - 1.10 1.00				Stiff to very stiff fissured light brown mottled light grey CLAY with occasional roots and with frequent shells and occasional fine gravel sized pockets of white calcareous silt.	(0.70)		1
		D	1.40					1.60		
		D	1.80				Stiff fissured light brown mottled light grey CLAY.	(0.60)		
2		UT100	2.00 - 2.45					2.20		2
		D	2.55				Stiff fissured dark greyish brown CLAY with occasional partings (<10mm) of white silt.	2.55		
		D	2.80				Firm to stiff fissured, locally laminated, dark greyish brown CLAY with rare sand sized gypsum crystals and fragments of lignite (<20mm).			
3							3.30-4.90m: Locally firm.			3
		D	3.50					(2.35)		
		ES	3.90							
4		UT100	4.00 - 4.45							4
		D	4.55							
5							Stiff to very stiff fissured dark brownish grey CLAY with occasional fine to medium gravel sized shell fragments (<20mm).	4.90		5
		D	5.50					(1.55)		
6		UT100	6.00 - 6.45							6
							6.45m: Dry. Borehole completed at 6.45m	6.45		
7										7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 113mm, 98mm and 84mm sample barrels: 1.20-6.00m.
CASING: 128mm to 4.00m.
GROUNDWATER: None encountered.
INSTALLATION: 50mm ID HDPE slotted pipe with washed gravel response zone: 1.45-6.45m. 50mm ID HDPE plain pipe with bentonite pellet seal: 1.45-0.20m. Raised borehole helmet set in concrete: 0.00-0.20m. Gas valve fitted.
REMARKS: Dynamic Probe undertaken prior to sampling - see separate sheet. Hand shear vane testing not possible due to strength of clay.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
03/11/2017 00:00	6.45	4.00	

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DYNAMIC PROBE LOG

EN ISO 22476-2

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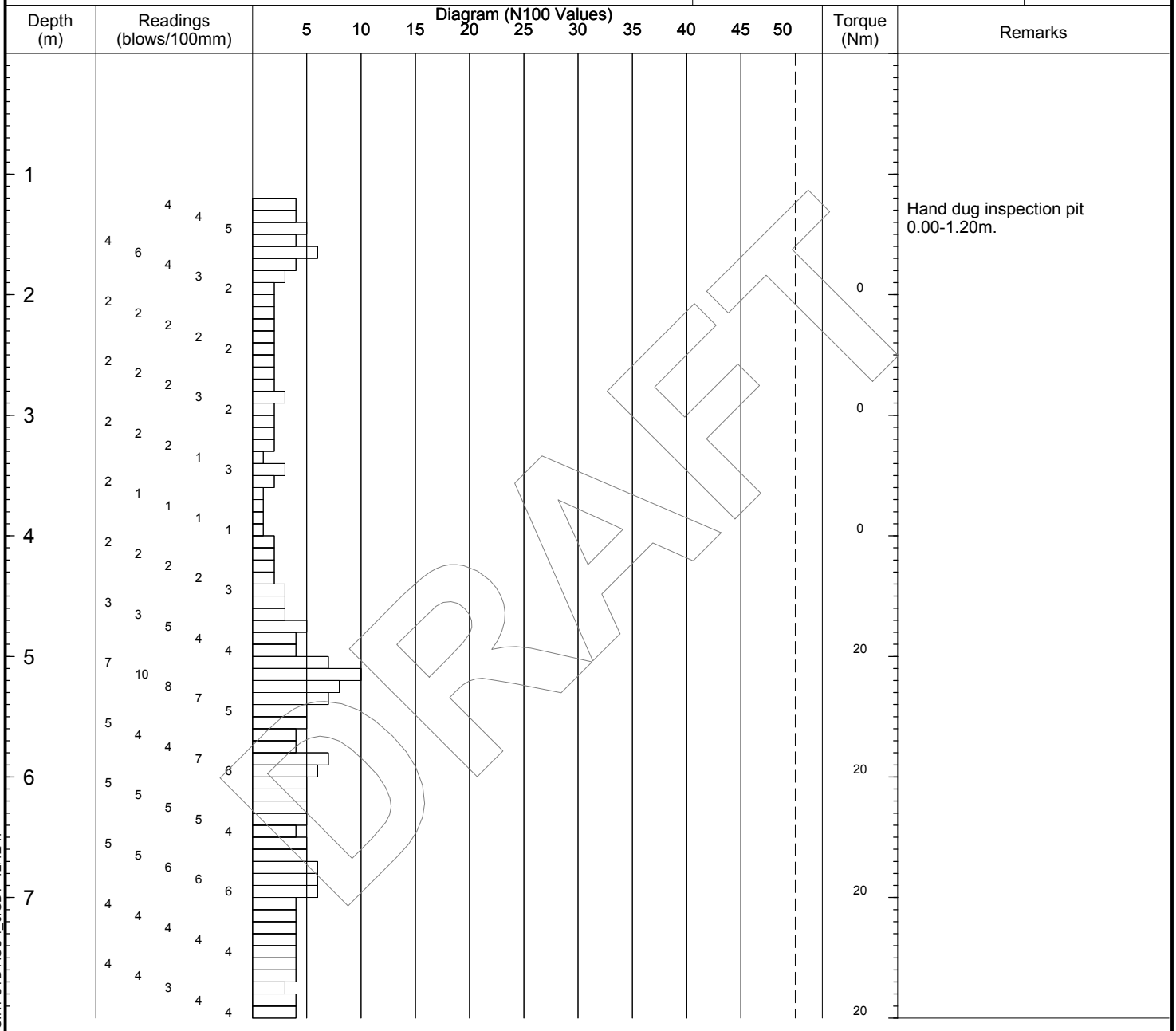
Probe No **SHDP2A109_U**

Sheet 1 of 2

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N Level: mAD	Date 03/11/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-8.00m.

REMARKS: Probing undertaken prior to windowless sampling - see separate sheet.

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DYNAMIC PROBE LOG

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Probe No **SHDP2A109_U**

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N Level: mAD	Date 03/11/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values) 5 10 15 20 25 30 35 40 45 50	Torque (Nm)	Remarks
				Dynamic probe completed at 8.00m
9				
10				
11				
12				
13				
14				
15				

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-8.00m.

REMARKS: Probing undertaken prior to windowless sampling - see separate sheet.

CC Ground Investigations Ltd

TRIAL PIT LOG

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Pit No **TP2ABR_2D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 460367 N 223091 Level: 69.98mAOD	Date 06/12/2017
Location: Section 2A		Dimensions: 2.00m Depth 2.00m 0.50m	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
		D ES	0.20		TOPSOIL: Soft friable dark brown very sandy CLAY with frequent roots. Sand is fine.	(0.30)		
					Stiff friable brown mottled dark orangish brown sandy CLAY with frequent roots. Sand is fine.	0.30	69.68	
		B D ES H	0.50 - 0.60 0.50	97		(0.30)		
		H	0.80	104	Stiff locally stiff fissured light grey mottled light brown and light orangish brown slightly sandy CLAY with occasional roots. Sand is fine.	0.60	69.38	
1		B D ES H	1.00 - 1.10 1.00	124		(1.00)		1
		D	1.50					
		B	1.80 - 2.00		Stiff fissured dark brown mottled light yellowish brown CLAY with occasional partings and very thin lenses (<30mm) of yellow and dark orangish brown silt.	1.60	68.38	
						(0.40)		
2					2.00m: Dry Trial pit completed at 2.00m	2.00	67.98	2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pits excavated using 0.60m bucket.

GROUNDWATER: Not encountered.

BACKFILL: Trial pit was backfilled with compacted arisings upon completion.

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TRIAL PIT LOG

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Pit No **P2ACLOB_1U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 460150 N 223083 Level: 69.41mAOD	Date 06/12/2017
Location: Section 2A		Dimensions: 2.00m Depth 2.00m 0.50m	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
		D ES	0.20		MADE GROUND: Soft dark brown slightly sandy slightly gravelly CLAY with frequent roots. Sand is fine. Gravel is sub-angular to rounded fine to coarse of flint.	0.15	69.26	
					MADE GROUND: Soft friable dark brown slightly gravelly sandy CLAY with a low cobble content and occasional roots. Gravel is angular to rounded fine to coarse of flint, quartzitic, tarmacadam, sandstone and brick. Cobbles are of bick, tarmacadam.	(0.45)		
		B ES H	0.50 - 0.60 0.50 0.60	115	Stiff locally stiff fissured light brown mottled light orangish and light greyish brown slightly sandy CLAY with occasional roots. Sand is fine.	0.60	68.81	
		H	0.75	114		(0.70)		
1		B D ES H	1.00 - 1.20 1.00 1.10 - 1.20	119				1
		B D	1.40		Stiff light grey mottled light brown and light orangish brown slightly sandy locally sandy silty CLAY. Sand is fine.	1.30 (0.20)	68.11	
		D	1.60		Soft to firm dark orangish brown mottled brown and light grey very sandy CLAY. Sand is fine.	1.50 (0.20)	67.91	
		B B	1.80 - 2.00 1.81 - 2.00		Light grey mottled light brown and light orangish brown clayey silty fine SAND.	1.70 (0.30)	67.71	
2					2.00m: Dry Trial pit completed at 2.00m	2.00	67.41	2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pits excavated using 0.60m bucket.

GROUNDWATER: None encountered.

BACKFILL: Trial pit was backfilled with compacted arisings upon completion.

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TRIAL PIT LOG

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Pit No **P2ACLOB_3D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 460142 N 222724 Level: 68.81mAOD	Date 05/12/2017
Location: Section 2A		Dimensions: 2.00m Depth 2.00m 0.50m	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
		D	0.10		MADE GROUND: Soft dark brown slightly sandy slightly gravelly CLAY with frequent roots . Sand is fine. Gravel is sub-angular to rounded fine to coarse of flint.	(0.20)		
		D ES	0.25		EMBANKMENT FILL: Firm light brown mottled light orangish brown and light grey CLAY with occasional roots.	0.20 (0.25)	68.61	
		D ES H B	0.50 0.60 - 0.80	72	Firm to stiff friable brown mottled orangish brown and light grey slightly sandy CLAY with occasional roots. Sand is fine.	0.45 (0.40)	68.36	
		H	0.80	79	Stiff fissured light brown mottled light orangish and light greyish brown CLAY with occasional rootlets.	0.85	67.96	
1		B ES B H	1.00 - 1.10 1.00 1.01 - 1.10 1.20	93		(0.95)		1
		D H	1.50	112				
		B B	1.80 - 2.00 1.81 - 2.00		Firm to stiff fissured greyish brown mottled light yellowish and orangish brown slightly sandy CLAY with occasional partings and very thin lenses (<30mm) of yellow and dark orangish brown silt. Sand is fine.	1.80 (0.20)	67.01	
2					2.00m: Dry Trial pit completed at 2.00m	2.00	66.81	2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pits excavated using 0.60m bucket.

GROUNDWATER: None encountered.

BACKFILL: Trial pit was backfilled with compacted arisings upon completion.

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TRIAL PIT LOG

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Pit No **P2ACLOB_4D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 460140 N 222921 Level: 69.80mAOD	Date 05/12/2017
Location: Section 2A		Dimensions: 2.00m Depth 2.00m 0.50m	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
		D	0.10		MADE GROUND: Soft friable dark brown slightly gravelly sandy CLAY with occasional roots. Sand is fine. Gravel is sub-angular to rounded fine to coarse of flint.	(0.20)		
						0.20	69.60	
		D ES	0.30		EMBANKMENT FILL: Firm friable brown slightly sandy slightly gravelly CLAY with occasional roots. Sand is fine. Gravel is sub-angular to rounded fine to coarse predominantly of flint.	(0.20)		
						0.40	69.40	
		D ES H	0.50	111	Stiff fissured light brown mottled light orangish and light greyish brown CLAY with occasional rootlets.			
1		B ES H B	1.00 - 1.10 1.00 1.01 - 1.10	80		(1.00)		1
		H	1.30	86				
		D	1.50		Sstiff fissured greyish brown mottled light yellowish and orangish brown slightly sandy CLAY with occasional partings and very thin lenses (<30mm) of yellow and dark orangish brown silt. Sand is fine.	1.40	68.40	
						(0.60)		
		B	1.90 - 2.00					
2		B	1.91 - 2.00		2.00m: Dry Trial pit completed at 2.00m	2.00	67.80	2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pits excavated using 0.60m bucket.

GROUNDWATER: None encountered.

BACKFILL: Trial pit was backfilled with compacted arisings upon completion.

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TRIAL PIT LOG

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Pit No **P2ACLOB_4U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E 460106 N 222952 Level: 69.46mAOD	Date 06/12/2017
Location: Section 2A		Dimensions: 2.00m Depth 1.60m 0.50m	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
		D ES	0.10		TOPSOIL: Soft friable dark brown slightly gravelly sandy CLAY with occasional roots. Sand is fine. Gravel is sub-angular to rounded of quartzitic and flint.	(0.30)		
					Stiff friable light brown mottled light orangish brown and light grey sandy to very sandy CLAY with occasional roots. Sand is fine.	0.30	69.16	
		D ES H	0.50	112		(0.60)		
		H	0.80	122				
1					Stiff fissured light brown mottled light orangish brown and light grey slightly sandy CLAY with occasional rootlets. Sand is fine.	0.90	68.56	1
		B H B	1.00 - 1.10 1.00 1.01 - 1.10	96		(0.50)		
					Stiff fissured light grey mottled light brown and light orangish brown sandy locally very sandy CLAY with occasional rootlets. Sand is fine.	1.40	68.06	
		B D B	1.50 - 1.60 1.50 1.51 - 1.60			(0.20)		
					1.60m: Dry Trial pit completed at 1.60m	1.60	67.86	
2								2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pits excavated using 0.60m bucket.

GROUNDWATER: None encountered.

BACKFILL: Trial pit was backfilled with compacted arisings upon completion.

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DYNAMIC PROBE LOG

EN ISO 22476-2

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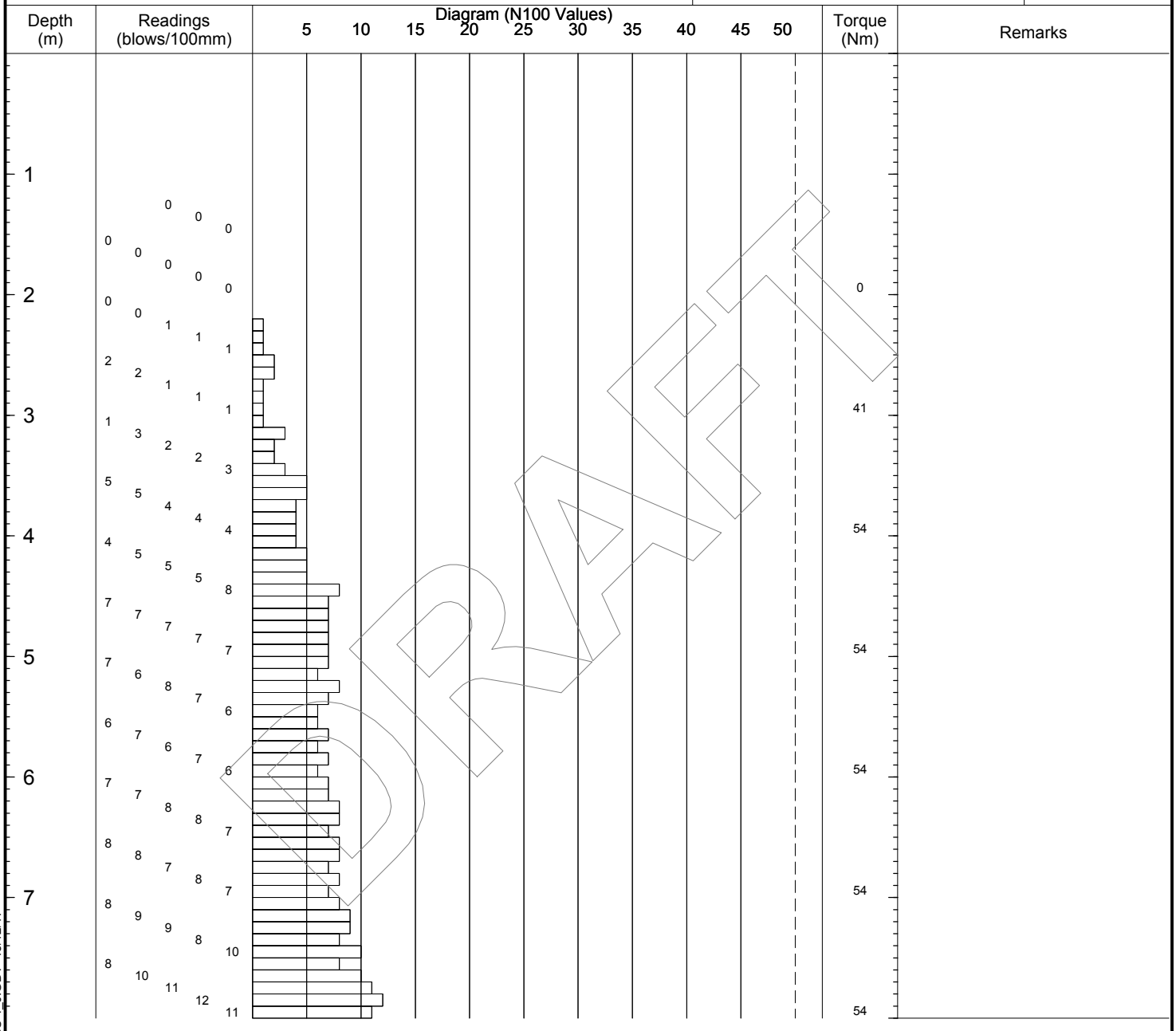
Probe No **SHDP2APDN_2U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Ground Investigation	Project No: **C5759**	Co-ords: E N Level: mAD	Date 06/12/2017
Location: Section 2A		**Specification: DPSH-B** Hammer Mass: 63Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T04



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-8.00m.

REMARKS: Probing undertaken adjacent to window sampling - see separate sheet.

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DYNAMIC PROBE LOG

EN ISO 22476-2

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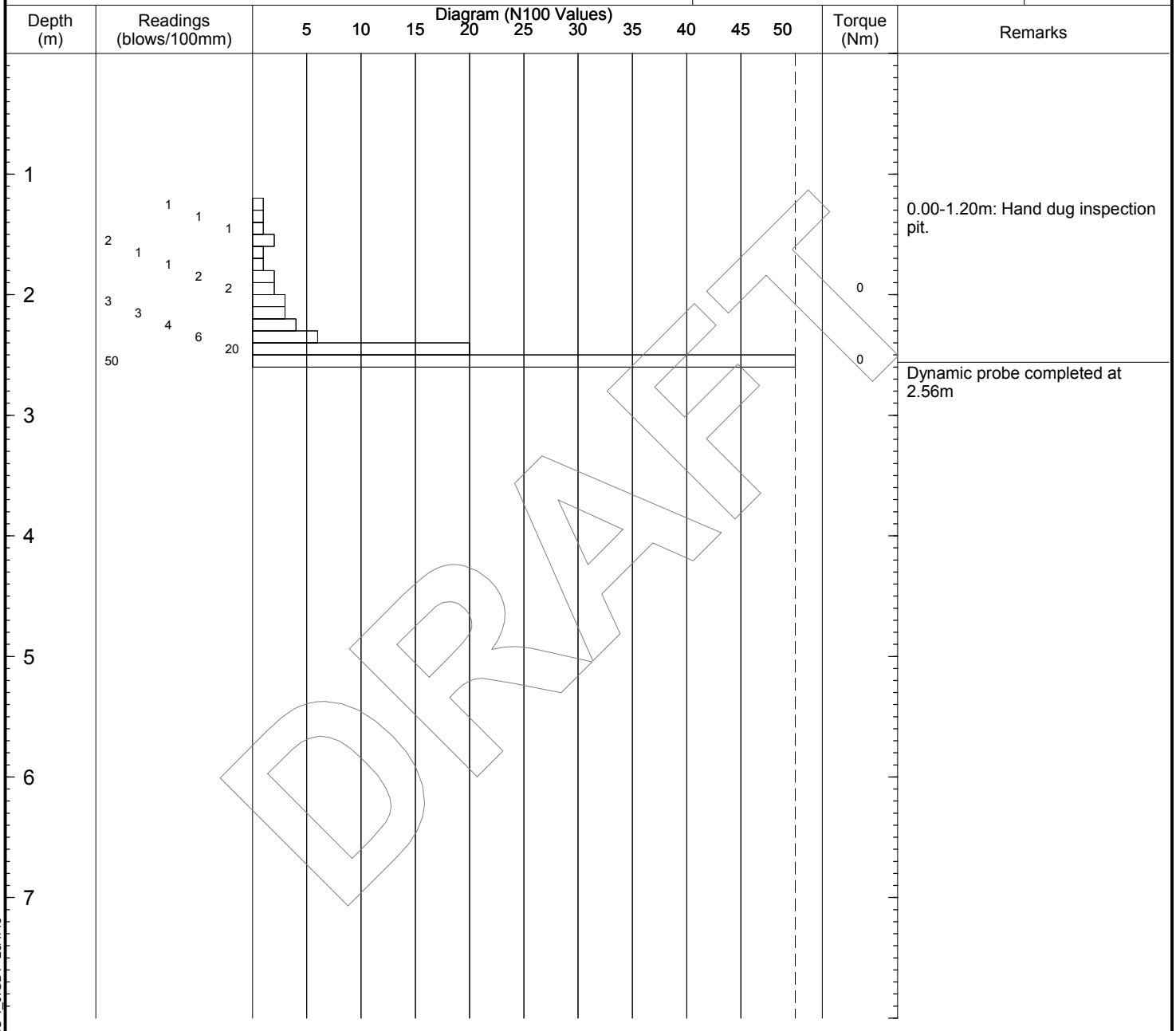
Probe No
HDP2A101_C

Sheet 1 of 1

Project Name: East West Rail Phase 2 Grip 4 Ground Investigation	Project No: **C5759**	Co-ords: E 467284 N 225359 Level: 89.15mAD	Date 08/01/2018
Location: Section 2A		**Specification: DPH** Hammer Mass: 50Kg Drop Height: 500mm Cone Base Diameter: 44mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing heavy (DPH): 1.20-2.56m.

REMARKS: On completion hole backfilled with arisings.

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DYNAMIC PROBE LOG

EN ISO 22476-2

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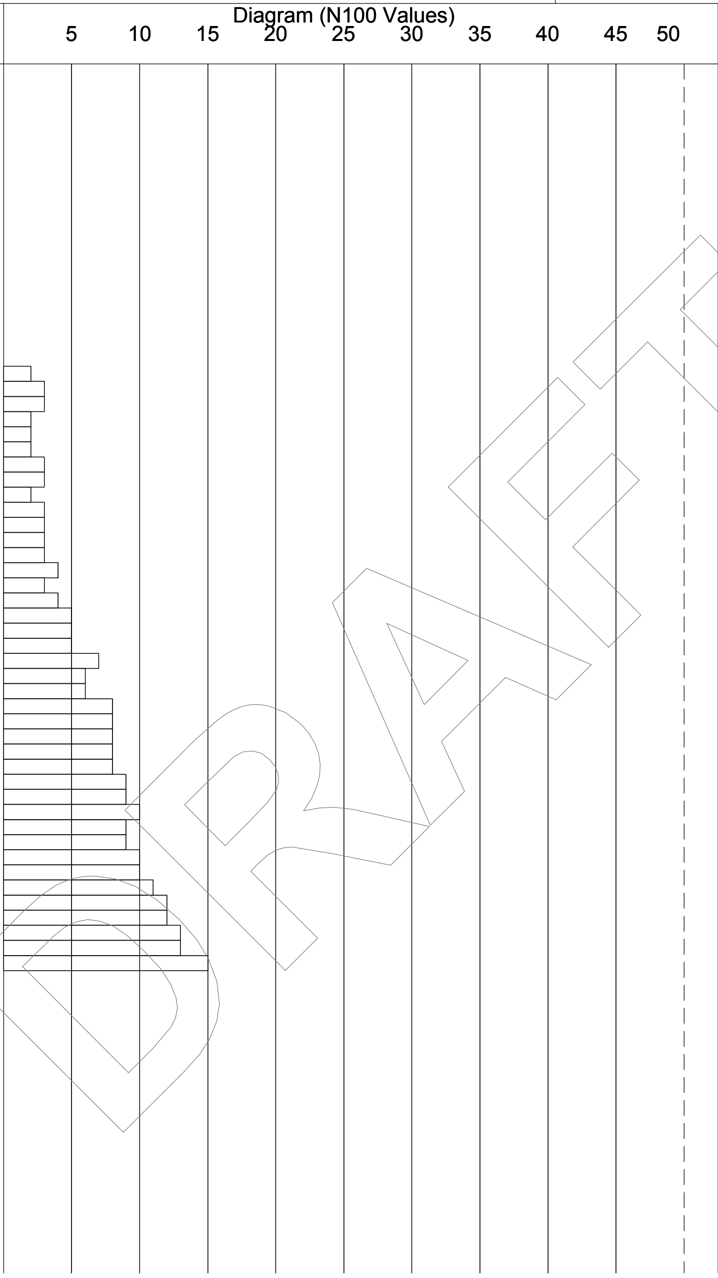
Probe No **HDP2A102_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Grip 4 Ground Investigation	Project No: **C5759**	Co-ords: E 466902 N 225255 Level: 89.60mAD	Date 08/01/2018
Location: Section 2A		**Specification: DPH** Hammer Mass: 50Kg	Scale 1 : 50
Client: East West Rail Alliance		Drop Height: 500mm Cone Base Diameter: 44mm	Rig No. T07

Depth (m)	Readings (blows/100mm)	Torque (Nm)	Remarks
1.20-1.50	0 0 0		0.00-1.20m: Hand dug inspection pit.
1.50-2.00	0 0 0 0 0	0	
2.00-2.50	2 3 3 2 2		
2.50-3.00	2 3 3 2 3	27	
3.00-3.50	3 3 3 4 3		
3.50-4.00	4 5 5 5 7	54	
4.00-4.50	6 6 8 8 8		
4.50-5.00	8 8 9 9 10	54	
5.00-5.50	9 9 10 10 11		
5.50-6.00	12 12 13 13 15	54	Dynamic probe completed at 6.00m

Diagram (N100 Values)



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing heavy (DPH): 1.20-6.00m.

REMARKS: On completion hole backfilled with arisings.

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DYNAMIC PROBE LOG

EN ISO 22476-2

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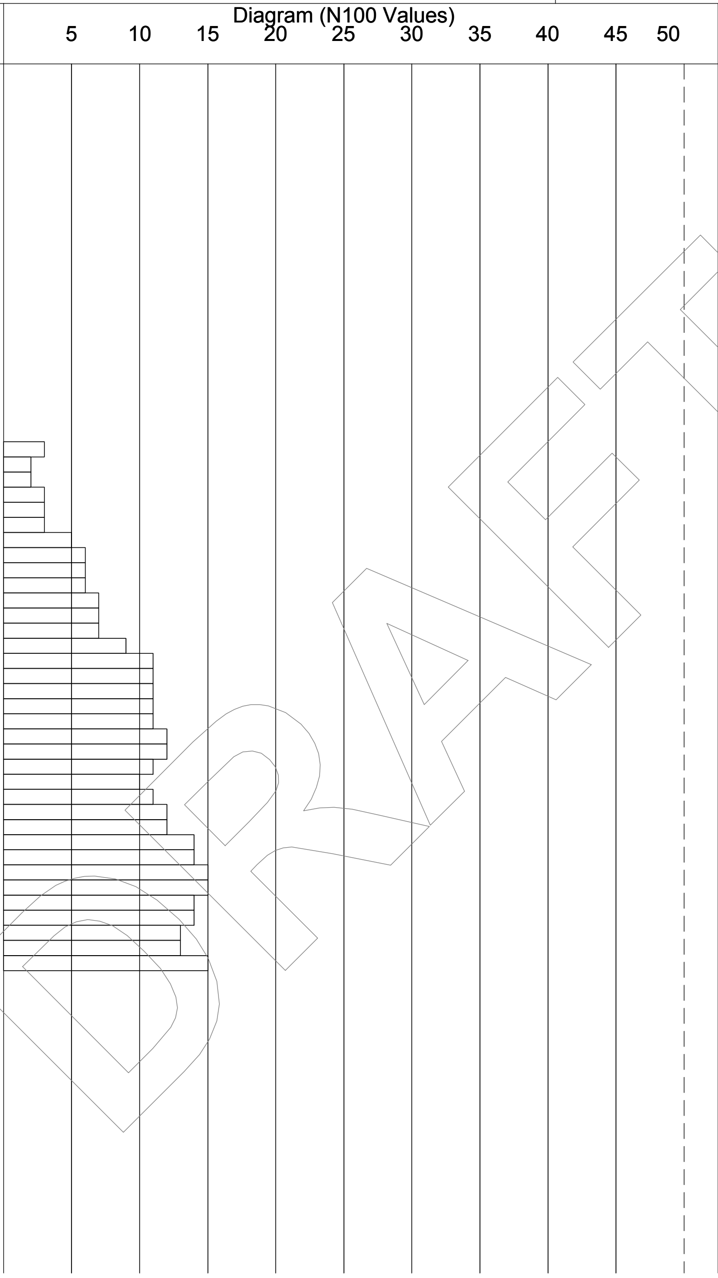
Project Name: East West Rail Phase 2 Grip 4 Ground Investigation	Project No: **C5759**	Co-ords: E 464891 N 224533 Level: 86.77mAD	Probe No **HDP2A105_C** Sheet 1 of 1 Date 08/01/2018
Location: Section 2A		**Specification: DPH** Hammer Mass: 50Kg Drop Height: 500mm Cone Base Diameter: 44mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07

Depth (m)	Readings (blows/100mm)	Torque (Nm)	Remarks
1.20-1.70	0, 0, 0, 0, 0		0.00-1.20m: Hand dug inspection pit.
1.70-2.20	0, 0, 0, 0, 0	14 (2.00)	
2.20-2.70	0, 0, 0, 0, 0		
2.70-3.20	3, 2, 2, 3, 3	54 (3.00)	
3.20-3.70	3, 5, 6, 6, 6		
3.70-4.20	7, 7, 7, 9, 11	54 (4.00)	
4.20-4.70	11, 11, 11, 11, 12		
4.70-5.20	12, 11, 10, 11, 12	54 (5.00)	
5.20-5.70	12, 14, 14, 15, 15		
5.70-6.00	14, 14, 13, 13, 15	54 (6.00)	Dynamic probe completed at 6.00m

Diagram (N100 Values)



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing heavy (DPH): 1.20-6.00m.
REMARKS: On completion hole backfilled with arisings.

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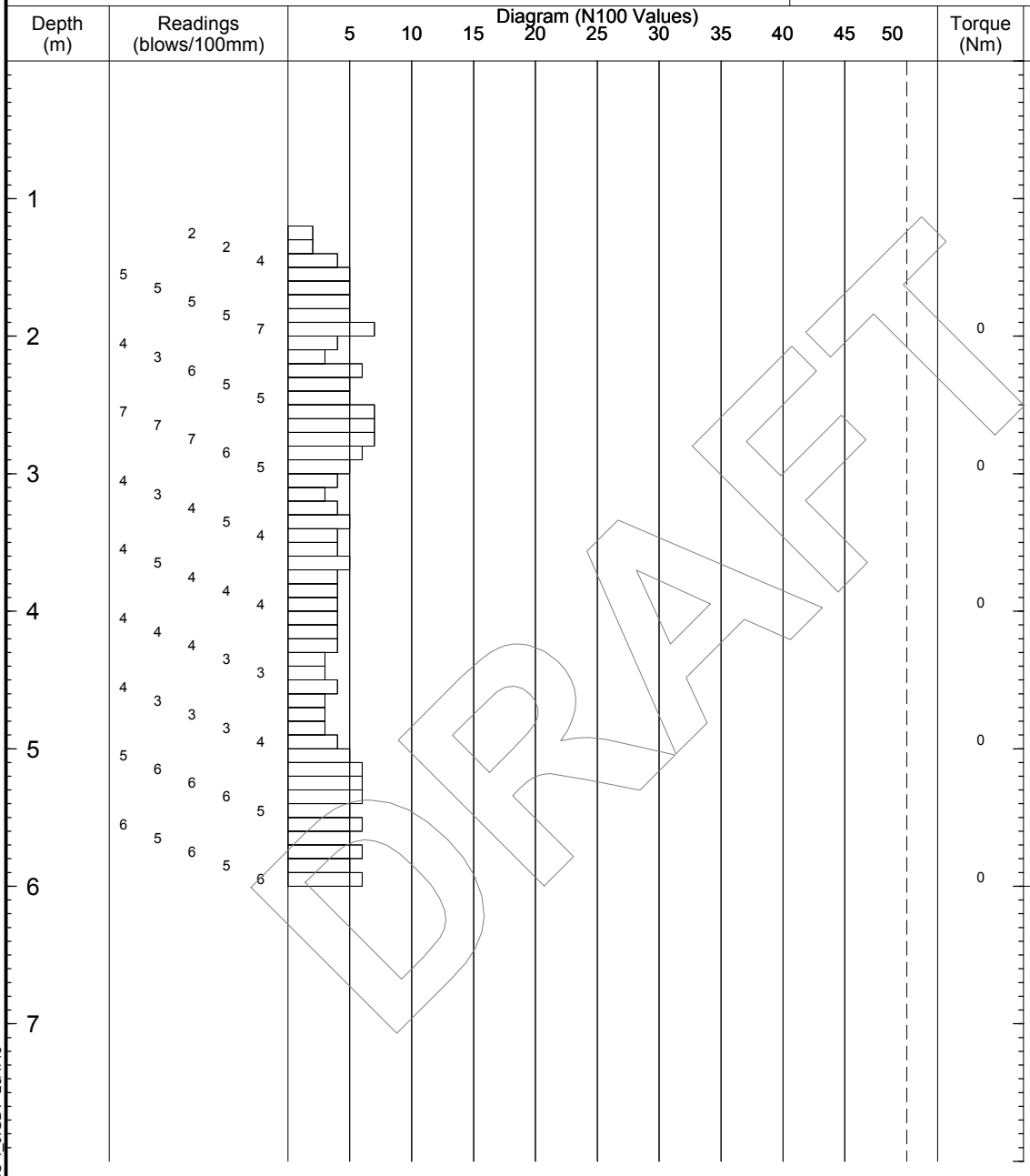
DYNAMIC PROBE LOG

EN ISO 22476-2

Telephone: 01452 739 165 , Fax: 01452 739 220 , Email: info@CCGround.co.uk

Probe No
HDP2A107_C
Sheet 1 of 1

Project Name: East West Rail Phase 2 Grip 4 Ground Investigation	Project No: **C5759**	Co-ords: E 464643 N 224436 Level: 86.18mAD	Date 08/01/2018
Location: Section 2A		**Specification: DPH** Hammer Mass: 50Kg Drop Height: 500mm Cone Base Diameter: 44mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing heavy (DPH): 1.20-6.00m.

REMARKS: On completion hole backfilled with arisings.

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DYNAMIC PROBE LOG

EN ISO 22476-2

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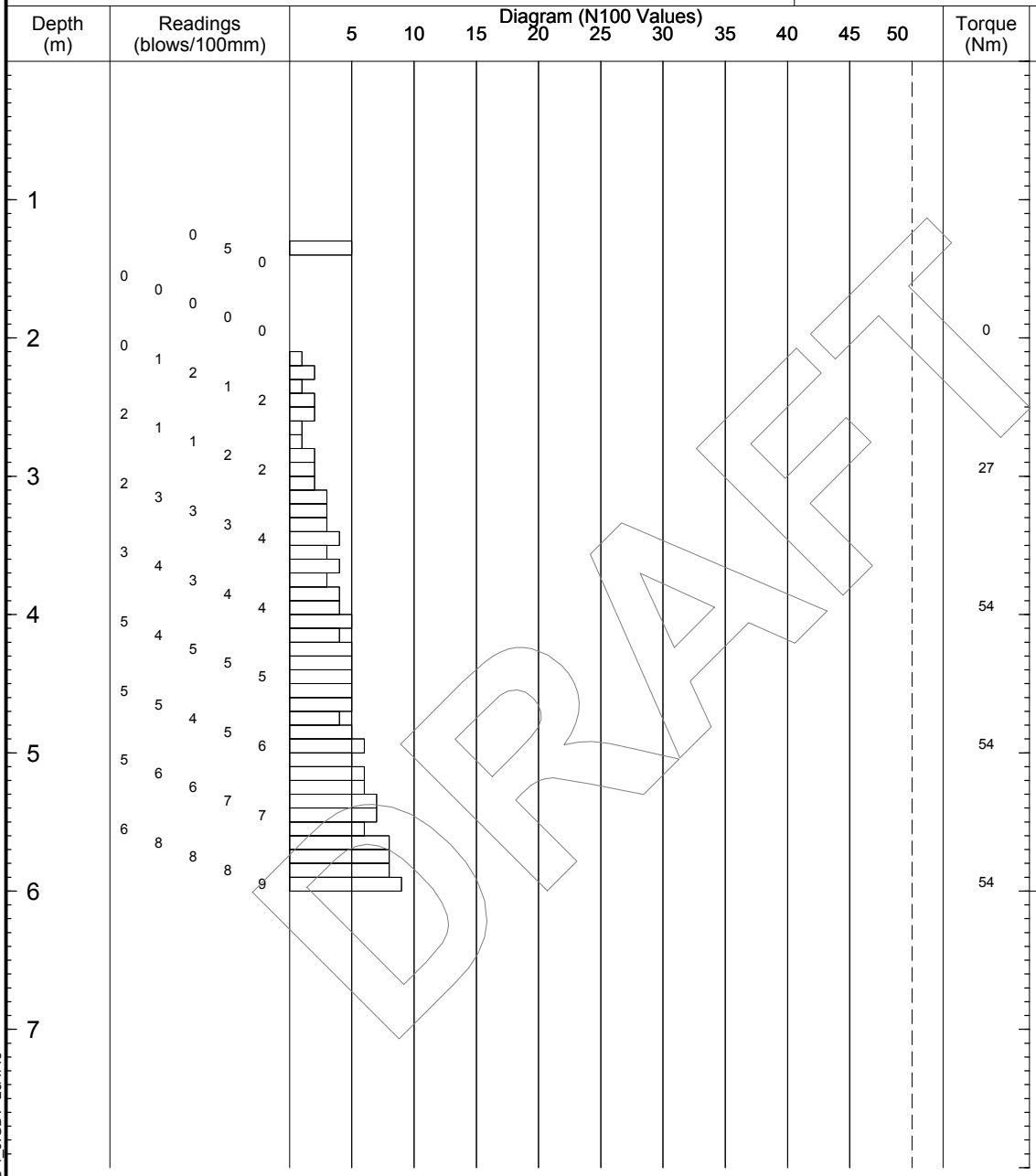
Probe No
HDP2A110_C
Sheet 1 of 1

Project Name: East West Rail Phase 2 Grip 4 Ground Investigation	Project No: **C5759**	Co-ords: E 464211 N 224312 Level: 83.95mAD	Date 09/01/2018
Location: Section 2A		**Specification: DPH** Hammer Mass: 50Kg Drop Height: 500mm Cone Base Diameter: 44mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07



Remarks
0.00-1.20m: Hand dug inspection pit.
Dynamic probe completed at 6.00m

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing heavy (DPH): 1.20-6.00m.

REMARKS: On completion hole backfilled with arisings.

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DYNAMIC PROBE LOG

EN ISO 22476-2

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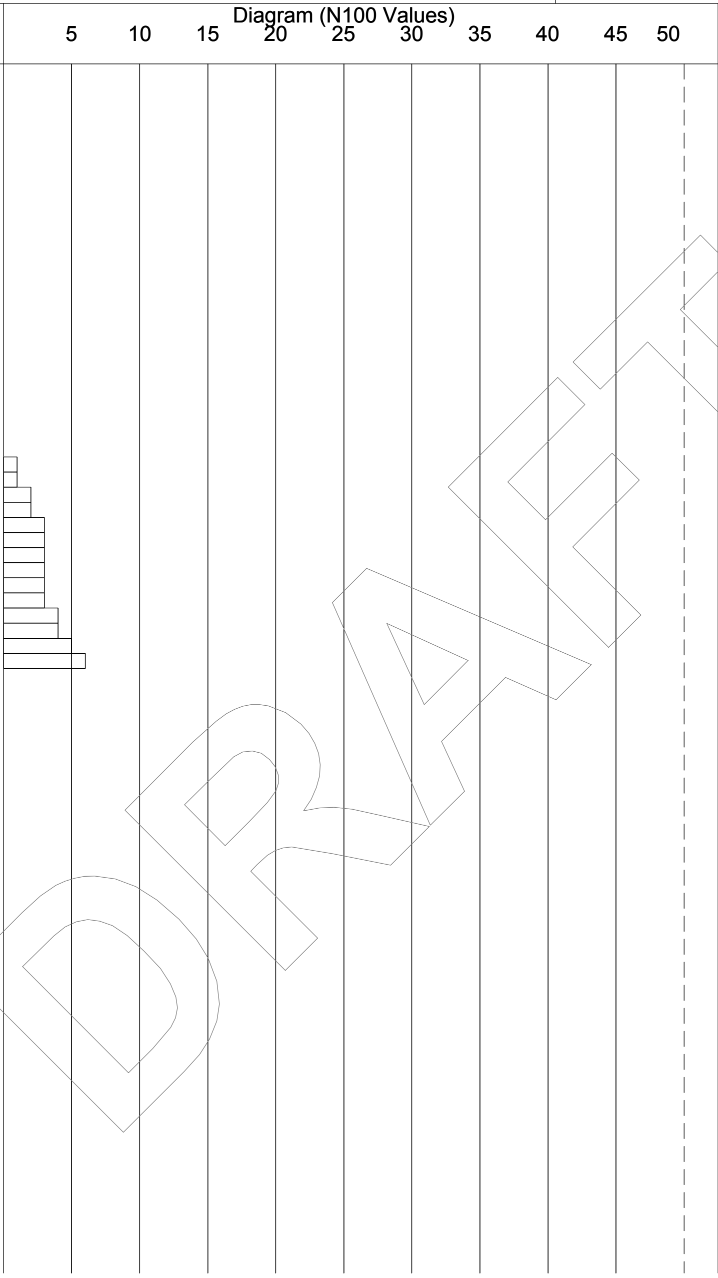
Project Name: East West Rail Phase 2 Grip 4 Ground Investigation	Project No: **C5759**	Co-ords: E 463128 N 223994 Level: 77.60mAD	Date 09/01/2018
Location: Section 2A		**Specification: DPH** Hammer Mass: 50Kg Drop Height: 500mm Cone Base Diameter: 44mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07

Depth (m)	Readings (blows/100mm)	Torque (Nm)	Remarks
1.00–1.50	0 0 0		0.00-1.20m: Hand dug inspection pit.
1.50–2.00	0 0 0 0 0	14 (at 2.00)	
2.00–2.50	0 0 0 0 0		
2.50–3.00	0 1 1 2 2	41 (at 3.00)	
3.00–3.50	3 3 3 3 3		
3.50–4.00	3 4 4 5 6	54 (at 4.00)	Dynamic probe completed at 4.00m

Diagram (N100 Values)



Depth scale: 1, 2, 3, 4, 5, 6, 7

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing heavy (DPH): 1.20-4.00m.

REMARKS: On completion hole backfilled with arisings.

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DYNAMIC PROBE LOG

EN ISO 22476-2

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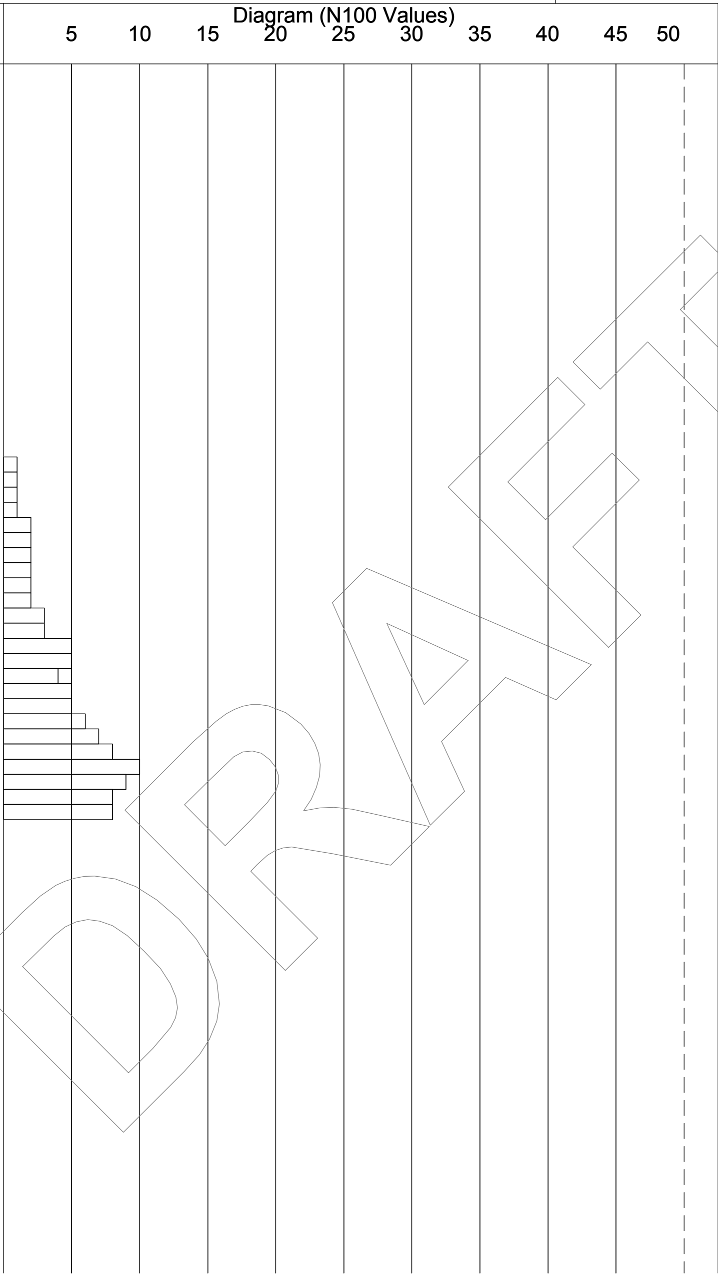
Probe No **HDP2A116_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Grip 4 Ground Investigation	Project No: **C5759**	Co-ords: E 462623 N 223821 Level: 74.40mAD	Date 10/01/2018
Location: Section 2A		**Specification: DPH**	Scale 1 : 50
Client: East West Rail Alliance		Hammer Mass: 50Kg Drop Height: 500mm Cone Base Diameter: 44mm	Rig No. T07

Depth (m)	Readings (blows/100mm)	Torque (Nm)	Remarks
0.00-1.20			0.00-1.20m: Hand dug inspection pit.
1.20-1.30	0		
1.30-1.40	0		
1.40-1.50	0		
1.50-1.60	0		
1.60-1.70	0		
1.70-1.80	0		
1.80-1.90	0		
1.90-2.00	0	0	
2.00-2.10	0		
2.10-2.20	0		
2.20-2.30	0		
2.30-2.40	0		
2.40-2.50	0		
2.50-2.60	0		
2.60-2.70	1		
2.70-2.80	1		
2.80-2.90	1		
2.90-3.00	1	0	
3.00-3.10	2		
3.10-3.20	2		
3.20-3.30	2		
3.30-3.40	2		
3.40-3.50	2		
3.50-3.60	2		
3.60-3.70	3		
3.70-3.80	3		
3.80-3.90	5		
3.90-4.00	5	54	
4.00-4.10	4		
4.10-4.20	5		
4.20-4.30	5		
4.30-4.40	6		
4.40-4.50	7		
4.50-4.60	8		
4.60-4.70	10		
4.70-4.80	9		
4.80-4.90	8		
4.90-5.00	8	54	Dynamic probe completed at 5.00m

Diagram (N100 Values)



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing heavy (DPH): 1.20-5.00m.

REMARKS: On completion hole backfilled with arisings.

