



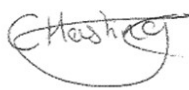
GROUNDTECH
CONSULTING

NEWPORT SILO BASE

GEO-ENVIRONMENTAL APPRAISAL

COUCH CONSULTING ENGINEERS

SEPTEMBER 2024

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SUMMARY

Site Details	
Site Location	<i>The site is located circa 3.16km south east of Newport Town Centre. The site is approximately centred on National Grid Reference ST329854.</i>
Site Area	<i>The site is rectangular in shape and has been levelled for the site's use by lorries and machinery. The site covers an area of circa. 7.3 hectares.</i> <i>The site is occupied by Marshalls Plc as a concrete factory and distribution centre. The factory is located to the north west of site.</i> <i>Offices, car parking and the factory are located to the north of site and a workshop is located to the south. The current access road is situated at the west of site.</i> <i>At the time of the investigation the site was predominantly surfaced by concrete. In the far south and north hardsurfacing had been broken out exposing the subbase prior to the Ground Investigation.</i>
Ground Model	
Made Ground Soils	<i>Three Made Ground populations were encountered in all exploratory holes to a maximum depth of 1.2m bgl. The Made Ground comprised dark grey gravelly fine to coarse sand was encountered in WS01, WS02, WS04, WS06 from ground level to depths of between 0.3m bgl and 1.2m bgl.</i> <i>Dark brown gravel of mudstone and chert was encountered in WS03 and WS05 from a depth of 0.19m bgl to a depth of 0.7m bgl. Firm, dark brown gravelly clay of minor constituents including mudstone and brick was also recorded in WS06 from a depth of 0.2m bgl to a depth of 0.4m bgl.</i>
Natural Soils	<i>The natural strata encountered generally confirmed the published geological records. Two main natural stratification were encountered consisting of firm, brown/dark grey gravelly, occasionally silty, occasionally sandy clay with minor constituents of mudstone, siltstone and occasional quartz in WS01 and WS04 from a depth of between 0.6m bgl and 0.67m bgl to a depth of between 1.0m bgl and 3.0m bgl.</i> <i>Firm, brown/dark grey, gravelly clay with minor constituents including siltstone and quartz was also encountered in WS06 from a depth of 0.6m bgl to a depth of 2.0m bgl.</i>
Bedrock	<i>No bedrock was encountered during the Ground Investigation.</i>
Groundwater	<i>No bedrock was encountered during the Ground Investigation.</i>
Ground Engineering Assessment	
Highways	<i>Plate load testing was undertaken in order to obtain a representative CBR value of the underlying strata at existing formation levels for access roads.</i> <i>CBR values ranged from 8.9% to 68.6% and achieved the required design value of >5%.</i> <i>The existing subbase at the site is suspected to have been stabilised due to the difficulty of excavation and should be considered during the redevelopment of the site, CBR values encountered would allow for the reuse of this subbase material however proposed levels should be consulted to the appropriateness of this material.</i>

SuDS	<i>The existing highway construction was approximately 0.70m in thickness and firm clay deposits were encountered below in all windowless sample borehole locations excluding WS02, WS03 and WS05.</i>
	<i>SuDS are not considered a feasible option due to the impermeable strata underlying the Made Ground.</i>
Constraints	<i>The trial pits indicate that instability of excavations is not anticipated provided they are not exposed to adverse weather conditions for any substantial period of time. Instability of the Made Ground is a possibility and should be considered in the groundworks method statements.</i>
	<i>Tracked high specification plant is recommended to maintain the build programme. Breaking equipment may also be required to break areas of hard surfacing.</i>
	<i>Difficulty occurred when excavating the subbase of the concrete. Breaking equipment may be required to excavate the Cementous subbase which has likely been stabilised due to the strengths encountered.</i>
	<i>A large vegetated ditch is located in the centre of the proposed footprint and will require consideration prior to the enabling stage. It is unknown if this is to be retained or removed, if it is to be removed it should be undertaken in accordance with an approved earthworks specification.</i>
GQRA and PL Assessment	
Human Health	<i>No realistic pollution linkages are considered to exist as no sources of contaminants have been identified and no pathway is present.</i>
Controlled Waters	<i>No realistic pollution linkages are considered to exist as no sources have been identified.</i>

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Plans		
<i>Plan Reference</i>	<i>Revision</i>	<i>Title</i>
<i>GRO-23266-P01</i>	-	<i>Project Location Plan</i>
<i>GRO-23266-P03</i>	-	<i>Exploratory Hole Location Plan</i>
<i>GRO-23266-P04</i>	-	<i>Generalised Ground Model</i>

1.0 INTRODUCTION

1.1 Project Objectives

Groundtech Consulting Limited have been instructed by Couch Consulting Engineers to undertake a Geo-Environmental Appraisal for a site at Corporation Road in Newport.

A main investigation was undertaken in accordance with BS 5930:2015, BS 10175:2017 and Eurocode 7

1.2 Proposed Development

The proposed development is commercial end use comprising a new access road and site entrance to the site.



1.3 Limitations

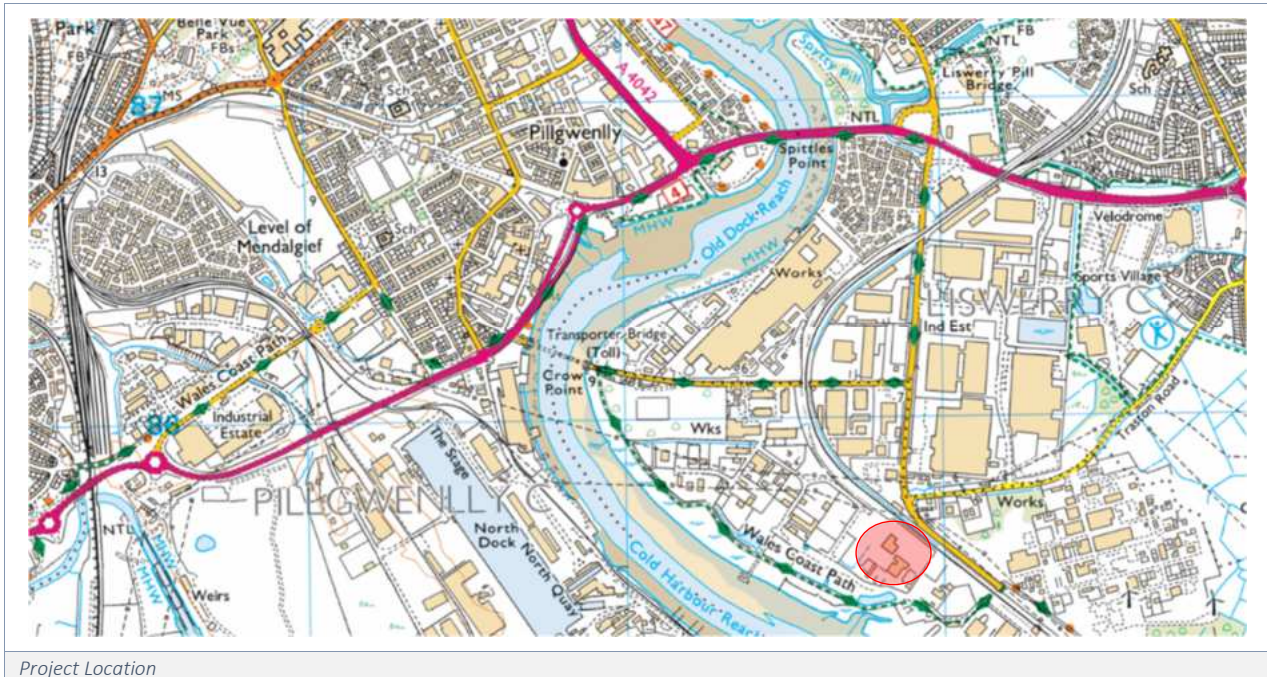
Other conditions may exist on the site that have not been taken into account in this assessment as they are outside the scope of works. Groundtech Consulting are not responsible for these circumstances that are not outlined in the report.

The assessment has been prepared for the exclusive use of the client. No third parties may rely on or reproduce the contents of the report without the written permission of Groundtech Consulting Limited. If any unauthorised third party comes into possession of the report they rely on it at their own risk and Groundtech Consulting Limited will not be obliged to provide a duty of care.

2.0 SITE SETTING

2.1 Location

The site is located circa 1.85 miles south east of Newport Town Centre, as shown on the Project Location Plan *GRO-23266-P01*. The site is approximately centred on National Grid Reference 332951, 185497.



Access to the site is gained off Corporation Road to the north of the site.

2.2 Site Description

The site is rectangular and is approximately 7.3 hectares in area, the development area comprises a proportion of the eastern area of the site where the new access road is proposed. The site is topographically level and used as a roadway by vehicles.