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DYNAMIC PROBE LOG

EN ISO 22476-2

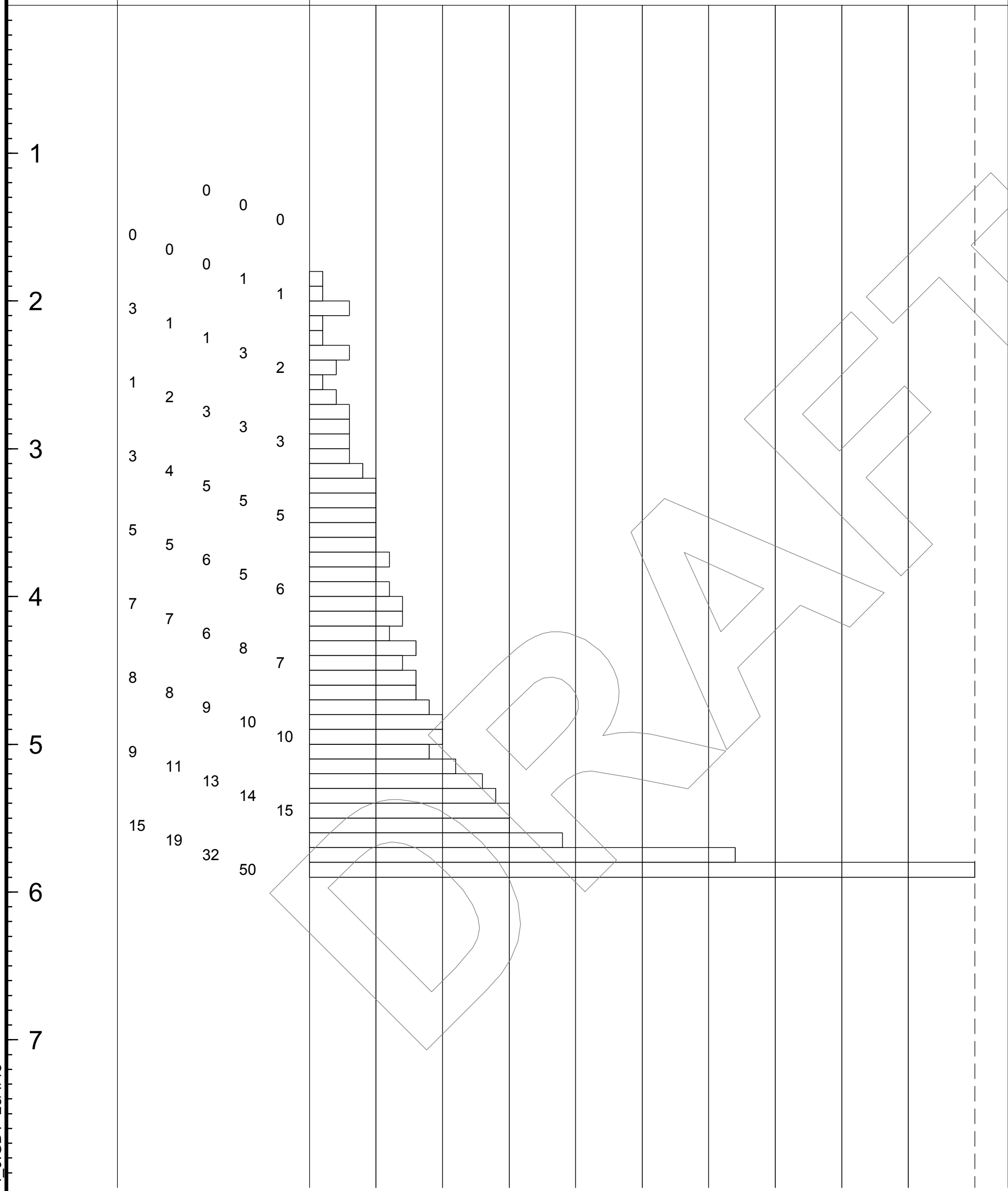
Telephone: 01452 739 165 , Fax: 01452 739 220 , Email: info@CCGround.co.uk

Probe No	**HDP2A119_C**
Sheet 1 of 1	
Project Name:	East West Rail Phase 2 Grip 4 Ground Investigation
Project No:	**C5759**
Co-ords:	E 461707 N 223496
Level:	69.29mAD
Date	10/01/2018
Location:	Section 2A
Specification:	**DPH**
Hammer Mass:	50Kg
Drop Height:	500mm
Cone Base Diameter:	44mm
Scale	1 : 50
Client:	East West Rail Alliance
Rig No.	T07

Readings (blows/100mm), as printed:

		0	0	0
0	0	0	1	1
3	1	1	3	2
1	2	3	3	3
3	4	5	5	5
5	5	6	5	6
7	7	6	8	7
8	8	9	10	10
9	11	13	14	15
15	19	32	50	

Diagram (N100 Values)



Depth (m)	Torque (Nm)
2	27
3	54
4	68
5	68
6	68

Remarks

0.00-1.20m: Hand dug inspection pit.

Dynamic probe completed at 5.89m

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing heavy (DPH): 1.20-5.89m.

REMARKS: On completion hole backfilled with arisings.

CC Ground Investigations Ltd

DYNAMIC PROBE LOG

EN ISO 22476-2

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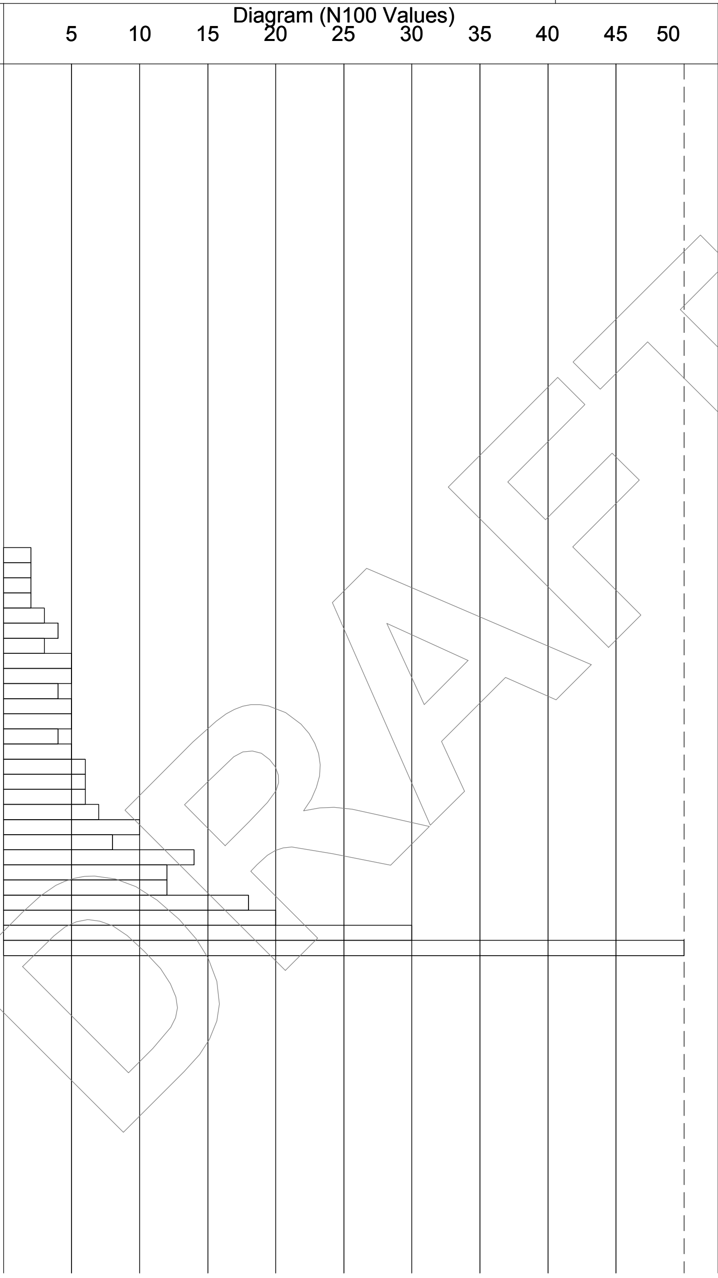
Probe No **HDP2A122_C**

Project Name: East West Rail Phase 2 Grip 4 Ground Investigation	Project No: **C5759**	Co-ords: E 461577 N 223450 Level: 69.05mAD	Date 10/01/2018
Location: Section 2A		**Specification: DPH** Hammer Mass: 50Kg Drop Height: 500mm Cone Base Diameter: 44mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07

Depth (m) | Readings (blows/100mm) | Diagram (N100 Values) | Torque (Nm) | Remarks

Depth (m): 1, 2, 3, 4, 5, 6, 7

Readings (blows/100mm): 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 2 2 2 3 4 3 5 5 4 5 5 4 5 6 6 6 7 10 8 14 12 12 18 20 30 50



Torque (Nm): 0, 54, 54, 54

Remarks:

0.00-1.20m: Hand dug inspection pit.

Dynamic probe completed at 5.89m

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing heavy (DPH): 1.20-5.89m.

REMARKS: On completion hole backfilled with arisings.

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DYNAMIC PROBE LOG

EN ISO 22476-2

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Probe No **HDP2A125_C**

Sheet 1 of 1

Project Name: East West Rail Phase 2 Grip 4 Ground Investigation	Project No: **C5759**	Co-ords: E 461475 N 223413 Level: 69.11mAD	Date 10/01/2018
Location: Section 2A		**Specification: DPH** Hammer Mass: 50Kg Drop Height: 500mm Cone Base Diameter: 44mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing heavy (DPH): 1.20-8.00m.

REMARKS: On completion hole backfilled with arisings.

CC Ground Investigations Ltd

TRIAL PIT LOG

Telephone: 01452 739 165 , Fax: 01452 739 220 , Email: info@CCGround.co.uk

Pit No **P2AMGOB_1D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 463651 N 224209 Level: 87.16mAOD	Date 20/12/2017
Location: Section 2A GI		Dimensions: Depth 2.00m, 2.00m × 0.50m	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
		D ES	0.20		TOPSOIL: Soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets (<1mm). Gravel is sub-angular to rounded fine to coarse of flint and quartzitic.	(0.25)		
					Firm fissured light brown mottled light orangish brown and light grey CLAY with occasional roots (<2mm).	0.25	86.91	
		B D ES H	0.50 - 0.70 0.50 0.70	 87				
1		ES	1.00			(1.25)		1
		H	1.20	91				
		B H	1.50 - 1.60 1.50	87	Firm fissured greyish brown mottled brown and dark orangish brown CLAY with occasional partings of yellow silt.	1.50	85.66	
						(0.50)		
		D H	1.90	87	2.00m: Dry.			
2					Trial pit completed at 2.00m	2.00	85.16	2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pit excavated using 0.45m bucket.

GROUNDWATER: None encountered.

STABILITY: Trial pit generally stable and vertical.

BACKFILL: Trial pit backfilled with arisings and compacted with bucket.

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TRIAL PIT LOG

Telephone: 01452 739 165 , Fax: 01452 739 220 , Email: info@CCGround.co.uk

Pit No: P2AMGOB_2

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 463645 N 224003 Level: 78.02mAOD	Date 20/12/2017
Location: Section 2A GI		Dimensions: Depth 2.00m, 2.00m × 0.50m	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
		D ES	0.20		TOPSOIL: Soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets (<1mm). Gravel is sub-angular to rounded fine to coarse of flint and quartzitic.	(0.25)		
					Firm fissured light brown mottled light orangish brown and light grey CLAY with occasional roots (<2mm).	0.25	77.77	
		D ES H	0.50	82				
1		B ES H	1.00 - 1.20 1.00	89		(1.45)		1
		D H	1.50	87				
					Firm fissured greyish brown mottled brown and dark orangish brown CLAY with occasional partings of yellow silt.	1.70	76.32	
		B H	1.90 - 2.00 1.90	87		(0.30)		
2					2.00m: Dry. Trial pit completed at 2.00m	2.00	76.02	2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pit excavated using 0.45m bucket.

GROUNDWATER: None encountered.

STABILITY: Trial pit generally stable and vertical.

BACKFILL: Trial pit backfilled with arisings and compacted with bucket.

CC Ground Investigations Ltd

TRIAL PIT LOG

Telephone: 01452 739 165 , Fax: 01452 739 220 , Email: info@CCGround.co.uk

Pit No **P2ACLOB_1D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 460140 N 222845 Level: 70.03mAOD	Date 09/04/2018
Location: Section 2A GI		Dimensions: 2.00m (Depth 2.00m, 0.70m)	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
		D ES	0.20		MADE GROUND: Soft dark brown slightly sandy slightly gravelly CLAY with frequent roots and rootlets (<6mm). Gravel is angular to rounded fine to coarse limestone, chalk, tarmacadam and siliceous material.	(0.40)		
		B D ES H	0.50 - 0.60 0.50	40 34 39	MADE GROUND: Soft light brown mottled orangish brown and grey slightly sandy slightly gravelly CLAY with low cobble content and occasional roots and rootlets (<3mm). Gravel is angular to rounded fine to coarse chalk, limestone and siliceous material.	0.40 (0.30)	69.63	
		D H	0.80	52 50 47	Soft to firm grey mottled brown slightly sandy CLAY with occasional rootlets (<1mm). [ALLUVIUM].	0.70 (0.20)	69.33	
1		B ES H	1.00 - 1.10 1.00 1.10	60 58 56	Firm light orangish brown mottled light grey slightly sandy locally sandy CLAY. [OXFORD CLAY].	0.90 (0.90)	69.13	1
		D H	1.50	60 62 64				
	1.1	B H	1.80 - 2.00 1.80	56 62	Firm friable fissured grey mottled brown and orangish brown CLAY with frequent lithorelicts (<10mm). [OXFORD CLAY].	1.80 (0.20)	68.23	
2					Trial pit completed at 2.00m	2.00	68.03	2
3								3
4								4

EQUIPMENT: 5 Tonne Tracked Excavator.

METHOD: Trial pits excavated using 0.60m bucket.

GROUNDWATER: Seepage encountered at 1.80m. No rise recorded.

STABILITY: Trial pit generally stable.

BACKFILL: Trial pit backfilled with arisings and compacted with excavator bucket.

PID: PID readings were undertaken on all environmental samples. Results: 0.20m - 0.0ppm; 0.50m - 0.0ppm; 1.00m - 0.0ppm.

CC Ground Investigations Ltd

WINDOWLESS SAMPLE LOG

Telephone: 01452 739 165 , Fax: 01452 739 220 , Email: info@CCGround.co.uk

Borehole No. **WS2A118_U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461707 N 223476	Hole Type WS
Location: Section 2A GI		Level: 66.08mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 23/04/2018 End: 24/04/2018	Logged By MB/EC

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		D	0.20				TOPSOIL: Soft dark brown slightly sandy CLAY with frewuent roots (<15mm).	0.25	65.83	
	1	ES	0.40	52			TOPSOIL: Soft dark brown slightly sandy CLAY with frequent roots (<15mm).	(0.55)		
		H	0.50 - 0.60	48			Soft to firm brown mottled orangish brown and light grey slightly sandy CLAY with occasional roots (<2mm). [ALLUVIUM]	0.80	65.28	
		B	0.50	49			Soft to firm brown mottled orangish brown and light grey slightly sandy CLAY with occasional roots (<2mm).	(0.40)		
		D	0.70	61			Firm light grey mottled light orangish brown slightly gravelly sandy CLAY with occasional rootlets (<1mm). Sand is fine. Gravel is angular to sub-angular fine to coarse of sandstone. [ALLUVIUM]	1.20	64.88	
1		ES	1.00 - 1.10	74				(0.40)		1
		H	1.00	72				1.60	64.48	
		B		62			Firm light grey mottled light orangish brown slightly gravelly sandy CLAY with occasional rootlets (<1mm). Sand is fine. Gravel is angular to sub-angular fine to coarse of sandstone.	(0.85)		
		D	1.39	68			Soft orangish brown mottled light grey sandy silty CLAY.	2.45	63.63	
		ES		64			Orangish brown mottled light grey clayey SAND.			
		H	1.60	32			Orangish brown mottled light grey clayey SAND.			
		H					Dark grey silty SAND.	(1.05)		
		D	1.90				Dark grey silty SAND.			
2		D	2.00 - 2.45							2
		UT100								
		D	2.45 - 2.55							
		D	2.55 - 2.60							
		B	2.60 - 3.00							
3		B	3.00 - 3.50							3
							Borehole completed at 3.50m	3.50	62.58	
4										4
5										5
6										6
7										7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted window sampling rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 128mm, 101mm and 86mm sample barrels: 1.20-3.50m.
CASING: Not used.
GROUNDWATER: Seepage at 0.60m. Rose to 0.56m.
BACKFILL: Upon completion, borehole backfilled with bentonite pellets: 1.00-3.00m and arisings: 0.00-1.00m.
REMARKS: Dynamic probe undertaken adjacent to window sample - see separate sheet. Borehole collapsed:3.00-3.50m. Client agreed terminating at 3.50m.
PID: PID readings were undertaken on all environmental samples. Results: 0.20m - 0.00ppm, 0.50m - 0.00ppm, 1.00m - 0.00ppm.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
23/04/18	0.56		

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
23/04/2018 17:00	1.20		0.50
24/04/2018 08:00	1.20		0.72
24/04/2018 17:00	3.50		0.56

CC WS LOG C5759_GI SECTION 2A.GPJ CCGI GINT STD AGS 4_0.GDT 4/5/18

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DYNAMIC PROBE LOG

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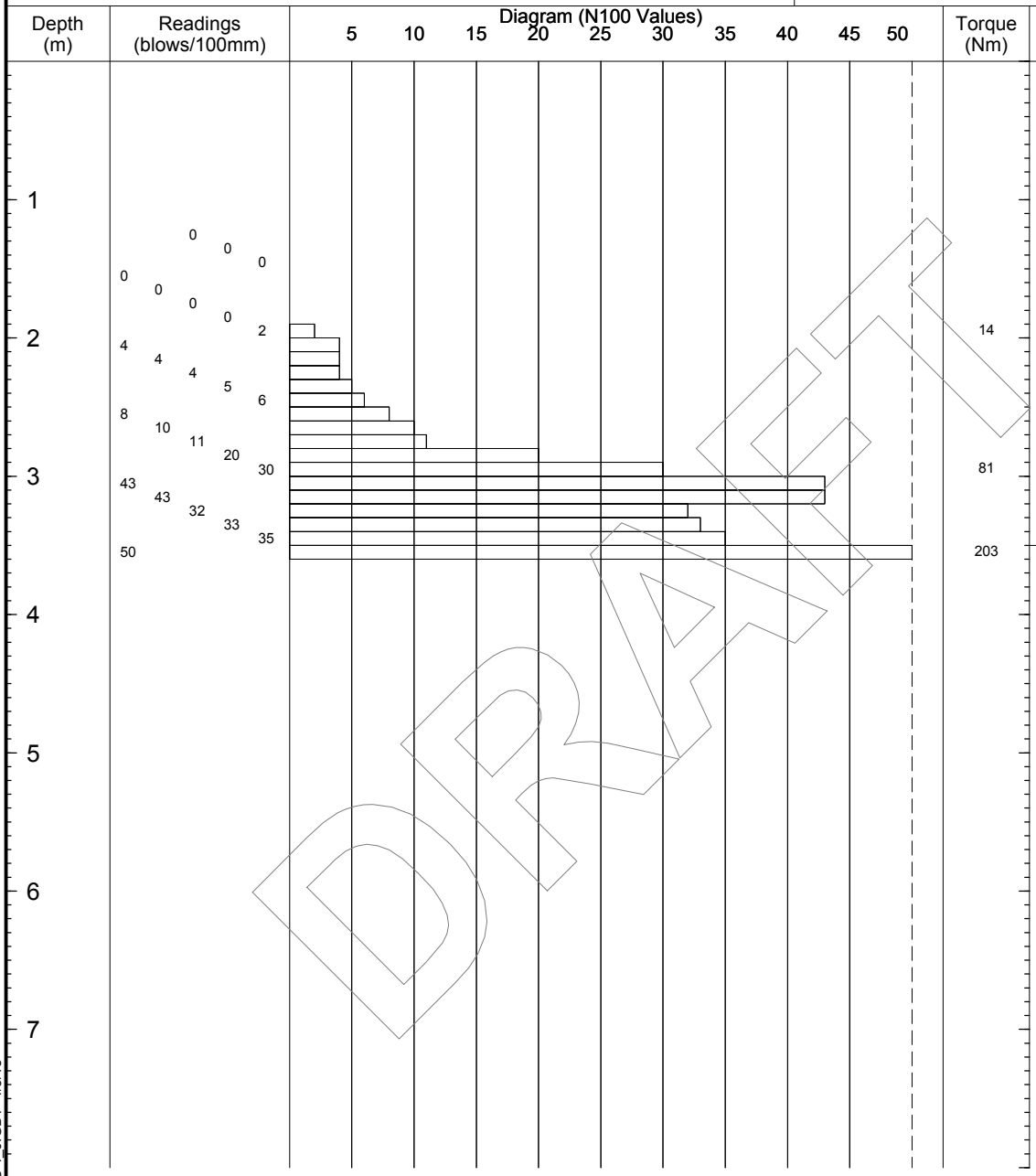
Probe No **SHDP2A118_U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461707 N 223476 Level: 66.08mAD	Date 23/04/2018
Location: Section 2A GI		**Specification: DPSH-B** Hammer Mass: 64Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No.



Remarks

Hand dug inspection pit: 0.00-1.20m.

50/85mm.
Dynamic probe completed at 3.50m

EQUIPMENT: Terrier 2002 track mounted window sampling rig.

METHOD: Dynamic probing superheavy (DPSH-B): 1.00-3.50m.

REMARKS: Probing undertaken adjacent to windowless sample - see separate sheet.

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WINDOWLESS SAMPLE LOG

Telephone: 01452 739 165 , Fax: 01452 739 220 , Email: info@CCGround.co.uk

Borehole No. **WS2A120_D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461673 N 223507	Hole Type WS
Location: Section 2A GI		Level: 66.05mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 26/04/2018 End: 26/04/2018	Logged By

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		ES	0.20				TOPSOIL: Soft dark brown slightly sandy CLAY with frequent roots (<20mm).	0.25	65.80	
		H	0.40	56			Firm brown mottled grey slightly sandy CLAY with occasional rootlets (<2mm).	0.60	65.45	
		B	0.50 - 0.60				Firm tending to stiff light brown mottled light orangish brown and light grey slightly sand CLAY.	0.90	65.15	
	1	D	0.50	64			Light orangish brown mottled light grey clayey silty SAND.			
		ES	0.70							
1		H	0.80 - 0.90					(1.10)		
		B	0.80	80						
		D	1.00							
		ES	1.30							
		H								
		D								
		D	1.80							
2		D	2.00				Brown mottled dark orangish brown very silty fine SAND with occasional shell fragments.	2.00	64.05	
		D	2.10				Dark grey very silty SAND with rare shell fragments.	2.20	63.85	
		B	2.30 - 2.80					(0.60)		
		D	2.30							
3							Borehole completed at 2.80m	2.80	63.25	
4										
5										
6										
7										
8										

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 113mm, 101mm sample barrels: 1.20-2.80m.
CASING: 128mm to 2.00m.
GROUNDWATER: Seepage encountered at 0.80m. Borehole damp at 2.80m.
BACKFILL: Bolehole backfilled with bentonite pellets: 1.20-2.80m. Inspection pit backfilled with arisings: 0.00-1.20m and surface reinstated.
REMARKS: Dynamic Probe undertaken prior to sampling - see separate sheet SHDP2A126_D. Drillers notes refusal at 2.80m, borehole terminated.
PID: PID testing undertaken: 0.20m - 0.00ppm; 0.50m - 0.00ppm; 1.00m - 0.00ppm.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
26/04/18	0.90	2.00	

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
26/04/2018 17:00	2.80	2.00	

CC Ground Investigations Ltd

DYNAMIC PROBE LOG

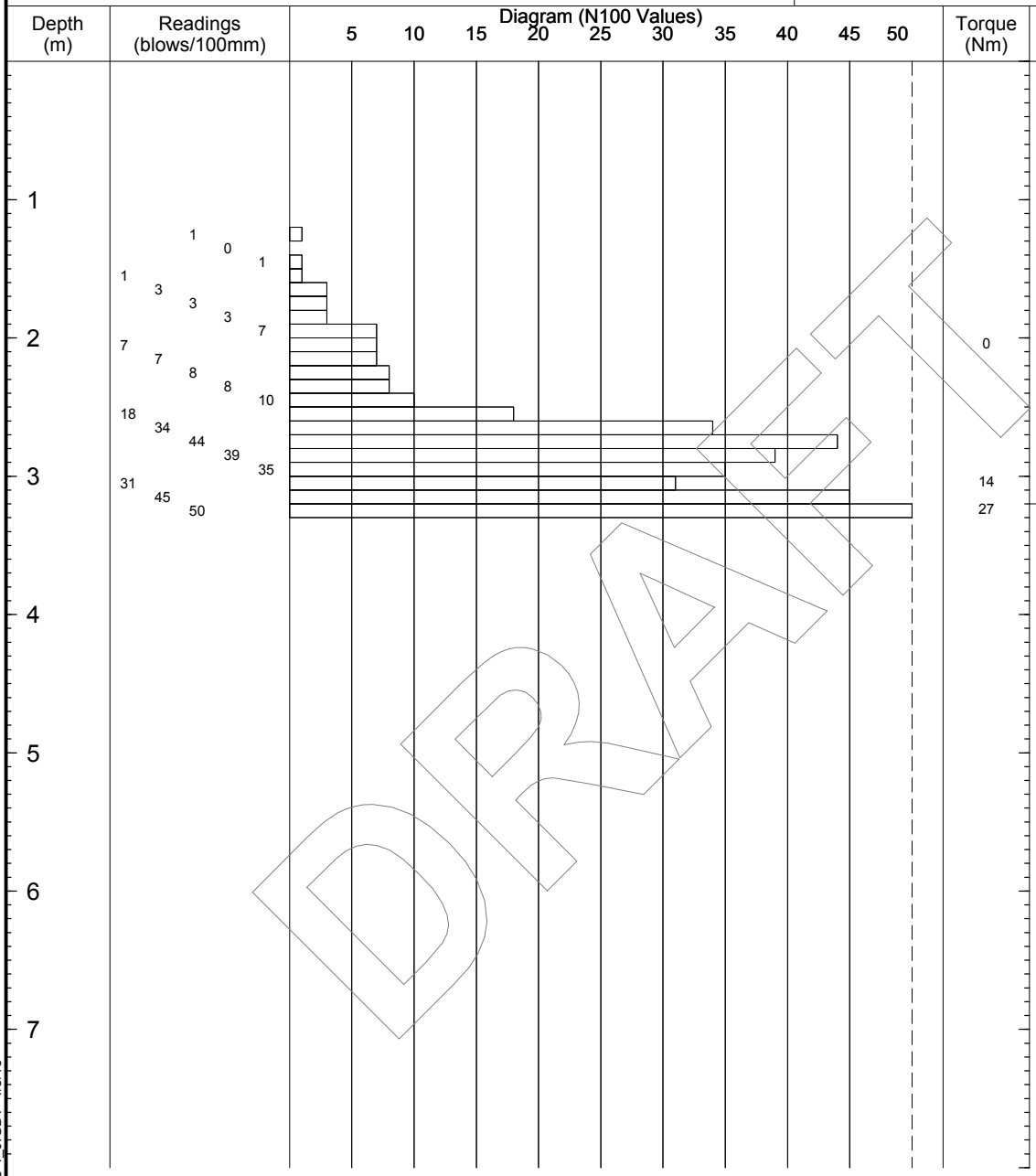
EN ISO 22476-2

Telephone: 01452 739 165 , Fax: 01452 739 220 , Email: info@CCGround.co.uk

Probe No **SHDP2A120_D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461673 N 223507 Level: 66.05mAD	Date 26/04/2018
Location: Section 2A GI		**Specification: DPSH-B** Hammer Mass: 64Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T06



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-3.20m.

REMARKS: Probing undertaken adjacent to windowless sample - see separate sheet.

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WINDOWLESS SAMPLE LOG

Borehole No. **WS2A121_U**
Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461581 N 223433	Hole Type WS
Location: Section 2A GI		Level: 65.71mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 23/04/2018 End: 24/04/2018	Logged By MB/EC

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		D	0.20				TOPSOIL: Soft dark brown lightly sandy CLAY with frequent roots (>15mm).	0.25	65.46	
	1	ES	0.30	60			TOPSOIL: Soft dark brown slightly sandy CLAY with frequent roots (>15mm).	0.45	65.26	
		D	0.40	62			Soft to firm dark brown slightly sandy CLAY with occasional roots (<10mm). [ALLUVIUM]	(0.40)		
		H	0.50 - 0.60	70				0.85	64.86	
1		B	0.50				Soft to firm dark brown slightly sandy CLAY with occasional roots (<10mm).			1
		D	0.70	72			Firm brown mottled orangish brown light grey slightly sandy CLAY with occasional roots (<2mm) becoming sandy with depth. [ALLUVIUM]	1.20	64.51	
		ES	1.00 - 1.10	70				1.30	64.41	
		H	1.00				Firm brown mottled orangish brown light grey slightly sandy CLAY with occasional roots (<2mm). Becomes sandy.	(0.70)		
		B		75						
		D	1.40				Firm light grey mottled light orangish brown sandy CLAY with occasional roots (<2mm) becoming very sandy and slightly gravelly with depth. Gravel is angular to sub-angular fine to coarse of sandstone.	2.00	63.71	
2		ES	1.50 - 2.00	73						2
		H					Firm light grey mottled light orangish brown sandy CLAY with occasional roots (<2mm). Gravel is angular to sub-angular fine to coarse of sandstone.	(1.50)		
		D					Very soft orangish brown mottled grey sandy CLAY.			
		B					Very soft orangish brown mottled grey sandy CLAY.			
		B	2.50 - 3.00				Very soft orangish brown mottled light grey very sandy CLAY.			
3		B	3.00 - 3.50				Very soft orangish brown mottled light grey very sandy CLAY.	3.50	62.21	3
							Dark grey silty SAND.			
							Dark grey silty SAND.			
4							Borehole completed at 3.50m			4
5										5
6										6
7										7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted window sampling rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 128mm, 101mm and 86mm sample barrels: 1.20-3.50m.
CASING: 113mm diameter to 2.00m.
GROUNDWATER: Drillers log states seepage at 0.50m. Rose to 0.39m.
BACKFILL: Upon completion, borehole backfilled with bentonite pellets: 1.00-3.50m and arisings: 0.00-1.00m.
REMARKS: Dynamic probe undertaken adjacent to window sample - see separate sheet. Borehole collapsed:3.00-3.50m. Client agreed terminating at 3.50m. PID readings were undertaken on all environmental samples. Results: 0.20m - 0.00ppm, 0.50m - 0.00ppm, 1.00m - 0.00ppm.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
24/04/18	0.50		

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
23/04/2018 17:00	1.20		
24/04/2018 08:00	1.20		
24/04/2018 17:00	3.50	2.00	0.39

CC Ground Investigations Ltd

DYNAMIC PROBE LOG

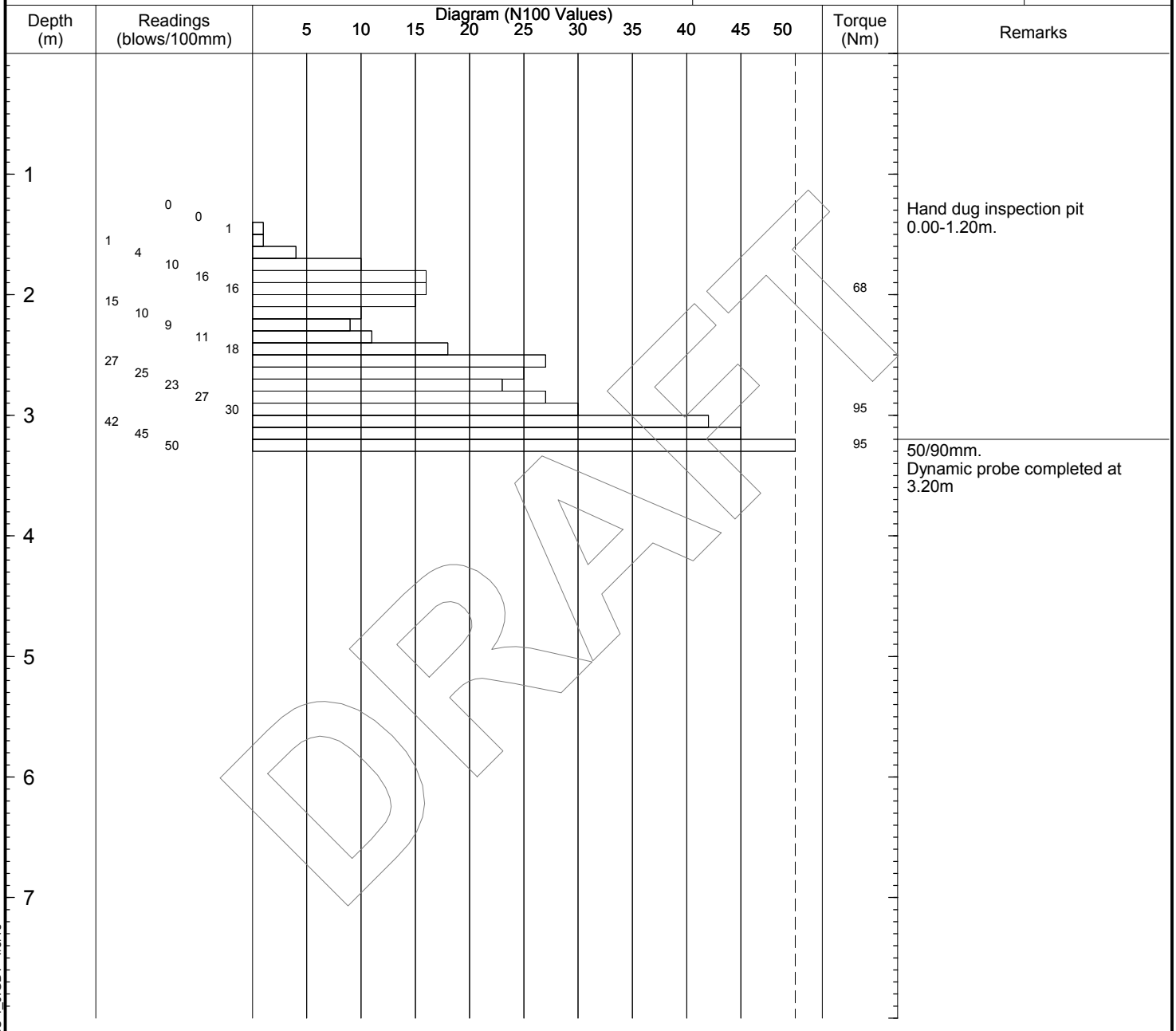
EN ISO 22476-2

Telephone: 01452 739 165 , Fax: 01452 739 220 , Email: info@CCGround.co.uk

Probe No **SHDP2A121_U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461581 N 223433 Level: 65.71mAD	Date 24/04/2018
Location: Section 2A GI		**Specification: DPSH-B** Hammer Mass: 64Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No.



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted window sampling rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-3.20m.

REMARKS: Probing undertaken adjacent to windowless sample - see separate sheet.

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WINDOWLESS SAMPLE LOG

Telephone: 01452 739 165 , Fax: 01452 739 220 , Email: info@CCGround.co.uk

Borehole No. **WS2A123_D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461502 N 223447	Hole Type WS
Location: Section 2A GI		Level: 65.68mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 26/04/2018 End: 26/04/2018	Logged By

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		D	0.25				TOPSOIL: Soft dark brown slightly sandy CLAY with frequent rootlets (<20mm).	0.20	65.48	
		ES	0.30 - 0.50				MADE GROUND: Light brown very sandy silty GRAVEL with a high cobble content. Gravel is angular to rounded fine to coarse of concrete, brick, limestone, sandstone and siliceous material. 0.20m-0.50m: Cobbles are angular of concrete.	0.50	65.18	
		B	0.55 - 0.65					0.70	64.98	
	1	B	0.55					(0.40)		
		D					Firm brown mottled grey sandy slightly silty CLAY with rare rootlets (<1mm).	1.10	64.58	
1		ES	1.00 - 1.10							1
		B	1.00				Firm light brown mottled orangish brown and grey slightly sandy CLAY. 0.70m-1.10m: Sand tends from slightly sandy to sandy	(0.70)		
		D								
		ES								
		D	1.50				Firm light orangish brown mottled light grey fine sandy CLAY.	1.80	63.88	
							Light orangish brown mottled light grey silty fine SAND.	(0.50)		
2		D	1.90							2
							Dark grey silty fine SAND with frequent clay lenses.	2.30	63.38	
		D	2.40							
		B	2.50 - 3.00							
3								(1.20)		3
							Firm tending to stiff dark grey silt CLAY with frequent lenses of grey silty fine sand,	3.50	62.18	
		D	3.60					3.65	62.03	
		D	3.80				Stiff tending to very stiff fissured dark grey CLAY. Fissures are closely spaced.			
4		UT100	4.00 - 4.35							4
		D	4.50							
5		D	5.00					(2.60)		5
		D	5.50							
		D	5.90							
6		UT70	6.00 - 6.25							6
							3.65m-6.25m: Medium strength grey horizontal fine grained sandstone fragments recovered.	6.25	59.43	
							Borehole completed at 6.25m			
7										7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 101mm, 86mm sample barrels: 1.20-6.25m.
CASING: 128mm to 3.00m.
GROUNDWATER: Dampness encountered at 0.90m to the base of the borehole.
INSTALLATION: 50mm ID HDPE slotted pipe with washed gravel response zone: 6.25-1.25m. 50mm ID HDPE plain pipe with bentonite pellet seal: 1.25-0.20m. Raised borehole helmet set in concrete: 0.00-0.20m. Gas valve fitted.
REMARKS: Dynamic Probe undertaken prior to sampling - see separate SHDP123_D. PID testing undertaken: 0.25m - 0.00ppm, 0.55m - 0.00ppm; 1.00m - 0.00ppm. Driller notes 6.00m-6.25m UT70 bouncing UT70 damaged. Borehole samples unsuitable for field hand vein testing.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
26/04/18	0.90	3.00	

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
26/04/2018 00:00	6.25	3.00	

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DYNAMIC PROBE LOG

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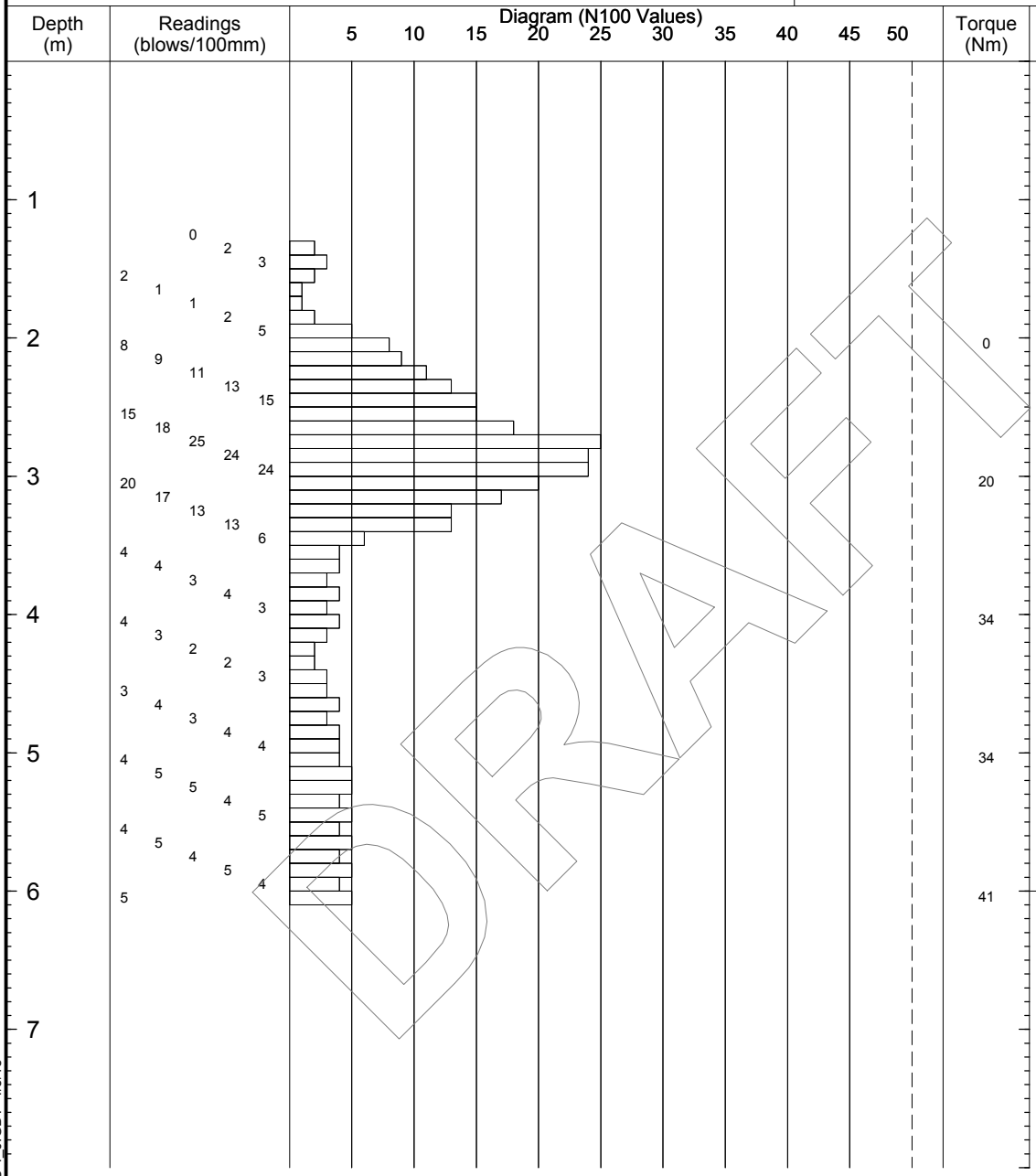
Probe No **SHDP2A123_D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461502 N 223447 Level: 65.68mAD	Date 26/04/2018
Location: Section 2A GI		**Specification: DPSH-B** Hammer Mass: 64Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted window sampling rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-6.00m.

REMARKS: Probing undertaken adjacent to windowless sample - see separate sheet.

CC Ground Investigations Ltd

WINDOWLESS SAMPLE LOG

Telephone: 01452 739 165 , Fax: 01452 739 220 , Email: info@CCGround.co.uk

Borehole No. **WS2A126_D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461253 N 223351	Hole Type WS
Location: Section 2A GI		Level: 67.25mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 26/04/2018 End: 26/04/2018	Logged By

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		D	0.20				TOPSOIL: Soft dark brown slightly sandy CLAY with frequent roots (<20mm).	0.25	67.00	
		ES	0.30 - 0.45				MADE GROUND: Brown sandy clayey GRAVEL with a high cobble content and rare roots (<25mm). Gravel is angular to sub-angular fine to coarse of brick, concrete, limestone, sandstone.	0.45	66.80	
		B	0.50 - 0.60	76			0.25m-0.45m: Cobbles are sub-angular to sub-rounded of brick, concrete and limestone.	(1.05)		
		D	0.50				Firm light brown mottled light orangish brown and light grey CLAY with rare rootlets (<2mm).			
		ES	0.80	77			Firm tending to stiff laminated brown mottled orangish yellow CLAY with occasional lenses of fine silty sand.	1.50	65.75	
		H	0.90	74				(0.80)		
		H	1.00 - 1.10					2.30	64.95	
		H	1.00				Firm tending to stiff dark grey slightly sandy CLAY with occasional lenses of silty fine sand (<5mm).	(0.50)		
		B						2.80	64.45	
		D					Dark grey silty fine SAND.	(0.40)		
		ES	1.60					3.20	64.05	
		D					Stiff dark grey sandy silty CLAY with frequent pockets of dark grey silty fine sand and occasional fossil shells.	(0.40)		
		UT100	2.00 - 2.45					3.60	63.65	
		D	2.50				Borehole completed at 3.60m			
		D	2.90							
		D	3.00							
	1	D	3.50							

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 113mm, 101mm sample barrels: 1.20-3.60m.
CASING: 128mm to 2.00m.
GROUNDWATER: Encountered in pit at 0.80m after 20 minutes monitoring, water strike at 3.60m on completion of borehole.
BACKFILL: Upon completion, borehole backfilled with bentonite pellets: 1.20-3.60m and arisings: 0.00-1.20m.
REMARKS: Dynamic Probe undertaken adjacent to sampling - see separate sheet SHDP2A126_D. Drillers note borehole refused at 3.60m.
PID: PID testing undertaken: 0.20m - 0.00ppm, 0.50m - 0.00ppm; 1.00m - 0.00ppm.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
26/04/18	3.60	2.00	

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
26/04/2018 17:00	3.60	2.00	3.60

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DYNAMIC PROBE LOG

EN ISO 22476-2

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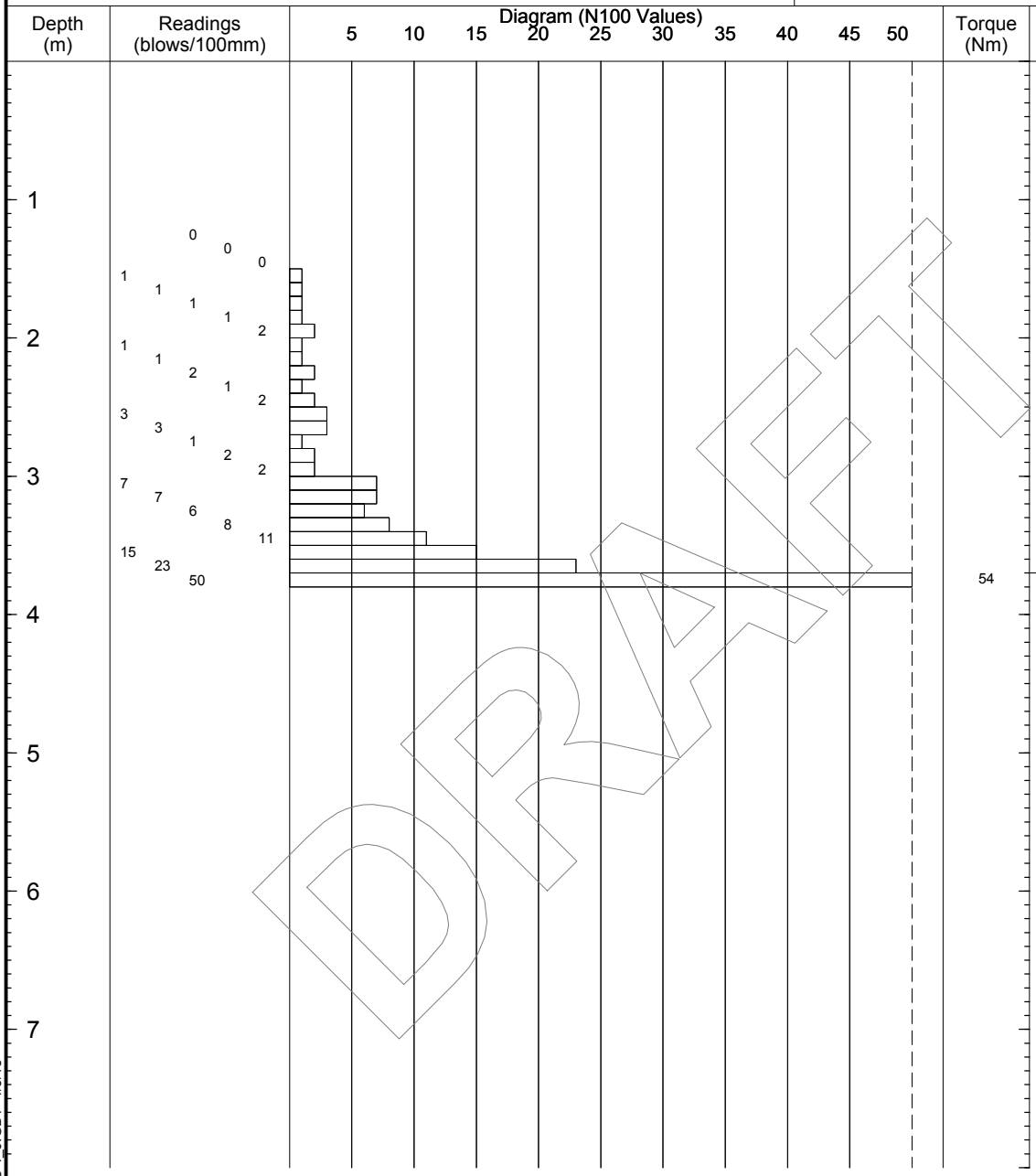
Probe No **SHDP2A126_D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461253 N 223351 Level: 67.25mAD	Date 26/04/2018
Location: Section 2A GI		**Specification: DPSH-B** Hammer Mass: 64Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T06



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted window sampling rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-3.70m.

REMARKS: Probing undertaken adjacent to windowless sample - see separate sheet.