Site Features

The site is occupied by Marshalls PLC as a concrete factory and distribution centre. The factory is located to the north west of site with access roads covering the site. The factory is a large steel framed building approximately 0.2 hectares in area. An associated steel framed building to the factory is located to the north east.

Some areas of the existing roadway are to be retained and some are to be grubbed up and replaced with new roadways in line with Couch consulting plan 221681-AHR-GH-XX-DR-A-SK-010.

The site offices and canteen are located to the west of site, staff car parking is directly north of the offices. The site offices are comprised of a reception to the west, adjacent to the entrance.

The south of site is utilised as an area of storage for Marshall's concrete products and experiences a heavy traffic flow of machinery and lorries. The yard primarily stored blocks of concrete and bricks prepared for delivery.

At the extreme south of site, a workshop with an associated yard is located. At the time of the investigation the workshop was empty with works proceeding in the surrounding land where concrete had been broken out. The workshop primarily focused on repairs and maintenance for the Marshalls Yard.

A large heavily vegetated ditch is present to the west of site, south of the site office and directly east of the currently used access road. This area contains bushes and shrubbery.

An electricity substation is present to the south of the site approximately 3m wide and 5m in length.

At the time of the investigation the site was predominantly surfaced by concrete. In the far south and north hard surfacing had been broken out exposing the subbase prior to the Ground Investigation.

Site Boundaries and Surrounding Area

The site boundary is secured by metal palisade fencing and concrete walls. Site entrances are steel gates. The north west boundary dense vegetation of bushes and mature trees are present adjacent to the railway.

The site is surrounded by following features/land uses:

- North - Dense vegetation and mature trees with a railway line, corporation road beyond and industrial properties beyond.
- East - Dense vegetation and mature trees with a railway line, corporation road beyond and industrial properties beyond.
- South - Emirates Fast Courier Services to the south/south east. Dense vegetation with the River Usk beyond.
- West - Access road with Industrial properties beyond.

Site photographs are presented in *Appendix 2*.

3.0 PREVIOUS INVESTIGATION SUMMARY

Groundtech Consulting completed a geotechnical appraisal referenced GRO-23266-4831 dated the 17th November 2023 in regards to the proposed development of a new silo supported by piled foundations.

3.1 Scope of Works

The following scope of works was completed by Groundtech Consulting between the 18th September to 20th September 2023:

- 1 No. cable percussive borehole (BH101) was drilled to a depth of 15.0m bgl using a Dando 2000
- Rotary follow was advanced from 15.0m to a final depth of 19.5m bgl

3.2 Ground Model

Surfacing

Brown paving bricks were encountered at ground level to a depth of 0.08m bgl.

Made Ground

Made Ground was encountered in BH101 to a maximum depth of 1.8m bgl and comprised five populations:

1. Paving bricks was encountered from ground level to a depth of 0.08m bgl.
2. Grey brown gravelly fine to medium sand with constituents of brick and concrete was encountered from a depth of 0.08m bgl to a depth of 0.15m bgl.
3. A layer of concrete was encountered from a depth of 0.15m bgl to a depth of 0.2m bgl.
4. Red grey sandy angular to rounded fine to coarse gravel of brick and concrete was encountered from a depth of 0.2m bgl to a depth of 0.5m bgl.
5. Black gravelly ashy fine to coarse sand with a strong hydrocarbon odour and constituents of ash, slag, and clinker was encountered from 0.5m bgl to a depth of 1.8m bgl.



Previous Exploratory Hole Location Plan

Natural Strata

Soft grey silty organic Clay was encountered from a depth of 1.8m bgl to a depth of 12.7m bgl.

Bedrock

Bedrock consisting of red brown/green grey Mudstone was encountered from 12.7m bgl to a final depth of 19.5m bgl.

Groundwater

Groundwater seepages were encountered at 0.9m bgl and 10.95m bgl within the borehole.

Observations

Clinker and ash were present within the Made Ground from 0.5m to 1.8m bgl. Olfactory evidence of contamination was noted in the form of a hydrocarbon odour within the same Made Ground strata. Strong organic odour was also noted within the natural silty Clay.

3.3 Geo-Environmental Testing Summary

Two samples of the Made Ground had been tested at the site for a range of determinands including heavy metals, Polycyclic aromatic hydrocarbons, Total petroleum hydrocarbons and asbestos. A summary of the results and generic quantitative risk assessment is presented below.

Soils

No elevated concentrations of metals, speciated PAHs or TPH CWG were detected in the Made Ground.

Asbestos fibres were detected within the Made Ground at 0.8m bgl with subsequent quantification testing recording a mass of <0.001%.

As the development area is to be covered with hardstanding no risk is was considered to be present to site end users from contaminated soils.

3.4 Geotechnical Summary

Piled foundations driven into the mudstone bedrock were considered the most feasible option for the silo. The clay was of a medium volume change potential.

4.0 SCOPE OF INVESTIGATION AND RATIONALE

4.1 Project Objectives

The aim of the fieldwork was to:

Determine the stratification beneath the site
Maintain watching brief for visual and olfactory evidence of contamination
Obtain samples using methodology in current guidance for contamination testing
Obtain relevant geotechnical parameters for highways design

4.2 Scope of Works

The following scope of works was completed between the 9th July and 10th of July 2023:

- 6 No. Windowless sample boreholes (WS01 to WS06) were advanced to a maximum depth of 3.0m bgl using a Dando Terrier
- 3 No. Dynamic probes (DP01, DP03 and DP05) were progressed to a maximum depth of 0.8m bgl
- 6 No. Plate Load Tests (PLT01 to PLT06) were conducted at a depth of between 0.35m and 0.8m bgl
- Traffic Management along existing access road.

The exploratory hole locations are presented on Groundtech Plan GRO-23266-P03 and the exploratory hole logs are in Appendix 3.

The exploratory holes were positioned to establish the stratification beneath the site and target any areas of concern as summarised in the table below:

Location	Target Rationale
WS01 to WS06	Determine stratification beneath the proposed highway
PLT01 to PLT06	Obtain CBR values for proposed highway design
DP01, DP03 and DP05	To obtain soil parameters

The exploratory holes were logged by a suitably experienced geo-environmental engineer in general accordance with the following current guidance:

- BS 5930 'Code of Practice for Site Investigations' 2020
- BS EN 14688-1:2002 'Geotechnical Investigation and Testing – Identification and classification of soil'

4.3 Soil Sampling

During the intrusive investigation, representative samples were taken at regular intervals, changes of strata and where evidence of contamination existed. Laboratory analysis was scheduled on the samples obtained.

The samples obtained are summarised in the table below:

Soil Sample	Number
<i>Environmental Sample</i>	<i>11</i>
<i>Disturbed Sample</i>	<i>6</i>

The samples have been obtained in accordance with current environmental and geotechnical guidance. The sampling plan has been designed obtain samples from all required strata using the correct methodology.

Disturbed samples of soil for geo-environmental testing were placed in the correct sampling containers as required by the laboratory in accordance with their MCERTS and UKAS Accreditation. Transportation was arranged in a timely manner and the samples were at the correct temperature.

The sample locations and depths are recorded on the exploratory logs.

4.4 Laboratory Testing

To inform the Generic Quantitative Risk Assessment, the following geo-environmental testing was scheduled to assess the risk from contamination on the site. The testing is based on observations during the Ground Investigation.

Contaminant of Concern (CoC)	Matrix	Number
<i>Arsenic, cadmium, chromium (total and hexavalent), copper, lead, mercury, nickel, selenium, zinc and pH.</i>	<i>Soil</i>	<i>6</i>
<i>Total Petroleum Hydrocarbons (TPH CWG)</i>	<i>Soil</i>	<i>3</i>
<i>Asbestos (Screening and Quantification)</i>	<i>Soil</i>	<i>6</i>

The Geo-Environmental Laboratory Testing Results are presented in *Appendix 4*.

Representative disturbed samples were obtained for all soil types encountered. Selected samples were scheduled for testing at an approved laboratory in accordance with BS 1377 'Method of Test for Soils for Civil Engineering Purposes' 1990. The following tests were scheduled:

British Standard	Test Method	Number
<i>Part 2</i>	<i>Water Content</i>	<i>6</i>
<i>Part 2</i>	<i>Plasticity Index Analysis</i>	<i>6</i>

The Geotechnical Laboratory Testing Results are presented in *Appendix 5*.