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WINDOWLESS SAMPLE LOG

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Borehole No. **WS2ALOB_1U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461928 N 223533	Hole Type WS
Location: Section 2A GI		Level: 67.41mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 23/04/2018 End: 23/04/2018	Logged By EC

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		B ES	0.20				TOPSOIL: Grass over soft to firm brown sightly gravelly slightly sandy silty CLAY sith occasional rootlets (<3mm). Gravel is angular to sub-angular fine of siliceous material.	0.26	67.15	
	1	B	0.50				Soft orangish brown locally mottled light grey slightly sandy silty CLAY.	(0.84)		
1		B ES D H H H H D H UT100	1.00 1.15 1.42 1.56 1.66 1.76 1.90 2.00 - 2.45	 68 42 55 52 58			Soft to firm light orangish brown mottled grey slightly gravelly slightly sandy silty CLAY. Gravel is sub-angular to sub-rounded fine to medium of siliceous material.	1.10 1.20	66.31 66.21	
							Firm grey mottled orangish brown slightly sandy silty CLAY.	(1.40)		
2		D D	2.45 - 2.55 2.55 - 2.60				Firm grey slightly clayey SILT with frequent lenses (2mm) of sand and occasional shell and shell fragments (<4mm) .	2.60	64.81	
3		D	2.90					(0.70)		
		B	3.50 - 4.00				Firm grey clayey slightly silty SAND with occasional shells and shell fragments (<4mm). 3.60-3.80m: Clayey.	3.30	64.11	
	2							(1.10)		
4		B	4.00 - 4.50							
							Borehole completed at 4.40m	4.40	63.01	
5										
6										
7										
8										

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted window sampling rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 128mm, 101mm and 86mm sample barrels: 1.20-4.40m.
CASING: 128mm diameter to 2.00m.
GROUNDWATER: Encountered at 0.71m and at 3.91m, rose to 3.30m after 20 minutes.
BACKFILL: Upon completion, borehole backfilled with bentonite pellets: 1.00-4.40m and arisings: 0.00-1.00m.
REMARKS: Dynamic probe undertaken adjacent to window sample - see separate sheet. PID readings were undertaken on all environmental samples. Results: 0.20m - 0.10ppm and 1.00m - 0.00ppm.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
23/04/18	0.71		
23/04/18	3.91		

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
23/04/2018 17:00	4.40	2.00	3.91

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DYNAMIC PROBE LOG

EN ISO 22476-2

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Probe No **SHDP2ALOB_1U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461928 N 223533 Level: 67.41mAD	Date 23/04/2018
Location: Section 2A GI		**Specification: DPSH-B** Hammer Mass: 64Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T04

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values) 5 10 15 20 25 30 35 40 45 50	Torque (Nm)	Remarks
1	0 0 0 1 0 1 2 1			Hand dug inspection pit: 0.00-1.20m.
2	1 1 1 2 4		20	
3	3 2 7 11 12 10 10 12 13 17		68	
4	15 14 14 13 16 21 38 50		81 203	50/50mm Dynamic probe completed at 4.20m
5				
6				
7				

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted window sampling rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-4.20m.

REMARKS: Probing undertaken adjacent to windowless samp - see separate sheet.

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TRIAL PIT LOG

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Pit No **TP2ALOB_1D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461998 N 223632 Level: 67.35mAOD	Date 04/06/2018
Location: Section 2A GI		Dimensions: 2.00m (Depth 2.00m, 0.70m)	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
					TOPSOIL: Soft friable dark brown slightly sandy CLAY with frequent roots (<3mm). Sand is fine.	(0.20)		
		ES	0.30		Soft to firm becoming firm friable light brown mottled light orangish brown slightly sandy slightly gravelly CLAY with occasional roots (<2mm). Sand is fine. Gravel is sub-angular to rounded fine to coarse of siliceous material.	0.20	67.15	
		H	0.40	50				
		B	0.50 - 0.60	45		(0.60)		
		D	0.50	48				
		ES						
		H	0.70	67				
				65				
				62		0.80	66.55	
1					Firm light bluish grey mottled light orangish brown CLAY with occasional rootlets (<1mm).			1
		B	1.00 - 1.10	71		(0.50)		
		ES	1.00	72				
		H		79		1.30	66.05	
					Firm light bluish grey mottled light brown and light orangish brown sandy CLAY. Sand is fine.			
		D	1.50			(0.40)		
						1.70	65.65	
					Firm light bluish grey mottled light brown and light orangish brown very sandy CLAY with frequent lenses of bluish grey silty fine sand. Sand is fine.	(0.30)		
		B	1.90 - 2.00					
2					Trial pit completed at 2.00m	2.00	65.35	2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pit excavated using 0.45m bucket.

GROUNDWATER: Seepage at 1.90m.

STABILITY: Stable throughout.

BACKFILL: Trial pit backfilled with arisings and compacted with bucket.

REMARKS: PID testing undertaken on all environmental samples. Results: 0.30m - 0.10ppm, 0.50m - 0.10ppm; 1.00m - 0.00ppm.

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TRIAL PIT LOG

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Pit No **TP2ALOB_2D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 462088 N 223755 Level: 67.60mAOD	Date 04/06/2018
Location: Section 2A GI		Dimensions: 2.00m Depth 2.00m 0.70m	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
					TOPSOIL: Soft friable dark brown slightly sandy CLAY with frequent roots (<4mm). Sand is fine.	(0.25)		
		D ES	0.30		Soft to firm orangish brown mottled light grey and brown slightly sandy slightly gravelly CLAY with occasional roots (<2mm). Sand is fine. Gravel is angular to sub-rounded fine to coarse of siliceous material. [ALLUVIUM]	0.25	67.35	
		B ES H	0.50 - 0.60 0.50	42 38 50		(0.65)		
	1	H	0.80	41 39 46	Soft to firm light orangish brown mottled light brown slightly gravelly sandy CLAY. Sand is fine. Gravel is sub-angular to sub-rounded, fine to coarse of siliceous material. [ALLUVIUM]	0.90	66.70	
1		B ES	1.00 - 1.10 1.00			(0.70)		1
		H	1.30	37 39 44				
		D	1.50					
		D	1.70		Firm light bluish grey mottled light brown and light orangish brown sandy sandy CLAY. Sand is fine. [KELLAWAY FORMATION]	1.60	66.00	
	1	H	1.80	61 59 63		(0.40)		
2		B	1.90 - 2.00		Trial pit completed at 2.00m	2.00	65.60	2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pit excavated using 0.45m bucket.

GROUNDWATER: Seepage 0.90m, settled at 1.90m 20mins following completion of pit.

STABILITY: Stable throughout.

BACKFILL: Trial pit backfilled with arisings and compacted with bucket.

REMARKS: PID testing undertaken on all environmental samples. Results: 0.30m - 0.00ppm, 0.50m - 0.10ppm; 1.00m - 0.00ppm.

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TRIAL PIT LOG

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Pit No **TP2ALTN_2U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461894 N 223513 Level: 66.75mAOD	Date 04/06/2018
Location: Section 2A GI		Dimensions: 2.00m, Depth 3.00m, 0.70m	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
					TOPSOIL: Soft friable dark brown slightly sandy CLAY with frequent roots (<3mm). Sand is fine.	(0.25)		
		ES	0.30		Soft to firm light brown slightly sandy slightly gravelly CLAY with occasional roots (<2mm). Sand is fine. Gravel is sub-angular to rounded fine to coarse of siliceous material. [ALLUVIUM]	0.25	66.50	
		H	0.40	41		(0.35)		
		D	0.50	39				
		ES		44		0.60	66.15	
		H	0.70	60	Firm light orangish brown mottled light brown and light grey slightly sandy slgihtly gravelly CLAY with occasional rootlets (<1mm). Sand is fine. Gravel is sub-angular to rounded fine to coarse of siliceous material. [ALLUVIUM]			
	1	D	0.80	64				
				62		(0.60)		
1		B	1.00 - 1.10	65				1
		ES	1.00	55				
		H		57		1.20	65.55	
		B	1.30 - 1.50		Light brown mottled orangish brown slightly gravelly very clayey SAND. Sand is fine and medium. Gravel is sub-angular to rounded of siliceous material. [ALLUVIUM]	(0.40)		
					Firm light blusish grey mottled orangish brown sandy CLAY. [KELLAWAY FORMATION]	1.60	65.15	
		H	1.80	59				
		B	1.90 - 2.00	61				
2				57		(0.70)		2
		D	2.20					
					Dark grey silty fine SAND with occasional pockets of firm dark grey fine sandy CLAY with frequent shells. [KELLAWAY FORMATION]	2.30	64.45	
		D	2.50					
						(0.70)		
		B	2.90 - 3.00					
3					Trial pit completed at 3.00m	3.00	63.75	3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pit excavated using 0.45m bucket.

GROUNDWATER: Seepage 0.90m, heavy seepage 1.20-1.60m.

STABILITY: Unstable and collapsing 1.20-1.60m.

BACKFILL: Trial pit backfilled with arisings and compacted with bucket.

REMARKS: PID testing undertaken on all environmental samples. Results: 0.30m - 0.10ppm, 0.50m - 0.10ppm; 1.00m - 0.00ppm.

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WINDOWLESS SAMPLE LOG

Telephone: 01452 739 165 , Fax: 01452 739 220 , Email: info@CCGround.co.uk

Borehole No. **WS2A115_U**

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 462629 N 223805	Hole Type WS
Location: Section 2A GI		Level: 71.33mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 24/05/2018 End: 24/05/2018	Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		B	0.30 - 0.40				TOPSOIL: Soft to firm dark brown slightly gravelly slightly sandy CLAY with frequent rootlets (<3mm). Gravel is angular to sub-angular fine of flint.	0.25	71.08	
		D	0.30	62			Firm brown mottled orangish brown slightly gravelly slightly sandy CLAY with occasional roots (<2mm). Gravel is angular to sub-rounded fine to medium of flint.	0.45	70.88	
		ES	0.40	66						
		H	0.50 - 0.60	64						
1		B	0.50	67						1
		D	0.70	69			Firm brown mottled orangish brown and light grey slightly sandy CLAY with occasional gypsum crystals (<3mm) and rare rootlets (<1mm).	(1.40)		
		ES	1.00 - 1.20	71						
		H	1.00	77						
		B	1.20	68						
		D	1.40	70						
		ES		74						
		H		77				1.85	69.48	
2		H	1.90	75			Firm becoming stiff laminated and fissured brown mottled dark brown CLAY with occasional partings (<3mm) of yellow silt and rare gypsum crystals (<15mm).			2
		D	2.00 - 2.45							
		D						(1.05)		
		UT100								
		D	2.50							
							Stiff laminated dark grey slightly sandy CLAY with occasional partings (<2mm) of grey fine sandy silt and rare gypsum crystals (<10mm).	2.90	68.43	
3		D	3.00							3
								(1.10)		
		D	3.50							
							4.00m: Dry.	4.00	67.33	
4		D	3.90				Borehole completed at 4.00m			4
5										5
6										6
7										7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted window sampling rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 113mm, 101mm, and 86mm sample barrels: 1.20-4.00m.
CASING: 113mm diameter to 2.00m.
GROUNDWATER: None encountered.
BACKFILL: Upon completion, borehole backfilled with bentonite pellets: 1.00-4.00m and arisings: 0.00-1.00m.
REMARKS: Dynamic probe undertaken adjacent to window sample - see separate sheet. PID readings were undertaken on all environmental samples. Results: 0.30m - 0.00ppm, 0.50m - 0.00ppm and 1.00m - 0.00ppm.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
24/05/2018 17:00	4.00	2.00	

CC Ground Investigations Ltd

DYNAMIC PROBE LOG

EN ISO 22476-2

Telephone: 01452 739 165 , Fax: 01452 739 220 , Email: info@CCGround.co.uk

Probe No **SHDP2A115_U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 462629 N 223805 Level: 71.33mAD	Date 24/05/2018
Location: Section 2A GI		**Specification: DPSH-B** Hammer Mass: 64Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values) 5 10 15 20 25 30 35 40 45 50	Torque (Nm)	Remarks
1	0 0 0 3 3 3 4 4 3 2 3 3			Hand dug inspection pit: 0.00-1.20m.
2	2 3 3 8 6 5 4 4 3		0	
3	5 5 4 7 8 24 19 19 25		27	
4	5 9 26 26 32 50		27	
5			41	Dynamic probe completed at 4.98m
6				
7				

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-4.98m.

REMARKS: Probing undertaken adjacent to windowless sample borehole WS2APDN_2U - see separate sheet. Dynamic probe refused at 4.98m.

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WINDOWLESS SAMPLE LOG

Telephone: 01452 739 165 , Fax: 01452 739 220 , Email: info@CCGround.co.uk

Borehole No. **WS2A124_U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461453 N 223378	Hole Type WS
Location: Section 2A GI		Level: 65.69mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 22/05/2018 End: 22/05/2018	Logged By TB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
							TOPSOIL: Soft dark brown slightly sandy CLAY with frequent roots (<2mm).	0.25	65.44	
		B	0.30 - 0.40				Firm to stiff dark brown mottled brown slightly gravelly slightly sandy CLAY with low cobble content and with occasional roots (<2mm) Gravel is sub-angular to sub-rounded fine to coarse of limestone, flint and chalk. Cobbles are sub-rounded of limestone.	0.50	65.19	
		D	0.30	90				(0.40)		
		ES	0.40	94				0.90	64.79	
1	1	H	0.60 - 0.70	92			Firm dark orangish brown mottled light grey slightly gravelly slightly sandy CLAY with occasional roots (<1mm). Gravel is sub-angular to sub-rounded fine of limestone and calcareous nodules.	1.20	64.49	1
		B	0.60	74						
		D	0.70	69				(0.80)		
		ES	1.00 - 1.20	70			Firm light orangish brown mottled light bluish grey sandy CLAY locally tending to clayey sand.			
		H	1.00	67						
		B	1.30	64						
		D	1.50 - 1.80	62						
		ES								
		H								
2		D	2.00 - 2.45				Light orangish brown mottled light bluish grey slightly gravelly silty fine SAND. Gravel is angular fine to coarse of sandstone.	2.00	63.69	2
		B					Dark grey very silty fine SAND.			
		UT100								
		B	2.50 - 3.00							
		D	2.50							
3								(1.85)		3
		D	3.50							
		D	3.90				Stiff fissured dark grey CLAY with rare pockets (<25mm) of iron pyrite.	3.85	61.84	
4		UT70	4.00 - 4.45							4
		D	4.50							
5								(2.45)		5
		D	5.50							
6										6
		D	6.35				Very stiff dark grey slightly gravelly slightly sandy CLAY with rare sans sized shell fragments. Gravel is sub-rounded fine to medium of pyritised sandstone.	6.30	59.39	
								6.40	59.29	
7							Borehole completed at 6.40m			7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted window sampling rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 113mm, 101mm, 76mm and 66mm sample barrels: 1.20-6.40m.
CASING: 113mm diameter to 4.00m.
GROUNDWATER: Encountered at 1.20m. No rise recorded.
INSTALLATION: Borehole was backfilled with bentonite pellets 4.00-6.40m. 50mm ID HDPE slotted pipe with washed gravel response zone: 1.00-4.00m. 50mm ID HDPE plain pipe with bentonite pellet seal: 0.20-1.00m. Raised borehole helmet set in concrete: 0.00-0.20m. Gas valve fitted.
REMARKS: Hole collapsed after run 3.00-4.00m at 4.00m back to 2.50m. Dynamic probe undertaken adjacent to window sample - see separate sheet. Drillers note borehole refused at 6.40m. PID readings were undertaken on all environmental samples. Results: 0.30m - 0.00ppm, 0.60m - 0.00ppm and 1.00m - 0.00ppm.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
23/05/18	1.20		

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
23/05/2018 17:00	6.40	4.00	

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DYNAMIC PROBE LOG

EN ISO 22476-2

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Probe No **SHDP2A124_U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461453 N 223378 Level: 65.69mAD	Date 23/05/2018
Location: Section 2A GI		**Specification: DPSH-B** Hammer Mass: 64Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07

Depth (m)	Readings (blows/100mm)	Diagram (N100 Values) 5 10 15 20 25 30 35 40 45 50	Torque (Nm)	Remarks
1	4 2 1 3 4			Hand dug inspection pit: 0.00-1.20m.
2	5 10 2 14 3 20 5 20		0	
3	20 21 22 27 29 32 34 26 19 21		27	
4	12 6 4 4 4 3 5 4 5 5		41	
5	4 5 4 5 5 5 5 5 6 5		54	
6	6 5 6 5 6 5 5 5 5 7 50		54	Dynamic probe completed at 6.45m
7			54	

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted window sampling rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-6.45m.

REMARKS: Probing undertaken adjacent to windowless sample - see separate sheet. Dynamic probe refused at 6.45m.

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WINDOWLESS SAMPLE LOG

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Borehole No. **WS2ALOB_1D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 462036 N 223713	Hole Type WS
Location: Section 2A GI		Level: 67.21mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 25/05/2018 End: 25/05/2018	Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
							TOPSOIL: Soft dark brown slightly sandy CLAY with frequent roots (<2mm).	0.20	67.01	
		B	0.30	72			Soft to firm orangish brown mottled light greyish brown CLAY with occasional rootlets (<1mm).	0.40	66.81	
		ES	0.50 - 0.60	65				(0.50)		
		H	0.50	68			Firm light grey mottled light orangish brown CLAY with occasional roots (<1mm).	0.90	66.31	
1		B	0.60	72						1
		D	0.90	66			Soft to firm brownish grey mottled dark grey CLAY with slight organic odour.	(0.45)		
		ES	1.00 - 1.20	67				1.35	65.86	
	1	H	1.00	68			Firm light bluish grey mottled light orangish brown slightly gravelly slightly sandy CLAY. Gravel is sub-angular to sub-rounded fine of flint.	1.50	65.71	
		H	1.10	74				1.70	65.51	
		B	1.40	77			Orangish brown sandy very clayey sub-rounded to rounded fine to coarse GRAVEL of flint and quartzite.			
		D	1.60	54						
		ES	1.80	68			Firm light bluish grey mottled brown very sandy CLAY locally tending to very silty sand.	(0.95)		
		H		57						
2		D	2.00 - 2.50							2
		D	2.00 - 2.45							
		D					Dark grey very silty SAND with rare shells.	2.65	64.56	
		B								
		UT100								
		D	2.80							
3		B	3.00 - 3.50							3
								(1.25)		
							Stiff dark grey sandy CLAY with rare pockets (<10mm) of iron pyrite.	3.90	63.31	
4	1	D	4.00					(0.45)		4
							Stiff fissured dark grey CLAY.	4.35	62.86	
		D	4.50							
5										5
								(2.45)		
		D	5.80							
6										6
		D	6.50							
		D	6.85				Very stiff dark grey sandy CLAY with occasional shell fragments.	6.80	60.41	
7							Borehole completed at 7.00m	7.00	60.21	7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted window sampling rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 113mm, 101mm and 86mm sample barrels: 1.20-7.00m.
CASING: 113mm diameter to 3.00m.
GROUNDWATER: Encountered at 4.10m. Rose to 1.33m after 65 minutes under Client instruction.
INSTALLATION: Borehole was backfilled with bentonite pellets 4.30-7.00m. Gravel: 4.00-4.30m. 50mm ID HDPE slotted pipe with washed gravel response zone: 1.00-4.30m. 50mm ID HDPE plain pipe with bentonite pellet seal: 0.20-1.00m. Raised borehole helmet set in concrete: 0.00-0.20m. Gas valve fitted.
REMARKS: UT100 attempted at 2.00-2.45m, no recovery. Bulk sample taken. Dynamic probe undertaken adjacent to window sample - see separate sheet. PID readings were undertaken on all environmental samples. Results: 0.30m - 0.00ppm, 0.50m - 0.00ppm and 1.00m - 0.00ppm.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
24/05/18	4.10	3.00	1.33

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
24/05/2018 17:00	7.00	3.00	2.10

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DYNAMIC PROBE LOG

EN ISO 22476-2

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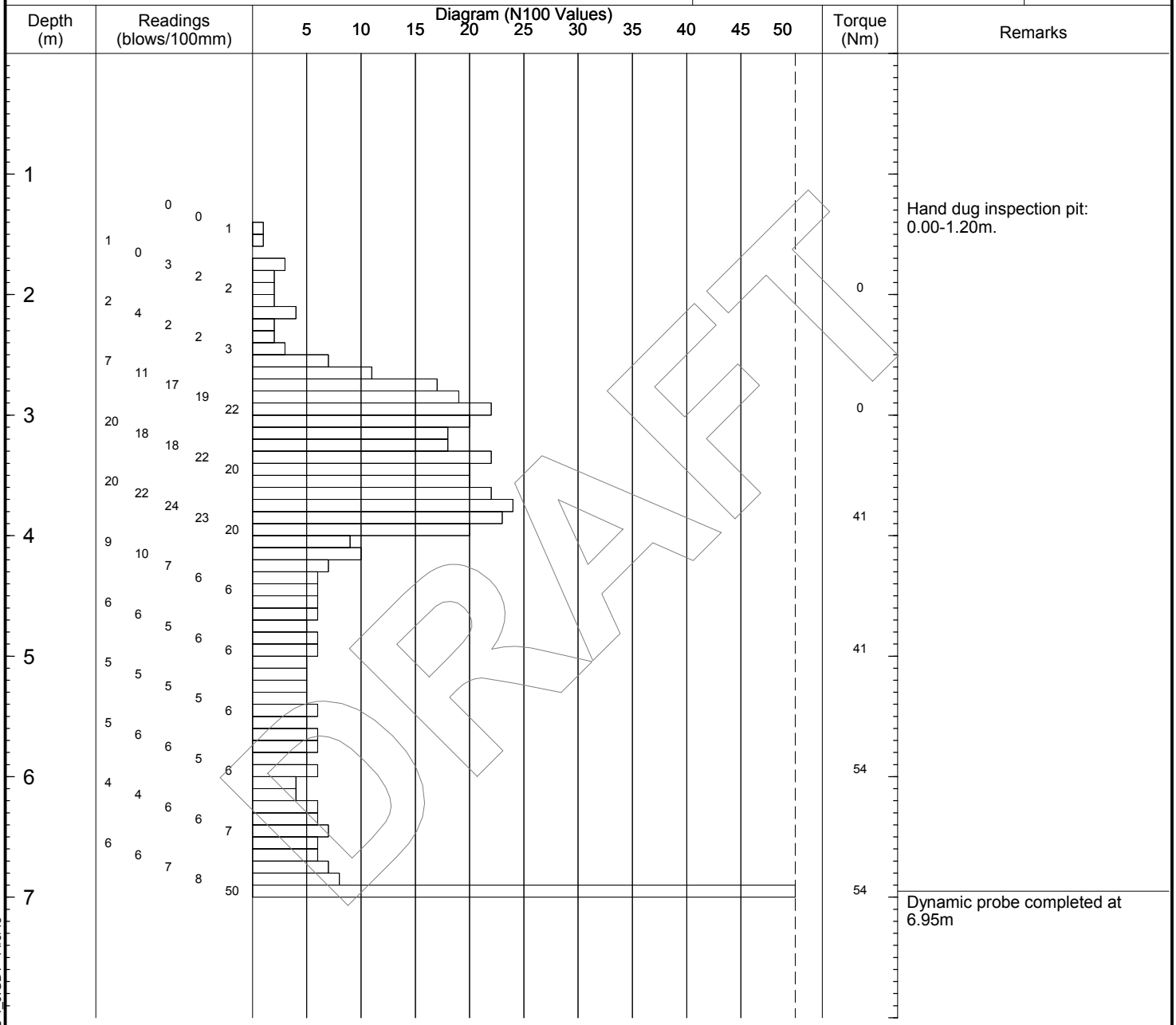
Probe No **SHDP2ALOB_1D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 462036 N 223713 Level: 67.21mAD	Date 25/05/2018
Location: Section 2A GI		**Specification: DPSH-B** Hammer Mass: 64Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-6.95m.

REMARKS: Probing undertaken adjacent to windowless sample borehole WS2APDN_2U - see separate sheet. Dynamic probe refused at 6.95m.

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WINDOWLESS SAMPLE LOG

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Borehole No. **WS2AMFOB_1D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 460700 N 223203	Hole Type WS
Location: Section 2A GI		Level: 69.40mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 22/05/2018 End: 22/05/2018	Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
							TOPSOIL: Soft to firm friable dark brown slightly sandy CLAY with occasional roots (<2mm).	0.20	69.20	
		D	0.30	100			Firm to stiff brown mottled greyish brown slightly sandy CLAY with occasional roots (<1mm).	0.45	68.95	
		ES	0.50 - 0.60	102				(0.45)		
		H	0.50	104			Firm light brownish grey mottled brown and orangish brown slightly sandy CLAY with occasional partially decomposed roots (<3mm).	0.90	68.50	
1		B	0.60	66						1
		D	0.90	68			Firm light bluish grey mottled orangish brown slightly sandy CLAY with occasional partially decomposed roots (<3mm).	1.20	68.20	
		ES	1.00 - 1.20	72						
		H	1.00	74			Firm becoming stiff laminated and fissured brown mottled dark orangish brown CLAY with frequent partings (<3mm) of yellow and orangish brown fine sandy silt.			
		H	1.10	72						
		B	1.50	76				(1.25)		
		D		76						
		ES		72						
		H		75						
2		D	2.00 - 2.45							2
		UT100								
								2.45	66.95	
		D	2.50				Stiff thinly laminated dark brownish grey CLAY with occasional partings (<10mm) of grey fine sandy silt and with rare gypsum crystals (<10mm).			
3								(1.00)		3
								3.45	65.95	
		D	3.50				Stiff to very stiff dark brownish grey slightly sandy CLAY with occasional shells.			
								(0.55)		
4		UT70	4.00 - 4.45				Dark grey very silty SAND.	4.00	65.40	4
	1									
		D	4.50					(1.30)		
	1									
5		D	5.00							5
		D	5.20							
							5.30m: Refusal.	5.30	64.10	
							Borehole completed at 5.30m			
6										6
7										7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted window sampling rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 113mm, 101mm, 76mm and 66mm sample barrels: 1.20-5.30m.
CASING: 113mm diameter to 2.00m.
GROUNDWATER: Encountered at 5.00m. Rose to 4.60m after 20 minutes.
BACKFILL: Upon completion, borehole backfilled with bentonite pellets: 1.00-5.30m and arisings: 0.00-1.00m.
REMARKS: Dynamic probe undertaken adjacent to window sample - see separate sheet. Drillers note borehole refused at 5.30m. PID readings were undertaken on al environmental samples. Results: 0.30m - 0.00ppm, 0.50m - 0.00ppm and 1.00m - 0.00ppm.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
22/05/18	5.00	2.00	4.60

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
22/05/2018 17:00	5.30	2.00	

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DYNAMIC PROBE LOG

EN ISO 22476-2

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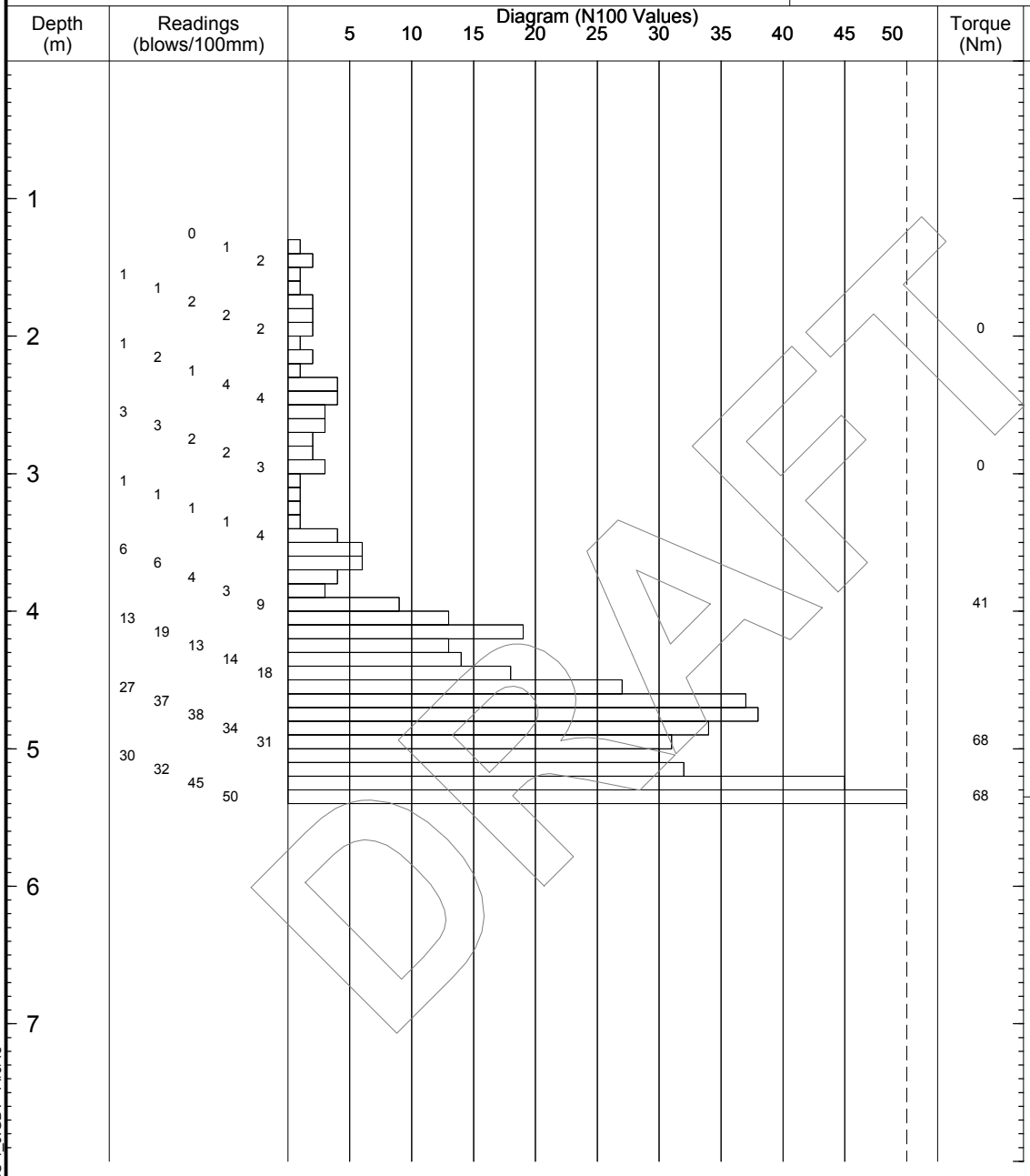
Probe No **SHDP2AMFOB_1D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 460700 N 223203 Level: 69.40mAD	Date 22/05/2018
Location: Section 2A GI		**Specification: DPSH-B** Hammer Mass: 64Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T07



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted window sampling rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-5.45m.

REMARKS: Probing undertaken adjacent to windowless samp - see separate sheet. Dynamic probe refused at 5.35m.

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WINDOWLESS SAMPLE LOG

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Borehole No. **WS2AMFOB_1U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type WS
Location: Section 2A GI		Level: mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 30/05/2018 End: 30/05/2018	Logged By DH

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		B ES	0.20	63			TOPSOIL: Soft brown slightly sandy CLAY with frequent roots and rootlets (<10mm).	0.10		
								(0.40)		
		B ES	0.50	68 70			MADE GROUND: Soft to firm brown slightly sandy CLAY with frequent roots and rootlets (<8mm).	0.50		
							Firm light orangish brown mottled dark brown sandy CLAY.			
1		B ES	1.00					(1.00)		1
							Firm thinly laminated dark brown mottled light yellowish orange silty CLAY with frequent decomposed rootlets (<50mm).	1.50		
								(0.70)		
2		D UT100	2.00 2.00 - 2.45				Firm thinly laminated bluish grey slightly sandy silty CLAY.	2.20		2
								(1.10)		
3		D	3.00							3
							Soft becoming firm bluish grey slightly sandy silty CLAY with frequent shell and fossill fragments (<20mm).	3.30		
	1							(1.00)		
4		D UT70	4.00 4.00 - 4.45							4
							Bluish grey slightly gravelly SAND with frequent shell fragments <20mm).Sand is fine to coarse. Gravel is sub-angular to sub-rounded coarse of siliceous material.	4.30		
								(0.70)		
5		D	5.00				Borehole completed at 5.00m	5.00		5
6										6
7										7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted window sampling rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 113mm, 101mm and 66mm sample barrels: 1.20-5.00m.
CASING: 113mm diameter to 2.00m.
GROUNDWATER: Encountered at 4.00m. Rose to 3.91m after 20 minutes.
BACKFILL: On completion, borehole backfilled with bentonite pellets: 1.20-5.00m and arisings: 0.00-1.00m.
REMARKS: Dynamic probe undertaken adjacent to window sample - see separate sheet. PID readings were undertaken on all environmental samples. Results: 0.20m - 0.00ppm, 0.50m - 0.00ppm and 1.00m - 0.40ppm.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
30/05/18	4.00	2.00	3.91

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
30/05/2018 17:00	5.00	2.00	5.00

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TRIAL PIT LOG

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Pit No **TP2ALOB_1U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461957 N 223555 Level: 67.30mAOD	Date 05/06/2018
Location: Section 2A GI		Dimensions: 2.00m (Depth 2.00m, 0.70m)	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing: No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
					TOPSOIL: Soft friable dark brown slightly sandy CLAY with frequent roots (<3mm).	(0.25)		
		ES	0.30		Firm orangish-brown mottled light brown and light grey slightly sandy gravelly CLAY with occasional roots (<2mm). Gravel sub-angular fine to coarse of siliceous material and flint. [ALLUVIUM]	0.25	67.05	
		H	0.40	58		(0.35)		
		D	0.50	54				
		ES		52		0.60	66.70	
		H	0.70	60	Firm light bluish grey mottled light brown and light orangish brown slightly gravelly CLAY with occasional rootlets (<1mm) and occasional randomly orientated undulating, polished surfaces noted (<500mm x 400mm exposed). Gravel is sub-rounded to rounded fine to coarse of siliceous material. [ALLUVIUM]			
				58				
				61		(0.70)		
1		B	1.00 - 1.10	61				1
	1	D	1.00	64				
		ES		62				
		H				1.30	66.00	
		D	1.50	58	Firm orangish brown mottled greyish brown slightly sandy CLAY with occasional thin pockets of orangish and yellowish-brown silty fine sand. Sand is fine. [KELLAWAY BEDS]			
		H		56		(0.50)		
				59				
					Stiff dark grey CLAY with rare up to fine gravel sized gypsum crystals. [KELLAWAY BEDS]	1.80	65.50	
		B	1.90 - 2.00	94		(0.20)		
2		D	1.90	87				2
		H		90	Trial pit completed at 2.00m	2.00	65.30	
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pit excavated using 0.45m bucket.

GROUNDWATER: Slight seepage 1.30m.

STABILITY: Stable throughout.

BACKFILL: Trial pit backfilled with arisings and compacted with bucket 0.00-2.00m.

REMARKS: PID testing undertaken on all environmental samples. Results: 0.30m - 0.10ppm, 0.50m - 0.10ppm; 1.00m - 0.00ppm.

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TRIAL PIT LOG

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Pit No **TP2ALOB_2U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461903 N 223471 Level: 67.23mAOD	Date 05/06/2018
Location: Section 2A GI		Dimensions: 2.00m Depth 2.00m 0.70m	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
					TOPSOIL: Grass over soft to firm brown sightly gravelly slightly sandy silty CLAY sith occasional rootlets (<3mm). Gravel is angular to sub-angular fine of siliceous material.	(0.25)		
		ES	0.30		Soft orangish brown locally mottled light grey slightly sandy silty CLAY.	0.25	66.98	
		D	0.50	54		(0.35)		
		ES		51				
		H		56		0.60	66.63	
		H	0.80	60	Firm light bluish/grey mottled light brown and light orangish brown slightly gravelly CLAY with occasional rootlets (<1mm) and occasional randomly orientated undulating, polished surfaces noted (up to 500mm x 400mm exposed). Gravel is sub-rounded to rounded fine to coarse of siliceous material. [ALLUVIUM]			
				59				
1				57		(0.70)		1
		B	1.00					
		D	1.10	60				
		ES		66				
		H						
	▼1					1.30	65.93	
		D	1.40		Firm orangish brown mottled greyish brown slightly sandy gravelly CLAY with occasional pockets of orangish brown silty fine sand (<50mm). Gravel sub-angular rounded fine to coarse siliceous material flint. [ALLUVIUM]	(0.40)		
		H	1.50	74				
				76				
				80		1.70	65.53	
		D	1.80		Firm fissured brownish grey slightly fine sandy CLAY with frequent thin lenses and pockets of orangish yellowish brown or grey silty fine sand (<50mm). Fissures are sub-horizontal, random and very closely spaced. [KELLAWAYS]	(0.30)		
		H	1.90					
2		B				2.00	65.23	2
					Trial pit completed at 2.00m			
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pit excavated using 0.45m bucket.

GROUNDWATER: Seepage below 1.40m.

STABILITY: Stable throughout.

BACKFILL: Trial pit backfilled with arisings and compacted with bucket 0.00-2.00m.

REMARKS: PID testing undertaken on all environmental samples. Results: 0.30m - 0.00ppm, 0.50m - 0.00ppm; 1.00m - 0.00ppm.

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ROTARY BOREHOLE LOG

Telephone: 01452 739 165 , Fax: 01452 739 220 , Email: info@CCGround.co.uk

Borehole No. **CP2ALOB_1D**

Sheet 1 of 3

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 4619977 N 223616	Hole Type DS+RC
Location: Section 2A GI		Level: 67.18mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 08/06/2018 End: 22/06/2018	Logged By SM/MM/DH

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
		B ES	0.20					TOPSOIL: Grass over soft brown mottled orangish brown and reddish brown slightly sandy silty CLAY with frequent roots (<2mm).	(0.50)		
	1	B ES	0.50					0.40-0.45m: 1no. broken land drain infilled with silty clay.	0.50	66.68	
	1							Soft yellowish brown mottled grey sandy silty CLAY.	(0.60)		
1		B SPT	1.00 1.20 - 1.65	 S 6				Soft orangish brown mottled grey sandy silty CLAY.	1.10	66.08	1
		H D H H SPT	1.70 1.80 1.90 2.00 - 2.45	15 15 20 S 27					(1.20)		
2								Soft thickly laminated grey slightly gravelly lightly sandy to sandy locally silty CLAY with rare shells (<10mm).	2.30	64.88	2
		H D H H C SPT C	2.70 2.80 2.90 3.00 - 4.00 3.00 - 3.27	15 10 10 S 120	C	75% %			(1.70)		
3											3
		H D H H C SPT C	3.70 3.80 3.90 4.00 - 5.00 4.00 - 4.40	15 15 10 C 60	C	70% %		Soft thickly laminated grey slightly sandy locally silty CLAY with rare shells (<10mm).	4.00	63.18	
4									(1.00)		4
		D H C SPT C	4.80 4.90 5.00 - 6.00 5.00 - 5.45	 15 C 16	C	100% %		Stiff thickly laminated becoming very stiff grey slightly sandy locally silty CLAY.	5.00	62.18	
5											5
		H H D H CS C SPT C	5.50 5.55 5.60 5.65 5.70 6.00 - 7.00 6.00 - 6.45	75 70 80 C 20	C	100% %			(2.00)		
6											6
		H H H C SPT C	6.50 6.60 6.70 7.00 - 8.00 7.00 - 7.35	120 125 120 C 75	C	100% 55% 55%		Very stiff thickly laminated grey slightly sandy locally silty CLAY.	7.00	60.18	
7											7
		CS	7.67 - 8.00						(1.40)		
8											8

EQUIPMENT: Hand digging tools. Fraste multi-purpose ML track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic sampling using 128mm sample barrel: 1.20-3.00m. Waterflush rotary coring using T6-116 coring barrel: 3.00-22.00m.
CASING: 168mm diameter to 3.00m, 140mm diameter to 11.90m.
GROUNDWATER: Encountered at 1.20m rose to 0.85m after 1hour. Artesian water was encountered at 14.70m. Rose to 0.30m above ground level on 15/06/2018, 3.50m above ground level on 25/06/2018 and was at 5.00m above gorund level on 25/06/2018.
BACKFILL: Upon completion, borehole backfilled with bentonite pellets: 14.00-0.50m and arisings 0.50-0.00m.
REMARKS: PID readings were undertaken on all environmental samples. Results: 0.20m - 0.00ppm; 0.50m - 0.00ppm.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
13/06/18	0.50		0.85

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
13/06/2018 17:00	6.00	3.00	1.20
14/06/2018 08:00	6.00	3.00	0.65

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Borehole No. **CP2ALOB_1D**

Sheet 2 of 3

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 4619977 N 223616	Hole Type DS+RC
Location: Section 2A GI		Level: 67.18mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 08/06/2018 End: 22/06/2018	Logged By SM/MM/DH

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
		C SPT C	8.00 - 9.00 8.00 - 8.05	C 1500		100% 75% 62%		Very stiff thickly laminated grey slightly sandy locally silty CLAY. *(continued from previous sheet)*			
									8.40	58.78	
		CS	8.83 - 9.00					Medium strong becoming strong light grey LIMESTONE with occasional convoluted grey sandy clay lanimae and bands (<100mm) and occasional shells (<30mm). Discontinuities are closely and medium spaced sub-horizontal undulated to stepped rough with no infill. 8.45-8.55m: Very stiff grey sandy clay.	(1.10)		
9		C SPT C	9.00 - 10.00 9.00 - 9.03	C 5000		100% 50% 45%					9
		CS	9.50 - 9.95						9.50	57.68	
								Strong light grey calcarenitic thinly to thickly laminated (0-5°) LIMESTONE with occasional shells (<30mm). Discontinuities are medium spaced sub-horizontal ondulated to stepped rough tight to open clean or infilled with sandy clay.			
10		C SPT C CS	10.00 - 11.00 10.00 - 10.23 10.33 - 10.80	C 96		100% 65% 65%					10
11		C SPT C	11.00 - 12.00 11.00 - 11.03	C 3000		85% 67% 67%			(3.50)		11
								11.45-12.00m: Stiff grey sandy clay.			
		CS	11.76 - 12.00								
12		C SPT C	12.00 - 13.00 12.00 - 12.37	C 60		100% 70% 57%					12
		CS	12.70								
13		C SPT C CS	13.00 - 14.00 13.00 - 13.04 13.10 - 13.43	C 3000		90% 60% 52%		Strong light grey fossiliferous LIMESTONE. Discontinuities are closely spaced sub-horizontal to 30° undulating smooth with clean.	13.00 (0.50)	54.18	13
								Very stiff dark slightly sandy silty CLAY.	13.50 (0.50)	53.68	
14		C SPT C CS	14.00 - 14.70 14.00 - 14.05 14.06 - 14.25	C 5000		90% 72% 60%		Medium strong light grey SILTSTONE. Discontinuities are closely spaced sub-horizontal undulating smooth infilled with dark grey clay (<4mm)	14.00 (0.70)	53.18	14
		C	14.70 - 16.00			100% 17% 17%		Weak light grey LIMESTONE. Discontinuities are closely spaced sub-horizontal undulating rough clean.	14.70 (1.30)	52.48	
15											15
16		C SPT C	16.00 - 17.50 16.00 - 16.25	C 600		99% 97% 97%		Medium strong fossiliferous LIMESTONE. Discontinuities are medium and closely spaced, sub-horizontal undulating rough clean.	16.00	51.18	16
		CS	16.40 - 16.65								
17											17
		CS	17.25 - 17.50								
		C	17.50 - 19.00	C 3000		100%					

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
14/06/2018 17:00	14.00	3.00	0.00
15/06/2018 08:00	14.00	3.00	0.00
15/06/2018 17:00	14.00	3.00	
21/06/2018 08:00	14.70	3.00	
21/06/2018 17:00	16.00	11.90	
22/06/2018 08:00	16.00	11.90	

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Borehole No. **CP2ALOB_1D**

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 4619977 N 223616	Hole Type DS+RC
Location: Section 2A GI		Level: 67.18mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 08/06/2018 End: 22/06/2018	Logged By SM/MM/DH

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
18		SPT C	17.50 - 17.52			97% 92%		Medium strong fossiliferous LIMESTONE. Discontinuities are medium and closely spaced, sub-horizontal undulating rough clean. *(continued from previous sheet)*			
		CS	18.10 - 18.37		C						
19		C	19.00 - 20.50	C 1500		98%			(6.00)		
		SPT C	19.00 - 19.01			98%					
		CS	19.67 - 19.88		C	98%					
20		C	20.50 - 22.00	C 1500		100%					
		SPT C	20.50 - 20.52			100%					
		CS	20.70 - 21.02		C	100%					
21		CS	21.60 - 21.85								
22								Borehole completed at 22.00m	22.00	45.18	
23											
24											
25											
26											
27											

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
22/06/2018 17:00	22.00	11.90	
25/06/2018 08:00	22.00	11.90	
25/06/2018 17:00	22.00		0.00

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Borehole No. **CP2AMFOB_2U**

Sheet 1 of 4

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 460644 N 223108	Hole Type DS+RC
Location: Section 2A GI		Level: 69.43mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 26/06/2018 End: 29/06/2018	Logged By MB/DH

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
								TOPSOIL: Firm friable dark brown slightly sandy CLAY with some roots (<3mm). Sand is fine.	0.15	69.28	
		B	0.30 - 0.40	130				Stiff friable brownish grey mottled orangish brown slight sandy slightly gravelly CLAY with occasional roots (<2mm). Gravel is sub-angular to rounded fine to medium of flint and siliceous material.	0.45	68.98	
		D	0.30						(0.75)		
		ES	0.50 - 0.60	110							
		H	0.50	107							
1		B	0.60	96				Stiff to very stiff fissured greyish brown mottled light orangish brown CLAY with occasional rootlets (<1mm). Fissures are random very closely spaced occasionally polished.	1.20	68.23	1
		D	0.90	130							
		ES	1.00 - 1.10	S 12							
		H	1.00								
		H	1.20								
		B	1.20 - 1.65					Firm to stiff thinly laminated dark orangish brown slightly sandy CLAY with frequent decomposed rootlets (<5mm) and occasional sand laminations (<8mm).	(1.20)		
		D									
		ES									
2		H	2.00								2
		SPT	2.00 - 2.60								
		D									
		UT100							2.40	67.03	
								Dark grey very clayey SAND with rare shell fragments (3mm).			
3	▼1	D	3.00								3
		SPT	3.00 - 3.45								
		D	3.81								
4		B	4.00	S 52				4.00-7.00m. Very dense.			4
		SPT	4.00 - 4.44								
		C	4.50 - 5.50		C			4.50-7.00m: Shell fragments absent.	(4.60)		
5		B	5.00								5
		C	5.50 - 7.00	S 130							
		SPT	5.50 - 5.71								
6		B	6.00		C			5.90m: 1no. sub-rounded cobble of weakly cemented sandstone (<70mm).			6
		B	7.00	C 22				Stiff thinly laminated dark grey slightly sandy silty CLAY.	7.00	62.43	
7		C	7.00 - 8.50								7
		SPT C	7.00 - 7.45		C						
		CS	7.65 - 7.82								
8											8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 128mm and 113mm sample barrels: 1.20-4.50m. Waterflush rotary coring using T6-116 coring barrel: 4.50-30.50m.
CASING: 140mm to 4.50m.
GROUNDWATER: None encountered prior to using waterflush.
INSTALLATION: Bentonite pellets: 30.00-30.50m. 50mm ID HDPE slotted pipe with washed gravel response zone: 2.00-30.00m. 50mm ID HDPE plain pipe with bentonite pellet seal: 0.20-2.00m. Raised borehole helmet set in concrete: 0.00-0.20m. Gas valve fitted.
REMARKS: PID readings were undertaken on all environmental samples. Results: 0.30m - 0.00ppm; 0.50m - 0.00ppm and 1.00m - 0.00ppm. Due to hard ground conditions and under instruction from the Client Engineer onsite, SPTs from 23.50-30.50m were not undertaken.
SPT testing not carried out below 23.50m on engineers instruction. Standpipe installed on 29/06/2018.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
27/06/18	3.10		

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
26/06/2018 17:00	4.00	3.00	
27/06/2018 08:00	4.00	3.00	3.10

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Borehole No. **CP2AMFOB_2U**

Sheet 2 of 4

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 460644 N 223108	Hole Type DS+RC
Location: Section 2A GI		Level: 69.43mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 26/06/2018 End: 29/06/2018	Logged By MB/DH