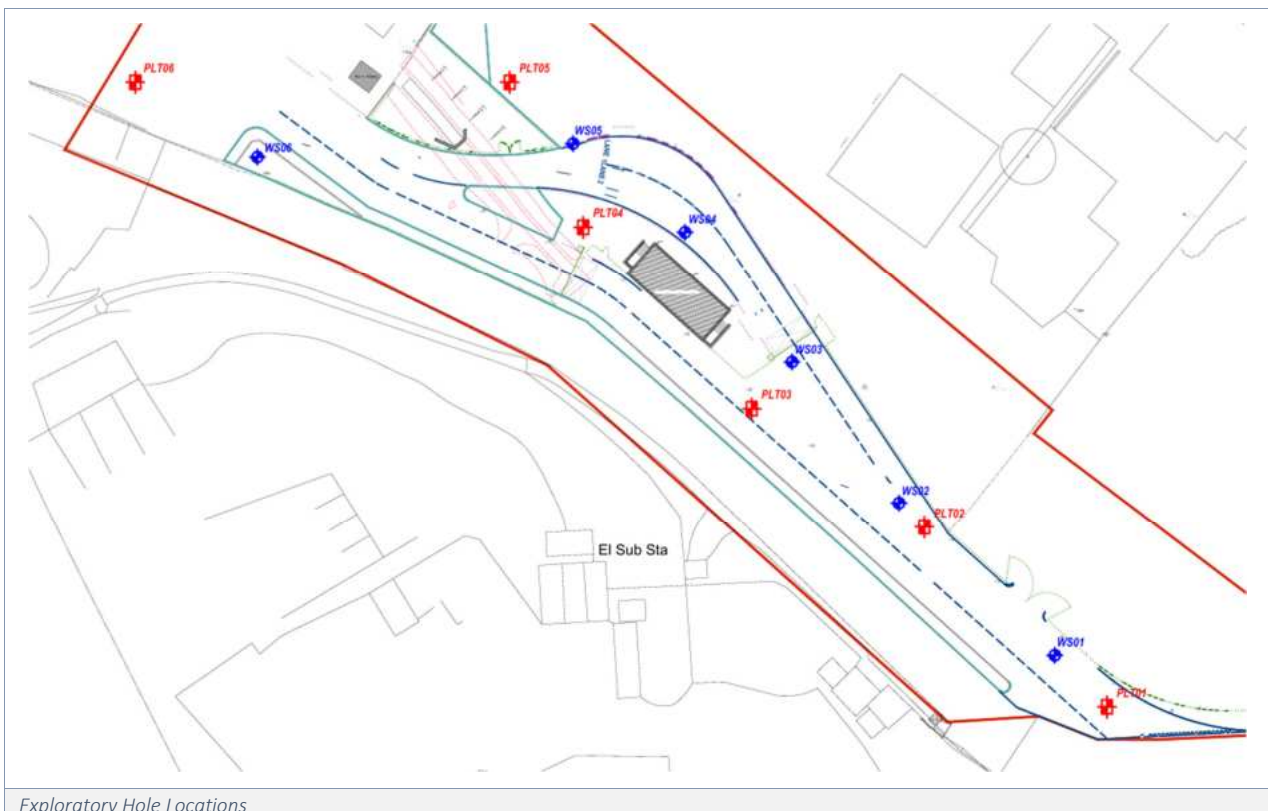
5.0 GROUND MODEL

5.1 Made Ground

The surfacing of site predominantly consisted of concrete to depths of between 0.17m bgl and 0.2m bgl in the extreme eastern and western section of site. Topsoil was encountered in the eastern section of site (PLT01) to a depth of 0.2m bgl.

Three main Made Ground populations were encountered during the investigation and are described below:

1. *Dark grey/reddish brown, gravelly, locally silty, fine to coarse sand of minor constituents including brick, mudstone, sandstone, occasional chert, occasional flint, occasional chalk and occasional vegetation was encountered in WS01, WS02, WS04, WS06 from ground level to depths of between 0.3m bgl and 1.2m bgl.*
2. *Dark brown angular to subangular fine to coarse gravel of mudstone and chert was encountered in WS03 and WS05 from a depth of 0.19m bgl to a depth of 0.7m bgl.*
3. *Firm, dark brown gravelly clay of minor constituents including mudstone, brick and vegetation was encountered in WS06 from a depth of 0.2m bgl to a depth of 0.4m bgl.*



5.2 Natural Ground

The natural strata encountered generally confirmed the published geological records. Two main natural stratification was encountered during the investigation and is described below:

1. *Firm, brown/dark grey gravelly, occasionally silty, occasionally sandy CLAY with minor constituents of mudstone, siltstone and occasional quartz was encountered in WS01 and WS04 from a depth of between 0.6m bgl and 0.67m bgl to a depth of between 1.0m bgl and 3.0m bgl.*
2. *Firm, brown/dark grey, gravelly CLAY with minor constituents including siltstone and quartz in WS06 from a depth of 0.6m bgl to a depth of 2.0m bgl.*

5.3 Bedrock

Bedrock was not encountered during the investigation.

5.4 Groundwater

Groundwater was not encountered during the Ground Investigation.

5.5 Watching Brief

A watching brief was maintained during the Ground Investigation and no visual or olfactory evidence of contamination was encountered.

5.6 Excavation Stability

No evidence of spalling or collapse was noted during excavation of the plate load test locations.

5.7 Excavation Progress

Difficulty progressing the excavation of the plate load tests locations occurred where very dense subbase strata was encountered.

6.0 GROUND ENGINEERING

6.1 Geotechnical Testing Results

Comparison of water content and the value of 0.4 times the Liquid Limit in accordance with BRE Digest 412 'Desiccation in Clay Soils' suggests significant desiccation has taken place when 0.4 times the Liquid Limit is greater than the actual water measured water content. This is a rudimentary method but also a good guide.

Results of the plasticity testing and the volume change potential of the Clay is summarised in the table below:

Reference	Depth (m)	Modified PI	Volume Change Potential	Desiccated
WS01	1.00	NP	-	-
WS04	1.50	43	High	N
WS04	2.00	39	Medium	N
WS04	3.00	41	High	N
WS06	1.50	35	Medium	N
PLT06	0.80	36	Medium	N

6.2 Assessment Background

The ground engineering investigation has been undertaken to formulate an accurate ground model in order to undertake preliminary foundation design. The ground model has been constructed with a moderate level of confidence.

Background

The site is currently situated in the Marshall's distribution yard. The concrete factory is located at the north and the storage yard is located to the south. The site's main office is situated to the west of site, adjacent to the current entry point to the site.

A large, vegetated ditch was present to the west of site adjacent to the current access road.

The access road at the site is to be retained and replaced in accordance with Couch Consulting plan 221681-AHR-GH-XX-DR-A-SK-010 as shown below, hatchings on the plan denote the varying areas of the new access road to be constructed.



Ground Conditions

Soft landscaping is present in the extreme east of the site along the site boundary. The remainder of the site contained hardsurfacing of stone paving and concrete. Made ground was encountered beneath the site to a depth of 1.2m bgl and generally comprised grey and reddish brown, occasionally silty, gravelly fine to coarse sand of minor constituents including brick, mudstone, sandstone, occasional chert, occasional flint and occasional chalk.

Superficial deposits were encountered in this Ground Investigation. Firm, brown, gravelly clay of minor constituents including siltstone, quartz and mudstone were encountered to a depth of between 0.6m bgl and 3.0m bgl. No bedrock deposits were encountered during the investigation.

No groundwater was encountered during the investigation.

Limitations

The main limitation at the site is considered to be the retention of some of the areas of hardstanding at the site and the implementation of new areas of hardstanding, the adjoining hard surfacing should be constructed that no impaction to vehicles occurs over transitional areas.

6.3 Geotechnical Parameters

The geotechnical test results have been evaluated to derive geotechnical parameters for the soils underlying the site. A depth to SPT N value graph is presented on Groundtech Plan GRO-23266-P04 to provide a generalised ground model for the site.

Characterisation of the geotechnical parameters above has been undertaken to select a characteristic value, which is a cautious estimate of the value affecting the occurrence of the limit state.

Dynamic probing was carried out below the concrete and stone paving and through correlation, an approximate SPT N value of the underlying material has been derived as detailed in the table below.

Ref	Depth (m)	Strata	Correlated SPT Value	Angle of Friction (' ϕ ')
DP01	0.4	MG: Dense Gravelly silty sand	44	39°
DP01	0.7	MG: Very Dense Gravelly Silty Sand	61	43°
DP03	0.4	MG: Loose Gravel	10	30°
DP03	0.7	Made Ground: Dense Gravel	50	41°
DP05	0.4	MG: Very loose Gravel	7	29°
DP05	0.6	MG: Dense gravel	50	41°

6.4 Construction

The excavation of plate load tests indicate that instability of excavations is not anticipated provided they are not exposed to adverse weather conditions for any substantial period of time. Instability of the Made Ground is a possibility and should be considered in the groundworks method statements.

Tracked high specification plant is recommended to maintain the build programme. Breaking equipment may also be required to break areas of hardsurfacing.

Difficulty occurred when excavating the subbase of the concrete. Breaking equipment may be required to excavate the Cementous subbase which appears to have been stabilised.