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
		D	8.00					Stiff thinly laminated dark grey slightly sandy silty CLAY. *(continued from previous sheet)*	(2.10)		
		C	8.50 - 9.30	C 24		100%					
		SPT C	8.50 - 8.95			40%					
9						25%					9
		D	9.00						9.10	60.33	
		C	9.30 - 10.00			98%		Weak light grey mottled dark grey fossiliferous LIMESTONE. Discontinuities are closely spaced sub-horizontal and vertical undulating rough and infilled with upto 10mm dark grey sandy silt.			
		CS	9.40 - 9.63			45%					
						30%					
10		C	10.00 - 11.50	C 55		98%					10
		SPT C	10.00 - 10.12			45%					
						42%			(2.55)		
11											11
		C	11.50 - 13.00	C 230		100%					
		SPT C	11.50 - 11.63			92%			11.65	57.78	
		CS	11.65 - 11.98			50%		Medium strong light grey fossiliferous LIMESTONE. Discontinuities are closely spaced sub-horizontal undulating rough infilled with upto 8mm dark grey clay.	(0.40)		
12									12.05	57.38	12
								Weak dark grey mottled light grey calcereous MUDSTONE interbedded with closely spaced thin beds of very stiff dark grey silty clay. Discontinuities are very closely spaced undulating smooth and infilled with upto 5mm grey clay.			
		CS	12.75 - 12.75								
13		C	13.00 - 14.50	C 1500		100%		12.95-13.30m: Bed of medium strong light grey limestone. Discontinuities are very closley spaced sub-horizontal undulating rough infilled with a sandy silt (<3mm).	(2.15)		13
		SPT C	13.00 - 13.07			95%					
						20%					
14		CS	13.90 - 14.02						14.20	55.23	14
								Medium strong light grey mottled dark grey crystalline LIMESTONE very thinly interbedded weak dark grey mudstone. Discontinuities are very closely spaced sub-horizontal undulating rough infilled with dark grey clay upto 4mm.			
		C	14.50 - 16.00	C 1500		99%					
		D	14.50			90%			(1.00)		
		SPT C	14.50 - 14.66			66%					
15		CS	14.79 - 15.01					14.80-15.00m: Bed of medium strong light grey crystalline limestone. Discontinuities are extremely closley spaced undulating rough with no infill (<10mm).	15.20	54.23	15
		CS	15.42 - 15.61					Medium strong light grey crystalline LIMESTONE. Discontinuities are sub-horizontal very closely to closely spaced planar smooth clean.			
16		C	16.00 - 17.50	C 1500		96%					16
		SPT C	16.00 - 16.08			70%			(1.90)		
						60%					
		CS	16.62 - 16.79								
17									17.10	52.33	17
								Stiff thinly laminated friable dark grey mottled dark purplish blue slightly sandy CLAY with frequent pyrite crystals (<1mm) and frequent shell fragments (<11mm).			
		C	17.50 - 19.00	C 79		97%					

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)

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Borehole No. **CP2AMFOB_2U**

Sheet 3 of 4

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 460644 N 223108	Hole Type DS+RC
Location: Section 2A GI		Level: 69.43mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 26/06/2018 End: 29/06/2018	Logged By MB/DH

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
		D SPT C	17.50 17.50 - 17.84			60% 60%		Stiff thinly laminated friable dark grey mottled dark purplish blue slightly sandy CLAY with frequent pyrite crystals (<1mm) and frequent shell fragments (<11mm). *(continued from previous sheet)*	(1.40)		
18		D CS	18.50 18.70 - 18.87		C			Weak to medium strong light grey fossiliferous LIMESTONE. Discontinuities are medium spaced undulating rough infilled with upto 1mm dark grey clay.	18.50	50.93	18
19		C SPT C	19.00 - 20.50 19.00 - 19.02	C 1500		97% 95% 95%			(1.80)		19
20		CS	19.90 - 20.05		C				20.30	49.13	20
		C	20.50 - 22.00			99% 90% 90%		Medium strong light grey crystalline LIMESTONE. Discontinuities are sub-horizontal planar smooth clean.	(1.50)		
21		CS	21.22 - 21.42		C				21.80	47.63	21
22		C	22.00 - 23.50	C 3000		99% 87% 87%		Weak to medium strong light grey fossiliferous LIMESTONE. Discontinuities are sub-horizontal to vertical undulating rough clean.			22
		CS	22.70 - 22.90		C				(2.00)		
23		C	23.50 - 25.00			100% 92% 90%			23.80	45.63	23
24		CS	24.43 - 24.61		C			Medium strong light grey crystaline LIMESTONE. Discontinuities are very closely to closely spaced undulating rough clean. 90% >0.10m spacing.	(1.63)		24
25		C	25.00 - 26.50			96% 96% 96%			25.43	44.00	25
		CS	25.75 - 26.01		C			Weak to medium strong dark grey fossiliferous LIMESTONE. Discontinuities are sub-horizontal undulating rough and infilled with dark grey silt.	(0.86)		
26		C	26.50 - 28.00			99% 99% 99%			26.29	43.14	26
27		CS	27.00 - 27.30		C			Medium strong light grey fossiliferous LIMESTONE. Discontinuities are very closely spaced undulating rough clean.			27

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
27/06/2018 17:00	19.00	4.50	2.40
28/06/2018 08:00	19.00	4.50	1.90

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ROTARY BOREHOLE LOG

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Borehole No.
CP2AMFOB_2U

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 460644 N 223108	Hole Type DS+RC
Location: Section 2A GI		Level: 69.43mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 26/06/2018 End: 29/06/2018	Logged By MB/DH

(m)	Water Levels	Core Run, Samples & Testing No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
28		C	28.00 - 29.50		C	97% 90% 90%		Medium strong light grey fossiliferous LIMESTONE. Discontinuities are very closely spaced undulating rough clean. *(continued from previous sheet)*	(3.31)		
29		CS	29.26 - 29.50		C						
		C	29.50 - 30.50			95% 95% 95%		Weak dark grey MUDSTONE. Discontinuities are medium closely spaced sub-horizontal undulating rough clean.	29.60	39.83	
30		CS	30.30 - 30.50		C				(0.90)		
								Borehole completed at 30.50m	30.50	38.93	
31											
32											
33											
34											
35											
36											
37											

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
28/06/2018 17:00	30.50	4.50	2.30

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Borehole No. **CP2APFB_1U**

Sheet 1 of 3

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 464733 N 122442	Hole Type RC
Location: Section 2A GI		Level: 88.05mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 06/07/2018 End: 11/07/2018	Logged By DH/MB/TH

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
								TOPSOIL: Stiff light orangish brown mottled light grey slightly sandy CLAY with frequent rootlets (<10mm).	0.10	87.95	
		B	0.30 - 0.40					Stiff light orangish brown slightly gravelly slightly sandy CLAY with occasional rootlets (<15mm). Gravel is sub-rounded fine to medium of siliceous material.	(0.50)		
		ES	0.30						0.60	87.45	
		B	0.50 - 0.60					Stiff locally firm thinly laminated friable dark orangish brown mottled light grey CLAY with frequent calcareous deposits (<8mm).			
		ES	0.50								
1		B	1.00 - 1.10						(1.10)		1
		ES	1.00	S 12							
		D	1.20 - 1.30						1.70	86.35	
		SPT	1.20 - 1.65					Stiff thinly laminated friable dark brown mottled light grey slightly sandy CLAY with frequent shell fragments (<16mm) and frequent calcite deposits (<7mm).			
2		D	1.80 - 1.90	S 22							2
		SPT	1.80 - 2.25						(1.30)		
		D	2.00 - 2.10								
		D	2.20 - 2.42								
3		D	3.00 - 3.10	S 18				Stiff friable dark bluish grey CLAY with frequent calcite deposits (<30mm) and rare lignite fragments (<80mm).	3.00	85.05	3
		SPT	3.00 - 3.45						(1.00)		
	1	D	3.78 - 4.00								
4		UT100	4.00 - 4.45					Stiff very closely fissured dark brown CLAY with rare shell fragments.	4.00	84.05	4
		D	4.45 - 4.55								
		D	4.55 - 4.60								
		D	4.80						(1.75)		
5		SPT	5.00 - 5.45	S 28							5
									5.75	82.30	
6		D	5.90					Very stiff very closely fissured dark brownish grey CLAY with frequent shell fragments.			6
		C	6.50 - 8.00	S 34		80%		6.50-12.50m: Very closely to closely fissured with occasional shell fragments.			
		SPT	6.50 - 6.95			0%					
7						0%					7
		CS	7.20 - 7.45		C						
8											8

EQUIPMENT: Hand digging tools. Fraste multi-purpose PLG track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic sampling using 128mm and 113mm sample barrels: 1.20-6.50m. Waterflush rotary coring using T6-116 coring barrel: 6.50-24.50m.
CASING: 140mm diameter to 4.00m.
GROUNDWATER: None encountered prior to using water flush to advance casing to 4.00m.
BACKFILL: Upon completion, borehole backfilled with bentonite pellets: 0.80-24.90m and arisngs: 0.00-0.80m.
REMARKS: PID readings were undertaken on all environmental samples. Results: 0.30m - 0.00ppm; 0.50m - 0.00ppm; 1.00m - 0.00ppm.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
09/07/18	4.00	4.00	

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
06/07/2018 17:00	4.00		
09/07/2018 08:00	4.00		

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ROTARY BOREHOLE LOG

Borehole No. **CP2APFB_1U**

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 464733 N 122442	Hole Type RC
Location: Section 2A GI		Level: 88.05mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 06/07/2018 End: 11/07/2018	Logged By DH/MB/TH

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
		C SPT	8.00 - 9.50 8.00 - 8.45	S 31		100% 0% 0%		Very stiff very closely fissured dark brownish grey CLAY with frequent shell fragments. *(continued from previous sheet)*			
9		D	9.00						(6.25)		9
		C SPT	9.50 - 11.00 9.50 - 9.95	S 26		100% 0% 0%		9.00-9.95m: Stiff.			
10		D	10.00								10
		D	10.50								
11		C SPT	11.00 - 12.50 11.00 - 11.45	S 48		83% 0% 0%					11
12		D CS	12.00 12.20 - 12.42					12.00-12.50. Locally tending to extremely weak mudstone. Very stiff very closely fissured indistinctly thinly laminated grey silty CLAY with occasional comminuted shell fragments (<10mm).	12.00	76.05	12
		C SPT C	12.50 - 14.00 12.50 - 12.95	C*51		100% 0% 0%					
13		H D H	13.30 13.50 - 13.60 13.70	108 115				13.30-14:00m: Stiff.			13
14		H C SPT C	13.90 14.00 - 15.50 14.00 - 14.42	132 C*57		100% 0% 0%					14
15		D	15.00 - 15.10					14.80m: 1No. Ammonite fossil fragment (20x100x50mm).	(5.50)		15
		C SPT C	15.50 - 17.00 15.50 - 15.88	C*67		100% 0% 0%		15.50-17.00m: With rare fossil fragments (<10mm). 15.50-18.50m: Tending to extremely weak mudstone.			
16		D	16.50 - 6.60								16
17		C SPT C	17.00 - 18.50 17.00 - 17.38	C*67		94% 0% 0%		*(continued on next sheet)*	17.50	70.55	17

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
09/07/2018 17:00	11.00	4.00	2.60
10/07/2018 08:00	11.00	4.00	2.60

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ROTARY BOREHOLE LOG

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Borehole No. **CP2APFB_1U**

Sheet 3 of 3

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 464733 N 122442	Hole Type RC
Location: Section 2A GI		Level: 88.05mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 06/07/2018 End: 11/07/2018	Logged By DH/MB/TH

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
		D	17.70 - 17.80					Very stiff thinly laminated grey silty CLAY locally tending to extremely weak mudstone with frequent locally occasional comminuted shell fragments (<30mm) and rare fossil fragments (<10mm). *(continued from previous sheet)*			
18		CS	17.90 - 18.15		C						
		D	18.20 - 18.30								
		C	18.50 - 20.00	C 43		67%		17.70-17.80m: With frequent pyritic shell fragments (<10mm).			
		SPT C	18.50 - 18.95			0% 0%		18.50-19.50m: Locally stiff.	(2.30)		
19					C						
		D	19.50 - 19.60	110							
		H	19.50						19.80	68.25	
20		C	20.00 - 21.50	C*75		100%		Very stiff grey silty CLAY locally tending to extremely weak mudstone with occasional lenses (<2mm) of greyish brown silty fine sand and occasional comminuted shell fragments (<10mm) and rare fossil fragments (<20mm).			
		SPT C	20.00 - 20.35			0% 0%		20.00-21.10m: With rare lenses of fine pyritic sand (<2mm).	(1.30)		
					C						
		D	20.80 - 20.90					20.90-21.10m: Slighty sandy.			
21		CS	21.10 - 21.30					Extremely weak grey argillaceous fine SANDSTONE with occasional comminuted shell fragments (<10mm). Discontinuities are sub-horizontal closely to medium spaced undulating rough.	21.10	66.95	
		B	21.50 - 23.00	C*158		100%		Very dense grey clayey fine SAND.	21.40	66.65	
		C	21.50 - 21.72			20%		21.90-22.10m: Weakly cemented.			
		SPT C				20%					
22					C						
		B	23.00 - 24.50	C*63		80%					
		C	23.00 - 23.39			0%			(3.50)		
		SPT C				0%					
					C						
24											
		SPT C	24.50 - 24.90	C*60				24.5-24.90m: Strata description assumed to continue beyond final drill depth to base of in-situ penetration test.			
								Borehole completed at 24.90m	24.90	63.15	
25											
26											
27											

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
10/07/2018 17:00	20.00	4.00	2.10
11/07/2018 08:00	20.00	4.00	2.40
11/07/2018 17:00	24.50	4.00	2.90

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ROTARY BOREHOLE LOG

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Borehole No. **CP2APOOB_1D**

Sheet 1 of 3

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 463636 N 224167	Hole Type RC
Location: Section 2A GI		Level: 85.73mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 03/07/2018 End: 05/07/2018	Logged By DH

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
		B	0.30 - 0.40	60				MADE GROUND: Dark brown slightly gravelly slightly sandy silty CLAY. Gravel is sub-angular to sub-rounded fine to coarse of siliceous material.	0.10	85.63	
		ES	0.30								
		H	0.50 - 0.60	62				Very stiff light brown mottled dark orangish brown gravelly slightly sandy CLAY with frequent rootlets (<20mm). Gravel is sub-angular to rounded medium to coarse of siliceous material.	0.40	85.33	
		B	0.50						(0.60)		
1		ES	0.60								1
		H	1.00 - 1.10					Firm light brown slightly gravelly CLAY. Gravel is angular to sub-rounded medium to coarse of siliceous material.	1.00	84.73	
		B	1.00	S 9							
		ES	1.20					Firm becoming firm to stiff friable thinly laminated dark orangish brown slightly sandy CLAY with frequent iron stained sandstone laminae (<3mm) and frequent leaf matter (<20mm).			
		SPT									
		ES	1.50								
		D	1.80						(1.70)		
2		D	1.99	70							2
		H	2.00								
		UT100	2.00 - 2.45								
		D	2.20								
		D	2.65					Stiff becoming to very stiff friable thinly laminated dark bluish grey slightly sandy silty CLAY with occasional shell fragments (<5mm) and rare fossils (<10mm).	2.70	83.03	
3		D	3.00								3
		SPT	3.20	S 16							
		H	3.40	100							
		D	3.71								
4		D	4.00						(2.50)		4
		UT100	4.20 - 4.65								
		D	4.65								
		H	4.70								
5		D	4.80								5
		D	5.00								
		SPT	5.20	S 30				Very stiff thinly laminae dark bluish grey slightly sandy CLAY with rare shell fragments (<8mm).	5.20	80.53	
		D	5.50								
									(1.20)		
6		D	6.00								6
		C	6.30 - 7.60	S 32		99% 0% 0%		Very stiff friable thinly laminae dark bluish grey slightly sandy silty CLAY with rare shell fragments (<8mm) and rare gypsum crystals (<1mm). 6.40-7.6m. With rare gypsum crystals (<1mm).	6.40	79.33	
		H	6.60								
		SPT	6.70								
7	1	D	7.00		C				(1.20)		7
		CS	7.44 - 7.60								
		C	7.60 - 9.10	S 27	C	100% 0% 0%		Very stiff thinly laminae dark bluish grey slightly sandy CLAY with rare shell fragments (<3mm).	7.60	78.13	
8											8

EQUIPMENT: Hand digging tools. Comacchio MC305 Multi-drill track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic sampling using 128mm and 113mm sample barrels: 1.20-6.30m. Water flush rotary coring using T6-116 coring barrel: 6.30m-19.60m.
CASING: 140mm diameter to 5.50m.
GROUNDWATER: Water level dry prior to water flush.
BACKFILL: Bentonite pellet seal: 19.60-20.03m. 50mm ID HDPE slotted pipe with washed gravel response zone: 1.40-19.60m. 50mm ID HDPE plain pipe with bentonite pellet seal: 0.20-1.40m. Raised borehole helmet set in concrete: 0.00-0.20m. Gas valve fitted.
REMARKS: PID readings were undertaken on all environmental samples. Results: 0.30m - 0.00ppm; 0.50m - 0.00ppm; 1.00m - 0.00ppm; 1.50m - 0.00ppm
Hand vane readings of >150kpa recorded at 4.70m, 6.60m, 8.00m, 13.10m, 14.80m and 19.00m.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
04/07/18	15.10	5.50	

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
03/07/2018 17:00	3.20		
04/07/2018 08:00	3.20		

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ROTARY BOREHOLE LOG

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Borehole No. **CP2APOOB_1D**

Sheet 2 of 3

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 463636 N 224167	Hole Type RC
Location: Section 2A GI		Level: 85.73mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 03/07/2018 End: 05/07/2018	Logged By DH

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
		D H	8.00					Very stiff thinly laminae dark bluish grey slightly sandy CLAY with rare shell fragments (<3mm). *(continued from previous sheet)*			
		CS	8.54 - 8.68		C						
		H	8.80	140							
9		D C SPT	9.00 9.10 - 10.60 9.10	S 39		95% 0% 0%			(3.10)		9
		H	9.70	130	C						
10		CS D	10.00 - 10.20 10.00								10
		C SPT	10.60 - 12.10 10.60	S 46		99% 0% 0%			10.70	75.03	
11		D	11.00					Very stiff friable thinly laminated dark bluish grey slightly gravelly slightly sandy silty CLAY with frequent shell fragments (<40mm) and rare pyritised fossils (<8mm) and rare laminations of coal (<6mm). Gravel is sub-angular fine of mudstone.	(1.30)		11
		H CS	11.50 11.60 - 11.85	120	C						
12		D C SPT	12.00 12.10 - 13.60 12.10	S 40		100% 0% 0%		Very stiff thinly laminated dark bluish grey slightly sandy silty CLAY with frequent rare shell fragments (<5mm).	12.00	73.73	12
		CS	12.81 - 13.01		C						
13		D H	13.00 13.10						(2.03)		13
		C SPT	13.60 - 15.10 13.60	S 50		95% 0% 0%					
14		D	14.00					Very stiff friable thinly laminated dark bluish grey slightly sandy silty CLAY with frequent sand laminae (<15mm) rare shell fragments (<8mm) and rare gypsum crystals (<15mm).	14.03	71.70	14
		CS	14.50 - 14.70		C				(1.17)		
		H	14.80								
15	1	D C SPT C	15.00 15.10 - 16.60 15.10	S 75		98% 0% 0%		Very dense dark grey clayey fine to coarse SAND.	15.20	70.53	15
		B	15.60 - 15.70		C				(1.40)		
16											16
		C SPT C D	16.60 - 18.10 16.60 16.65	S 71		94% 0% 0%		Light grey slightly sandy clayey SILT.	16.60	69.13	
17					C			Very dense dark grey slightly clayey silty fine to coarse SAND.	16.95	68.78	17
									(1.25)		

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
			7.10

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
04/07/2018 17:00	15.10	5.50	7.10
05/07/2018 08:00	15.10	5.50	3.00

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ROTARY BOREHOLE LOG

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Borehole No. **CP2APOOB_1D**

Sheet 3 of 3

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 463636 N 224167	Hole Type RC
Location: Section 2A GI		Level: 85.73mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 03/07/2018 End: 05/07/2018	Logged By DH

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
18		B	17.60 - 17.70					Very dense dark grey slightly clayey silty fine to coarse SAND. *(continued from previous sheet)*			
		C	18.10 - 19.60	S 143		100% 0% 0%					
		SPT C	18.10					Very stiff thinly laminated dark bluish grey slightly sandy silty CLAY.	18.20	67.53	
		D	18.20								
19		H	19.00						(1.83)		
		D	19.20								
		CS	19.38 - 19.60								
		SPT C	19.60	S 36				19.60-20.03m: Strata description assumed to continue beyond final drill depth to base of insitu pentration test.			
20								Borehole completed at 20.03m	20.03	65.70	
21											
22											
23											
24											
25											
26											
27											

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
05/07/2018 17:00	20.03	5.50	2.62

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TRIAL PIT LOG

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Pit No **P2AMFOB_2D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 460728 N 223256 Level: 69.64mAOD	Date 16/07/2018
Location: Section 2A GI		Dimensions: Depth 2.00m (2.00m × 0.60m)	Scale 1 : 25
Client: East West Rail Alliance			Logged By MD

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
					Very stiff dark brown slightly sandy CLAY with frequent roots (<3mm). Sand is fine. [TOPSOIL]	(0.30)		
		ES H	0.30	140	Very stiff fissured slight brown mottled orangish brown and light grey CLAY with occasional rootlets (<1mm). Fissures are subvertical closely spaced open (<10mm). [OXFORD CLAY]	0.30	69.34	
		D ES H	0.50 0.60	 140		(0.90)		
1		B ES H	1.00 - 1.10 1.00	105 106 105				1
	1				Firm light grey mottled orangish brown sandy CLAY. Sand is fine. [KELLAWAY BEDS]	1.20	68.44	
		D H	1.30	61 60		(0.25)		
		D H	1.50 1.60	 56 55	Firm fissured brown mottled dark orangish brown and light yellowish brown CLAY. Fissures are sub-horizontal and randomly orientated extremely closely to very closely spaced. [KELLAWAY BEDS]	1.45	68.19	
						(0.55)		
		B H	1.90 - 2.00 1.90	56 54 55	2.00m: Dry. Trial pit completed at 2.00m	2.00	67.64	
2								2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pit excavated using 0.60m bucket.

GROUNDWATER: Seepage: 1.20-1.45m.

STABILITY: Trial pit remained stable and vertical.

BACKFILL: Trial pit backfilled with arisings and compacted with bucket.

REMARKS: PID testing undertaken on all environmental samples. Results 0.30m - 0.00ppm, 0.50m - 0.00ppm, 1.00m - 0.00ppm.

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TRIAL PIT LOG

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Pit No **P2AMFOB_3D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 460699 N 223190 Level: 69.34mAOD	Date 16/07/2018
Location: Section 2A GI		Dimensions: 2.00m, Depth 1.50m, 0.60m	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
					Very stiff dark brown slightly sandy CLAY with frequent roots (<3mm). Sand is fine. [TOPSOIL]	(0.30)		
		ES	0.30		Very stiff fissured light brown mottled orangish brown and light grey CLAY with occasional rootlets (<1mm). Fissures are subvertical closely spaced open (<10mm). [OXFORD CLAY]	0.30	69.04	
		D ES	0.50					
		H	0.80	140		(0.90)		
1		B ES H	1.00 - 1.20 1.00 1.10	145 148 129				1
	1	H	1.30	78	Stiff light grey mottled orangish brown sandy CLAY. Sand is fine. [KELLAWAY BEDS]	1.20	68.14	
		B D H	1.40 - 1.40 1.40 1.50	88 85 48 49 53	Stiff becoming firm fissured brown mottled dark orangish brown and light yellowish brown CLAY. Fissures are randomly orientated extremely closely to very closely spaced. [KELLAWAY BEDS]	1.35	67.99	
						1.50	67.84	
					Trial pit completed at 1.50m			
2								2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pit excavated using 0.60m bucket.

GROUNDWATER: Slight seepage at 1.30m.

STABILITY: Trial pit remained stable and vertical.

BACKFILL: Trial pit backfilled with arisings and compacted with bucket.

REMARKS: Hand shear vane at 0.50m refused. PID testing undertaken on all environmental samples. Results 0.30m - 0.00ppm, 0.50m - 0.00ppm, 1.00m - 0.00ppm. Soakaway undertaken.

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TRIAL PIT LOG

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Pit No: P2AMFOB_3U

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 4460599 N 223003 Level: 68.47mAOD	Date 16/07/2018
Location: Section 2A GI		Dimensions: Depth 2.00m; 2.00m × 0.60m	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
					Very stiff dark brown slightly sandy CLAY with frequent roots (<3mm). Sand is fine. [TOPSOIL]	(0.30)		
		ES H	0.30	140	Very stiff fissured slight brown mottled orangish brown and light grey CLAY with occasional rootlets (<1mm). Fissures are sub-vertical closely spaced open (<10mm). [OXFORD CLAY]	0.30	68.17	
		D ES H	0.50 0.60	140		(0.90)		
1		H B ES H	0.90 1.00 - 1.10 1.00	120 118 128 110 113		1.20	67.27	1
		D H	1.40	62 66	Stiff light grey mottled orangish brown slightly sandy CLAY. Sand is fine. [KELLAWAY BEDS]	(0.40)		
	1	D H	1.70	92 95 90	Firm becoming stiff, fissured brown mottled dark orangish brown and light yellowish brown CLAY. Fissures are sub-horizontal and randomly orientated extremely closely to very closely spaced. [KELLAWAY BEDS]	1.60	66.87	
2		B H	1.90 - 2.00 1.90	98 100 104	Trial pit completed at 2.00m	(0.40) 2.00	66.47	2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pit excavated using 0.60m bucket.

GROUNDWATER: Water seepae below 1.80m.

STABILITY: Trial pit remained stable and vertical.

BACKFILL: Trial pit backfilled with arisings and compacted with bucket.

REMARKS: PID testing undertaken on all environmental samples. Results 0.30m - 0.00ppm, 0.50m - 0.00ppm, 1.00m - 0.00ppm.

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ROTARY BOREHOLE LOG

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Borehole No. **CP2AGFFB_1U**

Sheet 1 of 2

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 460978 N 223223	Hole Type RC
Location: Section 2A GI		Level: 68.09mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 06/07/2018 End: 09/07/2018	Logged By DH/MB

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
								TOPSOIL: Soft dark brown slightly sandy clayey SILT with frequent roots and rootlets (<80mm).	0.10	67.99	
		B D ES	0.30 0.30 - 0.40 0.30					Very stiff dark brown gravelly slightly sandy CLAY with occasional rootlets (<10mm). Gravel is sub-angular fine to coarse of siliceous material.	(1.20)		
1		B D ES	0.50 0.50 - 0.60 0.50								1
		B D ES SPT H	1.00 1.00 - 1.10 1.00 1.20 - 1.65 1.55	S 8 120 				Soft to firm thinly laminated light brown mottled dark orangish brown slightly sandy CLAY with frequent rootlets (<30mm).	1.30	66.79	
2		D H UT100	2.00 - 2.10 2.05 2.20 - 2.65	75 					(1.10)		2
								Firm thinly laminated dark bluish grey slightly sandy silty CLAY with rare pyrite crystals (<2mm).	2.40	65.69	
3		D SPT	3.00 - 3.10 3.20 - 3.65	 S 32 75					(1.00)		3
								Very stiff thinly laminated dark grey sandy silty CLAY with occasional shell fragments (<4mm).	3.40	64.69	
4		H D SPT	3.90 4.00 - 4.10 4.20 - 4.50	70 S *158					(0.80)		4
		D	4.50					Very dense dark grey slightly gravelly clayey fine SAND with frequent irregular very thin lenses of grey very silty fine sand. Gravel is angular to sub-angular fine to coarse of sandstone.	4.20	63.89	
5		D SPT C	4.95 5.00 - 5.31	C *90 					(0.70)		5
								Very dense dark grey very silty fine SAND.	4.90	63.19	
									(0.70)		
								Extremely weak dark grey fine gravelly SANDSTONE with rare fossil shells. Locally weathered to silty fine sand.	5.60	62.49	
6		D C SPT C	5.95 6.10 - 7.60 6.10 - 6.42	 C *88 		100% 0% 0%			(0.90)		6
		D	6.60					Stiff fissured dark brownish-grey CLAY with rare fossil shells. Fissures are sub-horizontal to randomly orientated closely spaced.	6.50	61.59	
7		CS	7.00 - 7.30		C						7
		C SPT C	7.60 - 9.10 7.60 - 8.05	C 21 	C	100% 0% 0%			(2.70)		
8											8

EQUIPMENT: Hand digging tools. Comacchio MC305 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic sampling using 128mm and 113mm sample barrels: 1.20-5.00m. Waterflush rotary coring using T6-116 coring barrel: 5.00-15.10m.
CASING: 140mm diameter to 5.00m.
GROUNDWATER: None encountered prior to adding water flush.
BACKFILL: Borehole backfilled with bentonite pellets: 0.00-15.10m on 10/07/2018.
REMARKS: PID readings were undertaken on all environmental samples. Results: 0.30m - 0.00ppm; 0.50m - 0.00ppm; 1.00m - 0.00ppm.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
06/07/2018 17:00	4.20		
09/07/2018 08:00	4.20	5.00	

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Borehole No. **CP2AGFFB_1U**

Sheet 2 of 2

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 460978 N 223223	Hole Type RC
Location: Section 2A GI		Level: 68.09mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 06/07/2018 End: 09/07/2018	Logged By DH/MB

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
		D	8.00 - 8.10					Stiff fissured dark brownish-grey CLAY with rare fossil shells. Fissures are sub-horizontal to randomly orientated closely spaced. *(continued from previous sheet)*			
		CS	8.30 - 8.60		C						
9								8.90-9.20m: Occasional pyritised nodules (<20mm).			9
		C	9.10 - 10.60			100% 88% 75%		Medium strong locally weak light grey and grey fine grained shelly LIMESTONE. Discontinuities are sub-horizontal closely to widely spaced with silty fine sand infill.	9.20	58.89	
		CS	9.55 - 9.85		C			9.20-9.45m: Weak.			
10								10.30-10.55m: Grey and weak.			10
		C	10.60 - 12.10			94% 83% 61%			(2.80)		
		CS	10.85 - 11.05		C						
11								11.10-11.75m: Very weak and weak, grey and dark grey of locally argillaceous.			11
12									12.00	56.09	12
		C	12.10 - 13.60			100% 85% 75%		Weak light grey SILTSTONE. Discontinuities are sub-horizontal closely to widely spaced with silty fine sand infill.	(0.43)		
		CS	12.60 - 12.95		C			12.25-12.45m: Weathered to very stiff light grey becoming grey clay.	12.43	55.66	
13								Medium strong to strong light grey fine grained shelly LIMESTONE. Discontinuities are sub-horizontal closely and medium spaced undulating and rough.	(1.17)		13
								12.92-13.26m: discontinuities are sub-horizontal very closely and closely spaced undulating rough sometimes clean sometimes infilled (1-5mm).			
		C	13.60 - 15.10	C *88		100% 41% 33%		Very stiff fissured dark brownish-grey CLAY. Fissures are sub-horizontal and sub-vertical very closely and closely spaced.	13.60	54.49	
		SPT C	13.60 - 13.92						(0.50)		
14		D	13.90					Weak to medium strong very thinly to thinly bedded light grey fine grained slightly shelly LIMESTONE with medium interbeds of very stiff dark brownish grey clay.	14.10	53.99	14
		CS	14.34 - 14.54		C			discontinuitites are sub-horizontal very closely to medium spaced undulating rough occasionally infilled (<3mm) with clay.	(1.00)		
15								14.10-14.30m: Very closely spaced bedding fractures.			15
								14.55-14.80m: Very stiff clay.	15.10	52.99	
								14.80-15.10m: Medium strong to strong.			
								Borehole completed at 15.10m			
16											16
17											17

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
09/07/2018 17:00	15.10	5.00	

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TRIAL PIT LOG

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Pit No **TP2ALOB_4D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 462174 N 223882 Level: 68.52mAOD	Date 17/07/2018
Location: Section 2A GI		Dimensions: 2.00m Depth 2.00m 0.60m	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
					Very stiff dark brown slightly sandy slightly gravelly CLAY with frequent roots (<3mm). Gravel is sub-angular to sub-rounded fine to coarse of siliceous material and flint. [TOPSOIL]	(0.25)		
		ES	0.30	140	Very stiff orangish brown slightly sandy gravelly CLAY with occasional rootlets (<2mm). Gravel is sub-angular to rounded fine to coarse of siliceous material and flint. [GLACIAL DEPOSITS]	0.25	68.27	
		D	0.50			(0.45)		
		ES						
		H	0.60	140				
					Firm to stiff light brown mottled light orangish brown and light grey CLAY with occasional rootlets (<1mm). [PROBABLE KELLAWAY BEDS]	0.70	67.82	
		H	0.90	68				
1		B	1.00 - 1.10	72				1
		ES	1.00	69				
						(0.90)		
		H	1.20	75	1.20m: Locally slightly sandy with lenses and partings of orangish brown silty fine sand.			
				79				
				78				
		D	1.50	72				
		H		75				
				76	1.60-1.80m: Becoming very sandy.	1.60	66.92	
	1	D	1.70	54	Firm to stiff light bluish grey mottled orangish brown sandy CLAY. Sand is fine.	(0.20)		
		H		52	[KELLAWAY BEDS]	1.80	66.72	
				51	Light bluish grey mottled orangish brown clayey fine to medium SAND.	(0.20)		
		B	1.90 - 2.00		[KELLAWAY BEDS]			
2					Trial pit completed at 2.00m	2.00	66.52	2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pit excavated using 0.60m bucket.

GROUNDWATER: Seepage from 1.80m.

STABILITY: Trial pit unstable.

BACKFILL: Trial pit backfilled with arisings and compacted with bucket.

REMARKS: PID testing undertaken on all environmental samples. Results 0.30m - 0.00ppm, 0.50m - 0.00ppm, 1.00m - 0.00ppm.

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Pit No **P2AMFOB_1U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 460600 N 223058 Level: 69.05mAOD	Date 17/07/2018
Location: Section 2A GI		Dimensions: Depth 2.00m (2.00m × 0.60m)	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
					Very stiff dark brown slightly sandy CLAY with frequent rootlets (<3mm). Sand is fine. [TOPSOIL]	(0.30)		
		ES	0.30			0.30	68.75	
		H	0.40	140	Very stiff fissured light brown mottled light grey and light orangish brown CLAY with occasional roots (<40mm). Fissures are sub-vertical and sub-horizontal closely spaced. [OXFORD CLAY]			
		D	0.50					
		ES						
		H	0.70	140		(0.90)		
					0.80m: With rare roots (<10mm).			
1		B	1.00 - 1.10	140				1
		ES	1.00					
		H				1.20	67.85	
		D	1.30	140	Very stiff brownish grey motteld dark orangish brown slightly sandy CLAY with rare rootlets (<3mm) and occasional thin lenses and partings of dark orangish brown silty fine sand. [KELLAWAY BEDS]	(0.20)		
		H				1.40	67.65	
		D	1.50		Stiff to very stiff fissured brown mottled dark orangish brown and light yellowish brown CLAY with rare roots (<3mm) and occasional thin lenses and partings of orangish brown and yellowish brown silty fine sand. Fissures are sub-horizontal and randomly orientated very closely to closely spaced. [KELLAWAY BEDS]	(0.60)		
		B	1.90 - 2.00					
2					2.00m: Dry. Trial pit completed at 2.00m	2.00	67.05	2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pit excavated using 0.60m bucket.

GROUNDWATER: No groundwater encountered.

STABILITY: Trial pit remained stable and vertical.

BACKFILL: Trial pit backfilled with arisings and compacted with bucket.

REMARKS: Hand vane test 1.40-2.00m not undertaken, strata too fissured. PID testing undertaken on all environmental samples. Results 0.30m - 0.00ppm, 0.50m - 0.00ppm, 1.00m - 0.00ppm.

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Pit No: P2AMFOB_4U

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 460659 N 22304 Level: 69.14mAOD	Date 17/07/2018
Location: Section 2A GI		Dimensions: 2.00m, Depth 1.50m, 0.60m	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
					Very stiff dark brown slightly sandy CLAY with frequent rootlets (<3mm). Sand is fine. [TOPSOIL]	(0.30)		
		ES	0.30	140	0.30-0.70m: With some closely and mediumly spaced subvertical open (<10mm) fissures.	0.30	68.84	
		D	0.50		Very stiff fissured light brown mottled light grey and light orangish brown CLAY with occasional rootlets (<2mm). Fissures are sub-vertical and sub-horizontal closely spaced. [OXFORD CLAY]			
		ES H	0.60	140		(0.80)		
		H	0.90	140				
1		B ES	1.00 - 1.10 1.00					1
					Stiff light grey mottled orangish brown slightly sandy CLAY. Sand is fine. [KELLAWAY BEDS]	1.10 (0.20)	68.04	
		D	1.20	90				
		H		92 95	Stiff fissured brown mottled dark orangish brown and light yellowish brown CLAY with occasional thin lenses and partings of orangish brown and yellowish brown silty fine sand. Fissures are sub-horizontal and randomly orientated very closely to closely spaced. [KELLAWAY BEDS]	1.30 (0.20)	67.84	
		B	1.40	85				
		D		88		1.50	67.64	
		H		85	1.50m: Dry. Trial pit completed at 1.50m			
2								2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pit excavated using 0.60m bucket.

GROUNDWATER: No groundwater encountered.

STABILITY: Trial pit remained stable and vertical.

BACKFILL: Trial pit backfilled with arisings and compacted with bucket.

REMARKS: PID testing undertaken on all environmental samples. Results 0.30m - 0.00ppm, 0.50m - 0.00ppm, 1.00m - 0.00ppm. Soakaway undertaken.

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TRIAL PIT LOG

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Pit No **TP2ABR_3D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 460392 N 223045 Level: 69.65mAOD	Date 18/07/2018
Location: Section 2A GI		Dimensions: Depth 2.00m (2.00m × 0.60m)	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
					Very stiff dark brown slightly gravelly CLAY with frequent roots (<20mm). Gravel is subangular to rounded fine to coarse of siliceous material and flint. [TOPSOIL]	(0.30)		
		ES H	0.30	140	Very stiff desiccated brown mottled dark brown and orangish brown slightly sandy CLAY with rare roots (<100mm). Sand is fine. [PROBABLE GLACIAL DEPOSITS]	0.30	69.35	
		D ES H	0.50	140		(0.40)		
		H	0.80	140	Very stiff fissured light grey mottled light brown and light orangish brown CLAY with occasional rootlets (upto 1mm). Fissures are subvertical and randomly orientated, closely spaced. [PROBABLE OXFORD CLAY]	0.70	68.95	
1		B ES	1.00 - 1.10 1.00			(0.80)		1
		H D	1.30 1.35	140	1.30-1.50m: Occasional partings of orangish brown clayey fine sand.			
		D	1.60		Stiff fissured brown mottled dark orangish brown and light yellowish brown CLAY with rare pockets of gypsum (<20mm) and occasional partings of orangish brown and light yellowish brown silty fine sand. Fissures are sub-horizontal and randomly orientated very closely to closely spaced. [KELLAWAY BEDS]	1.50	68.15	
		H D	1.80 1.90 - 2.00	90 86		(0.50)		
2					2.00m: Dry Trial pit completed at 2.00m	2.00	67.65	2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pit excavated using 0.60m bucket.

GROUNDWATER: No groundwater encountered.

STABILITY: Trial pit remained stable and vertical.

BACKFILL: Trial pit backfilled with arisings and compacted with bucket.

REMARKS: PID testing undertaken on all environmental samples. Results 0.30m - 0.00ppm, 0.50m - 0.00ppm, 1.00m - 0.00ppm.

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ROTARY BOREHOLE LOG

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Borehole No. **CP2AMFOB_1D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 460658 N 223134	Hole Type DS+RC
Location: Section 2A GI		Level: 69.24mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 31/07/2018 End: 31/07/2018	Logged By MM

(m)	Water Levels	Core Run, Samples & Testing No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
		ES	0.30					MADE GROUND: (grass on) firm dark brown slightly gravelly slightly sandy silty CLAY with frequent roots and rootlets (<10mm). Gravel is angular to sub-angular fine to coarse of siliceous material.	0.10	69.14	
		ES	0.50	80					0.35	68.89	
		H	0.55	85				MADE GROUND: Firm brown to orangish brown slightly sandy gravelly silty CLAY with low cobble content. Gravel is angular to sub-angular fine to coarse of siliceous material and brick. Cobbles are sub-angular of siliceous material (<200mm).	(0.40)		
		H	0.60	120					0.75	68.49	
		H						MADE GROUND: Stiff brown to orangish brown slightly sandy gravelly silty CLAY with low cobble content. Gravel is angular to sub-angular fine to coarse of siliceous material and brick. Cobbles are sub-angular of siliceous material (<200mm). 0.75m: Dry. Borehole completed at 0.75m			

EQUIPMENT: Hand digging tools.
METHOD: Hand dug inspection pit: 0.00-0.75m.
CASING: None used.
GROUNDWATER: Not encountered.
BACKFILL: Upon completion, inspection pit backfilled with arisings: 0.00-0.75m.
REMARKS: Inspection pit terminated at 0.75m due to exposed bureid service at 0.65m. No geotechnical samples taken as instructed by Atkins engineer. PID readings were undertaken on all environmental samples. Results: 0.30m - 0.40ppm and 0.50m - 0.10ppm.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
31/07/2018 17:00	0.75		

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ROTARY BOREHOLE LOG

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Borehole No. **CP2AMFOB_1D (A)**
Sheet 1 of 2

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 460658 N 223133	Hole Type DS+RC
Location: Section 2A GI		Level: 69.52mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 01/08/2018 End: 03/08/2018	Logged By MM

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
		B	0.20 - 0.40					MADE GROUND: Grass over firm dark brown slightly gravelly slightly sandy silty CLAY with frequent roots and rootlets (<10mm). Gravel is angular to sub-angular fine to coarse of siliceous material.	0.10	69.42	
		B	0.40 - 0.60						(0.60)		
		H	0.60	60				MADE GROUND: Firm brown to orangish brown slightly sandy gravelly silty CLAY. Gravel is angular to sub-angular fine to coarse of siliceous material and brick. 0.35m: 1no. band of gravel (<50mm). 0.48m: 1no. band of gravel (<50mm).	0.70	68.82	
		H	0.65	80							
1		H	0.70	125					(0.50)		1
		B	0.90 - 1.20								
		D	1.00						1.20	68.32	
		ES	1.20					Stiff brown mottled grey slightly gravelly slightly sandy silty CLAY. Gravel is sub-angular to sub-rounded fine of siliceous material.			
		UT100	1.20 - 1.65						(0.80)		
		D	1.65	70				Firm brown mottled grey slightly gravelly slightly sandy silty CLAY with rare rootlets (<2mm). Gravel is sub-angular to sub-rounded fine of siliceous material.	2.00	67.52	
		H	1.70	70							
2		H	1.80	70							2
		D	1.90	S 12							
		H	2.00 - 2.45					Firm becoming stiff grey slightly sandy slightly gravelly silty CLAY with occasional light brown clay lenses (<3mm). Gravel is sub-angular to sub-rounded fine of siliceous material.			
		SPT									
				130							
				110					(1.60)		
3		UT100	3.00 - 3.45	100							3
		D	3.45 - 3.50						3.60	65.92	
				80				Stiff grey slightly gravelly sandy silty CLAY with rare calcite lenses. Gravel is angular to sub-angular fine to medium of siliceous material and mudstone. 3.80-3.90m: tending to a gravelly very clayey fine to coarse sand.	(0.40)		
		H	3.70	70							
		H	3.80								
4		D	3.90	S*68		80% 0% 0%			4.00	65.52	4
		C	4.00 - 5.00		C			Very stiff grey slightly gravelly sandy silty CLAY with rare calcite lenses and rare pockets (<30mm) of orangish brown slightly sandy clay. Gravel is angular to sub-angular fine to coarse of siliceous material and mudstone. 4.00-4.37m: SPT disturbed. 5.00-5.36m: CPT disturbed.			
		SPT	4.00 - 4.37								
		CS	4.72 - 4.90								
		D	4.90								
5		C	5.00 - 6.50	C*71		90% 0% 0%			(2.60)		5
		SPT C	5.00 - 5.36								
		CS	5.45		C						
6											6
		D	6.20								
		CS	6.30 - 6.50								
		C	6.50 - 8.00	C 44		100% 0% 0%			6.60	62.92	
		SPT(C)	6.50 - 6.95					Very stiff thinly to thickly laminated grey silty CLAY with rare calcite and gypsum lenses.			
7					C						7
		CS	7.55 - 7.80								
8									(2.60)		8

EQUIPMENT: Hand digging tools. Fraste Multi-drill PL(G) track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic sampling using 128mm sample barrels: 1.20-4.00m. Waterflush rotary coring using T6-116 coring barrel: 4.00-15.50m.
CASING: 128mm diameter to 4.00m.
GROUNDWATER: Not encountered prior to using water-flush to advance casing to 4.00m.
BACKFILL: Upon completion, borehole backfilled with bentonite pellets: 0.00-15.50m
LOCATION: OX 17m+1675yd (76.45ch) DOWN CESS
REMARKS: PID readings were undertaken on all environmental samples. Results: 1.20m - 0.20ppm. No environmental samples taken: 0.00-1.00m as instructed by Atkins engineer.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
01/08/2018 17:00	1.20		
02/08/2018 08:00	1.20		

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ROTARY BOREHOLE LOG

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Borehole No. **CP2AMFOB_1D (A)**
Sheet 2 of 2

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 460658 N 223133	Hole Type DS+RC
Location: Section 2A GI		Level: 69.52mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 01/08/2018 End: 03/08/2018	Logged By MM

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
		D	7.90	C 39		100%		Very stiff thinly to thickly laminated grey silty CLAY with rare calcite and gypsum lenses. *(continued from previous sheet)*			
		C	8.00 - 9.50			20%					
		SPT(C)	8.00 - 8.45			20%					
9					C						9
		CS	9.20 - 9.30					Strong locally medium strong light grey crystalline fossiliferous LIMESTONE. Discontinuities are sub-horizontal medium spaced stepped rough clean. 9.50-9.63m: CPT disturbed.	9.20	60.32	
		D	9.20								
		C	9.50 - 11.00	C*250		100%					
		SPT(C)	9.50 - 9.63			93%					
10						93%					10
					C				(2.75)		
		CS	10.60 - 11.00								
11											11
		C	11.00 - 12.50	C*500		87%					
		SPT(C)	11.00 - 11.09			49%					
		CS	11.32 - 11.50			49%		11.25-11.32m: 1no. horizontal discontinuity with slightly gravelly sandy clay infill. 11.52-11.54m: 1no. horizontal discontinuity stepped rough with sandy clay infill. 11.80-11.95m: 1no. thin bed of weak light brown to off white marl.			
					C				11.95	57.57	
12								Very stiff thinly to thickly laminated grey silty CLAY with rare calcite and gypsum lenses.	(0.65)		12
		D	12.20 - 12.30								
		C	12.50 - 14.00			91%		Medium strong light grey crystalline fossiliferous LIMESTONE. Discontinuities are sub-horizontal medium spaced stepped rough clean. 13.00-13.10m: sandy clay. 13.20-13.35m: sandy clay with limestone lenses.	12.60	56.92	
						63%					
13						55%			(1.15)		13
					C						
		CS	13.50 - 13.75						13.75	55.77	
								Stiff thinly to thickly laminated grey silty CLAY with rare calcite and gypsum lenses.			
14		C	14.00 - 15.50			100%			(0.70)		14
						100%					
						100%			14.45	55.07	
		CS	14.45 - 14.75					Medium strong light grey crystalline fossiliferous LIMESTONE. Discontinuities are sub-horizontal medium spaced stepped rough clean.			
15					C				(1.05)		15
								Borehole completed at 15.50m	15.50	54.02	
16											16
17											17

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
02/08/2018 17:00	11.00	4.00	2.69
03/08/2018 08:00	11.00	4.00	2.11
03/08/2018 17:00	15.50	4.00	2.89

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TRIAL PIT LOG

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Pit No **P2ACLOB_3U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 460161 N 223142 Level: 69.54mAOD	Date 08/08/2018
Location: Section 2A GI		Dimensions: 2.00m (Depth 2.00m, 0.70m)	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
					TOPSOIL: Dark brown clayey fine SAND with frequent roots (<3mm).	(0.25)		
		ES	0.30		Brown slightly gravelly silty fine to medium SAND with occasional roots (<2mm). Gravel is angular to rounded fine to coarse of siliceous material. (ALLUVIUM)	0.25	69.29	
		B ES	0.50 - 0.60 0.50			(0.35)		
					Dark brown mottled dark grey clayey fine SAND. (ALLUVIUM)	0.60	68.94	
						(0.30)		
1		B D ES H	1.00 - 1.10 1.00	74 76 71	Firm orangish brown mottled brown and brownish grey slightly sandy CLAY. Sand is fine. (ALLUVIUM)	0.90	68.64	1
		H	1.30	78 72 69		(0.60)		
		D	1.60		Light bluish grey mottled orangish brown very clayey fine SAND. (KELLAWAY BEDS)	1.50	68.04	
						(0.50)		
2		B	1.90 - 2.00		2.00m: Dry. Trial pit completed at 2.00m	2.00	67.54	2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pit excavated using 0.45m bucket.