A large, vegetated ditch is located in the centre of the proposed footprint and will require consideration during the enabling works. The lack of groundwater at the site is likely due to the drainage ditch present at the site.

6.5 Concrete Classification

Made Ground

Water soluble sulphate testing was undertaken on 4 samples of the Made Ground. The range of soluble sulphate (SO_4) recorded is 21.4mg/l to 225.0mg/l. Associated pH values ranged between 7.7 and 10.4 indicating slightly alkaline conditions.

For a dataset containing less than five results, the highest sulphate test results should be used and the lowest pH results used to determine the characteristic values. For the Made Ground, a characteristic water soluble sulphate concentration of 225.0mg/l and a pH value of 7.7 have been selected.

Natural Strata

Water soluble sulphate testing was undertaken on one sample of the natural strata. The soluble sulphate (SO_4) value recorded is 59.7mg/l. The associated pH value is 8.6 indicating slightly alkaline conditions.

For a dataset containing less than five results, the highest sulphate test results should be used and the lowest pH results used to determine the characteristic values. For the natural soils, a characteristic water-soluble sulphate concentration of 59.7mg/l and a pH value of 8.5 have been selected.

As cohesive soils have been encountered at the site the groundwater is considered to be static.

The results of laboratory pH and sulphate content indicate that ACEC Class AC-1 and sulphate class DS-1 conditions prevail in accordance with BRE Special Digest 1 "Concrete in aggressive ground" 2005. The specific concrete mixes (the Design Concrete Class) to be used on site will be determined by the site-specific concrete requirements in terms of the durability and structural performance. These are assessed in terms of the

Structural Performance Level (SPL) and any need for Additional Protective Measures (APM) detailed in Part D of BRE Special Digest 1 with further guidance in Pt E and F.

6.6 Highway Design

Plate load testing was undertaken in order to obtain a representative CBR value of the underlying strata at existing formation levels for access roads. The full results are presented in *Appendix 6* and a summary of the results are presented below.

Location	Depth (m)	Strata	CBR Value (%)	Modulus of subgrade reaction (kN/m ² /mm)
PBT01	0.8	MADE GROUND: brown gravelly sand	24.6	92.3
PBT02	0.4	MADE GROUND: brown gravelly sand	44.8	130.5
PBT03	0.6	MADE GROUND: brown gravelly sand	21.0	84.4
PBT04	0.5	MADE GROUND: black gravelly sand	22.1	86.9
PBT05	0.6	MADE GROUND: black gravelly sand	68.6	166.9
PBT06	0.6	MADE GROUND: yellow gravelly sand	8.9	51.3

Plate load testing was undertaken within the footprint of the proposed access road. All results have achieved the required design value of 5% for highway and pavements.

Both granular and cohesive subgrade should be proof rolled prior to construction as a minimum.

The soils are considered to frost susceptible due to the fines content, highway construction should be a minimum thickness of 450mm to mitigate against the risk.

As part of the development of the new roadway, varying roadways are to be constructed from smooth concrete and Marshalls Tegula 60 paving. Existing surfacing to be retained comprises of Block paving and concrete.

The existing subbase at the site is suspected to have been stabilised due to the difficulty of excavation and should be considered during the redevelopment of the site, CBR values encountered would allow for the reuse of this subbase material however proposed levels should be consulted to the appropriateness of this material.

The existing highway construction was approximately 0.70m in thickness and firm clay deposits were encountered below in all windowless sample borehole locations excluding WS02, WS03 and WS05.

It is also proposed that Corporation Street is to be resurfaced.

It is unknown if the existing ditch at the site is to be retained or removed, if this is to be removed it should be excavated and backfilled appropriately in accordance with an approved earthworks specification.

7.0 LAND QUALITY

7.1 Geo-Environmental Testing Results - Soils

Samples of Made Ground and natural strata have been tested for a range of relevant Contaminants of Concern. In accordance with LCRM, a Generic Quantitative Risk Assessment (GQRA) has been undertaken to determine the significance of the concentrations as derived through Geo-Environmental testing.

The GQRA process comprises the comparison of the actual concentrations measured on site with Generic Assessment Criteria (GACs) for the protection of human health.

The GACs used for the assessment of soil concentrations have been derived using the CLEA model. The GACs used are listed below:

- *Soil Guideline Values (SGVs) which demonstrate minimal risk.*
- *LQM/CIEH S4ULs which use the same toxicological data as the SGVs but different exposure criteria.*
- *C4SLs which demonstrate low risk.*

In deriving the GACs for use on Brownfield sites we have assumed a 1% Soil Organic Matter, unless the results indicate otherwise.

The proposed end-use for the site is a commercial development comprising the development of a new access road for Marshall's concrete factory. We have therefore undertaken the GQRA on the basis that the proposed development site falls under the commercial land-use scenario as defined in SR3 (EA, 2009b).

The strata or sources of contamination targeted by the laboratory testing scheduled is summarised in the table below:

Strata	Number of Samples Tested	Locations
<i>Granular Made Ground</i>	<i>4</i>	<i>WS01, WS02, WS04, PLT02</i>
<i>Natural Sand</i>	<i>1</i>	<i>WS06</i>

A summary of the Geo-Environmental Testing results is presented below and the GQRA screening values are presented in *Appendix 7*:

Contaminant	Range (mg/kg)	Metals		
		Screening value (mg/kg)	Exceedances	Locations
<i>Arsenic</i>	<i>4.3 – 23</i>	<i>640</i>	-	-
<i>Cadmium</i>	<i><0.2 – 2.4</i>	<i>190</i>	-	-
<i>Chromium</i>	<i>9.1-230</i>	<i>8600</i>	-	-
<i>Hexavalent Chromium</i>	<i><1.8</i>	<i>33</i>	-	-
<i>Copper</i>	<i>6.2 – 130</i>	<i>68,000</i>	-	-
<i>Lead</i>	<i>8 – 720</i>	<i>2300</i>	-	-
<i>Mercury</i>	<i><0.3 – 1.2</i>	<i>26</i>	-	-
<i>Nickel</i>	<i>4.3 - 43</i>	<i>980</i>	-	-
<i>Selenium</i>	<i><1.0 – 1.6</i>	<i>12,000</i>	-	-
<i>Zinc</i>	<i>36 – 370</i>	<i>730,000</i>	-	-
Polycyclic Aromatic Hydrocarbons (PAHs)				

Contaminant	Range (mg/kg)	Screening value (mg/kg)	Exceedances	Locations
<i>Naphthalene</i>	<0.05 – 0.42	1600	-	-
<i>Acenaphthylene</i>	<0.05	83,000	-	-
<i>Acenaphthene</i>	<0.05 – 0.06	84,000	-	-
<i>Fluorene</i>	<0.05 – 0.06	63,000	-	-
<i>Phenanthrene</i>	0.05 – 0.36	22,000	-	-
<i>Anthracene</i>	<0.05 – 0.08	520,000	-	-
<i>Fluoranthene</i>	<0.05 – 0.27	23,000	-	-
<i>Pyrene</i>	<0.05 – 0.67	54,000	-	-
<i>Benzo(a)anthracene</i>	<0.05 – 0.49	520,000	-	-
<i>Chrysene</i>	<0.05 – 0.59	350	-	-
<i>Benzo(bk)fluoranthene</i>	<0.05 – 0.74	44	-	-
<i>Benzo(a)pyrene</i>	<0.05 – 0.49	35	-	-
<i>Indeno(123cd)pyrene</i>	<0.05 – 0.28	500	-	-
<i>Dibenzo(ah)anthracene</i>	<0.05	3.5	-	-
<i>Benzo(ghi)perylene</i>	<0.05 – 0.28	3900	-	-
TPH CWG - Aliphatics				
Contaminant	Range (mg/kg)	Screening value (mg/kg)	Exceedances	Locations
>C5-C6	<0.020	3200	-	-
>C6-C8	<0.020	7800	-	-
>C8-C10	<0.050	2000	-	-
>C10-C12	1.2 – 6.2	9700	-	-
>C12-C16	2.4 – 16	36,000	-	-
>C16-C21	<8.0 – 51	28,000	-	-
>C21-C35	21 – 520	28,000	-	-
<i>Total aliphatics C5-35</i>	25 - 590	28,000	-	-
TPH CWG - Aromatics				
Contaminant	Range (mg/)	Screening value (mg/kg)	Exceedances	Locations
>EC5-EC7	<0.010	26,000	-	-
>EC7-EC8	<0.010	56,000	-	-
>EC8-EC10	<0.050	3500	-	-
>EC10-EC12	<1.0	16,000	-	-
>EC12-EC16	<2.0 – 2.3	36,000	-	-
>EC16-EC21	<10 – 12	28,000	-	-
>EC21-EC35	<10 -150	28,000	-	-
<i>Total aromatics C5-35</i>	<10 – 170	28,000	-	-
<i>Total aliphatics and aromatics(C5-35)</i>	<10 - 590	28,000	-	-
<i>MTBE</i>	<5.00 ug/kg	7900	-	-
<i>Benzene</i>	<5.00 ug/kg	27	-	-
<i>Toluene</i>	<5.00 ug/kg	56,000	-	-
<i>Ethylbenzene</i>	<5.00 ug/kg	5700	-	-
<i>m/p-Xylene</i>	<5.00 ug/kg	5900	-	-
<i>o-Xylene</i>	<5.00 ug/kg	6600	-	-

Others			
<i>Organic Matter</i>	<i>1.6%</i>		
Asbestos Screen			
Position	Depth (m bgl)	Result	Quantification
<i>WS01</i>	<i>0.15</i>	<i>None Detected</i>	<i>n/a</i>
<i>WS02</i>	<i>0.20</i>	<i>None Detected</i>	<i>n/a</i>
<i>WS03</i>	<i>0.10</i>	<i>None Detected</i>	<i>n/a</i>

7.2 Generic Quantitative Risk Assessment - Soils

Made Ground was recorded in all exploratory locations to a maximum depth of 1.2m bgl in WS02 and comprised two main populations.

Heavy Metals

Geo-Environmental testing on the soils has indicated that there are no elevated heavy metal concentrations when compared to commercial screening values.

Speciated Polycyclic Aromatic Hydrocarbons (PAHs)

Using the commercial screening values, no elevated concentrations of speciated PAHs have been recorded.

Total Petroleum Hydrocarbons (TPH)

When compared to the commercial screening values no elevated concentrations of TPH was recorded at the site.

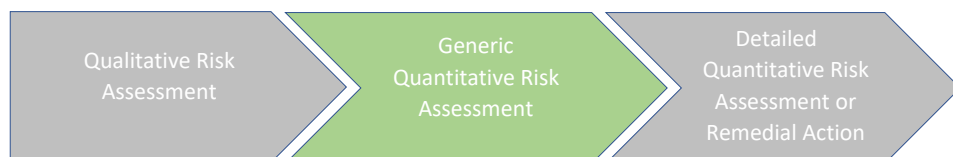
Asbestos

Asbestos testing was undertaken on three samples and no asbestos was detected.

7.3 Pollution Linkage Assessment

The CSM has been based on the Ground Investigation and testing using Source-Pathway-Receptor assessment criteria that is applicable in the UK, a risk assessment has been completed to determine if a plausible pollution linkage exists between the identified contaminants and receptors. The risk classification has been estimated in accordance with the CIRIA C552 assessment criteria outlined in *Appendix 7*.

Human Health Pollution Linkage Assessment

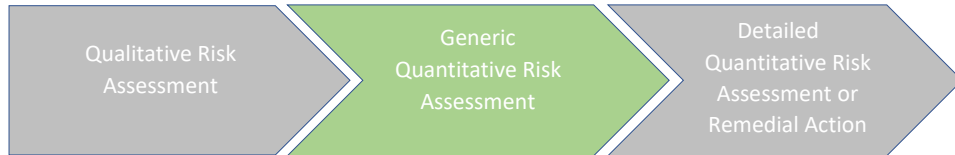


- The table below represents the second stage in the land quality risk assessment process - **the Generic Quantitative Risk Assessment**.
- In order for a development site to be deemed 'suitable for use' the level of risk needs to be reduced to an acceptable level - low to negligible risk. The purpose of each stage of risk assessment is to establish if there is a requirement for additional stages of assessment in order to have sufficient confidence to support a risk characterisation or remedial action.

Conceptual Site Model					Generic Quantitative Risk Assessment	
PL	Potential Source	Pollution Linkage	Likelihood	Consequence/ Severity	Risk Rating	Rationale and Action
PL1	Contaminated Soils	Ingestion of soil and dust. Dermal contact with soil.	Unlikely	Medium	Low	<i>Pollution Linkage 1 refers to proposed site users coming into contact with contaminated soils on the site.</i> <i>Made Ground was encountered beneath the site to a maximum depth of 1.2m bgl and no evidence of visual or olfactory contamination was noted.</i> <i>No elevated concentrations for commercial end use were recorded through the laboratory testing. The hardstanding surfacing of the proposed development will create an impermeable pathway to site end users therefore no risk is considered to exist.</i>
PL2	Contaminated Soils	Inhalation of vapour.	Low likelihood	Medium to Severe	Low	<i>No sources of mobile contamination were identified by the Ground Investigation and therefore no pollution linkage is considered to exist.</i>

Conceptual Site Model					Generic Quantitative Risk Assessment	
PL	Potential Source	Pollution Linkage	Likelihood	Consequence/ Severity	Risk Rating	Rationale and Action
PL3	Contaminated Soils	Inhalation of soil dust by adjacent site users.	Unlikely	Medium	Low	<i>Pollution Linkage 3 relates to contamination on the subject site affecting adjacent site users. No contaminants of concern were noted during the investigation and adjacent land uses are indicative of the general activities on site. Therefore, no risk is considered to exist.</i>
PL4	Contaminated Soils	Attacking potable water supply pipe.	Unlikely	Medium	Low	<i>Pollution Linkage 4 refers to the contaminants permeating potable water pipes and consumption by the future site end users of the tainted water supply.</i> <i>No water pipes are proposed as part of the new roadway and therefore the risk is considered to be low.</i>
PL5	Ground Gas	Migration and accumulation of ground gas in internal spaces.	Unlikely	Medium to Severe	Low	<i>Made Ground was encountered but no sources of ground gases were identified. As no enclosed spaces are proposed at the site, no accumulation of ground gas is possible and no risk is considered to exist.</i> <i>The site is not within an area requiring radon precautions within foundations.</i>

Controlled Waters Pollution Linkage Assessment



- The table below represents the second stage in the land quality risk assessment process – **Generic Quantitative Risk Assessment**.
- In order for a development site to be deemed ‘suitable for use’ the level of risk needs to be reduced to an acceptable level - low to negligible risk. The purpose of each stage of risk assessment is to establish if there is a requirement for additional stages of assessment in order to have sufficient confidence to support a risk characterisation or remedial action.

Conceptual Site Model					Generic Quantitative Risk Assessment	
PL	Potential source	Pollution linkage	Likelihood	Severity	Level of risk	Rationale
PL6	Contaminated Soils	Impaction of groundwater from soil contamination (diffuse and point). Impaction of groundwater from groundwater plume.	Unlikely	Medium	Low	Made Ground has been encountered at the site to a maximum depth of 1.2m bgl and comprised of granular and cohesive materials. No visual or olfactory evidence of contamination was encountered. Geological maps indicate that the site is underlain by Superficial tidal flat deposits (Unproductive Aquifer) and the bedrock strata comprises Mercia Mudstone (Secondary B Aquifer). A clay aquitard is present beneath the site and was encountered during the investigation. No realistic pollution linkage has been identified to the underlying
PL7	Contaminated Soils	Migration of soil and groundwater contamination impacting surface waters.	Unlikely	Medium	Low	Pollution Linkage 7 refers to the River Usk 230m south west of the site, no source of mobile contamination has been identified and therefore no realistic pollution linkage exists.

7.4 Outline Remedial Strategy

Soils

No elevated Contaminants of Concern (CoC) were identified by the laboratory testing or Ground Investigation therefore, no remedial action is necessary.

Ground Gas

As no confined spaces are proposed as part of the development, the risk from ground gas is considered to be low as there is no receptor for accumulation of gasses.

Vapours

No remedial action is required, no vapour sources were identified.

Controlled Waters

As no mobile contaminants have been encountered as part of the Ground Investigation no risk to controlled waters is considered to exist.

Watching Brief and Regulatory Compliance

If previously unidentified contamination is encountered, work should cease in that area and Groundtech Consulting contacted for advice.

Regulatory compliance should be obtained pre-commencement to avoid delays during the construction phase which will have cost implications.

7.5 Asbestos in Soils

Asbestos was not encountered during the ground investigation and therefore no risk is considered to exist.

7.6 Health and Safety - Construction and Ground Workers

During the reclamation and construction phases of the site development it will be necessary to protect the health and safety of site personnel. The risk to construction and ground workers is assessed in the table below:

PL Ref	Potential Source	Pollution Linkage	Likelihood	Severity	Level of Risk
PL8	Made Ground	Ingestion, direct contact, inhalation of dusts.	Likely	Medium	Low
PL9	Asbestos	Ingestion, direct contact, inhalation of dusts.	Likely	Medium	Low

No elevated concentrations of contamination have been encountered during the laboratory testing.

General guidance on these matters is given in the Health and Safety Executive (HSE) document "Protection of Workers and the General Public during the Redevelopment of Contaminated Land". In summary, the following measures are suggested to provide a minimum level of protection:

- All ground workers should be issued with the relevant protective clothing, footwear and gloves. These protective items should not be removed from the site and personnel should be instructed as to why and how they are to be used.