GROUNDWATER: Not encountered.

STABILITY: Trial pit walls stable and vertical throughout.

BACKFILL: Upon completion, trial pit backfilled with arisings and compacted with excavator bucket.

REMARKS: PID readings were undertaken on all environmental samples. Results: 0.30m - 0.20ppm; 0.50m - 0.20ppm and 1.00m - 0.00ppm.

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TRIAL PIT LOG

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Pit No **TP2ALOB_4U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461832 N 223403 Level: 66.90mAOD	Date 08/08/2018
Location: Section 2A GI		Dimensions: 2.30m, Depth 2.00m, 0.70m	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
					TOPSOIL: Very stiff fissured dark brown slight gravelly slightly sandy CLAY frequent roots (<3mm). Gravelly sub-angular to rounded fine to coarse of siliceous material.	(0.25)		
		ES	0.30		Very stiff fissured brown mottled grey slightly gravelly slightly sandy CLAY with occasional roots (<2mm). Gravel sub-angular to rounded fine to coarse of siliceous material and sandstone. (GLACIAL DEPOSITS)	0.25	66.65	
		B D ES	0.50 - 0.60 0.50			(0.35)		
					Very stiff randomly orientated closely fissured light brown mottled light grey CLAY with occasional rootlets (<1mm) and polished fissure surfaces. (OXFORD CLAY)	0.60	66.30	
1		B ES H	1.00 - 1.10 1.00 1.10	 135 140		(0.90)		1
					1.20-1.50m: Firm to stiff			
		H	1.40	75 78 83		1.50	65.40	
		D	1.60		Firm randomly orientated extremely closely and very closely fissured dark brownish grey sightly sandy CLAY with occasional very thin lenses (<5mm) of yellow and light brown silt and fine sand. Sand is fine. (KELLAWAY BEDS)	(0.50)		
		H	1.80	70 72 74				
2					2.00m: Dry. Trial pit completed at 2.00m	2.00	64.90	2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pit excavated using 0.60m bucket.

GROUNDWATER: Not encountered.

STABILITY: Trial pit walls stable and vertical throughout.

BACKFILL: Upon completion, trial pit backfilled with arisings and compacted with excavator bucket.

REMARKS: PID readings were undertaken on all environmental samples. Results: 0.30m - 0.00ppm; 0.50m - 0.00ppm and 1.00m - 0.00ppm.

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TRIAL PIT LOG

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Pit No **TP2ALOB_6U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461737 N 223345 Level: 66.03mAOD	Date 08/08/2018
Location: Section 2A GI		Dimensions: 2.00m (Depth 2.00m, 0.70m)	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
					MADE GROUND. Firm friable fissured dark brown slightly gravelly slightly sandy CLAY with frequent roots (<3mm). Gravel is angular-rounded to fine to coarse of brick, concrete and siliceous material.	0.05	65.98	
		ES	0.20			(0.25)		
					MADE GROUND: Reddish brown and grey angular to sub-angular COBBLES of brick, concrete and limestone with much fines. Fines are firm dark brown slightly sandy gravelly clay with occasional roots (<3mm). Gravel is angular to rounded fine to coarse of concrete, brick, sandstone, limestone and siliceous material.	0.30	65.73	
		D	0.50	110	Stiff locally firm brown mottled orangish-brown and grey slightly sandy gravelly CLAY with occasional rootlets (<1mm). Gravel sub-angular to rounded fine to coarse of siliceous material.			
		ES		118				
		H		109				
		B	0.70 - 0.80			(0.75)		
		H	0.80	78				
				79				
1				80				1
					Firm orangish-brown mottled light grey slightly gravelly slightly sandy CLAY. Gravel sub-angular to rounded fine to coarse of siliceous material.	1.05	64.98	
		ES	1.20					
		H	1.30	62		(0.60)		
				61				
		B	1.50 - 1.60					
					Light bluish grey mottled orangish brown very clayey fine SAND. (KELLAWAY BEDS)	1.65	64.38	
		D	1.70			(0.35)		
		B	1.90 - 2.00					
2					2.00m: Dry. Trial pit completed at 2.00m	2.00	64.03	2
3								3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pit excavated using 0.45m bucket.

GROUNDWATER: Not encountered.

STABILITY: Trial pit walls stable and vertical throughout.

BACKFILL: Upon completion, trial pit backfilled with arisings and compacted with excavator bucket.

REMARKS: PID readings were undertaken on all environmental samples. Results: 0.20m - 0.10ppm; 0.50m - 0.00ppm and 1.20m - 0.00ppm.

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ROTARY BOREHOLE LOG

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Borehole No. **CP2AJLFB_1D**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 459803 N 222831	Hole Type DS+RC
Location: Section 2A GI		Level: 64.04mAOD	Scale 1 : 12.50
Client: East West Rail Alliance		Dates: Start: 30/07/2018 End: 30/07/2018	Logged By MM

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
		B	0.00 - 0.30					BALLAST: Loose grey angular to sub-angular medium to coarse GRAVEL of igneous material. [CLEAN BALLAST]			
								BALLAST: Grey angular to sub-angular medium to coarse GRAVEL of igneous material. [SLIGHTLY DIRTY BALLAST]	0.08	63.96	
									(0.22)		
		B	0.30 - 0.45					TRACKBED LAYERS: Light brown sandy slightly silty angular to sub-angular fine to coarse GRAVEL of igneous material, brick and limestone with low cobble content. Cobbles are angular of brick (<150mm).	0.30	63.74	
		ES	0.30 - 0.30						(0.15)		
		ES	0.45 - 0.45					0.45m: Dry.	0.45	63.59	
								Borehole completed at 0.45m			
1											1
2											2

EQUIPMENT: Hand digging tools.
METHOD: Hand dug inspection pit: 0.00-0.45m.
CASING: None used.
GROUNDWATER: Not encountered.
BACKFILL: Upon completion, inspection pit backfilled with arisings: 0.00-0.45m.
REMARKS: PID readings were undertaken on all environmental samples. Results: 0.30m - 0.30ppm and 0.45m - 0.70ppm. Inspection pit refused due to ground conditions at 0.45m.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
30/07/2018 17:00	0.45		

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ROTARY BOREHOLE LOG

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Borehole No. **CP2AJLFB_1D (A)**
Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 459803 N 222831	Hole Type DS+RC
Location: Section 2A GI		Level: 68.15mAOD	Scale 1 : 12.50
Client: East West Rail Alliance		Dates: Start: 30/07/2018 End: 30/07/2018	Logged By MM

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
								BALLAST: Loose grey angular to sub-angular medium to coarse GRAVEL of igneous material. [CLEAN BALLAST]			
								BALLAST: Grey angular to sub-angular medium to coarse GRAVEL of igneous material. [SLIGHTLY DIRTY BALLAST]	0.08	68.07	
									(0.22)		
								TRACKBED LAYERS: Light brown sandy slightly silty angular to sub-angular fine to coarse GRAVEL of igneous material, brick and limestone with low cobble content. Cobbles are angular of brick (<150mm).	0.30	67.85	
									(0.25)		
								0.55m: Dry.	0.55	67.60	
								Borehole completed at 0.55m			
1											1
2											2

EQUIPMENT: Hand digging tools.
METHOD: Hand dug inspection pit: 0.00-0.55m.
CASING: None used.
GROUNDWATER: Not encountered.
BACKFILL: Upon completion, inspection pit backfilled with arisings: 0.00-0.55m.
REMARKS: Inspection pit refused due to ground conditions at 0.55m. No samples taken as instructed by Atkins engineer.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
30/07/2018 17:00	0.55		

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ROTARY BOREHOLE LOG

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Borehole No. **CP2AJLFB_1D (B)**
Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 459804 N 222830	Hole Type DS+RC
Location: Section 2A GI		Level: 69.07mAOD	Scale 1 : 12.50
Client: East West Rail Alliance		Dates: Start: 31/07/2018 End: 31/07/2018	Logged By MM

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
								BALLAST: Loose grey angular to sub-angular medium to coarse GRAVEL of igneous material. [CLEAN BALLAST]			
								BALLAST: Grey angular to sub-angular medium to coarse GRAVEL of igneous material. [SLIGHTLY DIRTY BALLAST]	0.08	68.99	
									(0.22)		
								TRACKBED LAYERS: Light brown sandy slightly silty angular to sub-angular fine to coarse GRAVEL of igneous material, brick and limestone with low cobble content. Cobbles are angular of brick (<200mm).	0.30	68.77	
									(0.17)		
								0.47m: Dry.	0.47	68.60	
								Borehole completed at 0.47m			
1											1
2											2

EQUIPMENT: Hand digging tools.
METHOD: Hand dug inspection pit: 0.00-0.47m.
CASING: None used.
GROUNDWATER: Not encountered.
BACKFILL: Upon completion, inspection pit backfilled with arisings: 0.00-0.47m.
REMARKS: Inspection pit refused due to ground conditions at 0.47m. No samples taken as instructed by Atkins engineer.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
31/07/2018 17:00	0.45		

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ROTARY BOREHOLE LOG

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Borehole No. **CP2AJLFB_1D (C)**
Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 459806 N 222831	Hole Type DS+RC
Location: Section 2A GI		Level: 69.03mAOD	Scale 1 : 12.50
Client: East West Rail Alliance		Dates: Start: 31/07/2018 End: 31/07/2018	Logged By MM

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
								BALLAST: Loose grey angular to sub-angular medium to coarse GRAVEL of igneous material. [CLEAN BALLAST]			
								BALLAST: Grey angular to sub-angular medium to coarse GRAVEL of igneous material. [SLIGHTLY DIRTY BALLAST]	0.08	68.95	
									(0.22)		
								TRACKBED LAYERS: Light brown sandy slightly silty angular to sub-angular fine to coarse GRAVEL of igneous material, brick and limestone with low cobble content. Cobbles are angular of brick (<200mm).	0.30	68.73	
									(0.20)		
								0.50m: Dry.	0.50	68.53	
								Borehole completed at 0.50m			
1											1
2											2

EQUIPMENT: Hand digging tools.
METHOD: Hand dug inspection pit: 0.00-0.50m.
CASING: None used.
GROUNDWATER: None encountered.
BACKFILL: Upon completion, inspection pit backfilled with arisings: 0.00-0.50m.
REMARKS: Inspection pit refused due to ground conditions at 0.50m. No samples taken as instructed by Atkins engineer.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
31/07/2018 17:00	0.50		

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ROTARY BOREHOLE LOG

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Borehole No. **CP2AJLFB_1D (D)**
Sheet 1 of 2

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type DS+RC
Location: Section 2A GI		Level: mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 06/12/2018 End: 07/12/2018	Logged By MM

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
								BALLAST. (Drillers description).			
		B	0.30					SUBGRADE FILL: Light brown sandy slightly silty angular to sub-angular fine to coarse GRAVEL of igneous material, brick and limestone with low cobble content. Cobbles are angular of limestone (<150mm).	0.20 (0.45)		
		ES	0.50								
		B							0.65		
		ES						SUBGRADE FILL: Greyish brown clayey sandy angular to sub-angular fine to coarse GRAVEL of igneous material, brick and limestone with low cobble content. Cobbles are angular of limestone (<150mm).	(0.90)		
1		B	1.00								1
		D									
		ES	1.20 - 1.65	S 5							
		SPT							1.55		
		H	1.70	50				Firm light brown mottled grey slightly sandy slightly gravelly slightly CLAY. Gravel is angular to sub-angular fine of limestone.(KELLAWAYS CLAY FORMATION)	(0.45)		
		ES	1.80	65							
2		D	1.90	70					2.00		2
		SPT	2.00 - 2.45	S 4				Firm brown mottled grey silty CLAY. (KELLAWAYS CLAY FORMATION)			
									(1.35)		
		H	2.75	55							
		D	2.90	60							
3		UT100	3.00 - 3.45								3
									3.35		
		D	3.45 - 3.55					Stiff grey thinly laminated silty CLAY. (KELLAWAYS CLAY FORMATION)			
		H	3.70	75					(0.85)		
		D	3.90	80							
4		C	4.00 - 5.20	90		83% 79% 68%					4
		SPT	4.00 - 4.12	S*750					4.20		
		CS	4.32 - 4.55		C			Medium strong grey shelly LIMESTONE. Discontinuities are horizontal medium spaced locally closely spaced undulating and stepped rough. (CORNBRASH FORMATION) 4.32: 1no. open fracture (25mm) infilled with grey clayey sand.			
5											5
		C	5.20 - 6.70	C*429		100% 90% 80%		5.08-5.20: Discontinuities are very closely spaced with fractures infilled with grey clayey sand (<15mm). 5.20-6.00: Sub-vertical discontinuity stepped rough.			
		SPT C	5.20 - 5.26						(2.65)		
6		CS	6.05 - 6.45		C			5.95-6.00: Non intact, recovered as angular to sub-angular fine to medium gravel. 6.10: 1No. 45 degree discontinuity stepped rough. 6.30: 1No. fine gravel sized void. 6.55: 1No. open fracture (50mm) infilled with grey clayey sand.			6
		C	6.70 - 7.20	C*375		100% 30% 0%			6.85		
		SPT C	6.70 - 6.76					Stiff to very stiff indistinctly laminated grey silty CLAY with occasional fine to medium sand sized comminuted shell fragments (2-10mm). (FOREST MARBLE FORMATION) 7.20-7.28m: Medium strong light grey limestone.			
7		CS	6.90 - 7.15	135	C						7
		H	7.00	110		30% 15% 0%					
		D	7.15	130							
		C	7.20 - 8.20						(2.10)		
8											8

EQUIPMENT: Hand digging tools. Fraste multi-purpose ML track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic sampling using 113mm sample barrel: 1.20-4.00m. Water-flush rotary coring using T6-116 coring barrel: 4.00-17.20m.
CASING: 140mm diameter to 4.00m.
GROUNDWATER: Not encountered prior to flush casing.
BACKFILL: Upon completion, borehole backfilled with bentonite pellets: 0.00-17.20m.
REMARKS: PID readings undertaken on all environmental samples. Results: 0.30m - 0.10ppm, 0.50m - 0.50ppm, 1.00m - 0.20ppm and 1.80m - 0.00ppm. Reported SPT 'N' values in excess of 50 have been linearly extrapolated.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)

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ROTARY BOREHOLE LOG

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Borehole No. **CP2AJLFB_1D (D)**
Sheet 2 of 2

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E N	Hole Type DS+RC
Location: Section 2A GI		Level: mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 06/12/2018 End: 07/12/2018	Logged By MM

(m)	Water Levels	Core Run, Samples & Testing: No/Type	Depth (m)	Result	Core Run & Sample	TCR SCR RQD	Install	Description	Depth (m)	Level (mAD)	Legend
		CS C SPT C	8.12 - 8.20 8.20 - 9.70 8.20 - 8.27	C*333	C	93% 37% 20%		Stiff to very stiff indistinctly laminated grey silty CLAY with occasional fine to medium sand sized comminuted shell fragments (2-10mm). (FOREST MARBLE FORMATION) *(continued from previous sheet)* 8.12-8.20m: Medium strong light grey limestone.			
9		D CS	8.90 8.95 - 9.25		C			Medium strong locally strong grey mottled dark grey LIMESTONE. Discontinuities are closely spaced stepped rough. (FOREST MARBLE FORMATION)	8.95		9
								9.25-9.40: Grey firm clay.	(0.75)		
		C SPT C	9.70 - 11.20 9.70 - 9.73	C*750		67% 43% 43%		Very stiff thinly laminated grey silty CLAY with occasional fine gravel sized comminuted shell fragments (2-6mm). (FOREST MARBLE FORMATION)	9.70		
10					C				(0.85)		10
		CS	10.70 - 11.00					Medium strong locally strong light grey oolitic LIMESTONE with frequent coarse sand sized comminuted shell fragments (<2mm). Discontinuities are sub-horizontal medium locally closely spaced undulating and stepped rough locally stained brown. (WHITE LIMESTONE FORMATION)	10.55		
11		C SPT C	11.20 - 12.70 11.20 - 11.23	C**		100% 96% 96%		11.60: 1no. open fracture (30mm) infilled with grey firm clay.			11
12					C						12
		CS	12.40 - 12.70					12.38: 1no. open fracture (20mm) infilled with grey firm clay.			
		C SPT C	12.70 - 14.20 12.70 - 12.73	C**		105% 88% 85%		12.70-12.85: Grey firm clay.			
13		CS	13.15 - 13.40					13.05-13.10: Non intact, recovered as angular to sub-angular fine to medium gravel.			13
					C				(6.65)		
14											14
		C SPT C	14.20 - 15.70 14.20 - 14.27	C*375		90% 87% 79%		14.50: 1no. open fracture (30mm) infilled with grey firm clay.			
		CS	14.80 - 15.10					14.55-14.90: Shelly.			
15					C						15
		CS C SPT C	15.65 - 15.88 15.70 - 17.20 15.70 - 15.76	C*429		103% 101% 93%					
16					C						16
17											17
								Borehole completed at 17.20m	17.20		

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
06/12/2018 17:00	9.70	4.00	1.62
07/12/2018 08:00	9.70	4.00	1.34
07/12/2018 17:00	17.20	4.00	1.16

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WINDOWLESS SAMPLE LOG

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Borehole No. **WS2ALTN_2U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461920 N 223570	Hole Type WS
Location: Section 2A GI		Level: 69.56mAOD	Scale 1 : 50.00
Client: East West Rail Alliance		Dates: Start: 03/12/2018 End: 03/12/2018	Logged By TB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Sample	Install	Description	Depth (m)	Level (mAD)	Legend
		B ES	0.20				MADE GROUND: Dark brown slightly gravelly slightly sandy silty CLAY with frequent roots and rootlets (<5mm). Gravel is sub-angular fine to medium of ballast and siliceous material.	0.20	69.36	
		B ES H	0.50	36			MADE GROUND: Yellowish brown slightly gravelly clayey SAND. Gravel is sub-angular to rounded fine to coarse of siliceous material.	0.45	69.11	
1		B ES H	1.00	42			MADE GROUND: Soft locally tending to firm dark brownish grey slightly gravelly slightly sandy silty CLAY. Gravel is sub-angular medium of siltstone.	(1.20)		1
		D ES H	1.50 1.65 - 2.70	34				1.65	67.91	
2		B D ES UT70	1.90 2.00 - 2.45				MADE GROUND: Soft dark brown mottled greyish brown slightly gravelly slightly sandy silty CLAY. Gravel is sub-angular fine to coarse of red brick.	(1.05)		2
		H	2.50	31				2.70	66.86	
		B	2.70 - 3.30				Very soft dark grey slightly gravelly slightly sandy clayey SILT with partially decomposing organic material.	(0.60)		
3		D ES	2.90					3.30	66.26	3
		B	3.30 - 5.35				Soft thinly laminated yellowish brown mottled light grey very sandy silty CLAY.			
		H	3.50	56						
4		D ES UT70	3.90 4.00					(2.05)		4
		H	4.50	62						
5	1	D	4.90					5.35	64.21	5
		B	5.35 - 6.00				Grey silty clayey SAND	(0.65)		
6	1	D	5.90				5.85-5.95m: With rare intact shell fossils (<18mm). Borehole completed at 6.00m	6.00	63.56	6
7										7
8										8

EQUIPMENT: Hand digging tools. Terrier 2002 track mounted rig.
METHOD: Hand dug inspection pit: 0.00-1.20m. Continuous disturbed sampling using 113mm and 101mm sample barrels: 1.20-6.00m.
CASING: 128mm diameter to 2.00m.
GROUNDWATER: Seepage encountered at 0.30m. Borehole damp at 4.00m. Water strike at 5.90m rising to 5.11m following 20 minute monitoring period.
BACKFILL: Upon completion, borehole backfilled with bentonite pellets: 1.20-6.00m and arisings: 0.00-1.20m.
REMARKS: PID readings were undertaken on all environmental samples. Results: 0.20m - 0.20ppm, 0.50m - 0.10ppm, 1.00m - 0.20ppm; 1.50m - 0.10ppm, 1.90m - 0.10ppm, 2.90m - 0.10ppm and 3.90m - 0.10ppm. Dynamic Probe undertaken adjacent to sampling - see separate sheet. Borehole refused at 6.00m.

Groundwater:

Date	Strike Depth (m)	Casing Depth (m)	Depth After Observation (m)
03/12/18	5.90	2.00	5.11

Hole Progress:

Date	Hole Depth (m)	Casing Depth (m)	Water Depth (m)
03/12/2018 17:00	6.00	2.00	5.90

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DYNAMIC PROBE LOG

EN ISO 22476-2

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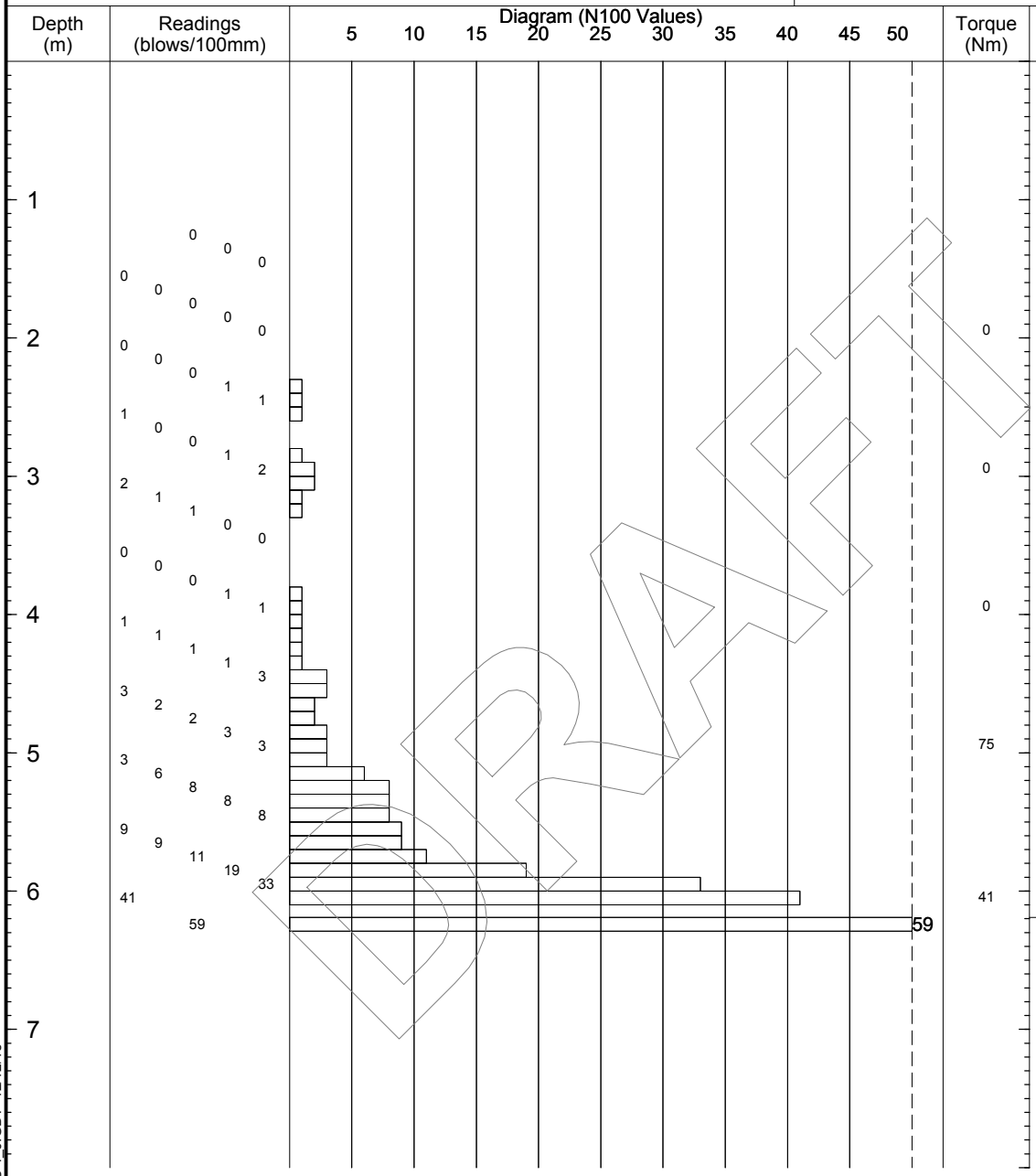
Probe No **SHDP2ALTN_2U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461920 N 223570 Level: 69.56mAOD	Date 03/12/2018
Location: Section 2A GI		**Specification: DPSH-B** Hammer Mass: 64Kg Drop Height: 750mm Cone Base Diameter: 51mm	Scale 1 : 50
Client: East West Rail Alliance			Rig No. T06



EQUIPMENT: Hand digging tools. Terrier 2002 track mounted window sampling rig.

METHOD: Hand dug inspection pit: 0.00-1.20m. Dynamic probing superheavy (DPSH-B): 1.20-6.19m.

REMARKS: Probing undertaken adjacent to windowless sampling - see separate sheet. Dynamic probe refused at 6.19m.

CC Ground Investigations Ltd

TRIAL PIT LOG

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Pit No **TP2ALTN_2U**

Sheet 1 of 1

Project Name: East West Rail Phase 2 GRIP4 Ground Investigation	Project No: **C5759**	Co-ords: E 461894 N 223513 Level: 66.75mAOD	Date 04/06/2018
Location: Section 2A GI		Dimensions: 2.00m, Depth 3.00m, 0.70m	Scale 1 : 25
Client: East West Rail Alliance			Logged By MB

(m)	Water Levels	Samples & In Situ Testing No/Type	Depth (m)	Result	Description	Depth (m)	Level (mAD)	Legend
					TOPSOIL: Soft friable dark brown slightly sandy CLAY with frequent roots (<3mm). Sand is fine.	(0.25)		
		ES	0.30			0.25	66.50	
		H	0.40	41	Soft to firm light brown slightly gravelly slightly sandy CLAY with occasional roots (<2mm). Sand is fine. Gravel is sub-angular to rounded fine to coarse of siliceous material. (ALLUVIUM)	(0.35)		
		D	0.50	39				
		ES		44		0.60	66.15	
		H	0.70	60	Firm light orangish brown mottled light brown and light grey slightly gravelly slightly sandy CLAY with occasional rootlets (<1mm). Sand is fine. Gravel is sub-angular to rounded fine to coarse of siliceous material. (ALLUVIUM)			
	1	D	0.80	64				
				62		(0.60)		
1		B	1.00 - 1.10	65				1
		ES	1.00	55				
		H		57		1.20	65.55	
		B	1.30 - 1.50		Light brown mottled orangish brown slightly gravelly very clayey fine to medium SAND. Gravel is sub-angular to rounded of siliceous material. (ALLUVIUM)			
						(0.40)		
					Firm light bluish grey mottled orangish brown sandy CLAY. (OXFORD CLAY - PETERBOROUGH MEMBER)	1.60	65.15	
		H	1.80	59				
		B	1.90 - 2.00	61				
2				57		(0.70)		2
		D	2.20					
					Dark grey silty fine SAND with occasional pockets of firm dark grey fine sandy CLAY with frequent shells. (KELLAWAYS SAND FORMATION)	2.30	64.45	
		D	2.50					
						(0.70)		
		B	2.90 - 3.00					
3					Trial pit completed at 3.00m	3.00	63.75	3
4								4

EQUIPMENT: JCB 3CX mechanical excavator.

METHOD: Trial pit excavated using 0.45m bucket.

GROUNDWATER: Seepage encountered at 0.90m and 1.20-1.60m. No rise is recorded.

STABILITY: Trial pit walls unstable and collapsing from: 1.20-1.60m.

BACKFILL: Upon completion, trial pit backfilled with arisings and compacted with excavator bucket.

REMARKS: Nomenclature provided by Client. PID readings were undertaken on all environmental samples. Results: 0.30m - 0.10ppm; 0.50m - 0.10ppm and 1.00m - 0.00ppm.

Appendix D – Soil Screening Results

ATKINS

Assessment Criteria : *Commercial - 1% SOM Sand*

☐ Use MRL Values?

Constituent	Unit	Limit of Detection	Generic Assessment Criteria	Number of Samples	Minimum Value	Maximum Value	Number of Exceedances	Locations of Exceedances	Location	WS2A02C	WS2A01D	WS2ALLCU	FCGF2A15C	WS2A14C	WS2A19U	WS2A-3D	WS2A 15D	WS2a	WS2a12C	FCT2A2D	WS2A4U	WS2A16U	WS2A6C	WS2A7D	WS2A8C	WS2A9U	WS2A10C	WS2A11D	WS2A13C	WS2 A17U	FCMG2A1 U	WS2 AFCNG	W52A 18D	WS2A19U	WS2A 20D
									Sample ID	B	A	ES3	ES1	ES1	ES1	ES1		5C	ES1	ES1	ES1	ES1	ES2	ES1	ES1	ES1	ES1	ES2	ES1	ES1	ES1			ES1	
									Depth	3.6m	1m	2.5m	0.3m	0.3m	0.3m	0.3m	0.3m	0.3m	0.3m	0.3m	0.3m	0.3m	1m	0.3m	0.3m	0.3m	0.3m	1m	0.3m	0.3m	0.3m	1m	0.3m	0.3m	0.3m
									Date	15-Jul-15	13-Jul-15	01-Jun-15	28-May-15	03-Jun-15	02-Jun-15	04-Aug-15	18-Jun-15	20-May-15	18-May-15	11-May-15	13-May-15													24-Jun-15		23-Jun-15
									Strata	SGF	MDG	MDG	BLT	BLT	MDG	MDG	SGF		TBL	SGF	MDG	TBL	SGF	ALV	BLT	MDG	BLT	GDC	BLT	SGF			MDG	MDG	MDG
									Zone																									
ACM Type		N/A	No SSV	0	-	-	0			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Asbestos Identification	%	0.001	No SSV	32	-	-	0			No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	%	0.02	No SSV	32	5.3	25	0			20	20	25	6.8	8.2	13	5.6	11	10	9.6	15	15	11	17	22	5.6	15	9	17	12	22	23	9.1	5.3	7.3	14
pH		N/A	No SSV	32	4.5	9.6	0			6.3	9.6	7.8	7.7	8.1	9	8	8	8.6	8.5	8.5	8.2	8.1	8.1	7.1	9.4	6.3	9.4	8.1	8.7	7.4	7.8	8	8.6	9	8.8
Boron (Hot Water Soluble)	mg/kg	0.4	No SSV	32	<0.4	2.3	0			1.3	1.5	2	1.1	<0.4	1.9	1.2	1.7	<0.4	<0.4	0.5	0.85	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.8	0.69	0.82	1.1	2.3	1.8
Cyanide (Total)	mg/kg	0.5	No SSV	32	<0.5	38	0			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	11	11	7.6	38	8.8	30	12	21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Arsenic	mg/kg	1	635	32	4.9	48	0			15	41	13	13	8.4	33	15	31	34	39	25	32	15	25	17	23	19	32	23	6.1	4.9	14	42	27	27	25
Cadmium	mg/kg	0.1	410	32	<0.1	1.5	0			0.12	0.23	0.74	0.3	<0.1	0.18	0.12	0.29	0.25	0.27	0.18	1.5	0.19	0.29	0.1	0.17	0.24	0.39	0.66	0.23	0.22	<0.1	0.25	0.23	0.33	0.39
Chromium	mg/kg	1	208000	32	14	660	0			41	660	71	26	25	30	190	31	16	14	22	44	29	55	49	35	52	39	57	20	22	38	23	22	19	30
Copper	mg/kg	0.5	106000	32	1.6	120	0			16	23	56	12	1.6	59	63	26	12	16	47	39	30	25	17	18	30	81	31	15	36	22	110	120	59	49
Mercury	mg/kg	0.1	3600	32	<0.1	0.47	0			<0.1	0.47	<0.1	0.25	<0.1	<0.1	0.13	<0.1	<0.1	<0.1	<0.1	<0.1	0.12	<0.1	<0.1	<0.1	<0.1	0.11	<0.1	<0.1	0.12	<0.1	<0.1	0.17	0.44	0.26
Nickel	mg/kg	0.5	1770	32	7.7	74	0			21	47	74	23	7.7	30	25	26	20	22	24	58	18	47	23	21	27	36	51	21	21	20	35	24	23	24
Lead	mg/kg	0.5	2310	32	4.1	120	0			21	24	25	26	4.1	23	31	68	13	15	22	53	56	17	20	19	30	66	34	15	27	13	65	39	92	120
Zinc	mg/kg	0.5	1100000	32	20	270	0			57	64	160	68	20	92	110	67	76	83	96	110	72	87	65	51	91	150	100	85	95	83	130	110	100	270
Chromium (Hexavalent)	mg/kg	0.5	49.1	5	<0.5	<0.5	0				<0.5	<0.5				<0.5							<0.5							<0.5					
Organic Matter	%	0.4	No SSV	32	<0.4	21	0			1.7	2.2	3.8	1.7	<0.4	3.5	21	3.5	<0.4	<0.4	5.5	1.9	1.7	0.78	2.9	3.3	5.3	8.4	2.1	<0.4	6.9	0.86	5.2	4.3	4	5.7
Total TPH >C6-C40	mg/kg	10	No SSV	32	<10	650	0			<10	<10	<10	<10	<10	28	26	80	<10	<10	<10	<10	<10	<10	<10	25	<10	37	<10	<10	<10	24	<10	24	200	650
Naphthalene	mg/kg	0.1	90.1	32	<0.1	0.38	0			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.28	<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	0.21	<0.1	<0.1	0.38
Acenaphthylene	mg/kg	0.1	No SSV	32	<0.1	1.6	0			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	<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	1.6
Acenaphthene	mg/kg	0.1	83600	32	<0.1	1.1	0			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<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	0.24
Fluorene	mg/kg	0.1	66500	32	<0.1	1.2	0			<0.1	<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	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.2
Phenanthrene	mg/kg	0.1	No SSV	32	<0.1	15	0			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.2	<0.1	<0.1	<0.1	<0.1	0.22	0.36	0.77	15
Anthracene	mg/kg	0.1	535000	32	<0.1	3.9	0			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.55	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.6	<0.1	<0.1	<0.1	<0.1	0.1	0.15	0.28	3.9
Fluoranthene	mg/kg	0.1	72200	32	<0.1	20	0			0.17	0.29	<0.1	0.2	<0.1	1.6	0.46	5.1	<0.1	0.31	<0.1	0.29	<0.1	<0.1	<0.1	1.4	<0.1	3.1	0.26	<0.1	0.17	<0.1	1.2	0.67	1.6	20
Pyrene	mg/kg	0.1	54100	32	<0.1	17	0			0.13	0.18	<0.1	0.21	<0.1	1.7	0.33	4.8	<0.1	0.21	<0.1	0.21	<0.1	<0.1	<0.1	1.1	<0.1	3.9	0.36	<0.1	0.17	<0.1	1.8	0.67	1.7	17
Benzo[a]anthracene	mg/kg	0.1	BaP Surrogate	32	<0.1	9.8	0			<0.1	<0.1	<0.1	<0.1	<0.1	0.81	<0.1	2.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.58	<0.1	1	<0.1	<0.1	<0.1	<0.1	0.67	<0.1	1	9.8
Chrysene	mg/kg	0.1	BaP Surrogate	32	<0.1	10	0			<0.1	<0.1	<0.1	<0.1	<0.1	1.3	<0.1	2.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.29	<0.1	0.76	<0.1	<0.1	<0.1	<0.1	0.79	<0.1	1.2	10
Benzo[b]fluoranthene	mg/kg	0.1	BaP Surrogate	32	<0.1	11	0			<0.1	<0.1	<0.1	<0.1	<0.1	1.1	<0.1	3.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2.1	<0.1	<0.1	<0.1	<0.1	1.6	<0.1	1.4	11
Benzo[k]fluoranthene	mg/kg	0.1	BaP Surrogate	32	<0.1	4.2	0			<0.1	<0.1	<0.1	<0.1	<0.1	0.51	<0.1	1.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.51	<0.1	<0.1	<0.1	<0.1	0.62	<0.1	0.65	4.2
Benzo[a]pyrene	mg/kg	0.1	76.3	32	<0.1	8.1	0			<0.1	<0.1	<0.1	<0.1	<0.1	0.85	<0.1	2.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.66	<0.1	<0.1	<0.1	<0.1	1.1	<0.1	0.97	8.1
Indeno(1,2,3-c,d)Pyrene	mg/kg	0.1	BaP Surrogate	32	<0.1	4.3	0			<0.1	<0.1	<0.1	<0.1	<0.1	0.57	<0.1	1.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.58	<0.1	<0.1	<0.1	<0.1	0.66	<0.1	0.62	4.3
Dibenz(a,h)Anthracene	mg/kg	0.1	BaP Surrogate	32	<0.1	1.2	0			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.38	<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	0.21	<0.1	0.15	1.2
Benzo[g,h,i]perylene	mg/kg	0.1	BaP Surrogate	32	<0.1	3.6	0			<0.1	<0.1	<0.1	<0.1	<0.1	0.63	<0.1	2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.79	<0.1	<0.1	<0.1	<0.1	0.64	<0.1	0.73	3.6
Total Of 16 PAH's	mg/kg	2	No SSV	32	<2	110	0			<2	<2	<2	<2	<2	9.1	<2	31	<2	<2	<2	<2	<2	<2	<2	3.4	<2	15	<2	<2	<2	<2	9.9	<2	11	110
Phenol	mg/kg	0.3	685	32	<0.3	<0.5	0			<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Stone Content	%	0.1	No SSV	3	<0.1	<0.1	0																												
Moisture Content	%	N/A	No SSV	3	9.9	15	0																												
Total mass of sample received	kg	0.001	No SSV	3	1.3	1.6	0																												
Asbestos in Soil	Type	N/A	No SSV	3	-	-	0																												
pH	pH Units	N/A	No SSV	3	6.2	6.5	0																												
Total Cyanide	mg/kg	1	No SSV	3	<1	<1	0																												
Water Soluble Sulphate (2:1 Leachate Equivalent)	g/l	0.00125	No SSV	3	0.0053	0.089	0																												
Organic Matter	%	0.1	No SSV	3	<0.1	1	0																												
Total Phenols (monohydric)	mg/kg	1	No SSV	3	<1	<1	0																												
Naphthalene	mg/kg	0.05	90.1	3	<0.05	<0.05	0																												
Acenaphthylene	mg/kg	0.1	No SSV	3	<0.1	<0.1	0																												
Acenaphthene	mg/kg	0.1	83600	3	<0.1	<0.1	0																												
Fluorene	mg/kg	0.1	66500	3	<0.1	<0.1	0																												
Phenanthrene	mg/kg	0.1	No SSV	3	<0.1	<0.1	0																												
Anthracene	mg/kg	0.1	535000	3	<0.1	<0.1	0																												
Fluoranthene	mg/kg	0.1	72200	3	<0.1	<0.1	0																												
Pyrene	mg/kg	0.1	54100	3	<0.1	<0.1	0																												
Benzo(a)anthracene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0																												
Chrysene	mg/kg	0.05	BaP Surrogate	3	<0.05	<0.05	0																												
Benzo(b)fluoranthene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0																												
Benzo(k)fluoranthene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0																												
Benzo(a)pyrene	mg/kg	0.1	76.3	3	<0.1	<0.1	0																												
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0																												
Dibenz(a,h)anthracene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0																												
Benzo(ghi)perylene	mg/kg	0.05	BaP Surrogate	3	<0.05	<0.05	0																												
Speciated Total EPA-16 PAHs	mg/kg	1.6	No SSV	3	<1.6	<1.6	0																												
Arsenic (aqua regia extractable)	mg/kg	1	635	3	9.6	12	0																												
Boron (water soluble)	mg/kg	0.2	No SSV	3	0.4	1.1	0																												
Cadmium (aqua regia extractable)	mg/kg	0.2	410	3	<0.2	<0.2	0																												
Chromium (aqua regia extractable)	mg/kg	1	208000	3	26	32	0																												
Copper (aqua regia extractable)	mg/kg	1	106000	3	19	37	0																												
Lead (aqua regia extractable)	mg/kg	1	2310	3	12	53	0																												
Mercury (aqua regia extractable)	mg/kg	0.3	3600	3	<0.3	<0.3	0																												
Nickel (aqua regia extractable)	mg/kg	1	1770	3	21	92	0																												
Zinc (aqua regia extractable)	mg/kg	1	1100000	3	71	200	0																												
Petroleum Hydrocarbons																																		
TPH C10 - C40	mg/kg	10																																

ATKINS

Assessment Criteria :			Commercial - 1% SOM Sand																	
Use MRL Values?																				
Constituent	Unit	Limit of Detection	Generic Assessment Criteria	Number of Samples	Minimum Value	Maximum Value	Number of Exceedances	Locations of Exceedances	CP2AMG-1I	CP2AUB3 2E	OXDUB2A 32C W	OXDOB2A 29D	W52AOB2 9D	OXDOB2A 31C		RC2ALOB-I	RC2ALOB-I	RC2AMF-U
									ES1	ES1	ES2	ES1	ES2	ES		RC2ALOB-I	RC2ALOB-I	RC2AMF-U
									0.3m	0.3m	1m	0.3m	1m	0.3m		0.3m	1.00-1.00m	0.30-0.30m
									28-Sep-15	06-May-15	06-May-15	12-May-15	12-May-15					
									TPS							TPS	TPS	TPS
ACM Type		N/A	No SSV	0	-	-	0		-	-	-	-	-	-				
Asbestos Identification	%	0.001	No SSV	32	-	-	0		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected				
Moisture	%	0.02	No SSV	32	5.3	25	0		20	5.6	14	11	11	8.8				
pH		N/A	No SSV	32	4.5	9.6	0		4.5	9.6	8.7	8.6	8.3	8.5				
Boron (Hot Water Soluble)	mg/kg	0.4	No SSV	32	<0.4	2.3	0		1.1	0.88	1.8	0.98	0.76	0.81				
Cyanide (Total)	mg/kg	0.5	No SSV	32	<0.5	38	0		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5				
Arsenic	mg/kg	1	635	32	4.9	48	0		11	29	13	48	17	25				
Cadmium	mg/kg	0.1	410	32	<0.1	1.5	0		0.14	0.42	0.27	<0.1	<0.1	0.22				
Chromium	mg/kg	1	208000	32	14	660	0		40	25	48	35	48	20				
Copper	mg/kg	0.5	106000	32	1.6	120	0		120	28	28	22	15	55				
Mercury	mg/kg	0.1	3600	32	<0.1	0.47	0		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Nickel	mg/kg	0.5	1770	32	7.7	74	0		28	27	45	47	25	26				
Lead	mg/kg	0.5	2310	32	4.1	120	0		33	42	18	22	16	33				
Zinc	mg/kg	0.5	1100000	32	20	270	0		230	86	81	80	66	100				
Chromium (Hexavalent)	mg/kg	0.5	49.1	5	<0.5	<0.5	0											
Organic Matter	%	0.4	No SSV	32	<0.4	21	0		1.6	2.8	3.3	1.2	1.1	2.1				
Total TPH >C6-C40	mg/kg	10	No SSV	32	<10	650	0		<10	<10	<10	<10	<10	10				
Naphthalene	mg/kg	0.1	90.1	32	<0.1	0.38	0		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Acenaphthylene	mg/kg	0.1	No SSV	32	<0.1	1.6	0		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Acenaphthene	mg/kg	0.1	83600	32	<0.1	1.1	0		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Fluorene	mg/kg	0.1	66500	32	<0.1	1.2	0		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Phenanthrene	mg/kg	0.1	No SSV	32	<0.1	15	0		<0.1	0.48	<0.1	<0.1	<0.1	0.25				
Anthracene	mg/kg	0.1	535000	32	<0.1	3.9	0		<0.1	0.21	<0.1	<0.1	<0.1	0.14				
Fluoranthene	mg/kg	0.1	72200	32	<0.1	20	0		<0.1	0.73	<0.1	0.13	<0.1	0.51				
Pyrene	mg/kg	0.1	54100	32	<0.1	17	0		<0.1	0.74	<0.1	0.29	<0.1	0.69				
Benzo[a]anthracene	mg/kg	0.1	BaP Surrogate	32	<0.1	9.8	0		<0.1	0.39	<0.1	<0.1	<0.1	0.41				
Chrysene	mg/kg	0.1	BaP Surrogate	32	<0.1	10	0		<0.1	0.35	<0.1	<0.1	<0.1	0.53				
Benzo[b]fluoranthene	mg/kg	0.1	BaP Surrogate	32	<0.1	11	0		<0.1	<0.1	<0.1	<0.1	<0.1	1.5				
Benzo[k]fluoranthene	mg/kg	0.1	BaP Surrogate	32	<0.1	4.2	0		<0.1	<0.1	<0.1	<0.1	<0.1	0.4				
Benzo[a]pyrene	mg/kg	0.1	76.3	32	<0.1	8.1	0		<0.1	<0.1	<0.1	<0.1	<0.1	0.91				
Indeno(1,2,3-c,d)Pyrene	mg/kg	0.1	BaP Surrogate	32	<0.1	4.3	0		<0.1	<0.1	<0.1	<0.1	<0.1	0.65				
Dibenz(a,h)Anthracene	mg/kg	0.1	BaP Surrogate	32	<0.1	1.2	0		<0.1	<0.1	<0.1	<0.1	<0.1	0.23				
Benzo[g,h,i]perylene	mg/kg	0.1	BaP Surrogate	32	<0.1	3.6	0		<0.1	<0.1	<0.1	<0.1	<0.1	0.57				
Total Of 16 PAH's	mg/kg	2	No SSV	32	<2	110	0		<2	2.9	<2	<2	<2	6.8				
Phenol	mg/kg	0.3	685	32	<0.3	<0.5	0		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3				
Stone Content	%	0.1	No SSV	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Moisture Content	%	N/A	No SSV	3	9.9	15	0									15	13	9.9
Total mass of sample received	kg	0.001	No SSV	3	1.3	1.6	0									1.6	1.3	1.5
Asbestos in Soil	Type	N/A	No SSV	3	-	-	0									Not-detected	Not-detected	Not-detected
pH	pH Units	N/A	No SSV	3	6.2	6.5	0									6.5	6.2	6.4
Total Cyanide	mg/kg	1	No SSV	3	<1	<1	0									<1	<1	<1
Water Soluble Sulphate (2:1 Leachate Equivalent)	g/l	0.00125	No SSV	3	0.0053	0.089	0									0.0053	0.089	0.0078
Organic Matter	%	0.1	No SSV	3	<0.1	1	0									1	<0.1	0.6
Total Phenols (monohydric)	mg/kg	1	No SSV	3	<1	<1	0									<1	<1	<1
Naphthalene	mg/kg	0.05	90.1	3	<0.05	<0.05	0									<0.05	<0.05	<0.05
Acenaphthylene	mg/kg	0.1	No SSV	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	83600	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	66500	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	No SSV	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	535000	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	72200	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	54100	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Chrysene	mg/kg	0.05	BaP Surrogate	3	<0.05	<0.05	0									<0.05	<0.05	<0.05
Benzo(b)fluoranthene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	76.3	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Dibenz(a,h)anthracene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.05	BaP Surrogate	3	<0.05	<0.05	0									<0.05	<0.05	<0.05
Speciated Total EPA-16 PAHs	mg/kg	1.6	No SSV	3	<1.6	<1.6	0									<1.6	<1.6	<1.6
Arsenic (aqua regia extractable)	mg/kg	1	635	3	9.6	12	0									12	11	9.6
Boron (water soluble)	mg/kg	0.2	No SSV	3	0.4	1.1	0									0.7	1.1	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	410	3	<0.2	<0.2	0									<0.2	<0.2	<0.2
Chromium (aqua regia extractable)	mg/kg	1	208000	3	26	32	0									28	26	32
Copper (aqua regia extractable)	mg/kg	1	106000	3	19	37	0									19	37	26
Lead (aqua regia extractable)	mg/kg	1	2310	3	12	53	0									17	12	53
Mercury (aqua regia extractable)	mg/kg	0.3	3600	3	<0.3	<0.3	0									<0.3	<0.3	<0.3
Nickel (aqua regia extractable)	mg/kg	1	1770	3	21	92	0									22	92	21
Zinc (aqua regia extractable)	mg/kg	1	1100000	3	71	200	0									71	200	72
Petroleum Hydrocarbons																		
TPH C10 - C40	mg/kg	10														<10	<10	<10

ATKINS

Assessment Criteria : *Public Open Space (Parks) - 1% SOM Sand*

☐ Use MRL Values?