- *Hand-washing and boot-washing facilities should be provided.*
- *Care should be taken to minimise the potential for off-site migration of contamination by the provision of dust suppression control and wheel cleaning equipment during the construction works.*
- *Good practices relating to personal hygiene should be adopted on the site.*
- *The contractor shall satisfy the Health and Safety Executive with regard to any other matters concerning the health, safety and welfare of persons on the site.*

7.7 Waste Classification by Assessment

We have reviewed the testing results and inputted them into the HazWasteOnline model which allows users to code and classify waste as defined in the EWC (European Waste Catalogue 2002) based on EC Regulation 1272/2008 on the Classification, labelling and packaging of substances and mixtures (CLP) and latest Environment Agency guidance (WM3 "Guidance on the classification and assessment of waste (1st edition 2015)-Technical Guidance").

This is a useful tool as waste producers have the legal responsibility to classify any waste they produce.

Six samples were tested to assess whether they contained any contaminants in the hazardous range when screened against assessment criteria within WM3. The results are in the Waste Classification Report presented in *Appendix 9*.

Based on the assessment tool the Made Ground has been classified as *Non-Hazardous* with the exception of one sample from PLT05 at 0.40m bgl which has been classified as hazardous based on zinc concentrations causing a carcinogenic hazardous properties. Discussions should be held with waste receiver as zinc concentrations encountered were relatively low.

Total testing was not undertaken on the natural soils and are assumed to be *Non-Hazardous*.

7.8 Waste Acceptance Criteria (WAC) Results

Waste Acceptance Criteria was outside the scope of this investigation and the guidance given below is general.

The Landfill Directive (Directive 1999/31/EC on the landfilling of waste) led to the establishment of a methodology for classifying wastes. Wastes can only be accepted at a landfill if they meet the relevant Waste Acceptance Criteria (WAC) for that type of landfill. There are three different WAC, these are for:

- *Inert waste*
- *Non-Hazardous waste*
- *Hazardous waste*

Wastes should first be classified based on their total concentrations as detailed in the previous section. WAC testing is then required if the end disposal route is a landfill.

The possibility of automatic inert classification of the natural soils should be explored in accordance with Section 4.3 of the EA guidance document. The Council Decision includes a list of wastes in Section 2.1.1 of the document that are assumed to be inert and therefore acceptable at a landfill for inert waste without testing, this is the case if:

- *They are single stream waste of a single waste type (although different waste types from the list may be accepted together if they are from a single source)*
and
- *There is no suspicion of material or substances such as metals, asbestos, plastics, chemicals, etc to an extent which increases the risk associated with the waste sufficiently to justify contamination and they do not contain other their disposal in other classes of landfill.*

If any organic contaminated material is encountered during the construction phase, it is possible that this may be classified as hazardous and testing should be undertaken at that time.

Materials should segregate and where necessary sufficient time is allowed to further classify the material properly, including discussion with landfill sites and waste transfer stations to find the best disposal route. It is recommended that where possible that the soils could be recycled at a suitable local waste treatment plant or transfer station rather than a landfill disposal route.

The reuse of soils on the site this should be done in accordance with the CL:AIRE “Development Industry Code of Practice for the Definition of Waste” (CL:AIRE CoP). Any re-use scheme should be designed to minimise disposal costs.

After a cut and fill balance plan/volume calculation has been carried out, a U1 and T5 exemption could be registered. This will allow the use of the following soils without a waste permit or under Dow CoP MMP:

- *1,000 tonnes (c. 600m³) of non-hazardous soil*
- *5,000 tonnes (c. 3,000m³) of natural sand and gravels.*
- *50,000 tonnes (c. 25,000m³) of bituminous material to be used in roadways.*
- *5,000 tonnes (c. 3,000m³) of crushed concrete/stone.*

8.0 FINAL APPRAISAL

8.1 Land Quality

Made Ground was encountered in all exploratory holes from ground level to a maximum depth of 1.2m bgl. No elevations of heavy metals or TPH or speciated PAHs were detected by the laboratory testing when compared to the commercial screening values.

No remedial action is required as no contaminants of concern or sources of contamination have been identified by the Ground Investigation

No realistic pollution linkages to the human health or controlled waters are considered to exist as no sources of contamination or contaminants of concern have been identified during the Ground Investigation.

Six samples were tested to assess whether they contained any contaminants in the hazardous range when screened against assessment criteria within WM3. The assessment tool classified Made Ground as non-hazardous with the exception of PLT05 at 0.40m bgl which has been classified as hazardous due to concentrations of Zinc encountered.

8.2 Ground Engineering

Plate load testing undertaken during the Ground Investigation recorded CBR values ranging from 8.9 to 68.6% achieving the required design value of greater than 5%.

Laboratory testing indicates the concrete classification to be ACEC Class AC-1 and sulphate class DS-1.

9.0 RELEVANT INDUSTRY REFERENCES

British Standards Institution. Investigation of Potentially Contaminated sites - code of practice. BS 10175:2017. Don't need all of these?

British Standards Institution 'Code of Practice for Site Investigations' BS 5930:2020

British Standards Institution "Geotechnical investigation and testing – Identification and classification of soil" BS EN ISO 14688:2018

BRE Report BR211 'Radon – Guidance on protective measures for new buildings' 2023 Edition.

BRE Special Digest 1: "Concrete in Aggressive Ground" 3rd Ed 2005.

CIRIA 552 "Contaminated Land Risk Assessment – A guide to good practice" 2001.

CIRIA C665 "Assessing Risks Posed by Hazardous Ground Gases to Buildings" 2007.

Wilson & Card "Proposed method classifying gassing sites" Ground Engineering 1999.

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BS 8576:2013 'Guidance on investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs)'

BS 8485:2015+A1:2019 'Code of practise for the design of protective measures for methane and carbon dioxide ground gases for new buildings'

The Hazardous Waste (England) Regulations 2005.

Environment Agency Hazardous Waste: "Guidance on the classification and assessment of waste" WM3 ver 1 May 2015.

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DETR. Circular 02/2000 Contaminated Land.

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Department of the Environment, 1994, CLR Report No 4 'Sampling Strategies for Contaminated Land'.

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LCRM "Land Contamination Risk Management", April 2021.

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CL:AIRE, 2014 'Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination'.

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Environmental Quality Standards.

UK Drinking Water Standards: Water Supply (Water Quality) Regulations 1989 (SI 1989/1147) and Water Supply (Water Quality) Regulations 2000 (SI 2000/3184).

UKWIR Report 10/WM/03/21 2010 "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites"

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Environment Agency & NHBC, 2000. R&D Publication 66. Guidance for the Safe Development of Housing on Land Affected by Contamination.

Environment Agency "Guidance on the classification and assessment of waste (1st edition 2015) Technical Guidance WM3"

NHBC Standards 2023.

CL:AIRE "The Definition of Waste: Development Industry Code of Practice" Version 2 March 2011.

CIRIA "Asbestos in soil and made ground: a guide to understanding and managing risks" C733 2014

Control of Asbestos Regulations (CAR) 2012

Harris, M R, Herbert, S. M, Smith, M A 'Remedial Treatment for Contaminated Land' (twelve volumes), special publications 101-112, CIRIA 1996.

Department of the Environment. 1995. Industry Profiles - 48 separate publications available from The Stationery Office, London.

BRE Report 465 "Cover Systems for Land Regeneration" 2004.

Privett, K D, Matthews, S C, & Hodges, R, A, 'Barriers, liners and cover systems for containment and control of land contamination' 1996. CIRIA Special Publication 124.

BRE Digest 365 "Soakaway Design" 2016.

Environment Agency. R&D Publication 20. Methodology for the Derivation of Remedial Targets for Soil and Groundwater to Protect Water Resources. 1999.

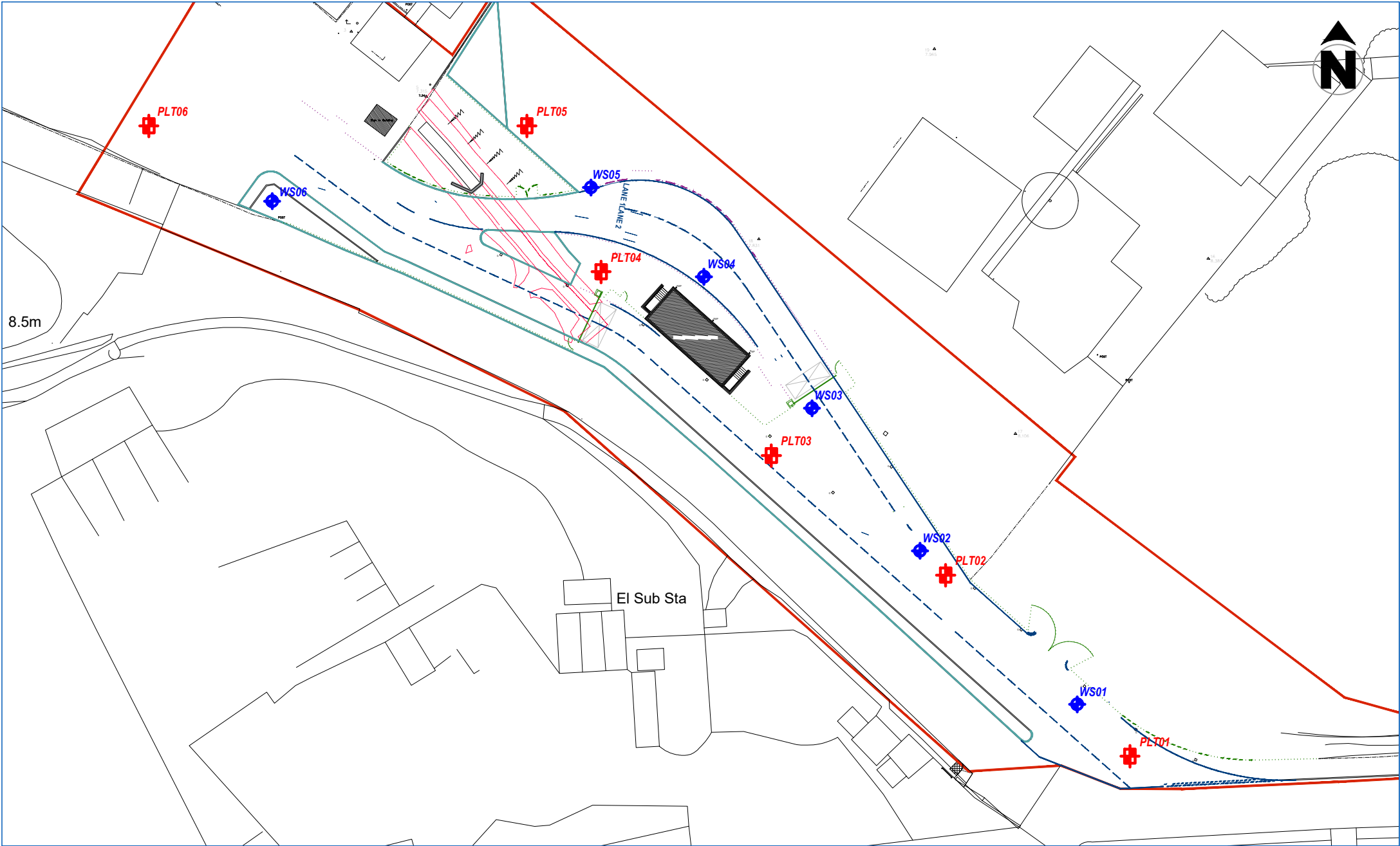
Environment Agency Technical Guidance Note 01. Hydrogeological Risk Assessment for Landfills.

Specification for Highways Works – Series 600 Earthworks November 2016.

APPENDIX 1 - Plans

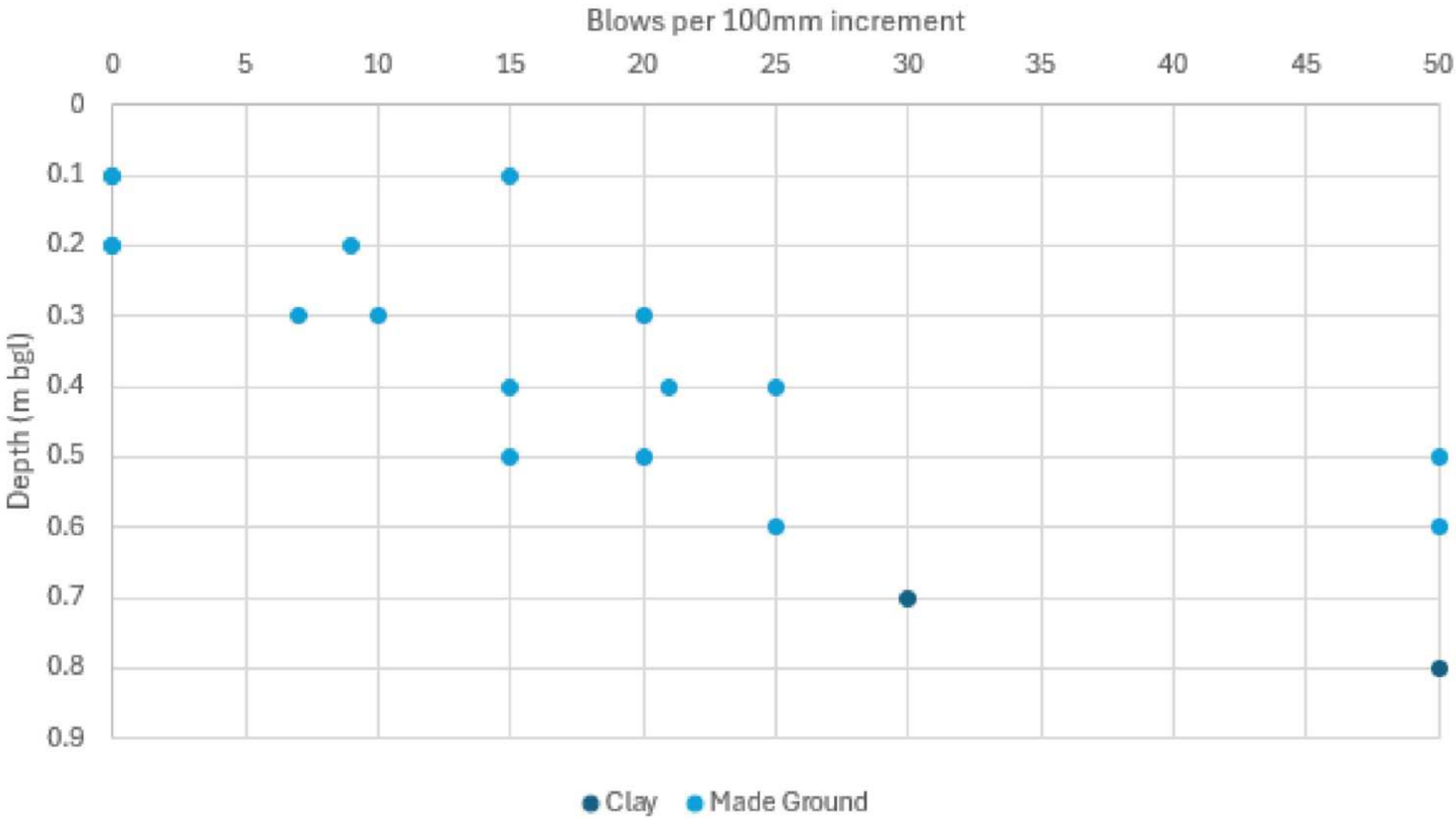


GROUNDTECH CONSULTING	CLIENT	DATE			Status		Notes Site Location
	MARSHALLS	NOVEMBER 2023			Preliminary		
	PROJECT TITLE	SCALE			Draft		
	NEW SILO BASE, NEWPORT	NTS			Issued		
PLAN TITLE	PLAN NUMBER				For Comment		
PROJECT LOCATION PLAN	GRO-23266-P01		Rev.	Details	Date	Approved	