Constituent	Unit	Limit of Detection	Generic Assessment Criteria	Number of Samples	Minimum Value	Maximum Value	Number of Exceedances	Locations of Exceedances	Location	Sample ID	Depth	Date	Strata	Zone	WS2A02C	WS2A01D	WS2ALLCU	FCGF2A15C	WS2A14C	WS2A19U	WS2A-3D	WS2A 15D	WS2a	WS2a12C	FCT2A2D	WS2A4U	WS2A16U	WS2A6C	WS2A7D	WS2A8C	WS2A9U	WS2A10C	WS2A11D	WS2A13C	WS2 A17U	FCMG2A11	WS2 AFCNG	W52A 18D	WS2A19U	WS2A 20D
										B	3.6m	15-Jul-15	SGF																													
										A	1m	13-Jul-15	MDG																													
										ES3	2.5m	01-Jun-15	MDG																													
										ES1	0.3m	28-May-15	BLT																													
										ES1	0.3m	03-Jun-15	BLT																													
										ES1	0.3m	02-Jun-15	MDG																													
										ES1	0.3m	04-Aug-15	MDG																													
											0.3m	18-Jun-15	SGF																													
										5C	0.3m	20-May-15																													
										ES1	0.3m	18-May-15	TBL																													
										ES1	0.3m	11-May-15	SGF																													
										ES1	0.3m	13-May-15	MDG																													
										ES1	0.3m		TBL																													
										ES2	1m		SGF																													
										ES1	0.3m		ALV																													
										ES1	0.3m		BLT																													
										ES1	0.3m		MDG																													
										ES1	0.3m		BLT																													
										ES1	1m		GDC																													
										ES2	0.3m		BLT																													
										ES1	0.3m		SGF																													
										ES1	0.3m																															
										ES2	1m																															
											0.3m	24-Jun-15	MDG																													
										ES1	0.3m		MDG																													
											0.3m	23-Jun-15	MDG																													
Asbestos Identification	%	0.001	No SSV	32	-	-	0								No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	%	0.02	No SSV	32	5.3	25	0								20	20	25	6.8	8.2	13	5.6	11	10	9.6	15	15	11	17	22	5.6	15	9	17	12	22	23	9.1	5.3	7.3	14
pH		N/A	No SSV	32	4.5	9.6	0								6.3	9.6	7.8	7.7	8.1	9	8	8	8.6	8.5	8.5	8.2	8.1	8.1	7.1	9.4	6.3	9.4	8.1	8.7	7.4	7.8	8	8.6	9	8.8
Boron (Hot Water Soluble)	mg/kg	0.4	No SSV	32	<0.4	2.3	0								1.3	1.5	2	1.1	<0.4	1.9	1.2	1.7	<0.4	<0.4	0.5	0.85	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1.8	0.69	0.82	1.1	2.3	1.8
Cyanide (Total)	mg/kg	0.5	No SSV	32	<0.5	38	0								<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	11	11	7.6	38	8.8	30	12	21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Arsenic	mg/kg	1	168	32	4.9	48	0								15	41	13	13	8.4	33	15	31	34	39	25	32	15	25	17	23	19	32	23	6.1	4.9	14	42	27	27	25
Cadmium	mg/kg	0.1	882	32	<0.1	1.5	0								0.12	0.23	0.74	0.3	<0.1	0.18	0.12	0.29	0.25	0.27	0.18	1.5	0.19	0.29	0.1	0.17	0.24	0.39	0.66	0.23	0.22	<0.1	0.25	0.23	0.33	0.39
Chromium	mg/kg	1	83500	32	14	660	0								41	660	71	26	25	30	190	31	16	14	22	44	29	55	49	35	52	39	57	20	22	38	23	22	19	30
Copper	mg/kg	0.5	45200	32	1.6	120	0								16	23	56	12	1.6	59	63	26	12	16	47	39	30	25	17	18	30	81	31	15	36	22	110	120	59	49
Mercury	mg/kg	0.1	1110	32	<0.1	0.47	0								<0.1	0.47	<0.1	0.25	<0.1	<0.1	0.13	<0.1	<0.1	<0.1	<0.1	<0.1	0.12	<0.1	<0.1	<0.1	<0.1	0.11	<0.1	<0.1	0.12	<0.1	<0.1	0.17	0.44	0.26
Nickel	mg/kg	0.5	804	32	7.7	74	0								21	47	74	23	7.7	30	25	26	20	22	24	58	18	47	23	21	27	36	51	21	21	20	35	24	23	24
Lead	mg/kg	0.5	1340	32	4.1	120	0								21	24	25	26	4.1	23	31	68	13	15	22	53	56	17	20	19	30	66	34	15	27	13	65	39	92	120
Zinc	mg/kg	0.5	201000	32	20	270	0								57	64	160	68	20	92	110	67	76	83	96	110	72	87	65	51	91	150	100	85	95	83	130	110	100	270
Chromium (Hexavalent)	mg/kg	0.5	251	5	<0.5	<0.5	0									<0.5	<0.5				<0.5							<0.5							<0.5					
Organic Matter	%	0.4	No SSV	32	<0.4	21	0								1.7	2.2	3.8	1.7	<0.4	3.5	21	3.5	<0.4	<0.4	5.5	1.9	1.7	0.78	2.9	3.3	5.3	8.4	2.1	<0.4	6.9	0.86	5.2	4.3	4	5.7
Total TPH >C6-C40	mg/kg	10	No SSV	32	<10	650	0								<10	<10	<10	<10	<10	28	26	80	<10	<10	<10	<10	<10	<10	<10	25	<10	37	<10	<10	<10	24	<10	24	200	650
Naphthalene	mg/kg	0.1	623	32	<0.1	0.38	0								<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.28	<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	0.21	<0.1	<0.1	0.38
Acenaphthylene	mg/kg	0.1	No SSV	32	<0.1	1.6	0								<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	<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	1.6
Acenaphthene	mg/kg	0.1	28600	32	<0.1	1.1	0								<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<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	0.24
Fluorene	mg/kg	0.1	19600	32	<0.1	1.2	0								<0.1	<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	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.2
Phenanthrene	mg/kg	0.1	No SSV	32	<0.1	15	0								<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.2	<0.1	<0.1	<0.1	<0.1	0.22	0.36	0.77	15
Anthracene	mg/kg	0.1	150000	32	<0.1	3.9	0								<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.55	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.6	<0.1	<0.1	<0.1	<0.1	0.1	0.15	0.28	3.9
Fluoranthene	mg/kg	0.1	20200	32	<0.1	20	0								0.17	0.29	<0.1	0.2	<0.1	1.6	0.46	5.1	<0.1	0.31	<0.1	0.29	<0.1	<0.1	<0.1	1.4	<0.1	3.1	0.26	<0.1	0.17	<0.1	1.2	0.67	1.6	20
Pyrene	mg/kg	0.1	15100	32	<0.1	17	0								0.13	0.18	<0.1	0.21	<0.1	1.7	0.33	4.8	<0.1	0.21	<0.1	0.21	<0.1	<0.1	<0.1	1.1	<0.1	3.9	0.36	<0.1	0.17	<0.1	1.8	0.67	1.7	17
Benzo[a]anthracene	mg/kg	0.1	BaP Surrogate	32	<0.1	9.8	0								<0.1	<0.1	<0.1	<0.1	<0.1	0.81	<0.1	2.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.58	<0.1	1	<0.1	<0.1	<0.1	<0.1	0.67	<0.1	1	9.8
Chrysene	mg/kg	0.1	BaP Surrogate	32	<0.1	10	0								<0.1	<0.1	<0.1	<0.1	<0.1	1.3	<0.1	2.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.29	<0.1	0.76	<0.1	<0.1	<0.1	<0.1	0.79	<0.1	1.2	10
Benzo[b]fluoranthene	mg/kg	0.1	BaP Surrogate	32	<0.1	11	0								<0.1	<0.1	<0.1	<0.1	<0.1	1.1	<0.1	3.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2.1	<0.1	<0.1	<0.1	<0.1	1.6	<0.1	1.4	11
Benzo[k]fluoranthene	mg/kg	0.1	BaP Surrogate	32	<0.1	4.2	0								<0.1	<0.1	<0.1	<0.1	<0.1	0.51	<0.1	1.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.51	<0.1	<0.1	<0.1	<0.1	0.62	<0.1	0.65	4.2
Benzo[a]pyrene	mg/kg	0.1	21.4	32	<0.1	8.1	0								<0.1	<0.1	<0.1	<0.1	<0.1	0.85	<0.1	2.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.66	<0.1	<0.1	<0.1	<0.1	1.1	<0.1	0.97	8.1
Indeno(1,2,3-c,d)Pyrene	mg/kg	0.1	BaP Surrogate	32	<0.1	4.3	0								<0.1	<0.1	<0.1	<0.1	<0.1	0.57	<0.1	1.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.58	<0.1	<0.1	<0.1	<0.1	0.66	<0.1	0.62	4.3
Dibenz(a,h)Anthracene	mg/kg	0.1	BaP Surrogate	32	<0.1	1.2	0								<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.38	<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	0.21	<0.1	0.15	1.2
Benzo[g,h,i]perylene	mg/kg	0.1	BaP Surrogate	32	<0.1	3.6	0								<0.1	<0.1	<0.1	<0.1	<0.1	0.63	<0.1	2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.79	<0.1	<0.1	<0.1	<0.1	0.64	<0.1	0.73	3.6
Total Of 16 PAH's	mg/kg	2	No SSV	32	<2	110	0								<2	<2	<2	<2	<2	9.1	<2	31	<2	<2	<2	<2	<2	<2	<2	3.4	<2	15	<2	<2	<2	<2	9.9	<2	11	110
Phenol	mg/kg	0.3	685	32	<0.3	<0.5	0								<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Stone Content	%	0.1	No SSV	3	<0.1	<0.1	0																																	
Moisture Content	%	N/A	No SSV	3	9.9	15	0																																	
Total mass of sample received	kg	0.001	No SSV	3	1.3	1.6	0																																	
Asbestos in Soil	Type	N/A	No SSV	3	-	-	0																																	
pH	pH Units	N/A	No SSV	3	6.2	6.5	0																																	
Total Cyanide	mg/kg	1	No SSV	3	<1	<1	0																																	
Water Soluble Sulphate (2:1 Leachate Equivalent)	g/l	0.00125	No SSV	3	0.0053	0.089	0																																	
Organic Matter	%	0.1	No SSV	3	<0.1	1	0																																	
Total Phenols (monohydric)	mg/kg	1	No SSV	3	<1	<1	0																																	
Naphthalene	mg/kg	0.05	623	3	<0.05	<0.05	0																																	
Acenaphthylene	mg/kg	0.1	No SSV	3	<0.1	<0.1	0																																	
Acenaphthene	mg/kg	0.1	28600	3	<0.1	<0.1	0																																	
Fluorene	mg/kg	0.1	19600	3	<0.1	<0.1	0																																	
Phenanthrene	mg/kg	0.1	No SSV	3	<0.1	<0.1	0																																	
Anthracene	mg/kg	0.1	150000	3	<0.1	<0.1	0																																	
Fluoranthene	mg/kg	0.1	20200	3	<0.1	<0.1	0																																	
Pyrene	mg/kg	0.1	15100	3	<0.1	<0.1	0																																	
Benzo(a)anthracene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0																																	
Chrysene	mg/kg	0.05	BaP Surrogate	3	<0.05	<0.05	0																																	
Benzo(b)fluoranthene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0																																	
Benzo(k)fluoranthene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0																																	
Benzo(a)pyrene	mg/kg	0.1	21.4	3	<0.1	<0.1	0																																	
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0																																	
Dibenz(a,h)anthracene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0																																	
Benzo(ghi)perylene	mg/kg	0.05	BaP Surrogate	3	<0.05	<0.05	0																																	
Speciated Total EPA-16 PAHs	mg/kg	1.6	No SSV	3	<1.6	<1.6	0																																	
Arsenic (aqua regia extractable)	mg/kg	1	168	3	9.6	12	0																																	
Boron (water soluble)	mg/kg	0.2	No SSV	3	0.4	1.1	0																																	
Cadmium (aqua regia extractable)	mg/kg	0.2	882	3	<0.2	<0.2	0																																	
Chromium (aqua regia extractable)	mg/kg	1	83500	3	26	32	0																																	
Copper (aqua regia extractable)	mg/kg	1	45200	3	19	37	0																																	
Lead (aqua regia extractable)	mg/kg	1	1340	3	12	53	0																																	
Mercury (aqua regia extractable)	mg/kg	0.3	1110	3	<0.3	<0.3	0																																	
Nickel (aqua regia extractable)	mg/kg	1	804	3	21	92	0																																	
Zinc (aqua regia extractable)	mg/kg	1	201000	3	71	200	0																																	
Petroleum Hydrocarbons																																								
TPH C10 - C40	mg/kg	10																																						

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Assessment Criteria :		*Public Open Space (Parks) - 1% SOM Sand*																		
☐ Use MRL Values?																				
Constituent	**Unit**	**Limit of Detection**	**Generic Assessment Criteria**	**Number of Samples**	**Minimum Value**	**Maximum Value**	**Number of Exceedances**	**Locations of Exceedances**	CP2AMG-11	CP2AUB32F	OXDUB2A32C.W	OXDOB2A29D	W52AOB29D	OXDOB2A31C		RC2ALOB-ES1	RC2ALOB-ES1	RC2AMF-U RC2AMF-U
									ES1	ES1	ES2	ES1	ES2	ES		0.3m	1.00-1.00m	0.30-0.30m
									28-Sep-15	06-May-15	06-May-15	12-May-15	12-May-15					
									TPS							TPS	TPS	TPS
ACM Type		N/A	No SSV	0	-	-	0		-	-	-	-	-	-				
Asbestos Identification	%	0.001	No SSV	32	-	-	0		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected				
Moisture	%	0.02	No SSV	32	5.3	25	0		20	5.6	14	11	11	8.8				
pH		N/A	No SSV	32	4.5	9.6	0		4.5	9.6	8.7	8.6	8.3	8.5				
Boron (Hot Water Soluble)	mg/kg	0.4	No SSV	32	<0.4	2.3	0		1.1	0.88	1.8	0.98	0.76	0.81				
Cyanide (Total)	mg/kg	0.5	No SSV	32	<0.5	38	0		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5				
Arsenic	mg/kg	1	168	32	4.9	48	0		11	29	13	48	17	25				
Cadmium	mg/kg	0.1	882	32	<0.1	1.5	0		0.14	0.42	0.27	<0.1	<0.1	0.22				
Chromium	mg/kg	1	83500	32	14	660	0		40	25	48	35	48	20				
Copper	mg/kg	0.5	45200	32	1.6	120	0		120	28	28	22	15	55				
Mercury	mg/kg	0.1	1110	32	<0.1	0.47	0		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Nickel	mg/kg	0.5	804	32	7.7	74	0		28	27	45	47	25	26				
Lead	mg/kg	0.5	1340	32	4.1	120	0		33	42	18	22	16	33				
Zinc	mg/kg	0.5	201000	32	20	270	0		230	86	81	80	66	100				
Chromium (Hexavalent)	mg/kg	0.5	251	5	<0.5	<0.5	0											
Organic Matter	%	0.4	No SSV	32	<0.4	21	0		1.6	2.8	3.3	1.2	1.1	2.1				
Total TPH >C6-C40	mg/kg	10	No SSV	32	<10	650	0		<10	<10	<10	<10	<10	10				
Naphthalene	mg/kg	0.1	623	32	<0.1	0.38	0		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Acenaphthylene	mg/kg	0.1	No SSV	32	<0.1	1.6	0		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Acenaphthene	mg/kg	0.1	28600	32	<0.1	1.1	0		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Fluorene	mg/kg	0.1	19600	32	<0.1	1.2	0		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				
Phenanthrene	mg/kg	0.1	No SSV	32	<0.1	15	0		<0.1	0.48	<0.1	<0.1	<0.1	0.25				
Anthracene	mg/kg	0.1	150000	32	<0.1	3.9	0		<0.1	0.21	<0.1	<0.1	<0.1	0.14				
Fluoranthene	mg/kg	0.1	20200	32	<0.1	20	0		<0.1	0.73	<0.1	0.13	<0.1	0.51				
Pyrene	mg/kg	0.1	15100	32	<0.1	17	0		<0.1	0.74	<0.1	0.29	<0.1	0.69				
Benzo[a]anthracene	mg/kg	0.1	BaP Surrogate	32	<0.1	9.8	0		<0.1	0.39	<0.1	<0.1	<0.1	0.41				
Chrysene	mg/kg	0.1	BaP Surrogate	32	<0.1	10	0		<0.1	0.35	<0.1	<0.1	<0.1	0.53				
Benzo[b]fluoranthene	mg/kg	0.1	BaP Surrogate	32	<0.1	11	0		<0.1	<0.1	<0.1	<0.1	<0.1	1.5				
Benzo[k]fluoranthene	mg/kg	0.1	BaP Surrogate	32	<0.1	4.2	0		<0.1	<0.1	<0.1	<0.1	<0.1	0.4				
Benzo[a]pyrene	mg/kg	0.1	21.4	32	<0.1	8.1	0		<0.1	<0.1	<0.1	<0.1	<0.1	0.91				
Indeno(1,2,3-c,d)Pyrene	mg/kg	0.1	BaP Surrogate	32	<0.1	4.3	0		<0.1	<0.1	<0.1	<0.1	<0.1	0.65				
Dibenz(a,h)Anthracene	mg/kg	0.1	BaP Surrogate	32	<0.1	1.2	0		<0.1	<0.1	<0.1	<0.1	<0.1	0.23				
Benzo[g,h,i]perylene	mg/kg	0.1	BaP Surrogate	32	<0.1	3.6	0		<0.1	<0.1	<0.1	<0.1	<0.1	0.57				
Total Of 16 PAH's	mg/kg	2	No SSV	32	<2	110	0		<2	2.9	<2	<2	<2	6.8				
Phenol	mg/kg	0.3	685	32	<0.3	<0.5	0		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3				
Stone Content	%	0.1	No SSV	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Moisture Content	%	N/A	No SSV	3	9.9	15	0									15	13	9.9
Total mass of sample received	kg	0.001	No SSV	3	1.3	1.6	0									1.6	1.3	1.5
Asbestos in Soil	Type	N/A	No SSV	3	-	-	0									Not-detected	Not-detected	Not-detected
pH	pH Units	N/A	No SSV	3	6.2	6.5	0									6.5	6.2	6.4
Total Cyanide	mg/kg	1	No SSV	3	<1	<1	0									<1	<1	<1
Water Soluble Sulphate (2:1 Leachate Equivalent)	g/l	0.00125	No SSV	3	0.0053	0.089	0									0.0053	0.089	0.0078
Organic Matter	%	0.1	No SSV	3	<0.1	1	0									1	<0.1	0.6
Total Phenols (monohydric)	mg/kg	1	No SSV	3	<1	<1	0									<1	<1	<1
Naphthalene	mg/kg	0.05	623	3	<0.05	<0.05	0									<0.05	<0.05	<0.05
Acenaphthylene	mg/kg	0.1	No SSV	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Acenaphthene	mg/kg	0.1	28600	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Fluorene	mg/kg	0.1	19600	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Phenanthrene	mg/kg	0.1	No SSV	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Anthracene	mg/kg	0.1	150000	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Fluoranthene	mg/kg	0.1	20200	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Pyrene	mg/kg	0.1	15100	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Chrysene	mg/kg	0.05	BaP Surrogate	3	<0.05	<0.05	0									<0.05	<0.05	<0.05
Benzo(b)fluoranthene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Benzo(k)fluoranthene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Benzo(a)pyrene	mg/kg	0.1	21.4	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Dibenz(a,h)anthracene	mg/kg	0.1	BaP Surrogate	3	<0.1	<0.1	0									<0.1	<0.1	<0.1
Benzo(ghi)perylene	mg/kg	0.05	BaP Surrogate	3	<0.05	<0.05	0									<0.05	<0.05	<0.05
Speciated Total EPA-16 PAHs	mg/kg	1.6	No SSV	3	<1.6	<1.6	0									<1.6	<1.6	<1.6
Arsenic (aqua regia extractable)	mg/kg	1	168	3	9.6	12	0									12	11	9.6
Boron (water soluble)	mg/kg	0.2	No SSV	3	0.4	1.1	0									0.7	1.1	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	882	3	<0.2	<0.2	0									<0.2	<0.2	<0.2
Chromium (aqua regia extractable)	mg/kg	1	83500	3	26	32	0									28	26	32
Copper (aqua regia extractable)	mg/kg	1	45200	3	19	37	0									19	37	26
Lead (aqua regia extractable)	mg/kg	1	1340	3	12	53	0									17	12	53
Mercury (aqua regia extractable)	mg/kg	0.3	1110	3	<0.3	<0.3	0									<0.3	<0.3	<0.3
Nickel (aqua regia extractable)	mg/kg	1	804	3	21	92	0									22	92	21
Zinc (aqua regia extractable)	mg/kg	1	201000	3	71	200	0									71	200	72
Petroleum Hydrocarbons																		
TPH C10 - C40	mg/kg	10														<10	<10	<10

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Assessment Criteria : *Commercial - 1% SOM Sand*

Use MRL Values?

Constituent	Unit	Limit of Detection	Generic Assessment Criteria	Number of Samples	Minimum Value	Maximum Value	Number of Exceedances	Locations of Exceedances	Location	WS2A101_C	WS2A101_C	CP2AJLFB_2U	CP2ATFB_2U (A)	CP2ATFB_2U (A)	TP2ABR_2D	WS2A102_C	WS2A104_U	WS2A113_C	WS2A122_C	SHDP2AT10_C	TP2AMGOB_1D	TP2AMGOB_1D	TP2AMGOB_2U	TP2ALOB_1D	TP2AMFOB_2U	TP2ALOB_1U	WSZAMFOB_1U	WSZAMFOB_1U	CP2AMFOB_1D
									Sample ID	WS2A101_C	WS2A101_C	CP2AJLFB_2U	CP2ATFB_2U (A)	CP2ATFB_2U (A)	TP2ABR_2D	WS2A102_C	WS2A104_U	WS2A113_C	WS2A122_C	SHDP2A110_C	TP2AMGOB_1D	TP2AMGOB_1D	TP2AMGOB_2U	TP2ALOB_1D	TP2AMFOB_2U	TP2ALOB_1U	WSZAMFOB_1U	WSZAMFOB_1U	CP2AMFOB_1D
									Depth	0.5m	1m	0.2m	0.2m	1m	1m	0.5m	0.3m	0.5m	1m	0.3m	0.2m	1m	0.2m	0.2m	0.5m	0.3m	0.2m	1m	0.3m
									Date	31/07/2017	31/07/2017	16/11/2017	09/11/2017	09/11/2017	06/12/2017	07/08/2017	02/11/2017	02/08/2017	03/08/2017	11/01/2018	20/12/2017	20/12/2017	20/12/2017	08/06/2018	26/06/2018	05/06/2018	30/05/2018	30/05/2018	31/07/2018
									Strata	TBL	GDC	TPS	TPS	OXC-SBY(W)	OXC-PET(W)	TBL	SGF	TBL	SGF		TPS	OXC-PET(W	TPS	OXC-PET(W	TPS	OXC-PET(W	ALV	OXC-PET(W	OXC-PET(W	MDG
									Zone																				
Stone Content	%	0.1	No SSV	21	<0.1	<0.1	0			<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	<0.1
Moisture Content	%	N/A	No SSV	21	8.5	26	0			12	19	20	26	15	18	18	16	8.5	22	8.6	18	25	18	20	22	15	13	12	18	9.5
Total mass of sample received	kg	0.001	No SSV	21	0.57	2	0			2	2	1.5	1.6	1.7	1.3	2	2	2	2	0.57	1.3	1.4	1.4	1.3	1.9	1.6	2	2	2	2
Asbestos in Soil	Type	N/A	No SSV	16	-	-	0			Not-detected	Not-detected	Not-detected	Not-detected	-	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	-	-	-	-	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
General Inorganics			No SSV	0	-	-	0																							
pH - Automated	pH Units	N/A	No SSV	21	5	8.6	0			8.2	7.7	8	7.5	7.7	7	8	8	8.5	7.6	8.6	7.8	5	6.2	5.2	7.2	7.5	8.1	7.9	5.6	7.8
Total Cyanide	mg/kg	1	No SSV	16	<1	<1	0			<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<1	<1	<1	<1	-	-	<1	<1	<1	-
Free Cyanide	mg/kg	1	373	16	<1	<1	0			<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<1	<1	<1	<1	-	-	<1	<1	<1	-
Total Sulphate as SO4	mg/kg	50	No SSV	16	350	120000	0			570	57000	1300	1300	120000	1300	-	1100	440	23000	-	920	850	350	1200	-	-	450	590	3200	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	No SSV	5	0.014	0.22	0			-	-	-	-	-	-	0.22	-	-	-	0.053	-	-	-	-	0.03	0.015	-	-	-	0.014
Sulphide	mg/kg	1	No SSV	16	<1	130	0			130	5.2	<1	<1	<1	<1	-	<1	1.3	2.5	-	<1	<1	<1	<1	<1	-	-	<1	<1	<1	-
Ammonium as NH4	mg/kg	0.5	No SSV	16	<0.5	14	0			<0.5	14	<0.5	<0.5	<0.5	<0.5	-	1.3	<0.5	<0.5	-	<0.5	<0.5	<0.5	3	-	-	<0.5	<0.5	<0.5	-
Fraction Organic Carbon (FOC)	N/A	0.001	No SSV	16	<0.001	0.026	0			0.0023	0.017	0.026	0.021	0.0038	0.0038	-	0.0082	<0.001	0.022	-	0.023	0.012	0.0094	0.0045	-	-	0.007	0.015	0.0084	-
Loss on Ignition @ 450oC	%	0.2	No SSV	11	0.9	9.4	0			1.8	8	9.4	7.8	-	3.4	-	3.5	0.9	4.8	-	-	-	-	-	-	-	3	4.1	3.2	-
Total Phenols			No SSV	0	-	-	0																							
Phenol	mg/kg	1	685	11	<1	<1	0			<1	<1	<1	<1	-	<1	-	<1	<1	<1	-	-	-	-	-	-	-	<1	<1	<1	-
Speciated PAHs			No SSV	0	-	-	0																							
Naphthalene	mg/kg	0.05	90.1	11	<0.05	<0.05	0			<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Acenaphthylene	mg/kg	0.05	No SSV	11	<0.05	<0.05	0			<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Acenaphthene	mg/kg	0.05	83600	11	<0.05	<0.05	0			<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Fluorene	mg/kg	0.05	66500	11	<0.05	<0.05	0			<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Phenanthrene	mg/kg	0.05	No SSV	11	<0.05	0.39	0			<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	0.39	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Anthracene	mg/kg	0.05	535000	11	<0.05	<0.05	0			<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Fluoranthene	mg/kg	0.05	72200	11	<0.05	0.36	0			<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	0.36	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Pyrene	mg/kg	0.05	54100	11	<0.05	0.3	0			<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	0.3	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Benzo(a)anthracene	mg/kg	0.05	BaP Surrogate	11	<0.05	0.14	0			<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	0.14	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Chrysene	mg/kg	0.05	BaP Surrogate	11	<0.05	0.18	0			<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	0.18	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Benzo(b)fluoranthene	mg/kg	0.05	BaP Surrogate	11	<0.05	<0.05	0			<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Benzo(k)fluoranthene	mg/kg	0.05	BaP Surrogate	11	<0.05	<0.05	0			<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Benzo(a)pyrene	mg/kg	0.05	76.3	11	<0.05	<0.05	0			<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	BaP Surrogate	11	<0.05	<0.05	0			<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Dibenz(a,h)anthracene	mg/kg	0.05	BaP Surrogate	11	<0.05	<0.05	0			<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Benzo(ghi)perylene	mg/kg	0.05	BaP Surrogate	11	<0.05	<0.05	0			<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Total PAH			No SSV	0	-	-	0																							
Speciated Total EPA-16 PAHs	mg/kg	0.8	No SSV	11	<0.8	1.37	0			<0.8	<0.8	<0.8	<0.8	-	<0.8	-	<0.8	<0.8	1.37	-	-	-	-	-	-	-	<0.8	<0.8	<0.8	-
Heavy Metals / Metalloids			No SSV	0	-	-	0																							
Arsenic (aqua regia extractable)	mg/kg	1	635	21	4.8	21	0			11	4.8	12	13	5.6	7.6	11	11	13	7.6	21	11	6.3	6.5	5.8	15	12	11	7.1	7.8	9.7
Boron (water soluble)	mg/kg	0.2	No SSV	16	<0.2	2.6	0			<0.2	1.9	2.5	1.8	2.6	2.3	-	1.9	0.3	2.5	-	2.4	1.8	1.9	1.7	-	-	1.6	1.9	2.3	-
Cadmium (aqua regia extractable)	mg/kg	0.2	410	16	<0.2	0.4	0			<0.2	0.3	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	0.4	-	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	-
Chromium (hexavalent)	mg/kg	4	49.1	16	<4	<4	0			<4	<4	<4	<4	<4	<4	-	<4	<4	<4	-	<4	<4	<4	<4	-	-	<4	<4	<4	-
Chromium (aqua regia extractable)	mg/kg	1	208000	21	13	58	0			16	33	41	50	33	44	29	39	17	49	13	50	58	34	39	27	48	33	22	39	23
Copper (aqua regia extractable)	mg/kg	1	106000	21	13	71	0			18	23	28	28	13	21	71	18	14	33	32	26	44	17	22	25	26	21	15	27	19
Lead (aqua regia extractable)	mg/kg	1	2310	21	6.9	38	0			9.3	7.6	34	36	7.3	12	35	16	8.5	14	15	19	6.9	9	12	19	9.5	12	20	21	38
Mercury (aqua regia extractable)	mg/kg	0.3	3600	16	<0.3	<0.3	0			<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	-	<0.3	<0.3	<0.3	-	<0.3	<0.3	<0.3	<0.3	-	-	<0.3	<0.3	<0.3	-
Nickel (aqua regia extractable)	mg/kg	1	1770	21	14	48	0			14	28	25	32	20	32	29	28	16	38	20	17	16	21	17	17	23	48	16	14	14
Selenium (aqua regia extractable)	mg/kg	1	13000	16	<1	2.2	0			<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<1	<1	<1	<1	-	-	2.2	<1	1.3	-
Vanadium (aqua regia extractable)	mg/kg	1	7490	16	19	50	0			28	19	50	47	23	35	-	38	32	34	-	42	30	34	42	-	-	38	26	32	-
Zinc (aqua regia extractable)	mg/kg	1	1100000	21	41	110	0			57	64	94	92	41	110	93	83	70	100	88	78	71	76	64	64	81	95	65	55	49
Monoaromatics			No SSV	0	-	-	0																							
Benzene	mg/kg	0.001	12.5	7	<0.001	<0.001	0			-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
Toluene	mg/kg	0.001	27900	7	<0.001	<0.001	0			-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
Ethylbenzene	mg/kg	0.001	7660	7	<0.001	<0.001	0			-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
p & m-xylene	mg/kg	0.001	No SSV	7	<0.001	<0.001	0			-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
o-xylene	mg/kg	0.001	3030	7	<0.001	<0.001	0			-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	3140	7	<0.001	<0.001	0			-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
Petroleum Hydrocarbons			No SSV	0	-	-	0																							
TPH C10 - C40	mg/kg	10	No SSV	5	<10	18	0			-	-	-	-	-	-	<10	-	-	-	18	-	-	-	-	<10	<10	-	-	-	<10
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	4490	7	<0.001	<0.001	0			-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	10400	7	<0.001	<0.001	0			-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	1370	7	<0.001	<0.001	0			-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	7900	7	<1	<1	0			-	-	-	<1	-	-	<1	<1	<1	<1	-	-	-	-	-	-	-	<1	<1	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	34000	7	<2	<2	0			-	-	-	<2	-	-	<2	<2	<2	<2	-	-	-	-	-	-	-	<2	<2	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	3620000	7	<8	<8	0			-	-	-	<8	-	-	<8	<8	<8	<8	-	-	-	-	-	-	-	<8	<8	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	3620000	7	<8	<8	0			-	-	-	<8	-	-	<8	<8	<8	<8	-	-	-	-	-	-	-	<8	<8	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	No SSV	7	<10	<10	0			-	-	-	<10	-	-	<10	<10	<10	<10	-	-	-	-	-	-	-	<10	<10	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	12.5	7	<0.001	<0.001	0			-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	27900	7	<0.001	<0.001	0			-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	2210	7	<0.001	<0.001	0			-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	12300	7	<1	<1	0			-	-	-	<1	-	-	<1	<1	<1	<1	-	-	-	-	-	-	-	<1	<1	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	41300	7	<2	<2	0			-	-	-	<2	-	-	<2	<2	<2	<2	-	-	-	-	-	-	-	<2	<2	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	28400	7	<10	<10	0			-	-	-	<10	-	-	<10	<10	<10	<10	-	-	-	-	-	-	-	<10	<10	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	28400	7	<10	<10	0			-	-	-	<10	-	-	<10	<10	<10	<10	-	-	-	-	-	-	-	<10	<10	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	No SSV	7	<10	<10	0			-	-	-	<10	-	-	<10	<10	<10	<10	-	-	-	-	-	-	-	<10	<10	-	-
PCBs			0.184	0	-	-	0																							
PCB Congener 077	mg/kg	0.001	No SSV	3	<0.001	<0.001	0			-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-
PCB Congener 081	mg/kg	0.001	No SSV	3	<0.001	<0.001	0			-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-
PCB Congener 105	mg/kg	0.001	No SSV	3	<0.001	<0.001	0			-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-
PCB Congener 114	mg/kg	0.001	No SSV	3	<0.001	<0.001	0			-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	No SSV	3	<0.001	<0.001	0			-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-
PCB Congener 123	mg/kg	0.001	No SSV	3	<0.001	<0.001	0			-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-
PCB Congener 126	mg/kg	0.001	No SSV	3	<0.001	<0.001	0			-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-
PCB Congener 156	mg/kg	0.001	No SSV	3	<0.001	<0.001	0			-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-
PCB Congener 157	mg/kg	0.001	No SSV	3	<0.001	<0.001	0			-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-
PCB Congener 167	mg/kg	0.001	No SSV	3	<0.001	<0.001	0			-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-
PCB Congener 169	mg/kg	0.001	No SSV	3	<0.001	<0.001	0			-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-
Total PCBs	mg/kg	0.012	0.184	3	<0.012	<0.012	0			-	-	-	-	-	-	<0.012	-	<0.012	-	<0.012	-	-	-	-	-	-	-	-	-	-
Pesticide and Herbicide Screen																													
Pesticides/Herbicides Screen in	P/A	N/A								-	-	-	-	-	-	Absent	-	Absent	-	Absent	-	-	-	-	-	-	-	-	-	-

ATKINS

Assessment Criteria : *Public Open Space (Parks) - 1% SOM Sand*

☐ **Use MRL Values?**

Constituent	Unit	Limit of Detection	Generic Assessment Criteria	Number of Samples	Minimum Value	Maximum Value	Number of Exceedances	Locations of Exceedances	Location	Sample ID	Depth	Date	Strata	Zone	WS2A101_C	WS2A101_C	CP2AJLFB_2U	CP2ATFB_2U (A)	CP2ATFB_2U (A)	TP2ABR_2D	WS2A102_C	WS2A104_U	WS2A113_C	WS2A122_C	SHDP2A110_C	TP2AMGOB_1D	TP2AMGOB_1D	TP2AMGOB_2U	TP2AMGOB_2U	CP2ALOB_1D	CP2AMFOB_2U	TP2ALOB_1U	WS2AMFOB_1U	WS2AMFOB_1U	CP2AMFOB_1D
										Sample ID					WS2A101_C	WS2A101_C	CP2AJLFB_2	P2ATFB_2U	P2ATFB_2U (	TP2ABR_2D	WS2A102_C	WS2A104_U	WS2A113_C	WS2A122_C	HDP2A110_	2AMGOB_1	2AMGOB_1	2AMGOB_2	2AMGOB_2	P2ALOB_1D	T2AMFOB_2	P2ALOB_1U	S2AMFOB_1U	S2AMFOB_1U	P2AMFOB_1D
										Depth					0.5m	1m	0.2m	0.2m	1m	1m	0.5m	0.3m	0.5m	1m	0.3m	0.2m	1m	0.2m	1m	0.2m	0.5m	0.3m	0.2m	1m	0.3m
										Date					31/07/2017	31/07/2017	16/11/2017	09/11/2017	09/11/2017	06/12/2017	07/08/2017	02/11/2017	02/08/2017	03/08/2017	11/01/2018	20/12/2017	20/12/2017	20/12/2017	20/12/2017	08/06/2018	26/06/2018	05/06/2018	30/05/2018	30/05/2018	31/07/2018
										Strata					TBL	GDC	TPS	TPS	OXC-SBY(W)	OXC-PET(W)	TBL	SGF	TBL	SGF		TPS	OXC-PET(W	TPS	OXC-PET(W	TPS	OXC-PET(W	ALV	OXC-PET(W	OXC-PET(W	MDG
										Zone																									
Stone Content	%	0.1	No SSV	21	<0.1	<0.1	0								<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	<0.1	<0.1
Moisture Content	%	N/A	No SSV	21	8.5	26	0								12	19	20	26	15	18	18	16	8.5	22	8.6	18	25	18	20	22	15	13	12	18	9.5
Total mass of sample received	kg	0.001	No SSV	21	0.57	2	0								2	2	1.5	1.6	1.7	1.3	2	2	2	2	0.57	1.3	1.4	1.4	1.3	1.9	1.6	2	2	2	2
Asbestos in Soil	Type	N/A	No SSV	16	-	-	0								Not-detected	Not-detected	Not-detected	Not-detected	-	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	-	-	-	-	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
General Inorganics			No SSV	0	-	-	0																												
pH - Automated	pH Units	N/A	No SSV	21	5	8.6	0								8.2	7.7	8	7.5	7.7	7	8	8	8.5	7.6	8.6	7.8	5	6.2	5.2	7.2	7.5	8.1	7.9	5.6	7.8
Total Cyanide	mg/kg	1	No SSV	16	<1	<1	0								<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<1	<1	<1	<1	-	-	<1	<1	<1	-
Free Cyanide	mg/kg	1	34	16	<1	<1	0								<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<1	<1	<1	<1	-	-	<1	<1	<1	-
Total Sulphate as SO4	mg/kg	50	No SSV	16	350	120000	0								570	57000	1300	1300	120000	1300	-	1100	440	23000	-	920	850	350	1200	-	-	450	590	3200	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	No SSV	5	0.014	0.22	0								-	-	-	-	-	-	0.22	-	-	-	0.053	-	-	-	-	0.03	0.015	-	-	-	0.014
Sulphide	mg/kg	1	No SSV	16	<1	130	0								130	5.2	<1	<1	<1	<1	-	<1	1.3	2.5	-	<1	<1	<1	<1	-	-	<1	<1	<1	-
Ammonium as NH4	mg/kg	0.5	No SSV	16	<0.5	14	0								<0.5	14	<0.5	<0.5	<0.5	<0.5	-	1.3	<0.5	<0.5	-	<0.5	<0.5	<0.5	3	-	-	<0.5	<0.5	<0.5	-
Fraction Organic Carbon (FOC)	N/A	0.001	No SSV	16	<0.001	0.026	0								0.0023	0.017	0.026	0.021	0.0038	0.0038	-	0.0082	<0.001	0.022	-	0.023	0.012	0.0094	0.0045	-	-	0.007	0.015	0.0084	-
Loss on Ignition @ 450oC	%	0.2	No SSV	11	0.9	9.4	0								1.8	8	9.4	7.8	-	3.4	-	3.5	0.9	4.8	-	-	-	-	-	-	-	3	4.1	3.2	-
Total Phenols			No SSV	0	-	-	0																												
Phenol	mg/kg	1	685	11	<1	<1	0								<1	<1	<1	<1	-	<1	-	<1	<1	<1	-	-	-	-	-	-	-	<1	<1	<1	-
Speciated PAHs			No SSV	0	-	-	0																												
Naphthalene	mg/kg	0.05	623	11	<0.05	<0.05	0								<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Acenaphthylene	mg/kg	0.05	No SSV	11	<0.05	<0.05	0								<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Acenaphthene	mg/kg	0.05	28600	11	<0.05	<0.05	0								<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Fluorene	mg/kg	0.05	19600	11	<0.05	<0.05	0								<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Phenanthrene	mg/kg	0.05	No SSV	11	<0.05	0.39	0								<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	0.39	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Anthracene	mg/kg	0.05	150000	11	<0.05	<0.05	0								<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Fluoranthene	mg/kg	0.05	20200	11	<0.05	0.36	0								<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	0.36	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Pyrene	mg/kg	0.05	15100	11	<0.05	0.3	0								<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	0.3	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Benzo(a)anthracene	mg/kg	0.05	BaP Surrogate	11	<0.05	0.14	0								<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	0.14	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Chrysene	mg/kg	0.05	BaP Surrogate	11	<0.05	0.18	0								<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	0.18	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Benzo(b)fluoranthene	mg/kg	0.05	BaP Surrogate	11	<0.05	<0.05	0								<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Benzo(k)fluoranthene	mg/kg	0.05	BaP Surrogate	11	<0.05	<0.05	0								<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Benzo(a)pyrene	mg/kg	0.05	21.4	11	<0.05	<0.05	0								<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	BaP Surrogate	11	<0.05	<0.05	0								<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Dibenz(a,h)anthracene	mg/kg	0.05	BaP Surrogate	11	<0.05	<0.05	0								<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Benzo(ghi)perylene	mg/kg	0.05	BaP Surrogate	11	<0.05	<0.05	0								<0.05	<0.05	<0.05	<0.05	-	<0.05	-	<0.05	<0.05	<0.05	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	-
Total PAH			No SSV	0	-	-	0																												
Speciated Total EPA-16 PAHs	mg/kg	0.8	No SSV	11	<0.8	1.37	0								<0.8	<0.8	<0.8	<0.8	-	<0.8	-	<0.8	<0.8	1.37	-	-	-	-	-	-	-	<0.8	<0.8	<0.8	-
Heavy Metals / Metalloids			No SSV	0	-	-	0																												
Arsenic (aqua regia extractable)	mg/kg	1	168	21	4.8	21	0								11	4.8	12	13	5.6	7.6	11	11	13	7.6	21	11	6.3	6.5	5.8	15	12	11	7.1	7.8	9.7
Boron (water soluble)	mg/kg	0.2	No SSV	16	<0.2	2.6	0								<0.2	1.9	2.5	1.8	2.6	2.3	-	1.9	0.3	2.5	-	2.4	1.8	1.9	1.7	-	-	1.6	1.9	2.3	-
Cadmium (aqua regia extractable)	mg/kg	0.2	882	16	<0.2	0.4	0								<0.2	0.3	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2	0.4	-	<0.2	<0.2	<0.2	<0.2	-	-	<0.2	<0.2	<0.2	-
Chromium (hexavalent)	mg/kg	4	251	16	<4	<4	0								<4	<4	<4	<4	<4	<4	-	<4	<4	<4	-	<4	<4	<4	<4	-	-	<4	<4	<4	-
Chromium (aqua regia extractable)	mg/kg	1	83500	21	13	58	0								16	33	41	50	33	44	29	39	17	49	13	50	58	34	39	27	48	33	22	39	23
Copper (aqua regia extractable)	mg/kg	1	45200	21	13	71	0								18	23	28	28	13	21	71	18	14	33	32	26	44	17	22	25	26	21	15	27	19
Lead (aqua regia extractable)	mg/kg	1	1340	21	6.9	38	0								9.3	7.6	34	36	7.3	12	35	16	8.5	14	15	19	6.9	9	12	19	9.5	12	20	21	38
Mercury (aqua regia extractable)	mg/kg	0.3	1110	16	<0.3	<0.3	0								<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	-	<0.3	<0.3	<0.3	-	<0.3	<0.3	<0.3	<0.3	-	-	<0.3	<0.3	<0.3	-
Nickel (aqua regia extractable)	mg/kg	1	804	21	14	48	0								14	28	25	32	20	32	29	28	16	38	20	17	16	21	17	17	23	48	16	14	14
Selenium (aqua regia extractable)	mg/kg	1	2550	16	<1	2.2	0								<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<1	<1	<1	<1	-	-	2.2	<1	1.3	-
Vanadium (aqua regia extractable)	mg/kg	1	1550	16	19	50	0								28	19	50	47	23	35	-	38	32	34	-	42	30	34	42	-	-	38	26	32	-
Zinc (aqua regia extractable)	mg/kg	1	201000	21	41	110	0								57	64	94	92	41	110	93	83	70	100	88	78	71	76	64	64	81	95	65	55	49
Monoaromatics			No SSV	0	-	-	0																												
Benzene	mg/kg	0.001	139	7	<0.001	<0.001	0								-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
Toluene	mg/kg	0.001	69900	7	<0.001	<0.001	0								-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
Ethylbenzene	mg/kg	0.001	21400	7	<0.001	<0.001	0								-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
p & m-xylene	mg/kg	0.001	No SSV	7	<0.001	<0.001	0								-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
o-xylene	mg/kg	0.001	9560	7	<0.001	<0.001	0								-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	70800	7	<0.001	<0.001	0								-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
Petroleum Hydrocarbons			No SSV	0	-	-	0																												
TPH C10 - C40	mg/kg	10	No SSV	5	<10	18	0								-	-	-	-	-	-	<10	-	-	-	18	-	-	-	-	<10	<10	-	-	-	<10
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	109000	7	<0.001	<0.001	0								-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	163000	7	<0.001	<0.001	0								-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	9720	7	<0.001	<0.001	0								-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	17700	7	<1	<1	0								-	-	-	<1	-	-	<1	<1	<1	<1	-	-	-	-	-	-	-	<1	<1	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	23800	7	<2	<2	0								-	-	-	<2	-	-	<2	<2	<2	<2	-	-	-	-	-	-	-	<2	<2	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	864000	7	<8	<8	0								-	-	-	<8	-	-	<8	<8	<8	<8	-	-	-	-	-	-	-	<8	<8	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	864000	7	<8	<8	0								-	-	-	<8	-	-	<8	<8	<8	<8	-	-	-	-	-	-	-	<8	<8	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	No SSV	7	<10	<10	0								-	-	-	<10	-	-	<10	<10	<10	<10	-	-	-	-	-	-	-	<10	<10	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	139	7	<0.001	<0.001	0								-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	69900	7	<0.001	<0.001	0								-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	5140	7	<0.001	<0.001	0								-	-	-	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	-	-	-	-	-	-	-	<0.001	<0.001	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	8260	7	<1	<1	0								-	-	-	<1	-	-	<1	<1	<1	<1	-	-	-	-	-	-	-	<1	<1	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	10600	7	<2	<2	0								-	-	-	<2	-	-	<2	<2	<2	<2	-	-	-	-	-	-	-	<2	<2	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	7870	7	<10	<10	0								-	-	-	<10	-	-	<10	<10	<10	<10	-	-	-	-	-	-	-	<10	<10	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	7870	7	<10	<10	0								-	-	-	<10	-	-	<10	<10	<10	<10	-	-	-	-	-	-	-	<10	<10	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	No SSV	7	<10	<10	0								-	-	-	<10	-	-	<10	<10	<10	<10	-	-	-	-	-	-	-	<10	<10	-	-
PCBs			0.049	0	-	-	0																												
PCB Congener 077	mg/kg	0.001	No SSV	3	<0.001	<0.001	0								-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-	-
PCB Congener 081	mg/kg	0.001	No SSV	3	<0.001	<0.001	0								-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-	-
PCB Congener 105	mg/kg	0.001	No SSV	3	<0.001	<0.001	0								-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-	-
PCB Congener 114	mg/kg	0.001	No SSV	3	<0.001	<0.001	0								-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-	-
PCB Congener 118	mg/kg	0.001	No SSV	3	<0.001	<0.001	0								-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-	-
PCB Congener 123	mg/kg	0.001	No SSV	3	<0.001	<0.001	0								-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-	-
PCB Congener 126	mg/kg	0.001	No SSV	3	<0.001	<0.001	0								-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-	-
PCB Congener 156	mg/kg	0.001	No SSV	3	<0.001	<0.001	0								-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-	-
PCB Congener 157	mg/kg	0.001	No SSV	3	<0.001	<0.001	0								-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-	-
PCB Congener 167	mg/kg	0.001	No SSV	3	<0.001	<0.001	0								-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-	-
PCB Congener 169	mg/kg	0.001	No SSV	3	<0.001	<0.001	0								-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-	-
PCB Congener 189	mg/kg	0.001	No SSV	3	<0.001	<0.001	0								-	-	-	-	-	-	<0.001	-	<0.001	-	<0.001	-	-	-	-	-	-	-	-	-	-	-
Total PCBs	mg/kg	0.012	0.049	3	<0.012	<0.012	0								-	-	-	-	-	-	<0.012	-	<0.012	-	<0.012	-	-	-	-	-	-	-	-	-	-	-
Pesticide and Herbicide Screen																																			
Pesticides/Herbicides Screen II	P/A	N/A													-	-	-	-	-	-	Absent	-	Absent	-	Absent	-	-	-	-	-	-	-	-	-	-	-

Appendix E – Leachate Screening Results

Assessment Criteria :																				
CaCO (mg/l):	0.00			pH	0.00															
Calcium (mg/l):	0.00			DOC (mg/l)	0.00			Catchment area:	Drinking Water Standard											
										Location										
										Sample ID		CP2ATFB_2U (A)	WS2A102_C	WS2A104_U	WS2A113_C	WS2A122_C	WS2ALOB_1D	WS2ALOB_1D	CP2AMG-D	CP2AMG-U
										Depth		0.2m	0.5m	0.3m	0.5m	1m	0.3m	1m	17m	2m
										Date		09/11/2017	07/08/2017	02/11/2017	02/08/2017	03/08/2017	25/05/2018	25/05/2018	42283	42276
Constituents	Unit	Limit of Detection	Generic Assessment Criteria	Number of Samples	Minimum Value	Maximum Value	Number of Exceedences	Locations of Exceedences	Strata	Zone										
Sulphate as SO4	mg/l	0.2	250	9	8.7	1500	1	WS2A122_C, 1m				24	170	12	8.7	1500	16	80		
Dissolved Organic Carbon	mg/l	0.1	No WSV	9	4.75	16.9	0					15.3	7.5	10.2	4.75	16.9	6.39	4.98		
Sulphide	mg/l	0.01	No WSV	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Cyanide (total)	mg/l	0.01	0.05	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Cyanide (free)	mg/l	0.01	See Cyanide (total)	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Nitrate (as NO3)	mg/l	0.01	50	9	0.14	2.4	0					2.4	0.14	0.39	0.32	0.18	1.6	0.57		
Ammonical Nitrogen	mg/l	0.01	No WSV	9	0.01	0.06	0					0.01	0.025	<0.01	<0.01	0.045	0.017	0.06		
Ammonium as NH4	mg/l	0.01	0.5	9	<0.01	0.077	0					0.013	0.032	<0.01	<0.01	0.058	0.022	0.077		
Arsenic	mg/l	0.01	0.01	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Cadmium	mg/l	0.0005	0.005	9	<0.0005	<0.0005	0					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		
Calcium	mg/l	0.012	N/A	9	13	640	0					25	74	24	20	640	13	28		
Chromium	mg/l	0.001	0.05	9	<0.001	0.0021	0					0.0015	<0.001	<0.001	0.0013	<0.001	0.0021	<0.001		
Lead	mg/l	0.005	0.01	9	<0.005	0.0095	0					0.0095	0.0068	0.0058	<0.005	<0.005	0.0087	<0.005		
Mercury	mg/l	0.0015	0.001	9	<0.0015	<0.0015	0					<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015		
Selenium	mg/l	0.01	0.01	9	<0.01	0.015	1	WS2A122_C, 1m				<0.01	<0.01	<0.01	<0.01	0.015	<0.01	<0.01		
Copper	mg/l	0.001	2	9	0.0044	0.034	0					0.033	0.012	0.016	0.0044	0.034	0.02	0.01		
Nickel	mg/l	0.001	0.02	9	<0.001	0.0079	0					0.0055	0.0011	0.0016	<0.001	0.0079	0.0025	<0.001		
Zinc	mg/l	0.001	3	9	0.0032	0.019	0					0.011	0.01	0.0067	0.0032	0.019	0.0093	0.013		
Hexavalent Chromium	mg/l	0.01	See Total Chromium	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Vanadium	mg/l	0.01	N/A	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Boron	mg/l	0.01	1	9	<0.01	0.42	0					0.038	0.03	0.078	<0.01	0.11	0.069	0.42		
Iron	mg/l	0.008	0.2	9	0.013	2.5	3	CP2ATFB_2U (A), 0.2m; WS2A113_C, 0.5m; WS2ALOB_1D, 0.3m				2.5	0.013	0.046	0.52	0.027	1.2	0.027		
Manganese	mg/l	0.001	0.05	9	0.0023	0.011	0					0.0046	0.0067	0.0023	0.0049	0.011	0.0053	0.0049		
pH	pH units	0.01	6.5-9.5	9	7.3	7.9	0					7.6	7.9	7.9	7.5	7.7	7.3	7.8		
Metals																				
Magnesium Aqueous Extract	mg/l	10	No WSV	9	<10	<10	0												<10	<10
Inorganics																				
pH			6.5-9.5	9	6.2	9.1	1	CP2AMG-U, 2m											9.1	6.2
Chloride Aqueous Extract	mg/l	1	No WSV	9	7.3	10	0												10	7.3
Nitrate Aqueous Extract as NO3	mg/l	1	No WSV	9	<1	2.7	0												<1	2.7
Sulphate Aqueous Extract as SO4	mg/l	10	No WSV	9	43	110	0												43	110
Total Sulphur as S	%	0.01	No WSV	9	0.28	1.9	0												1.9	0.28
Total Sulphate as SO4	%	0.01	No WSV	9	0.24	1.7	0												0.24	1.7

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Assessment Criteria :																				
			Freshwater EQS																	
CaCO (mg/l):	0.00			pH	7.50															
Calcium (mg/l):	54.75			DOC (mg/l)	38.22		Catchment area:	Thames												
										Location										
										Sample ID		CP2ATFB_2U (A)	WS2A102_C	WS2A104_U	WS2A113_C	WS2A122_C	WS2ALOB_1D	WS2ALOB_1D	CP2AMG-D	CP2AMG-U
										Depth		0.2m	0.5m	0.3m	0.5m	1m	0.3m	1m	17m	2m
										Date		09/11/2017	07/08/2017	02/11/2017	02/08/2017	03/08/2017	25/05/2018	25/05/2018	42283	42276
Constituents	Unit	Limit of Detection	Generic Assessment Criteria	Number of Samples	Minimum Value	Maximum Value	Number of Exceedences	Locations of Exceedences	Strata	Zone										
Sulphate as SO4	mg/l	0.2	400	9	8.7	1500	1	WS2A122_C, 1m				24	170	12	8.7	1500	16	80		
Dissolved Organic Carbon	mg/l	100000	No WSV	9	4750000	16900000	0					15300000	7500000	10200000	4750000	16900000	6390000	4980000		
Dissolved Organic Carbon	mg/l	0.1	No WSV	9	4.75	16.9	0					15.3	7.5	10.2	4.75	16.9	6.39	4.98		
Sulphide	mg/l	0.01	No WSV	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Cyanide (total)	mg/l	0.01	0.001	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Cyanide (free)	mg/l	0.01	0.001	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Nitrate (as NO3)	mg/l	0.01	N/A	9	0.14	2.4	0					2.4	0.14	0.39	0.32	0.18	1.6	0.57		
Ammonical Nitrogen	mg/l	0.01	No WSV	9	0.01	0.06	0					0.01	0.025	<0.01	<0.01	0.045	0.017	0.06		
Ammonium as NH4	mg/l	0.01	Not appropriate, see Ammonia	9	<0.01	0.077	0					0.013	0.032	<0.01	<0.01	0.058	0.022	0.077		
Ammonia	mg/l	0.000441	0.2	9	<0.00044	0.003396	0					0.000573351	0.001411324	<0.00044	<0.00044	0.002558026	0.000970286	0.003395999		
Arsenic	mg/l	0.01	0.05	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Cadmium	mg/l	0.0005	0.00008 -> CaCO3 0-50mg/l 0.00009 -> CaCO3 50-100mg/l 0.00015 -> CaCO3 100-200mg/l 0.00025 -> CaCO3 200+mg/l	9	<0.0005	<0.0005	0					<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		
Calcium	mg/l	0.012	N/A	9	13	640	0					25	74	24	20	640	13	28		
Chromium	mg/l	0.001	0.0034	9	<0.001	0.0021	0					0.0015	<0.001	<0.001	0.0013	<0.001	0.0021	<0.001		
Lead	mg/l	0.005	0.0012	9	<0.005	0.0095	4	CP2ATFB_2U (A), 0.2m; WS2A102_C, 0.5m; WS2A104_U, 0.3m; WS2ALOB_1D, 0.3m				0.0095	0.0068	0.0058	<0.005	<0.005	0.0087	<0.005		
Mercury	mg/l	0.0015	0.00007	9	<0.0015	<0.0015	0					<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015		
Selenium	mg/l	0.01	N/A	9	<0.01	0.015	0					<0.01	<0.01	<0.01	<0.01	0.015	<0.01	<0.01		
Copper	mg/l	0.001	0.001	9	0.0044	0.034	7	CP2ATFB_2U (A), 0.2m; WS2A102_C, 0.5m; WS2A104_U, 0.3m; WS2A113_C, 0.5m; WS2A122_C, 1m; WS2ALOB_1D, 0.3m; WS2ALOB_1D, 1m				0.033	0.012	0.016	0.0044	0.034	0.02	0.01		
Nickel	mg/l	0.001	0.004	9	<0.001	0.0079	2	CP2ATFB_2U (A), 0.2m; WS2A122_C, 1m				0.0055	0.0011	0.0016	<0.001	0.0079	0.0025	<0.001		
Zinc	mg/l	0.001	0.0109	9	0.0032	0.019	3	CP2ATFB_2U (A), 0.2m; WS2A122_C, 1m; WS2ALOB_1D, 1m				0.011	0.01	0.0067	0.0032	0.019	0.0093	0.013		
Hexavalent Chromium	mg/l	0.01	0.0034	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Vanadium	mg/l	0.01	0.02 -> CaCO3 0-200mg/l 0.06 -> CaCO3 200+mg/l	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		
Boron	mg/l	0.01	2	9	<0.01	0.42	0					0.038	0.03	0.078	<0.01	0.11	0.069	0.42		
Iron	mg/l	0.008	1	9	0.013	2.5	2	CP2ATFB_2U (A), 0.2m; WS2ALOB_1D, 0.3m				2.5	0.013	0.046	0.52	0.027	1.2	0.027		
Manganese	mg/l	0.001	0.123	9	0.0023	0.011	0					0.0046	0.0067	0.0023	0.0049	0.011	0.0053	0.0049		
pH	pH units	0.01	6-9	9	7.3	7.9	0					7.6	7.9	7.9	7.5	7.7	7.3	7.8		
Metals																				
Magnesium Aqueous Extract	mg/l	10	No WSV	9	<10	<10	0												<10	<10
Inorganics																				
pH			6-9	9	6.2	9.1	1	CP2AMG-D, 17m											9.1	6.2
Chloride Aqueous Extract	mg/l	1	No WSV	9	7.3	10	0												10	7.3
Nitrate Aqueous Extract as NO3	mg/l	1	No WSV	9	<1	2.7	0												<1	2.7
Sulphate Aqueous Extract as SO4	mg/l	10	No WSV	9	43	110	0												43	110
Total Sulphur as S	%	0.01	No WSV	9	0.28	1.9	0												1.9	0.28
Total Sulphate as SO4	%	0.01	No WSV	9	0.24	1.7	0												0.24	1.7

Appendix F - Groundwater Screening Results

ATKINS

Assessment Criteria :	Drinking Water Standard				
CaCO (mg/l):	5.00	pH	5.00		
Calcium (mg/l):	5.00	DOC (mg/l)	5.00	Catchment area:	Freshwater not listed

Constituents	Unit	Limit of Detection	Generic Assessment Criteria	Number of Samples	Minimum Value	Maximum Value	Number of Exceedences	Locations of Exceedences		Location	WS2A121_U	WS2A123_D	WS2A124_U	WS2ALOB_1D	CP2AMFOB_2U	CP2ALLCDE	CP2APOOB_1D	WS2A14D	WS2A100_U	WS2A103_U	WS2A106_D	WS2A109_U	CP2AMFOB_2U	WS2A100_U	CP2AMFOB_2U	CP2APOOB_1D	WS2ALOB_1D	WS2A121_U	WS2A123_D	WS2A100_U	WS2A103_U	WS2A106_D	WS2A14D	WS2A106_D	WS2A103_U	WS2A100_U	WS2ALOB_1D	CP2APOOB_1D	WS2A12U	WS2A14D	CP2ALLCDE	WS2A121_U	WS2A123_D	WS2A124_U	CP2AMFOB_2U
										Sample ID	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
										Depth	1.94m	2.34m	2.30m	0.92m	1.50m	4.24m	5.23m	2.58m	5.66m	1.90m	1.00m	4.47m	3.40m	4.60m	1.81m	5.40m	0.99m	2.00m	3.30m	4.50m	1.80m	1.00m	2.57m	1.01m	1.86m	4.64m	0.89m	5.31m	2.03m	2.67m	3.99m	1.76m	2.25m	2.12m	1.51m
										Date	24/09/2018	24/09/2018	24/09/2018	24/09/2018	24/09/2018	24/09/2018	25/09/2018	26/09/2018	27/09/2018	27/09/2018	27/09/2018	28/09/2018	01/08/2018	01/08/2018	03/09/2018	03/09/2018	03/09/2018	03/09/2018	03/09/2018	04/09/2018	04/09/2018	06/09/2018	06/09/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	23/10/2018	23/10/2018	23/10/2018	23/10/2018
									Strata		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
										Zone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH	pH Units	N/A	6.5-9.5	35	5.6	8.3	6	WS2A14D, -, 2.58m; WS2A106_D, -, 1.00m; WS2A106_D, -, 1.00m; WS2A14D, -, 2.57m; WS2A106_D, -, 1.01m; WS2A14D, -, 2.67m			7.3	7.4	7.2	7.4	8.3	6.8	6.9	5.7	6.8	6.8	5.6	7	7.9	6.8	8.2	7.1	7.9	7.5	7.4	6.8	7	5.6	5.7	5.8	6.8	6.9	7.4	6.9	6.8	6	6.8	7.3	7.4	7.3	8.3
Total Cyanide	mg/l	10000	0.05	35	<<0.01	<10000	0				<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<0.01	<0.01	<0.01	<0.01
Free Cyanide	mg/l	0.01	See Cyanide (total)	35	<0.01	<0.01	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	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulphate as SO4	mg/l	0.045	250	35	83	4290	26	WS2A124_U, -, 2.30m; WS2ALOB_1D, -, 0.92m; CP2ALLCDE, -, 4.24m; CP2APOOB_1D, -, 5.23m; WS2A14D, -, 2.58m; WS2A100_U, -, 5.66m; WS2A103_U, -, 1.90m; WS2A106_D, -, 1.00m; WS2A109_U, -, 4.47m; CP2AMFOB_2U, -, 3.40m; WS2A100_U, -, 4.60m; CP2APOOB_1D, -, 5.40m; WS2ALOB_1D, -, 0.99m; WS2A100_U, -, 4.50m; WS2A103_U, -, 1.80m; WS2A106_D, -, 1.00m; WS2A14D, -, 2.57m; WS2A106_D, -, 1.01m; WS2A103_U, -, 1.86m; WS2A100_U, -, 4.64m; WS2ALOB_1D, -, 0.89m; CP2APOOB_1D, -, 5.31m; WS2A12U, -, 2.03m; WS2A14D, -, 2.67m; CP2ALLCDE, -, 3.99m; WS2A124_U, -, 2.12m			113	114	284	491	159	856	1950	1960	1700	2190	2960	808	272	1780	168	2450	857	118	83	1880	1670	3390	1730	4290	2380	1940	713	2030	1470	1430	1160	150	168	409	230
Sulphide	mg/l	0.005	No WSV	35	<0.005	<0.012	0				<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.006	<0.007	<0.008	<0.009	<0.01	<0.011	<0.012	<0.005	<0.005	<0.005	<0.005
Ammoniacal Nitrogen as N	mg/l	0.015	No WSV	35	0.16	5.3	0				0.22	0.2	0.21	0.6	1	2.5	2.5	1	4.9	2.5	2.6	0.43	0.43	4.9	0.34	2.6	0.54	0.29	0.16	5.3	2.5	3.1	0.9	3.6	2.9	3.5	0.65	2.4	0.41	1.1	3.2	0.24	0.33	0.3	0.25
Ammonium as NH4	mg/l	0.015	0.5	35	0.2	6.8	25	WS2ALOB_1D, -, 0.92m; CP2AMFOB_2U, -, 1.50m; CP2ALLCDE, -, 4.24m; CP2APOOB_1D, -, 5.23m; WS2A14D, -, 2.58m; WS2A100_U, -, 5.66m; WS2A103_U, -, 1.90m; WS2A106_D, -, 1.00m; WS2A109_U, -, 4.47m; CP2AMFOB_2U, -, 3.40m; WS2A100_U, -, 4.60m; CP2APOOB_1D, -, 5.40m; WS2ALOB_1D, -, 0.99m; WS2A100_U, -, 4.50m; WS2A103_U, -, 1.80m; WS2A106_D, -, 1.00m; WS2A14D, -, 2.57m; WS2A106_D, -, 1.01m; WS2A103_U, -, 1.86m; WS2A100_U, -, 4.64m; WS2ALOB_1D, -, 0.89m; CP2APOOB_1D, -, 5.31m; WS2A12U, -, 2.03m; WS2A14D, -, 2.67m; CP2ALLCDE, -, 3.99m			0.28	0.26	0.27	0.77	1.3	3.2	3.3	1.3	6.3	3.2	3.4	0.55	0.55	6.3	0.44	3.3	0.69	0.37	0.2	6.8	3.3	3.9	1.2	4.7	3.7	4.5	0.84	3	0.53	1.4	4.1	0.31	0.42	0.38	0.32
Dissolved Organic Carbon (DOC)	mg/l	0.1	No WSV	35	3.62	933	0				8.69	6.8	5.74	9.47	3.62	81.2	68.9	16	69.8	44.1	933	3.99	4.59	77.5	15.5	77	11.4	15.2	6.05	61.9	33.7	924	18.3	643	40	66.1	9.38	47.5	10.6	24.2	79.3	6.97	6.12	5.71	8.07
Nitrate as N	mg/l	0.01	No WSV	35	0.02	4.55	0				0.02	0.05	0.04	0.02	0.05	0.18	0.7	0.17	0.6	0.39	4.44	2.06	0.05	0.07	0.3	0.57	0.16	0.15	0.18	0.23	0.21	4.04	0.11	4.55	0.48	0.64	0.51	1.19	0.45	1.05	0.66	0.06	0.1	0.54	0.82
Heavy Metals / Metalloids																																													
Arsenic (dissolved)	mg/l	0.00015	0.01	35	<0.00015	0.00873	0				0.00147	0.00113	0.00196	0.0008	0.00099	0.00182	0.00058	0.00054	0.00229	0.00047	0.00873	0.00059	0.00121	0.0025	0.00108	0.00055	0.00145	0.00232	0.0008	0.00119	0.00054	<0.00015	0.00197	0.00587	0.00071	0.00097	0.00079	0.0004	<0.00015	0.00097	0.00094	0.00111	0.00088	0.00058	0.00023
Boron (dissolved)	mg/l	0.01	No WSV	35	0.26	3.9	0				0.8	1.4	0.85	1.5	2.5	1.1	3.5	0.58	0.27	1.6	1.9	0.79	3.1	0.26	3.2	3.1	1.2	0.63	0.95	0.27	1.5	2.1	0.41	1.9	1.7	0.29	1.6	3.9	0.41	0.53	1.1	0.97	1.5	0.88	3.1
Cadmium (dissolved)	mg/l	0.00002	0.005	35	<0.00002	0.05	1	CP2APOOB_1D, -, 5.31m			<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.00011	0.00021	<0.00002	<0.00002	0.00015	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.0003	0.0001	<0.00002	<0.00002	<0.00002	0.05	<0.00002	0.00003	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Calcium (dissolved)	mg/l	0.012	No WSV	35	7.4	630	0				120	93	150	100	8.4	490	380	500	600	530	560	480	18	600	9.8	480	84	110	90	520	450	450	470	580	610	630	110	400	440	500	410	110	89	170	7.4
Chromium (hexavalent)	mg/l	0.005	No WSV	35	0.005	<0.005	0				<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	U/S	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium (dissolved)	mg/l	0.0002	0.05	35	0.0002	0.033	0				0.0002	0.0002	0.0007	<0.0002	<0.0002	0.0005	0.0002	0.0003	0.0006	0.0002	0.021	0.0003	<0.0002	0.0009	0.0003	0.0003	0.0004	0.0007	<0.0002	0.0005	<0.0002	0.033	0.0007	0.023	0.0002	0.0007	<0.0002	0.0002	0.0002	0.0006	0.0004	0.0003	<0.0002	0.0005	0.0003
Copper (dissolved)	mg/l	0.0005	2	35	<0.0005	0.032	0				0.0056	0.0036	0.0076	0.003	0.0013	0.0023	0.0096	0.0059	0.0033	0.004	0.032	0.0037	0.0009	0.0033	0.0012	0.0054	0.0073	0.0015	0.0043	0.0017	0.0021	<0.0005	0.0047	0.0087	<0.0005	0.0009	<0.0005	0.002	0.0017	0.0009	0.0028	<0.0005	0.0012	0.001	0.0013
Iron (dissolved)	mg/l	0.004	0.2	35	0.004	430	15	WS2A14D, -, 2.58m; WS2A103_U, -, 1.90m; WS2A106_D, -, 1.00m; WS2A109_U, -, 4.47m; WS2A100_U, -, 4.60m; WS2A121_U, -, 2.00m; WS2A106_D, -, 1.00m; WS2A14D, -, 2.57m; WS2A106_D, -, 1.01m; WS2A103_U, -, 1.86m; WS2A100_U, -, 4.64m; WS2A12U, -, 2.03m; WS2A14D, -, 2.67m; CP2ALLCDE, -, 3.99m; WS2A124_U, -, 2.12m			0.035	0.007	<0.004	0.01	0.01	0.065	0.008	2.6	0.082	0.26	330	0.26	<0.004	0.31	0.004	0.006	0.063	0.31	0.015	0.073	0.035	330	0.51	430	11	11	0.021	0.12	2.5	0.92	0.7	0.014	0.009	0.25	0.016
Lead (dissolved)	mg/l	0.0002	0.01	35	0.0002	0.01	0				<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	<0.0002	<0.0002	0.0037	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.01	0.0014	0.0015	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Manganese (dissolved)	mg/l	0.00005	0.05	35	0.0046	3.6	31	WS2A121_U, -, 1.94m; WS2A123_D, -, 2.34m; WS2A124_U, -, 2.30m; WS2ALOB_1D, -, 0.92m; CP2ALLCDE, -, 4.24m; CP2APOOB_1D, -, 5.23m; WS2A14D, -, 2.58m; WS2A100_U, -, 5.66m; WS2A103_U, -, 1.90m; WS2A106_D, -, 1.00m; WS2A109_U, -, 4.47m; WS2A100_U, -, 4.60m; CP2APOOB_1D, -, 5.40m; WS2ALOB_1D, -, 0.99m; WS2A121_U, -, 2.00m; WS2A123_D, -, 3.30m; WS2A100_U, -, 4.50m; WS2A103_U, -, 1.80m; WS2A106_D, -, 1.00m; WS2A14D, -, 2.57m; WS2A106_D, -, 1.01m; WS2A103_U, -, 1.86m; WS2A100_U, -, 4.64m; WS2ALOB_1D, -, 0.89m; CP2APOOB_1D, -, 5.31m; WS2A12U, -, 2.03m; WS2A14D, -, 2.67m; CP2ALLCDE, -, 3.99m; WS2A121_U, -, 1.76m; WS2A123_D, -, 2.25m; WS2A124_U, -, 2.12m			0.88	1.1	0.61	0.84	0.0077	3.3	0.98	0.2	0.93	0.65	1.3	1.6	0.005	1.6	0.0046	1.3	0.75	1.6	1.2	0.86	0.49	1.3	0.19	1.1	0.7	0.73	0.8	0.48	3.6	0.18	2.9	0.62	1.3	0.25	0.007
Mercury (dissolved)	mg/l	0.00005	0.001	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Nickel (dissolved)	mg/l	0.0005	0.02	35	<0.0005	0.35	10	CP2APOOB_1D, -, 5.23m; WS2A14D, -, 2.58m; WS2A100_U, -, 5.66m; WS2A106_D, -, 1.00m; WS2A100_U, -, 4.60m; WS2A100_U, -, 4.50m; WS2A106_D, -, 1.00m; WS2A14D, -, 2.57m; WS2A106_D, -, 1.01m; WS2A14D, -, 2.67m			0.013	0.008	0.0071	0.0038	0.0013	0.004	0.034	0.035	0.045	0.0069	0.2	0.012	0.0017	0.043	0.0017	0.017	0.0072	0.0088	0.01	0.052	0.0055	0.35	0.024	0.24	0.0044	0.019	0.0034	0.0076	0.0059	0.044	0.0027	0.0033	0.0013	0.008	<0.0005
Selenium (dissolved)	mg/l	0.0006	0.01	35	<0.0006	0.016	2	WS2A103_U, -, 1.90m; WS2A106_D, -, 1.00m			0.0048	0.0014	0.0016	0.0023	0.0015	0.0039	0.004	0.0021	0.0031	0.012	0.016	0.0076	0.0009	0.0016	0.0014	0.0029	0.0053	0.009	0.0015	0.0034	0.0072	<0.0006	0.0019	0.0085	0.0057	0.0018	0.0011	0.0019	0.0033	0.0017	0.0025	0.001	<0.0006	0.0023	<0.0006
Vanadium (dissolved)	mg/l	0.0002	No WSV	35	0.0002	0.012	0				0.0002	<0.0002	0.0007	<0.0002	0.0007	<0.0002	0.0004	<0.0002	0.0004	<0.0002	0.012	0.0004	0.0013	0.001	0.0016	<0.0002	0.0003	0.0005	0.0004	0.0007	<0.0002	<0.0002	<0.0002	0.0071	<0.0002	0.0011	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	0.0005	0.0006
Zinc (dissolved)	mg/l	0.0005	3	35	<0.0005	0.16	0				0.012	0.011	0.015	0.0033	<0.0005	0.024	0.011	0.12	0.0078	0.0076	0.16	0.014	<0.0005	0.0063	0.0016	0.011	0.0045	0.0037	0.0046	0.0085	0.0058	0.12	0.096	0.16	0.0054	0.0017	0.0036	0.0066	0.046	0.029	0.0063	0.0018	0.0016	0.004	0.0019
Monoaromatics																																													
Benzene	mg/l	0.001	0.001	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Toluene	mg/l	0.001	0.7	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ethylbenzene	mg/l	0.001	0.3	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
p & m-xylene	mg/l	0.001	0.5	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
o-xylene	mg/l	0.001	0.5	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Petroleum Hydrocarbons																																													
TPH-CWG - Aliphatic >C5 - C6	mg/l	0.001	15	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH-CWG - Aliphatic >C6 - C8	mg/l	0.001	15	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH-CWG - Aliphatic >C8 - C10	mg/l	0.001	0.3	35	<0.001	0.077	0				<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.077	<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	<0.001	<0.001
TPH-CWG - Aliphatic >C10 - C12	mg/l	0.01	0.3	35	<0.01	<0.01	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	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aliphatic >C12 - C16	mg/l	0.01	0.3	35	<0.01	<0.01	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	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aliphatic >C16 - C21	mg/l	0.01	N/A	35	<0.01	0.02	0				<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aliphatic >C21 - C35	mg/l	0.01	N/A	35	<0.01	0.15	0				<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aliphatic (C5 - C35)	mg/l	0.01	No WSV	35	<0.01	0.17	0				<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.17	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.077	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aromatic >C5 - C7	mg/l	0.001	0.01	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH-CWG - Aromatic >C7 - C8	mg/l	0.001	0.7	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH-CWG - Aromatic >C8 - C10	mg/l	0.001	0.3	35	<0.001	0.014	0				<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.014	<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	<0.001	<0.001
TPH-CWG - Aromatic >C10 - C12	mg/l	0.01	0.09	35	<0.01	<0.01	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	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aromatic >C12 - C16	mg/l	0.01	0.09	35	<0.01	<0.01	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	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aromatic >C16 - C21	mg/l	0.01	0.09	35	<0.01	<0.01	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	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aromatic >C21 - C35	mg/l	0.01	0.09	35	<0.01	<0.01	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	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aromatic (C5 - C35)	mg/l	0.01	No WSV	35	<0.01	0.014	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	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.014	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VOCs																																													
Chloromethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chloroethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromomethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vinyl Chloride	mg/l	0.001	0.0005	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trichlorofluoromethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,2-Trichloro-1,2,2-trifluoroethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cis-1,2-dichloroethene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2,2-Dichloropropane	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trichloromethane	mg/l	0.001	See Trihalomethanes	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,1-Trichloroethane	mg/l	0.001	2	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichloroethane	mg/l	0.001	0.003	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloropropene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trans-1,2-dichloroethene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Benzene	mg/l	0.001	0.001	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tetrachloromethane	mg/l	0.001	0.003	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichloropropane	mg/l	0.001	0.04	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trichloroethene	mg/l	0.001	0.01 (sum of TCE & PCE)	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dibromomethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromodichloromethane	mg/l	0.001	See Trihalomethanes	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cis-1,3-dichloropropene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trans-1,3-dichloropropene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Toluene	mg/l	0.001	0.7	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,2-Trichloroethane	mg/l	0.001	N/A	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3-Dichloropropane	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dibromochloromethane	mg/l	0.001	See Trihalomethanes	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tetrachloroethene	mg/l	0.001	0.01 (sum of TCE & PCE)	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dibromoethane	mg/l	0.001	0.0004	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chlorobenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,1,2-Tetrachloroethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ethylbenzene	mg/l	0.001	0.3	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
p & m-Xylene	mg/l	0.001	0.5	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Styrene	mg/l	0.001	0.02	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tribromomethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
o-Xylene	mg/l	0.001	0.5	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,2,2-Tetrachloroethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Isopropylbenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromobenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Propylbenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2-Chlorotoluene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4-Chlorotoluene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3,5-Trimethylbenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
tert-Butylbenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,4-Trimethylbenzene	mg/l	0.001	No WSV	35	<0.001	0.0138	0				<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0138	<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	<0.001	<0.001
sec-Butylbenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3-Dichlorobenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
p-Isopropyltoluene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichlorobenzene	mg/l	0.001	1	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,4-Dichlorobenzene	mg/l	0.001	0.3	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Butylbenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dibromo-3-chloropropane	mg/l	0.001	0.001	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,4-Trichlorobenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Hexachlorobutadiene	mg/l	0.001	0.0006	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,3-Trichlorobenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0				<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
SVOCs																																													
Aniline	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Phenol	mg/l	0.00005	0.05	35	<0.00005	0.047	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.047	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Chlorophenol	mg/l	0.00005	0.3	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Bis(2-chloroethyl)ether	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
1,3-Dichlorobenzene	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
1,2-Dichlorobenzene	mg/l	0.00005	1	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
1,4-Dichlorobenzene	mg/l	0.00005	0.3	35	<0.00005	0.0011	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.0011	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Bis(2-chloroisopropyl)ether	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Methylphenol	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Hexachloroethane	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Nitrobenzene	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Methylphenol	mg/l	0.00005	No WSV	35	<0.00005	0.0019	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.00053	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.0019	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Isophorone	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Nitrophenol	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,4-Dimethylphenol	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Bis(2-chloroethoxy)methane	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
1,2,4-Trichlorobenzene	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Naphthalene	mg/l	0.00001	See BaP	35	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
2,4-Dichlorophenol	mg/l	0.00005	N/A	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Chloroaniline	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Hexachlorobutadiene	mg/l	0.00005	0.0006	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Chloro-3-methylphenol	mg/l	0.00005	N/A	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,4,6-Trichlorophenol	mg/l	0.00005	0.2	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,4,5-Trichlorophenol	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Methylnaphthalene	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Chloronaphthalene	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dimethylphthalate	mg/l	0.00005	N/A	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,6-Dinitrotoluene	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Acenaphthylene	mg/l	0.00001	See BaP	35	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Acenaphthene	mg/l	0.00001	See BaP	35	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
2,4-Dinitrotoluene	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dibenzofuran	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Chlorophenyl phenyl ether	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Diethyl phthalate	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Nitroaniline	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Fluorene	mg/l	0.00001	See BaP	35	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Azobenzene	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005

Assessment Criteria :	Drinking Water Standard								
CaCO (mg/l):	5.00	pH	5.00						
Calcium (mg/l):	5.00	DOC (mg/l)	5.00	Catchment area:	Freshwater not listed				

Constituents	Unit	Limit of Detection	Generic Assessment Criteria	Number of Samples	Minimum Value	Maximum Value	Number of Exceedences	Locations of Exceedences	Strata	Zone	Location	Sample ID	Depth	Date	WS2A121_U	WS2A123_D	WS2A124_U	WS2ALOB_1D	CP2AMFOB_2U	CP2ALLCDE	CP2APOOB_1D	WS2A14D	WS2A100_U	WS2A103_U	WS2A106_D	WS2A109_U	CP2AMFOB_2U	WS2A100_U	CP2AMFOB_2U	CP2APOOB_1D	WS2ALOB_1D	WS2A121_U	WS2A123_D	WS2A100_U	WS2A103_U	WS2A106_D	WS2A14D	WS2A106_D	WS2A103_U	WS2A100_U	WS2ALOB_1D	CP2APOOB_1D	WS2A12U	WS2A14D	CP2ALLCDE	WS2A121_U	WS2A123_D	WS2A124_U	CP2AMFOB_2U
															1.94m	2.34m	2.30m	0.92m	1.50m	4.24m	5.23m	2.58m	5.66m	1.90m	1.00m	4.47m	3.40m	4.60m	1.81m	5.40m	0.99m	2.00m	3.30m	4.50m	1.80m	1.00m	2.57m	1.01m	1.86m	4.64m	0.89m	5.31m	2.03m	2.67m	3.99m	1.76m	2.25m	2.12m	1.51m
															24/09/2018	24/09/2018	24/09/2018	24/09/2018	24/09/2018	24/09/2018	25/09/2018	26/09/2018	27/09/2018	27/09/2018	27/09/2018	28/09/2018	01/08/2018	01/08/2018	03/09/2018	03/09/2018	03/09/2018	03/09/2018	04/09/2018	04/09/2018	06/09/2018	06/09/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	23/10/2018	23/10/2018	23/10/2018	23/10/2018
Bromophenyl phenyl ether	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Hexachlorobenzene	mg/l	0.00005	0.00035	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Phenanthrene	mg/l	0.00001	See BaP	35	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Anthracene	mg/l	0.00001	See BaP	35	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Carbazole	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dibutyl phthalate	mg/l	0.00005	0.35	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Anthraquinone	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Fluoranthene	mg/l	0.00001	See BaP	35	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Pyrene	mg/l	0.00001	See BaP	35	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Butyl benzyl phthalate	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Benzo(a)anthracene	mg/l	0.00001	See BaP	35	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Chrysene	mg/l	0.00001	See BaP	35	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(b)fluoranthene	mg/l	0.00001	See PAH Sum of 4	35	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(k)fluoranthene	mg/l	0.00001	See PAH Sum of 4	35	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(a)pyrene	mg/l	0.00001	0.00001	35	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Indeno(1,2,3-cd)pyrene	mg/l	0.00001	No WSV	35	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Dibenz(a,h)anthracene	mg/l	0.00001	See BaP	35	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(ghi)perylene	mg/l	0.00001	See PAH Sum of 4	35	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001

Assessment Criteria :	Freshwater EQS				
CaCO (mg/l):	0.00	pH	7.50		
Calcium (mg/l):	54.75	DOC (mg/l)	38.22	Catchment area:	Thames

Constituents	Unit	Limit of Detection	Generic Assessment Criteria	Number of Samples	Minimum Value	Maximum Value	Number of Exceedences	Locations of Exceedences
pH	pH Units	N/A	6-9	35	5.6	8.3	5	WS2A14D, -, 2.58m; WS2A106_D, -, 1.00m; WS2A106_D, -, 1.00m; WS2A14D, -, 2.57m; WS2A106_D, -, 1.01m
Total Cyanide	mg/l	0.01	0.001	35	<0.01	<0.01	0	
Free Cyanide	mg/l	0.01	0.001	35	<0.01	<0.01	0	
Sulphate as SO4	mg/l	0.045	400	35	83	4290	24	WS2ALOB_1D, -, 0.92m; CP2ALLCDE, -, 4.24m; CP2APOOB_1D, -, 5.23m; WS2A14D, -, 2.58m; WS2A100_U, -, 5.66m; WS2A103_U, -, 1.90m; WS2A106_D, -, 1.00m; WS2A109_U, -, 4.47m; WS2A100_U, -, 4.60m; CP2APOOB_1D, -, 5.40m; WS2ALOB_1D, -, 0.99m; WS2A100_U, -, 4.50m; WS2A103_U, -, 1.80m; WS2A106_D, -, 1.00m; WS2A14D, -, 2.57m; WS2A106_D, -, 1.01m; WS2A103_U, -, 1.86m; WS2A100_U, -, 4.64m; WS2ALOB_1D, -, 0.89m; CP2APOOB_1D, -, 5.31m; WS2A12U, -, 2.03m; WS2A14D, -, 2.67m; CP2ALLCDE, -, 3.99m; WS2A124_U, -, 2.12m
Sulphide	mg/l	0.005	No WSV	35	<0.005	<0.012	0	
Ammoniacal Nitrogen as N	mg/l	0.015	No WSV	35	0.16	5.3	0	
Ammonium as NH4	mg/l	0.015	Not appropriate, see Ammonia	35	0.2	6.8	0	
Dissolved Organic Carbon (DOC)	mg/l	0.1	No WSV	35	3.62	933	0	
Nitrate as N	mg/l	0.01	No WSV	35	0.02	4.55	0	
Heavy Metals / Metalloids								
Arsenic (dissolved)	mg/l	0.00015	0.05	35	<0.00015	0.00873	0	
Boron (dissolved)	mg/l	0.01	No WSV	35	0.26	3.9	0	
Cadmium (dissolved)	mg/l	0.00002	0.00008 -> CaCO3 0-50mg/l 0.00009 -> CaCO3 50-100mg/l 0.00015 -> CaCO3 100-200mg/l 0.00025 -> CaCO3 200+mg/l	35	<0.00002	0.05	0	
Calcium (dissolved)	mg/l	0.012	No WSV	35	7.4	630	0	
Chromium (hexavalent)	mg/l	0.005	No WSV	35	0.005	<0.005	0	
Chromium (dissolved)	mg/l	0.0002	0.0034	35	0.0002	0.033	3	WS2A106_D, -, 1.00m; WS2A106_D, -, 1.00m; WS2A106_D, -, 1.01m
Copper (dissolved)	mg/l	0.0005	0.001	35	<0.0005	0.032	27	WS2A121_U, -, 1.94m; WS2A123_D, -, 2.34m; WS2A124_U, -, 2.30m; WS2ALOB_1D, -, 0.92m; CP2AMFOB_2U, -, 1.50m; CP2ALLCDE, -, 4.24m; CP2APOOB_1D, -, 5.23m; WS2A14D, -, 2.58m; WS2A100_U, -, 5.66m; WS2A103_U, -, 1.90m; WS2A106_D, -, 1.00m; WS2A109_U, -, 4.47m; WS2A100_U, -, 4.60m; CP2AMFOB_2U, -, 1.81m; CP2APOOB_1D, -, 5.40m; WS2ALOB_1D, -, 0.99m; WS2A121_U, -, 2.00m; WS2A123_D, -, 3.30m; WS2A100_U, -, 4.50m; WS2A103_U, -, 1.80m; WS2A14D, -, 2.57m; WS2A106_D, -, 1.01m; CP2APOOB_1D, -, 5.31m; WS2A12U, -, 2.03m; CP2ALLCDE, -, 3.99m; WS2A123_D, -, 2.25m; CP2AMFOB_2U, -, 1.51m
Iron (dissolved)	mg/l	0.004	1	35	0.004	430	7	WS2A14D, -, 2.58m; WS2A106_D, -, 1.00m; WS2A106_D, -, 1.00m; WS2A106_D, -, 1.01m; WS2A103_U, -, 1.86m; WS2A100_U, -, 4.64m; WS2A12U, -, 2.03m
Lead (dissolved)	mg/l	0.0002	0.0012	35	0.0002	0.01	4	WS2A106_D, -, 1.00m; WS2A106_D, -, 1.00m; WS2A14D, -, 2.57m; WS2A106_D, -, 1.01m
Manganese (dissolved)	mg/l	0.00005	0.123	35	0.0046	3.6	31	WS2A121_U, -, 1.94m; WS2A123_D, -, 2.34m; WS2A124_U, -, 2.30m; WS2ALOB_1D, -, 0.92m; CP2ALLCDE, -, 4.24m; CP2APOOB_1D, -, 5.23m; WS2A14D, -, 2.58m; WS2A100_U, -, 5.66m; WS2A103_U, -, 1.90m; WS2A106_D, -, 1.00m; WS2A109_U, -, 4.47m; WS2A100_U, -, 4.60m; CP2APOOB_1D, -, 5.40m; WS2ALOB_1D, -, 0.99m; WS2A121_U, -, 2.00m; WS2A123_D, -, 3.30m; WS2A100_U, -, 4.50m; WS2A103_U, -, 1.80m; WS2A106_D, -, 1.00m; WS2A14D, -, 2.57m; WS2A106_D, -, 1.01m; WS2A103_U, -, 1.86m; WS2A100_U, -, 4.64m; WS2ALOB_1D, -, 0.89m; CP2APOOB_1D, -, 5.31m; WS2A12U, -, 2.03m; WS2A14D, -, 2.67m; CP2ALLCDE, -, 3.99m; WS2A121_U, -, 1.76m; WS2A123_D, -, 2.25m; WS2A124_U, -, 2.12m
Mercury (dissolved)	mg/l	0.00005	0.00007	35	<0.00005	<0.00005	0	
Nickel (dissolved)	mg/l	0.0005	0.004	35	<0.0005	0.35	25	WS2A121_U, -, 1.94m; WS2A123_D, -, 2.34m; WS2A124_U, -, 2.30m; CP2APOOB_1D, -, 5.23m; WS2A14D, -, 2.58m; WS2A100_U, -, 5.66m; WS2A103_U, -, 1.90m; WS2A106_D, -, 1.00m; WS2A109_U, -, 4.47m; WS2A100_U, -, 4.60m; CP2APOOB_1D, -, 5.40m; WS2ALOB_1D, -, 0.99m; WS2A121_U, -, 2.00m; WS2A123_D, -, 3.30m; WS2A100_U, -, 4.50m; WS2A103_U, -, 1.80m; WS2A106_D, -, 1.00m; WS2A14D, -, 2.57m; WS2A106_D, -, 1.01m; WS2A103_U, -, 1.86m; WS2A100_U, -, 4.64m; CP2APOOB_1D, -, 5.31m; WS2A12U, -, 2.03m; WS2A14D, -, 2.67m; WS2A124_U, -, 2.12m
Selenium (dissolved)	mg/l	0.0006	N/A	35	<0.0006	0.016	0	
Vanadium (dissolved)	mg/l	0.0002	No WSV	35	0.0002	0.012	0	
Zinc (dissolved)	mg/l	0.0005	0.0109	35	<0.0005	0.16	14	WS2A121_U, -, 1.94m; WS2A123_D, -, 2.34m; WS2A124_U, -, 2.30m; CP2ALLCDE, -, 4.24m; CP2APOOB_1D, -, 5.23m; WS2A14D, -, 2.58m; WS2A106_D, -, 1.00m; WS2A109_U, -, 4.47m; CP2APOOB_1D, -, 5.40m; WS2A106_D, -, 1.00m; WS2A14D, -, 2.57m; WS2A106_D, -, 1.01m; WS2A12U, -, 2.03m; WS2A14D, -, 2.67m
Monoaromatics								
Benzene	mg/l	0.001	0.01	35	<0.001	<0.001	0	
Toluene	mg/l	0.001	0.074	35	<0.001	<0.001	0	
Ethylbenzene	mg/l	0.001	0.02	35	<0.001	<0.001	0	
p & m-xylene	mg/l	0.001	0.03	35	<0.001	<0.001	0	
o-xylene	mg/l	0.001	0.03	35	<0.001	<0.001	0	
MTBE (Methyl Tertiary Butyl Ether)	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >C5 - C6	mg/l	0.001	0.01	35	<0.001	<0.001	0	
TPH-CWG - Aliphatic >C6 - C8	mg/l	0.001	0.01	35	<0.001	<0.001	0	
TPH-CWG - Aliphatic >C8 - C10	mg/l	0.001	0.01	35	<0.001	0.077	1	WS2A100_U, -, 4.50m
TPH-CWG - Aliphatic >C10 - C12	mg/l	0.01	0.01	35	<0.01	<0.01	0	
TPH-CWG - Aliphatic >C12 - C16	mg/l	0.01	0.01	35	<0.01	<0.01	0	
TPH-CWG - Aliphatic >C16 - C21	mg/l	0.01	0.01	35	<0.01	0.02	1	CP2APOOB_1D, -, 5.23m
TPH-CWG - Aliphatic >C21 - C35	mg/l	0.01	0.01	35	<0.01	0.15	1	CP2APOOB_1D, -, 5.23m
TPH-CWG - Aliphatic (C5 - C35)	mg/l	0.01	No WSV	35	<0.01	0.17	0	
TPH-CWG - Aromatic >C5 - C7	mg/l	0.001	0.01	35	<0.001	<0.001	0	
TPH-CWG - Aromatic >C7 - C8	mg/l	0.001	0.01	35	<0.001	<0.001	0	
TPH-CWG - Aromatic >C8 - C10	mg/l	0.001	0.01	35	<0.001	0.014	1	WS2A100_U, -, 4.50m
TPH-CWG - Aromatic >C10 - C12	mg/l	0.01	0.01	35	<0.01	<0.01	0	
TPH-CWG - Aromatic >C12 - C16	mg/l	0.01	0.01	35	<0.01	<0.01	0	
TPH-CWG - Aromatic >C16 - C21	mg/l	0.01	0.01	35	<0.01	<0.01	0	
TPH-CWG - Aromatic >C21 - C35	mg/l	0.01	0.01	35	<0.01	<0.01	0	
TPH-CWG - Aromatic (C5 - C35)	mg/l	0.01	No WSV	35	<0.01	0.014	0	
VOCs								
Chloromethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
Chloroethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
Bromomethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
Vinyl Chloride	mg/l	0.001	N/A	35	<0.001	<0.001	0	
Trichlorofluoromethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
1,1-Dichloroethene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
1,1,2-Trichloro-1,2,2-trifluoroethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
Cis-1,2-dichloroethene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
MTBE (Methyl Tertiary Butyl Ether)	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
1,1-Dichloroethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
2,2-Dichloropropane	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
Trichloromethane	mg/l	0.001	0.0025	35	<0.001	<0.001	0	
1,1,1-Trichloroethane	mg/l	0.001	0.1	35	<0.001	<0.001	0	
1,2-Dichloroethane	mg/l	0.001	0.01	35	<0.001	<0.001	0	
1,1-Dichloropropene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
Trans-1,2-dichloroethene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
Benzene	mg/l	0.001	0.01	35	<0.001	<0.001	0	
Tetrachloromethane	mg/l	0.001	N/A	35	<0.001	<0.001	0	
1,2-Dichloropropane	mg/l	0.001	N/A	35	<0.001	<0.001	0	
Trichloroethene	mg/l	0.001	0.01	35	<0.001	<0.001	0	
Dibromomethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
Bromodichloromethane	mg/l	0.001	See Trihalomethanes	35	<0.001	<0.001	0	
Cis-1,3-dichloropropene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
Trans-1,3-dichloropropene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
Toluene	mg/l	0.001	0.074	35	<0.001	<0.001	0	
1,1,2-Trichloroethane	mg/l	0.001	0.4	35	<0.001	<0.001	0	
1,3-Dichloropropane	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
Dibromochloromethane	mg/l	0.001	See Trihalomethanes	35	<0.001	<0.001	0	
Tetrachloroethene	mg/l	0.001	0.01	35	<0.001	<0.001	0	
1,2-Dibromoethane	mg/l	0.001	N/A	35	<0.001	<0.001	0	
Chlorobenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
1,1,1,2-Tetrachloroethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
Ethylbenzene	mg/l	0.001	0.02	35	<0.001	<0.001	0	
p & m-Xylene	mg/l	0.001	0.03	35	<0.001	<0.001	0	
Styrene	mg/l	0.001	0.05	35	<0.001	<0.001	0	
Tribromomethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
o-Xylene	mg/l	0.001	0.03	35	<0.001	<0.001	0	
1,1,2,2-Tetrachloroethane	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
Isopropylbenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
Bromobenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
n-Propylbenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
2-Chlorotoluene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
4-Chlorotoluene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
1,3,5-Trimethylbenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
tert-Butylbenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
1,2,4-Trimethylbenzene	mg/l	0.001	No WSV	35	<0.001	0.0138	0	
sec-Butylbenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
1,3-Dichlorobenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
p-Isopropyltoluene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
1,2-Dichlorobenzene	mg/l	0.001	0.02	35	<0.001	<0.001	0	
1,4-Dichlorobenzene	mg/l	0.001	0.02	35	<0.001	<0.001	0	
Butylbenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
1,2-Dibromo-3-chloropropane	mg/l	0.001	N/A	35	<0.001	<0.001	0	
1,2,4-Trichlorobenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
Hexachlorobutadiene	mg/l	0.001	0.0006	35	<0.001	<0.001	0	
1,2,3-Trichlorobenzene	mg/l	0.001	No WSV	35	<0.001	<0.001	0	
SVOCs								
Aniline	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
Phenol	mg/l	0.00005	0.0077	35	<0.00005	0.047	1	WS2A106_D, -, 1.00m
2-Chlorophenol	mg/l	0.00005	0.05	35	<0.00005	<0.00005	0	
Bis(2-chloroethyl)ether	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
1,3-Dichlorobenzene	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
1,2-Dichlorobenzene	mg/l	0.00005	0.02	35	<0.00005	<0.00005	0	
1,4-Dichlorobenzene	mg/l	0.00005	0.02	35	<0.00005	0.0011	0	
Bis(2-chloroisopropyl)ether	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
2-Methylphenol	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
Hexachloroethane	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
Nitrobenzene	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
4-Methylphenol	mg/l	0.00005	No WSV	35	<0.00005	0.0019	0	

Location	WS2A121_U	WS2A123_D	WS2A124_U	WS2ALOB_1D	CP2AMFOB_2U	CP2ALLCDE	CP2APOOB_1D	WS2A14D	WS2A100_U	WS2A103_U	WS2A106_D	WS2A109_U	CP2AMFOB_2U	WS2A100_U	CP2AMFOB_2U	CP2APOOB_1D	WS2ALOB_1D	WS2A121_U	WS2A123_D	WS2A100_U	WS2A103_U	WS2A106_D	WS2A14D	WS2A106_D	WS2A103_U	WS2A100_U	WS2ALOB_1D	CP2APOOB_1D	WS2A12U	WS2A14D	CP2ALLCDE	WS2A121_U	WS2A123_D	WS2A124_U	CP2AMFOB_2U
Sample ID	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Depth	1.94m	2.34m	2.30m	0.92m	1.50m	4.24m	5.23m	2.58m	5.66m	1.90m	1.00m	4.47m	3.40m	4.60m	1.81m	5.40m	0.99m	2.00m	3.30m	4.50m	1.80m	1.00m	2.57m	1.01m	1.86m	4.64m	0.89m	5.31m	2.03m	2.67m	3.99m	1.76m	2.25m	2.12m	1.51m
Date	24/09/2018	24/09/2018	24/09/2018	24/09/2018	24/09/2018	24/09/2018	25/09/2018	26/09/2018	27/09/2018	27/09/2018	27/09/2018	28/09/2018	01/08/2018	01/08/2018	03/09/2018	03/09/2018	03/09/2018	03/09/2018	03/09/2018	04/09/2018	04/09/2018	06/09/2018	06/09/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	23/10/2018	23/10/2018	23/10/2018	23/10/2018
Strata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
pH	7.3	7.4	7.2	7.4	8.3	6.8	6.9	5.7	6.8	6.8	5.6	7	7.9	6.8	8.2	7.1	7.9	7.5	7.4	6.8	7	5.6	5.7	5.8	6.8	6.9	7.4	6.9	6.8	6	6.8	7.3	7.4	7.3	8.3
Total Cyanide	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Free Cyanide	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulphate as SO4	113	114	284	491	159	856	1950	1960	1700	2190	2960	808	272	1780	168	2450	857	118	83	1880	1670	3390	1730	4290	2380	1940	713	2030	1470	1430	1160	150	168	409	230
Sulphide	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.006	<0.007	<0.008	<0.009	<0.01	<0.011	<0.012	<0.005	<0.005	<0.005	<0.005
Ammoniacal Nitrogen as N	0.22	0.2	0.21	0.6	1	2.5	2.5	1	4.9	2.5	2.6	0.43	0.43	4.9	0.34	2.6	0.54	0.29	0.16	5.3	2.5	3.1	0.9	3.6	2.9	3.5	0.65	2.4	0.41	1.1	3.2	0.24	0.33	0.3	0.25
Ammonium as NH4	0.28	0.26	0.27	0.77	1.3	3.2	3.3	1.3	6.3	3.2	3.4	0.55	0.55	6.3	0.44	3.3	0.69	0.37	0.2	6.8	3.3	3.9	1.2	4.7	3.7	4.5	0.84	3	0.53	1.4	4.1	0.31	0.42	0.38	0.32
Dissolved Organic Carbon (DOC)	8.69	6.8	5.74	9.47	3.62	81.2	68.9	16	69.8	44.1	933	3.99	4.59	77.5	15.5	77	11.4	15.2	6.05	61.9	33.7	924	18.3	643	40	66.1	9.38	47.5	10.6	24.2	79.3	6.97	6.12	5.71	8.07
Nitrate as N	0.02	0.05	0.04	0.02	0.05	0.18	0.7	0.17	0.6	0.39	4.44	2.06	0.05	0.07	0.3	0.57	0.16	0.15	0.18	0.23	0.21	4.04	0.11	4.55	0.48	0.64	0.51	1.19	0.45	1.05	0.66	0.06	0.1	0.54	0.82
Heavy Metals / Metalloids																																			
Arsenic (dissolved)	0.00147	0.00113	0.00196	0.0008	0.00099	0.00182	0.00058	0.00054	0.00229	0.00047	0.00873	0.00059	0.00121	0.0025	0.00108	0.00055	0.00145	0.00232	0.0008	0.00119	0.00054	<0.00015	0.00197	0.00587	0.00071	0.00097	0.00079	0.0004	<0.00015	0.00097	0.00094	0.00111	0.00088	0.00058	0.00023
Boron (dissolved)	0.8	1.4	0.85	1.5	2.5	1.1	3.5	0.58	0.27	1.6	1.9	0.79	3.1	0.26	3.2	3.1	1.2	0.63	0.95	0.27	1.5	2.1	0.41	1.9	1.7	0.29	1.6	3.9	0.41	0.53	1.1	0.97	1.5	0.88	3.1
Cadmium (dissolved)	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.00011	0.00021	<0.00002	<0.00002	0.00015	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002	0.0003	0.0001	<0.00002	<0.00002	<0.00002	0.05	<0.00002	0.00003	<0.00002	<0.00002	<0.00002	<0.00002	<0.00002
Calcium (dissolved)	120	93	150	100	8.4	490	380	500	600	530	560	480	18	600	9.8	480	84	110	90	520	450	450	470	580	610	630	110	400	440	500	410	110	89	170	7.4
Chromium (hexavalent)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	U/S	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium (dissolved)	0.0002	0.0002	0.0007	<0.0002	<0.0002	0.0005	0.0002	0.0003	0.0006	0.0002	0.021	0.0003	<0.0002	0.0009	0.0003	0.0003	0.0004	0.0007	<0.0002	0.0005	<0.0002	0.033	0.0007	0.023	0.0002	0.0007	<0.0002	0.0002	0.0002	0.0006	0.0004	0.0003	<0.0002	0.0005	0.0003
Copper (dissolved)	0.0056	0.0036	0.0076	0.003	0.0013	0.0023	0.0096	0.0059	0.0033	0.004	0.032	0.0037	0.0009	0.0033	0.0012	0.0054	0.0073	0.0015	0.0043	0.0017	0.0021	<0.0005	0.0047	0.0087	<0.0005	0.0009	<0.0005	0.002	0.0017	0.0009	0.0028	<0.0005	0.0012	0.001	0.0013
Iron (dissolved)	0.035	0.007	<0.004	0.01	0.01	0.065	0.008	2.6	0.082	0.26	330	0.26	<0.004	0.31	0.004	0.006	0.063	0.31	0.015	0.073	0.035	330	0.51	430	11	11	0.021	0.12	2.5	0.92	0.7	0.014	0.009	0.25	0.016
Lead (dissolved)	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0006	<0.0002	<0.0002	0.0037	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.01	0.0014	0.0015	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0004	0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Manganese (dissolved)	0.88	1.1	0.61	0.84	0.0077	3.3	0.98	0.2	0.93	0.65	1.3	1.6	0.005	1.6	0.0046	1.3	0.75	1.6	1.2	0.86	0.49	1.3	0.19	1.1	0.7	0.73	0.8	0.48	3.6	0.18	2.9	0.62	1.3	0.25	0.007
Mercury (dissolved)	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Nickel (dissolved)	0.013	0.008	0.0071	0.0038	0.0013	0.004	0.034	0.035	0.045	0.0069	0.2	0.012	0.0017	0.043	0.0017	0.017	0.0072	0.0088	0.01	0.052	0.0055	0.35	0.024	0.24	0.0044	0.019	0.0034	0.0076	0.0059	0.044	0.0027	0.0033	0.0013	0.008	<0.0005
Selenium (dissolved)	0.0048	0.0014	0.0016	0.0023	0.0015	0.0039	0.004	0.0021	0.0031	0.012	0.016	0.0076	0.0009	0.0016	0.0014	0.0029	0.0053	0.009	0.0015	0.0034	0.0072	<0.0006	0.0019	0.0085	0.0057	0.0018	0.0011	0.0019	0.0033	0.0017	0.0025	0.001	<0.0006	0.0023	<0.0006
Vanadium (dissolved)	0.0002	<0.0002	0.0007	<0.0002	0.0007	<0.0002	0.0004	<0.0002	0.0004	<0.0002	0.012	0.0004	0.0013	0.001	0.0016	<0.0002	0.0003	0.0005	0.0004	0.0007	<0.0002	<0.0002	<0.0002	0.0071	<0.0002	0.0011	<0.0002	<0.0002	<0.0002	0.0004	<0.0002	<0.0002	<0.0002	0.0005	0.0006
Zinc (dissolved)	0.012	0.011	0.015	0.0033	<0.0005	0.024	0.011	0.12	0.0078	0.0076	0.16	0.014	<0.0005	0.0063	0.0016	0.011	0.0045	0.0037	0.0046	0.0085	0.0058	0.12	0.096	0.16	0.0054	0.0017	0.0036	0.0066	0.046	0.029	0.0063	0.0018	0.0016	0.004	0.0019
Monoaromatics																																			
Benzene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Toluene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ethylbenzene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
p & m-xylene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
o-xylene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
MTBE (Methyl Tertiary Butyl Ether)	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Petroleum Hydrocarbons																																			
TPH-CWG - Aliphatic >C5 - C6	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH-CWG - Aliphatic >C6 - C8	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH-CWG - Aliphatic >C8 - C10	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.077	<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	<0.001	<0.001
TPH-CWG - Aliphatic >C10 - C12	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aliphatic >C12 - C16	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aliphatic >C16 - C21	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aliphatic >C21 - C35	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aliphatic (C5 - C35)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.17	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.077	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aromatic >C5 - C7	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH-CWG - Aromatic >C7 - C8	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH-CWG - Aromatic >C8 - C10	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.014	<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	<0.001	<0.001
TPH-CWG - Aromatic >C10 - C12	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aromatic >C12 - C16	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aromatic >C16 - C21	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aromatic >C21 - C35	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aromatic (C5 - C35)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.014	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VOCs																																			
Chloromethane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chloroethane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromomethane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vinyl Chloride	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trichlorofluoromethane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,2-Trichloro-1,2,2-trifluoroethane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cis-1,2-dichloroethene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
MTBE (Methyl Tertiary Butyl Ether)	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2,2-Dichloropropane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trichloromethane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,1-Trichloroethane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichloroethane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloropropene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trans-1,2-dichloroethene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Benzene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tetrachloromethane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichloropropane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trichloroethene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dibromomethane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromodichloromethane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cis-1,3-dichloropropene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trans-1,3-dichloropropene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Toluene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,2-Trichloroethane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3-Dichloropropane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dibromochloromethane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tetrachloroethene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dibromoethane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chlorobenzene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,1,2-Tetrachloroethane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ethylbenzene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
p & m-Xylene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Styrene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tribromomethane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
o-Xylene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,2,2-Tetrachloroethane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Isopropylbenzene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromobenzene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Propylbenzene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2-Chlorotoluene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4-Chlorotoluene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3,5-Trimethylbenzene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
tert-Butylbenzene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,4-Trimethylbenzene	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0138	<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	<0.001	<0.001
sec-Butylbenzene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3-Dichlorobenzene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
p-Isopropyltoluene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichlorobenzene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,4-Dichlorobenzene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Butylbenzene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dibromo-3-chloropropane	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,4-Trichlorobenzene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Hexachlorobutadiene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,3-Trichlorobenzene	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
SVOCs																																			
Aniline	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Phenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.047	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Chlorophenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Bis(2-chloroethyl)ether	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
1,3-Dichlorobenzene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
1,2-Dichlorobenzene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
1,4-Dichlorobenzene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.0011	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Bis(2-chloroisopropyl)ether	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Methylphenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Hexachloroethane	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Nitrobenzene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Methylphenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.00053	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	0.0019	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005

Assessment Criteria :	Freshwater EQS				
CaCO (mg/l):	0.00	pH	7.50		
Calcium (mg/l):	54.75	DOC (mg/l)	38.22	Catchment area:	Thames

Constituents	Unit	Limit of Detection	Generic Assessment Criteria	Number of Samples	Minimum Value	Maximum Value	Number of Exceedences	Locations of Exceedences
Isophorone	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
2-Nitrophenol	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
2,4-Dimethylphenol	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
Bis(2-chloroethoxy)methane	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
1,2,4-Trichlorobenzene	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
Naphthalene	mg/l	0.00001	0.002	35	<0.00001	<0.00001	0	
2,4-Dichlorophenol	mg/l	0.00005	0.0042	35	<0.00005	<0.00005	0	
4-Chloroaniline	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
Hexachlorobutadiene	mg/l	0.00005	0.0006	35	<0.00005	<0.00005	0	
4-Chloro-3-methylphenol	mg/l	0.00005	0.04	35	<0.00005	<0.00005	0	
2,4,6-Trichlorophenol	mg/l	0.00005	N/A	35	<0.00005	<0.00005	0	
2,4,5-Trichlorophenol	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
2-Methylnaphthalene	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
2-Chloronaphthalene	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
Dimethylphthalate	mg/l	0.00005	0.8	35	<0.00005	<0.00005	0	
2,6-Dinitrotoluene	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
Acenaphthylene	mg/l	0.00001	See BaP	35	<0.00001	<0.00001	0	
Acenaphthene	mg/l	0.00001	See BaP	35	<0.00001	<0.00001	0	
2,4-Dinitrotoluene	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
Dibenzofuran	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
4-Chlorophenyl phenyl ether	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
Diethyl phthalate	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
4-Nitroaniline	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
Fluorene	mg/l	0.00001	N/A	35	<0.00001	<0.00001	0	
Azobenzene	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
Bromophenyl phenyl ether	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
Hexachlorobenzene	mg/l	0.00005	0.00005	35	<0.00005	<0.00005	0	
Phenanthrene	mg/l	0.00001	See BaP	35	<0.00001	<0.00001	0	
Anthracene	mg/l	0.00001	0.0001	35	<0.00001	<0.00001	0	
Carbazole	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
Dibutyl phthalate	mg/l	0.00005	0.008	35	<0.00005	<0.00005	0	
Anthraquinone	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
Fluoranthene	mg/l	0.00001	0.0000063	35	<0.00001	<0.00001	0	
Pyrene	mg/l	0.00001	N/A	35	<0.00001	<0.00001	0	
Butyl benzyl phthalate	mg/l	0.00005	No WSV	35	<0.00005	<0.00005	0	
Benzo(a)anthracene	mg/l	0.00001	See BaP	35	<0.00001	<0.00001	0	
Chrysene	mg/l	0.00001	See BaP	35	<0.00001	<0.00001	0	
Benzo(b)fluoranthene	mg/l	0.00001	0.000017	35	<0.00001	<0.00001	0	
Benzo(k)fluoranthene	mg/l	0.00001	0.000017	35	<0.00001	<0.00001	0	
Benzo(a)pyrene	mg/l	0.00001	0.00000017	35	<0.00001	<0.00001	0	
Indeno(1,2,3-cd)pyrene	mg/l	0.00001	No WSV	35	<0.00001	<0.00001	0	
Dibenz(a,h)anthracene	mg/l	0.00001	N/A	35	<0.00001	<0.00001	0	
Benzo(ghi)perylene	mg/l	0.00001	0.0000082	35	<0.00001	<0.00001	0	

Location	WS2A121_U	WS2A123_D	WS2A124_U	WS2ALOB_1D	CP2AMFOB_2U	CP2ALLCDE	CP2APOOB_1D	WS2A14D	WS2A100_U	WS2A103_U	WS2A106_D	WS2A109_U
Sample ID	-	-	-	-	-	-	-	-	-	-	-	-
Depth	1.94m	2.34m	2.30m	0.92m	1.50m	4.24m	5.23m	2.58m	5.66m	1.90m	1.00m	4.47m
Date	24/09/2018	24/09/2018	24/09/2018	24/09/2018	24/09/2018	24/09/2018	25/09/2018	26/09/2018	27/09/2018	27/09/2018	27/09/2018	28/09/2018
Strata	-	-	-	-	-	-	-	-	-	-	-	-
Zone	-	-	-	-	-	-	-	-	-	-	-	-
Isophorone	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Nitrophenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,4-Dimethylphenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Bis(2-chloroethoxy)methane	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
1,2,4-Trichlorobenzene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Naphthalene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
2,4-Dichlorophenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Chloroaniline	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Hexachlorobutadiene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Chloro-3-methylphenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,4,6-Trichlorophenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,4,5-Trichlorophenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Methylnaphthalene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Chloronaphthalene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dimethylphthalate	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,6-Dinitrotoluene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Acenaphthylene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Acenaphthene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
2,4-Dinitrotoluene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dibenzofuran	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Chlorophenyl phenyl ether	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Diethyl phthalate	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Nitroaniline	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Fluorene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Azobenzene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Bromophenyl phenyl ether	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Hexachlorobenzene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Phenanthrene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Anthracene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Carbazole	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dibutyl phthalate	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Anthraquinone	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Fluoranthene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Pyrene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Butyl benzyl phthalate	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Benzo(a)anthracene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Chrysene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(b)fluoranthene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(k)fluoranthene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(a)pyrene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Indeno(1,2,3-cd)pyrene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Dibenz(a,h)anthracene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(ghi)perylene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001

Location	CP2AMFOB_2U	WS2A100_U	CP2AMFOB_2U	CP2APOOB_1D	WS2ALOB_1D	WS2A121_U	WS2A123_D	WS2A100_U	WS2A103_U	WS2A106_D	WS2A14D	WS2A106_D
Sample ID	-	-	-	-	-	-	-	-	-	-	-	-
Depth	3.40m	4.60m	1.81m	5.40m	0.99m	2.00m	3.30m	4.50m	1.80m	1.00m	2.57m	1.01m
Date	01/08/2018	01/08/2018	03/09/2018	03/09/2018	03/09/2018	03/09/2018	03/09/2018	04/09/2018	04/09/2018	06/09/2018	06/09/2018	22/10/2018
Strata	-	-	-	-	-	-	-	-	-	-	-	-
Zone	-	-	-	-	-	-	-	-	-	-	-	-
Isophorone	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Nitrophenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,4-Dimethylphenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Bis(2-chloroethoxy)methane	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
1,2,4-Trichlorobenzene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Naphthalene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
2,4-Dichlorophenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Chloroaniline	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Hexachlorobutadiene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Chloro-3-methylphenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,4,6-Trichlorophenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,4,5-Trichlorophenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Methylnaphthalene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Chloronaphthalene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dimethylphthalate	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,6-Dinitrotoluene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Acenaphthylene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Acenaphthene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
2,4-Dinitrotoluene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dibenzofuran	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Chlorophenyl phenyl ether	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Diethyl phthalate	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Nitroaniline	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Fluorene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Azobenzene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Bromophenyl phenyl ether	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Hexachlorobenzene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Phenanthrene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Anthracene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Carbazole	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dibutyl phthalate	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Anthraquinone	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Fluoranthene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Pyrene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Butyl benzyl phthalate	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Benzo(a)anthracene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Chrysene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(b)fluoranthene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(k)fluoranthene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(a)pyrene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Indeno(1,2,3-cd)pyrene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Dibenz(a,h)anthracene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(ghi)perylene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001

Location	WS2A103_U	WS2A100_U	WS2ALOB_1D	CP2APOOB_1D	WS2A12U	WS2A14D	CP2ALLCDE	WS2A121_U	WS2A123_D	WS2A124_U	CP2AMFOB_2U
Sample ID	-	-	-	-	-	-	-	-	-	-	-
Depth	1.86m	4.64m	0.89m	5.31m	2.03m	2.67m	3.99m	1.76m	2.25m	2.12m	1.51m
Date	22/10/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	22/10/2018	23/10/2018	23/10/2018	23/10/2018	23/10/2018
Strata	-	-	-	-	-	-	-	-	-	-	-
Zone	-	-	-	-	-	-	-	-	-	-	-
Isophorone	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Nitrophenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,4-Dimethylphenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Bis(2-chloroethoxy)methane	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
1,2,4-Trichlorobenzene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Naphthalene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
2,4-Dichlorophenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Chloroaniline	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Hexachlorobutadiene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Chloro-3-methylphenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,4,6-Trichlorophenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,4,5-Trichlorophenol	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Methylnaphthalene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Chloronaphthalene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dimethylphthalate	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,6-Dinitrotoluene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Acenaphthylene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Acenaphthene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
2,4-Dinitrotoluene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dibenzofuran	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Chlorophenyl phenyl ether	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Diethyl phthalate	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Nitroaniline	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Fluorene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Azobenzene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Bromophenyl phenyl ether	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Hexachlorobenzene	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Phenanthrene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Anthracene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Carbazole	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dibutyl phthalate	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Anthraquinone	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Fluoranthene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Pyrene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Butyl benzyl phthalate	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Benzo(a)anthracene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Chrysene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(b)fluoranthene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(k)fluoranthene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(a)pyrene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Indeno(1,2,3-cd)pyrene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Dibenz(a,h)anthracene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(ghi)perylene	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001

Measured Cu Concentration (dissolved) (µg l^{-1})	Measured Zn Concentration (dissolved) (µg l^{-1})	Measured Mn Concentration (dissolved) (µg l^{-1})	Measured Ni Concentration (dissolved) (µg l^{-1})	pH	DOC	Ca	Site-specific PNEC Dissolved Copper (µg l^{-1})	BioF	Bioavailable Copper Concentration (µg l^{-1})	Risk Characterisation Ratio
15				5.8	10	60	**11.41**	**0.09**	1.31	1.31
15				6	10	60	**11.41**	**0.09**	1.31	1.31
15				6.2	10	60	**12.43**	**0.08**	1.21	1.21
15				8.4	10	60	16.49	0.06	0.91	0.91
15				8.7	10	60	**14.79**	**0.07**	1.01	1.01
15				8.5	10	60	**14.79**	**0.07**	1.01	1.01
15				7	10	3	38.40	0.03	0.39	0.39
15				7	10	3.1	38.41	0.03	0.39	0.39
15				7	10	3.3	38.42	0.03	0.39	0.39
15				7	10	92	42.53	0.02	0.35	0.35
15				7	10	93	42.57	0.02	0.35	0.35
15				7	10	95	42.57	0.02	0.35	0.35
15				7	10	60	41.21	0.02	0.36	0.36
15				7	11	60	44.30	0.02	0.34	0.34
15				7	12	60	46.80	0.02	0.32	0.32
15				7	13	60	48.59	0.02	0.31	0.31
15				7	14	60	49.59	0.02	0.30	0.30
15				7	15	60	49.68	0.02	0.30	0.30
15				7	16	60	49.68	0.02	0.30	0.30
15				7	17	60	49.68	0.02	0.30	0.30
	15			5.9	10	60	11.41	0.09		
	15			6	10	60	11.41	0.09		

	15			6.1	10	60	11.12	0.09		
	15			7.9	10	60	34.24	0.03		
	15			8	10	60	30.40	0.03		
	15			8.2	10	60	22.64	0.04		
	15			7	10	2.9	38.40	0.03		
	15			7	10	3	38.40	0.03		
	15			7	10	3.2	38.41	0.03		
	15			7	10	158	42.57	0.02		
	15			7	10	160	42.57	0.02		
	15			7	10	162	42.57	0.02		
		80		5.4	10	60	1.00	0.09		
		80		5.5	10	60	11.41	0.09		
		80		5.6	10	60	11.41	0.09		
		80		8.4	10	60	16.49	0.06		
		80		8.5	10	60	14.79	0.07		
		80		8.7	10	60	14.79	0.07		
		80		7	10	0.9	38.28	0.03		
		80		7	10	1	38.29	0.03		
		80		7	10	1.2	38.30	0.03		
		80		7	10	199	42.57	0.02		
		80		7	10	200	42.57	0.02		
		80		7	10	202	42.57	0.02		
			10	6.4	10	60	18.32	0.05		
			10	6.5	10	60	22.24	0.04		
			10	6.6	10	60	26.42	0.04		
			10	8.6	10	60	14.79	0.07		

			10	8.7	10	60	14.79	0.07		
			10	8.8	10	60	14.79	0.07		
			10	7	10	1.9	38.34	0.03		
			10	7	10	2	38.35	0.03		
			10	7	10	2.1	38.35	0.03		
			10	7	10	87	42.34	0.02		
			10	7	10	88	42.38	0.02		
			10	7	10	89	42.42	0.02		
			10	7	15	60	49.68	0.02		
			10	7	20	60	49.68	0.02		
			10	7	21	60	49.68	0.02		
			10	7	16	60	49.68	0.02		
	15			7	15	60	49.68	0.02		
	15			7	16	60	49.68	0.02		
	15			7	18	60	49.68	0.02		
	15			7	20	60	49.68	0.02		
		80		7	15	60	49.68	0.02		
		80		7	16	60	49.68	0.02		
		80		7	18	60	49.68	0.02		
		80		7	20	60	49.68	0.02		
		80		7	21	60	49.68	0.02		
	15			7	21	60	49.68	0.02		
	25			7	10	60	41.21	0.02		
	40			6.6	10	60	26.42	0.04		

Site-specific PNEC Dissolved Zinc (µg l^{-1})	BioF	Bioavailable Zinc Concentration (µg l^{-1})	Risk Characterisation Ratio
19.90	0.55		
22.47	0.49		
25.04	0.44		
53.30	0.20		
57.16	0.19		
54.59	0.20		
41.90	0.26		
41.83	0.26		
41.69	0.26		
34.38	0.32		
34.35	0.32		
34.31	0.32		
35.32	0.31		
35.32	0.31		
35.32	0.31		
35.32	0.31		
35.32	0.31		
35.32	0.31		
35.32	0.31		
35.32	0.31		
21.19	0.51	7.72	0.71
22.47	0.49	7.28	0.67

23.75	0.46	6.88	0.63
46.88	0.23	3.49	0.32
48.17	0.23	3.39	0.31
50.73	0.21	3.22	0.30
41.98	0.26	3.89	0.36
41.90	0.26	3.90	0.36
41.76	0.26	3.92	0.36
33.19	0.33	4.93	0.45
33.16	0.33	4.93	0.45
33.13	0.33	4.93	0.45
14.76	0.74		
16.05	0.68		
17.33	0.63		
53.30	0.20		
54.59	0.20		
57.16	0.19		
44.55	0.24		
44.32	0.25		
43.92	0.25		
32.68	0.33		
32.67	0.33		
32.65	0.33		
27.61	0.39		
28.89	0.38		
30.18	0.36		
55.87	0.20		

57.16	0.19		
58.44	0.19		
42.91	0.25		
42.80	0.25		
42.69	0.26		
34.50	0.32		
34.48	0.32		
34.45	0.32		
35.32	0.31		
35.32	0.31		
35.32	0.31		
35.32	0.31		
35.32	0.31	4.63	0.42
35.32	0.31	4.63	0.42
35.32	0.31	4.63	0.42
35.32	0.31	4.63	0.42
35.32	0.31		
35.32	0.31		
35.32	0.31		
35.32	0.31		
35.32	0.31		
35.32	0.31	4.63	0.42
35.32	0.31	7.72	0.71
30.18	0.36	14.45	**1.33**

Site-specific PNEC Dissolved Manganese (µg l^{-1})	BioF	Bioavailable Manganese Concentration (µg l^{-1})	Risk Characterisation Ratio
2124.20	0.06		
2134.94	0.06		
2144.58	0.06		
123.00	1.00		
123.00	1.00		
123.00	1.00		
146.69	0.84		
153.84	0.80		
167.85	0.73		
1521.55	0.08		
1521.55	0.08		
1521.55	0.08		
899.90	0.14		
899.90	0.14		
899.90	0.14		
899.90	0.14		
899.90	0.14		
899.90	0.14		
899.90	0.14		
899.90	0.14		
899.90	0.14		
2129.72	0.06		
2134.94	0.06		

2139.89	0.06		
144.53	0.85		
123.00	1.00		
123.00	1.00		
139.45	0.88		
146.69	0.84		
160.89	0.76		
1521.55	0.08		
1521.55	0.08		
1521.55	0.08		
2098.77	0.06	4.69	0.04
2105.69	0.06	4.67	0.04
2112.22	0.06	4.66	0.04
123.00	1.00	80.00	0.65
123.00	1.00	80.00	0.65
123.00	1.00	80.00	0.65
123.00	1.00	80.00	0.65
123.00	1.00	80.00	0.65
123.00	1.00	80.00	0.65
1521.55	0.08	6.47	0.05
1521.55	0.08	6.47	0.05
1521.55	0.08	6.47	0.05
2153.29	0.06		
2157.32	0.06		
2028.53	0.06		
123.00	1.00		

123.00	1.00		
123.00	1.00		
123.00	1.00		
123.00	1.00		
123.00	1.00		
1521.55	0.08		
1521.55	0.08		
1521.55	0.08		
899.90	0.14		
899.90	0.14		
899.90	0.14		
899.90	0.14		
899.90	0.14		
899.90	0.14		
899.90	0.14		
899.90	0.14		
899.90	0.14	10.93	0.09
899.90	0.14	10.93	0.09
899.90	0.14	10.93	0.09
899.90	0.14	10.93	0.09
899.90	0.14	10.93	0.09
899.90	0.14		
899.90	0.14		
2028.53	0.06		

Appendix G – Surface Water Screening Results

Assessment Criteria :	Freshwater EQS
CaCO (mg/l):	0.00
pH	7.50
Calcium (mg/l):	54.75
DOC (mg/l)	38.22
Catchment area:	Thames

Constituents	Unit	Limit of Detection	Generic Assessment Criteria	Number of Samples	Minimum Value	Maximum Value	Number of Exceedences	Locations of Exceedences	Strata	Zone	Location	2ASW1(S)	2ASW1(E)	2ASW1(E)	2ASW3(S)	2ASW3(S)	2ASW3(S)	2ASW4(S)	2ASW4(S)	2ASW4(S)
											Sample ID	_	_	_	_	_	_	_	_	_
											Depth	0.00m	0.00m	0.00m	0.00m	0.00m	0.00m	0.00m	0.00m	0.00m
											Date	25/09/2018	28/08/2018	15/08/2018	17/08/2018	28/08/2018	24/09/2018	28/08/2018	15/08/2018	08/10/2018
											Strata	_	_	_	_	_	_	_	_	_
											Zone	_	_	_	_	_	_	_	_	_
pH	pH Units	N/A	6-9	9	7.1	8.2	0					8	8.2	8.2	7.4	7.4	7.2	7.2	7.1	7.2
Total Cyanide	mg/l	0.01	0.001	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Free Cyanide	mg/l	0.01	0.001	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulphate as SO4	mg/l	0.045	400	9	8.36	40.4	0					40.4	32.4	9.59	13	9.53	14.9	8.36	19.2	35.2
Sulphate as SO4	mg/l	0.045	400	9	8.4	40.4	0					40.4	32.4	9.6	13	9.5	14.9	8.4	19.2	35.2
Sulphide	mg/l	0.005	No WSV	9	<0.005	0.56	0					<0.005	<0.005	<0.005	0.56	<0.005	<0.005	<0.005	<0.005	0.081
Ammoniacal Nitrogen as N	mg/l	0.015	No WSV	9	0.055	5	0					0.061	0.14	0.055	0.5	3.2	2.6	2.9	0.12	5
Ammonium as NH4	mg/l	0.015	Not appropriate, see Ammonia	9	0.071	6.4	0					0.078	0.18	0.071	0.64	4.1	3.4	3.7	0.15	6.4
Ammonium as NH4	mg/l	0.015	Not appropriate, see Ammonia	9	0.071	0.15	0							0.071					0.15	
Dissolved Organic Carbon (DOC)	mg/l	0.1	No WSV	9	3.56	57.8	0					3.56	4.79	5.5	53.7	57.8	36.3	42.5	56.3	42.8
Nitrate as N	mg/l	0.01	No WSV	9	0.18	6.93	0					5.96	6.93	1.72	0.23	0.3	0.19	0.23	0.18	1.19
Heavy Metals / Metalloids																				
Arsenic (dissolved)	mg/l	0.00015	0.05	9	0.00032	0.0114	0					0.0007	0.00032	0.00035	0.00061	0.0114	0.00228	0.00647	0.0034	0.00467
Boron (dissolved)	mg/l	0.01	No WSV	9	0.022	0.27	0					0.037	0.053	0.022	0.23	0.19	0.11	0.21	0.27	0.17
Cadmium (dissolved)	mg/l	0.00002	0.00008 -> CaCO3 0-50mg/l 0.00009 -> CaCO3 50-100mg/l 0.00015 -> CaCO3 100-200mg/l 0.00025 -> CaCO3 200+mg/l	9	0.00002	0.00004	0					0.00003	<0.00002	<0.00002	0.00002	0.00004	<0.00002	<0.00002	<0.00002	<0.00002
Calcium (dissolved)	mg/l	0.012	No WSV	9	26	93	0					93	89	37	77	65	26	39	60	45
Chromium (hexavalent)	mg/l	0.005	No WSV	9	<0.005	<0.005	0					<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chromium (dissolved)	mg/l	0.0002	0.0034	9	0.0002	0.0008	0					0.0003	0.0002	0.0008	0.0005	0.0008	0.0002	0.0004	0.0007	<0.0002
Copper (dissolved)	mg/l	0.0005	0.001	9	<0.0005	0.0041	6	2ASW1(S), _, 0.00m; 2ASW1(E), _, 0.00m; 2ASW1(E), _, 0.00m; 2ASW3(S), _, 0.00m; 2ASW3(S), _, 0.00m; 2ASW4(S), _, 0.00m				0.0036	0.0034	0.0036	<0.0005	0.0023	0.0041	<0.0005	0.0009	0.0035
Iron (dissolved)	mg/l	0.004	1	9	<0.004	1.5	2	2ASW3(S), _, 0.00m; 2ASW4(S), _, 0.00m				0.019	<0.004	0.059	0.91	0.54	1.5	1.3	0.91	0.31
Lead (dissolved)	mg/l	0.0002	0.0012	9	0.0002	0.001	0					<0.0002	<0.0002	0.0003	0.001	0.001	<0.0002	0.0002	0.0005	0.0004
Manganese (dissolved)	mg/l	0.00005	0.123	9	0.00079	0.36	6	2ASW3(S), _, 0.00m; 2ASW3(S), _, 0.00m; 2ASW3(S), _, 0.00m; 2ASW4(S), _, 0.00m; 2ASW4(S), _, 0.00m; 2ASW4(S), _, 0.00m				0.0039	0.00079	0.0013	0.2	0.18	0.3	0.36	0.21	0.3
Mercury (dissolved)	mg/l	0.00005	0.00007	9	<0.00005	<0.00005	0					<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Nickel (dissolved)	mg/l	0.0005	0.004	9	<0.0005	0.0069	2	2ASW3(S), _, 0.00m; 2ASW3(S), _, 0.00m				0.001	<0.0005	0.001	0.0036	0.0065	0.0069	0.002	0.0039	0.0029
Selenium (dissolved)	mg/l	0.0006	N/A	9	<0.0006	0.0022	0					0.0015	0.0007	<0.0006	0.0014	0.0014	0.0022	0.0015	0.0013	0.0019
Vanadium (dissolved)	mg/l	0.0002	No WSV	9	0.0003	0.0016	0					0.0006	0.0006	0.0012	0.0012	0.0016	0.0004	0.0013	0.0007	0.0003
Zinc (dissolved)	mg/l	0.0005	0.0109	9	0.0035	0.031	1	2ASW1(E), _, 0.00m				0.0066	0.0054	0.031	0.0081	0.0035	0.0053	0.0045	0.0042	0.0044
Monoaromatics																				
Benzene	mg/l	0.001	0.01	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Toluene	mg/l	0.001	0.074	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ethylbenzene	mg/l	0.001	0.02	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
p & m-xylene	mg/l	0.001	0.03	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
o-xylene	mg/l	0.001	0.03	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/l	0.001	No WSV	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Petroleum Hydrocarbons																				
TPH-CWG - Aliphatic >C5 - C6	mg/l	0.001	0.01	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH-CWG - Aliphatic >C6 - C8	mg/l	0.001	0.01	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH-CWG - Aliphatic >C8 - C10	mg/l	0.001	0.01	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH-CWG - Aliphatic >C10 - C12	mg/l	0.01	0.01	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aliphatic >C12 - C16	mg/l	0.01	0.01	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aliphatic >C16 - C21	mg/l	0.01	0.01	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aliphatic >C21 - C35	mg/l	0.01	0.01	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aliphatic (C5 - C35)	mg/l	0.01	No WSV	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aromatic >C5 - C7	mg/l	0.001	0.01	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH-CWG - Aromatic >C7 - C8	mg/l	0.001	0.01	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH-CWG - Aromatic >C8 - C10	mg/l	0.001	0.01	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TPH-CWG - Aromatic >C10 - C12	mg/l	0.01	0.01	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aromatic >C12 - C16	mg/l	0.01	0.01	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aromatic >C16 - C21	mg/l	0.01	0.01	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aromatic >C21 - C35	mg/l	0.01	0.01	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
TPH-CWG - Aromatic (C5 - C35)	mg/l	0.01	No WSV	9	<0.01	<0.01	0					<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
VOCs																				
Chloromethane	mg/l	0.001	No WSV	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chloroethane	mg/l	0.001	No WSV	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromomethane	mg/l	0.001	No WSV	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Vinyl Chloride	mg/l	0.001	N/A	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trichlorofluoromethane	mg/l	0.001	No WSV	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethene	mg/l	0.001	No WSV	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,2-Trichloro-1,2,2-trifluoroethane	mg/l	0.001	No WSV	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cis-1,2-dichloroethene	mg/l	0.001	No WSV	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
MTBE (Methyl Tertiary Butyl Ether)	mg/l	0.001	No WSV	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethane	mg/l	0.001	No WSV	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2,2-Dichloropropane	mg/l	0.001	No WSV	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trichloromethane	mg/l	0.001	0.0025	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,1-Trichloroethane	mg/l	0.001	0.1	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichloroethane	mg/l	0.001	0.01	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1-Dichloropropene	mg/l	0.001	No WSV	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trans-1,2-dichloroethene	mg/l	0.001	No WSV	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Benzene	mg/l	0.001	0.01	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tetrachloromethane	mg/l	0.001	N/A	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichloropropane	mg/l	0.001	N/A	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trichloroethene	mg/l	0.001	0.01	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dibromomethane	mg/l	0.001	No WSV	9	<0.001	<0.001	0					<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Assessment Criteria :	Freshwater EQS																		
CaCO (mg/l):	0.00	pH	7.50																
Calcium (mg/l):	54.75	DOC (mg/l)	38.22	Catchment area:	Thames														
									Location		2ASW1(S)	2ASW1(E)	2ASW1(E)	2ASW3(S)	2ASW3(S)	2ASW3(S)	2ASW4(S)	2ASW4(S)	2ASW4(S)
									Sample ID		_	_	_	_	_	_	_	_	_
									Depth		0.00m	0.00m	0.00m	0.00m	0.00m	0.00m	0.00m	0.00m	0.00m
									Date		25/09/2018	28/08/2018	15/08/2018	17/08/2018	28/08/2018	24/09/2018	28/08/2018	15/08/2018	08/10/2018
									Strata		_	_	_	_	_	_	_	_	_
Constituents	Unit	Limit of Detection	Generic Assessment Criteria	Number of Samples	Minimum Value	Maximum Value	Number of Exceedences	Locations of Exceedences		Zone	_	_	_	_	_	_	_	_	_
Bromodichloromethane	mg/l	0.001	See Trihalomethanes	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cis-1,3-dichloropropene	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Trans-1,3-dichloropropene	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Toluene	mg/l	0.001	0.074	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,2-Trichloroethane	mg/l	0.001	0.4	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3-Dichloropropane	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dibromochloromethane	mg/l	0.001	See Trihalomethanes	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tetrachloroethene	mg/l	0.001	0.01	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dibromoethane	mg/l	0.001	N/A	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Chlorobenzene	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,1,2-Tetrachloroethane	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ethylbenzene	mg/l	0.001	0.02	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
p & m-Xylene	mg/l	0.001	0.03	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Styrene	mg/l	0.001	0.05	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Tribromomethane	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
o-Xylene	mg/l	0.001	0.03	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,1,2,2-Tetrachloroethane	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Isopropylbenzene	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Bromobenzene	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
n-Propylbenzene	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
2-Chlorotoluene	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
4-Chlorotoluene	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3,5-Trimethylbenzene	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
tert-Butylbenzene	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,4-Trimethylbenzene	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
sec-Butylbenzene	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,3-Dichlorobenzene	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
p-Isopropyltoluene	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dichlorobenzene	mg/l	0.001	0.02	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,4-Dichlorobenzene	mg/l	0.001	0.02	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Butylbenzene	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2-Dibromo-3-chloropropane	mg/l	0.001	N/A	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,4-Trichlorobenzene	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Hexachlorobutadiene	mg/l	0.001	0.0006	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1,2,3-Trichlorobenzene	mg/l	0.001	No WSV	9	<0.001	<0.001	0				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
SVOCs																			
Aniline	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Phenol	mg/l	0.00005	0.0077	9	<0.00005	0.002	0				<0.00005	<0.00005	<0.00005	0.00033	0.002	<0.00005	0.0011	<0.00005	<0.00005
2-Chlorophenol	mg/l	0.00005	0.05	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Bis(2-chloroethyl)ether	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
1,3-Dichlorobenzene	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
1,2-Dichlorobenzene	mg/l	0.00005	0.02	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
1,4-Dichlorobenzene	mg/l	0.00005	0.02	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Bis(2-chloroisopropyl)ether	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Methylphenol	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Hexachloroethane	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Nitrobenzene	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Methylphenol	mg/l	0.00005	No WSV	9	<0.00005	0.0066	0				<0.00005	<0.00005	<0.00005	0.0021	0.0066	<0.00005	0.0025	<0.00005	<0.00005
Isophorone	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Nitrophenol	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,4-Dimethylphenol	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Bis(2-chloroethoxy)methane	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
1,2,4-Trichlorobenzene	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Naphthalene	mg/l	0.00001	0.002	9	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
2,4-Dichlorophenol	mg/l	0.00005	0.0042	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Chloroaniline	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Hexachlorobutadiene	mg/l	0.00005	0.0006	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Chloro-3-methylphenol	mg/l	0.00005	0.04	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,4,6-Trichlorophenol	mg/l	0.00005	N/A	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,4,5-Trichlorophenol	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Methylnaphthalene	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2-Chloronaphthalene	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dimethylphthalate	mg/l	0.00005	0.8	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
2,6-Dinitrotoluene	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Acenaphthylene	mg/l	0.00001	See BaP	9	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Acenaphthene	mg/l	0.00001	See BaP	9	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
2,4-Dinitrotoluene	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dibenzofuran	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Chlorophenyl phenyl ether	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Diethyl phthalate	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
4-Nitroaniline	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Fluorene	mg/l	0.00001	N/A	9	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Azobenzene	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Bromophenyl phenyl ether	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Hexachlorobenzene	mg/l	0.00005	0.00005	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Phenanthrene	mg/l	0.00001	See BaP	9	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Anthracene	mg/l	0.00001	0.0001	9	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Carbazole	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Dibutyl phthalate	mg/l	0.00005	0.008	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Anthraquinone	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Fluoranthene	mg/l	0.00001	0.0000063	9	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Pyrene	mg/l	0.00001	N/A	9	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Butyl benzyl phthalate	mg/l	0.00005	No WSV	9	<0.00005	<0.00005	0				<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Benzo(a)anthracene	mg/l	0.00001	See BaP	9	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Chrysene	mg/l	0.00001	See BaP	9	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(b)fluoranthene	mg/l	0.00001	0.000017	9	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(k)fluoranthene	mg/l	0.00001	0.000017	9	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(a)pyrene	mg/l	0.00001	0.00000017	9	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Indeno(1,2,3-cd)pyrene	mg/l	0.00001	No WSV	9	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Dibenz(a,h)anthracene	mg/l	0.00001	N/A	9	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001
Benzo(ghi)perylene	mg/l	0.00001	0.0000082	9	<0.00001	<0.00001	0				<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001

Appendix H – Preliminary Waste Assessment

ATKINS CatWasteSoil

Classification Assessment Tool of Soil Wastes - Hazard Summary Sheet

Site Name	Route Section 2A 2015 Soil
Location	
Site ID	
Job Number	
Date	11/28/2018
User Name	Charlotte.Hidson@atkinsglobal.com
Company Name	Atkins

Hole ID	Sample Depth	Hazardous Waste Y/N	HP1	HP2	HP3	HP4	HP5	HP6	HP7	HP8	HP9	HP10	HP11	HP12	HP13	HP14	HP15	HP16
WS2A02C	3.6m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A01D	1m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2ALLCU	2.5m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
FCGF2A15C	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A14C	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A19U	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A-3D	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A 15D	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2a	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2a12C	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
FCT2A2D	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A4U	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A16U	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A6C	1m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A7D	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A8C	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A9U	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A10C	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A11D	1m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A13C	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2 A17U	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
FCMG2A1U	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2 AFCNG 2AID	1m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
W52A 18D	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A19U	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A 20D	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
CP2AMG-U	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
CP2AUB32E	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
OXDUB2A32C W	1m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
OXDOB2A29D	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
W52AOB29D	1m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
OXDOB2A31C	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
RC2ALOB-D	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
RC2ALOB-U	1.00-1.00m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
RC2AMF-U	0.30-0.30m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

ATKINS CatWasteSoil

Classification Assessment Tool of Soil Wastes - Hazard Summary Sheet

Site Name	East West Rail Section 2A 2017
Location	
Site ID	
Job Number	
Date	1/15/2019
User Name	Charlotte.Hidson@atkinsglobal.com
Company Name	Atkins

Hole ID	Sample Depth	Hazardous Waste Y/N	HP1	HP2	HP3	HP4	HP5	HP6	HP7	HP8	HP9	HP10	HP11	HP12	HP13	HP14	HP15	HP16
WS2A101_C	0.5m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A101_C	1m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
CP2AJLFB_2U	0.2m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
CP2ATFB_2U (A)	0.2m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
CP2ATFB_2U (A)	1m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP2ABR_2D	1m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A102_C	0.5m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A104_U	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A113_C	0.5m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2A122_C	1m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
SHDP2A110_C	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP2AMGOB_1D	0.2m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP2AMGOB_1D	1m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP2AMGOB_2U	0.2m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP2AMGOB_2U	1m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
CP2ALOB_1D	0.2m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
CP2AMFOB_2U	0.5m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
TP2ALOB_1U	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2AMFOB_1U	0.2m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
WS2AMFOB_1U	1m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
CP2AMFOB_1D	0.3m	N	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No