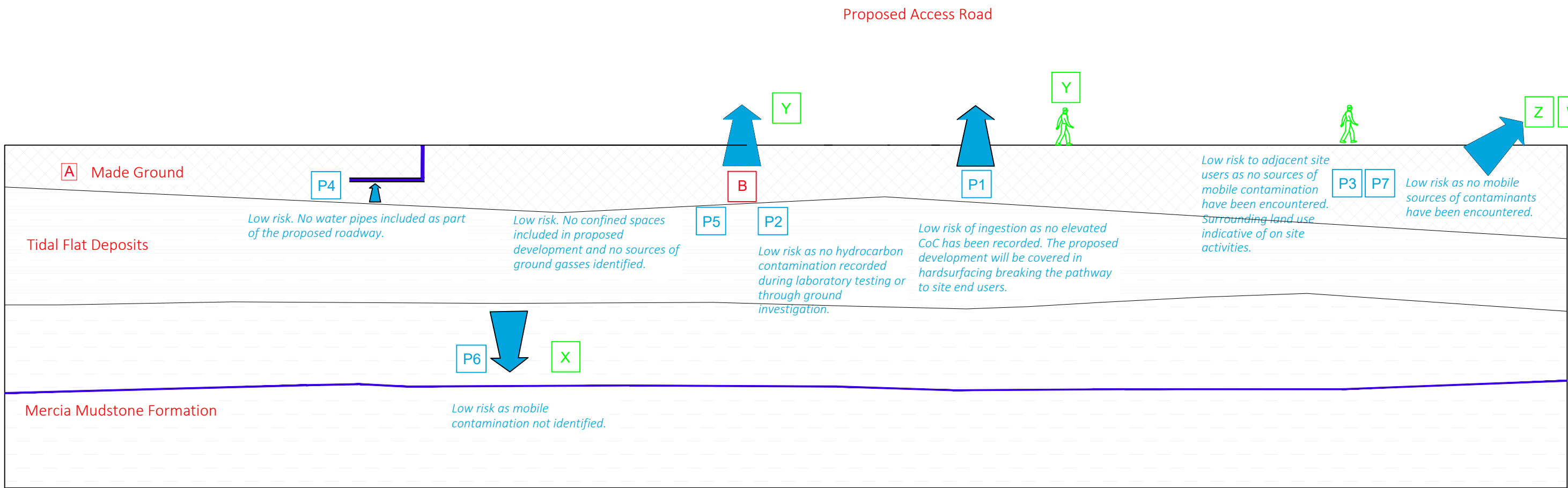


GROUNDTECH CONSULTING 	CLIENT	COUCH CONSULTING	DATE	AUGUST 2024				Status		Notes  Plate Load Testing Location  Windowless Sample Borehole Location 
	PROJECT TITLE	NEWPORT SILO BASE	SCALE	NTS				Preliminary		
	PLAN TITLE	EXPLORATORY HOLE LOCATION PLAN	PLAN NUMBER	GRO-23266-P03				Draft		
							Issued			
							For Comment			
								Approved		

Dynamic Probe vs Depth Test



SOURCES	POLLUTION LINKAGES	RECEPTORS
A. Contaminated soils / Made Ground. B. Ground gas.	P1. Ingestion of soil and dust. P2. Inhalation of vapour. P3. Inhalation of soil dust by adjacent site users. P4. Attacking of potable water supply pipe. P5. Migration and accumulation of ground gas in internal places. P6. Impaction of groundwater from soil contamination. P7. Migration of soil and groundwater contamination impacting surface waters.	W. River Usk 230m south west. X. Groundwater within the underlying Secondary B Bedrock Aquifers. Y. Site end users. Z. Adjacent site users.



APPENDIX 2 - Site Photographs



Photograph 1 – South area of site.



Photograph 2 – Hardstanding surfacing of site.



Photograph 3 – Reinstatement of trial pit.



Photograph 4 - Prior to plate load test.

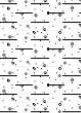


Photograph 5 – Northern area broken out prior to ground investigation.

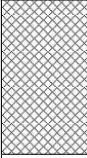


Photograph 6 – Borehole reinstatement.

APPENDIX 3 - Exploratory Hole Logs

					Borehole Log			Borehole No. WS01 Sheet 1 of 1	
Project Name: NEW SILO BASE, MARSHALL'S YARD					Project No. GRO-23266		Co-ords: -		Hole Type WS
Location: NEWPORT					Level:			Scale 1:25	
Client: MARSHALLS					Dates: 09/07/2024 -			Logged By LA	
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
 		0.00 - 0.30	ES		0.60			MADE GROUND: Black very gravelly silty coarse SAND. Gravel is angular medium to coarse of sandstone and brick.	1
		0.30 - 0.70	ES						
		1.00	D		1.00		Firm friable brown gravelly slightly sandy CLAY. Gravel is angular to subangular medium to coarse of mudstone. Sand is fine to coarse.		
								End of borehole at 1.00 m	2
									3
									4
									5
Remarks 1. Location cleared of services using handheld CAT scanner. 2. Hand dug inspection excavated to 1.0m bgl. 3. No groundwater encountered. 4. Borehole terminated at 1.0m bgl due to SPT refusal. 5. Borehole backfilled with arisings. to 0.15m bgl and concrete to ground level.									

					Borehole Log			Borehole No. WS02 Sheet 1 of 1		
Project Name: NEW SILO BASE, MARSHALL'S YARD					Project No. GRO-23266		Co-ords: -		Hole Type WS	
Location: NEWPORT					Level:			Scale 1:25		
Client: MARSHALLS					Dates: 09/07/2024 -			Logged By LA		
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
		Depth (m)	Type	Results						
		0.00 - 0.60	ES					MADE GROUND: CONCRETE.	1	
		0.19 - 0.30	ES							MADE GROUND: Light grey gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of brick, flint and mudstone. MADE GROUND: Reddish brown gravelly medium to coarse SAND. Gravel is angular to subangular fine to coarse of chalk and flint.
		0.30 - 0.70	ES							
		1.00	D							
		1.20		N=50 (5,15/50 for 100mm)	1.20			End of borehole at 1.20 m		
									2	
									3	
									4	
									5	
Remarks 1. Location cleared of services using handheld CAT scanner. 2. Concrete coring carried out to 0.19m bgl. 3. Hand dug inspection pit excavated to 1.2m bgl. 4 No groundwater encountered. 5. Borehole terminated at 1.2m bgl due to SPT refusal. 6. Borehole backfilled with arisings to 0.15m bgl and concrete to ground level.										

					Borehole Log			Borehole No. WS03 Sheet 1 of 1	
Project Name: NEW SILO BASE, MARSHALL'S YARD					Project No. GRO-23266		Co-ords: -		Hole Type WS
Location: NEWPORT					Level:			Scale 1:25	
Client: MARSHALLS					Dates: 09/07/2024 -			Logged By LA	
Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.19 - 0.50	ES		0.19			MADE GROUND: CONCRETE.	
		0.50	D		0.70			MADE GROUND: Dark brown angular to subangular fine to coarse gravel of mudstone and chert.	
End of borehole at 0.70 m									1
									2
									3
									4
									5
Remarks 1. Location cleared of services using handheld CAT scanner. 2. Concrete coring carried out to 0.19m bgl. 3. Hand dug inspection pit excavated to 0.7m bgl. 4. No groundwater encountered. 5. Borehole terminated at 0.7m bgl due to SPT refusal. 6. Borehole backfilled with arisings to 0.15m bgl and concrete to ground level.									

Borehole Log

Borehole No.

WS04

Sheet 1 of 1

Project Name: NEW SILO BASE, MARSHALL'S YARD

Project No.
GRO-23266

Co-ords: -

Hole Type
WS

Location: NEWPORT

Level:

Scale
1:25

Client: MARSHALLS

Dates: 09/07/2024 -

Logged By
LA

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.17 - 0.50	ES		0.17			MADE GROUND: CONCRETE	
					0.67			MADE GROUND: Reddish brown very gravelly fine to coarse SAND. Gravel is angular to subangular medium to coarse of mudstone.	
		1.20		N=12 (5,4/3,4,4,1)				Firm greyish black gravelly silty CLAY. Gravel is angular to subangular fine to coarse of mudstone.	1
		1.50	D						
		2.00 2.00	D	N=4 (1,1/1,1,1,1)					2
		3.00 3.00	D	N=52 (3,7/11,13,14,14)	3.00			End of borehole at 3.00 m	3
									4
									5

Remarks

1. Location cleared of services using handheld CAT scanner. 2. Concrete coring carried out to 0.17m bgl. 3. Hand dug inspection pit excavated to 1.2m bgl. 3. No groundwater encountered. 4. borehole terminated at 3.0m bgl. 5. Borehole backfilled with arisings to 0.15m bgl and concrete to ground level.





GROUNDTECH
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Borehole Log

Borehole No.

WS05

Sheet 1 of 1

Project Name:	NEW SILO BASE, MARSHALL'S YARD	Project No.	GRO-23266	Co-ords:	-	Hole Type	WS
Location:	NEWPORT	Level:		Scale	1:25	Logged By	LA
Client:	MARSHALLS	Dates:	09/07/2024 -				

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.19 - 0.50	ES		0.19			MADE GROUND: CONCRETE.	
		0.50	D		0.70			MADE GROUND: Dark brown angular to subangular fine to coarse gravel of mudstone and chert.	
								End of borehole at 0.70 m	
									1
									2
									3
									4
									5

Remarks
1. Location cleared of services using handheld CAT scanner. 2. Concrete coring carried out to 0.19m 2. Hand dug inspection pit excavated to 0.7m bgl. 3. No groundwater encountered. 4. Borehole terminated at 0.7m bgl due to SPT refusal. 5. Borehole backfilled with arisings to 0.15m bgl and concrete to ground level.



Borehole Log

Borehole No.

WS06

Sheet 1 of 1

Project Name: NEW SILO BASE, MARSHALL'S YARD

Project No.
GRO-23266

Co-ords: -

Hole Type
WS

Location: NEWPORT

Level:

Scale
1:25

Client: MARSHALLS

Dates: 09/07/2024 -

Logged By
LA

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								MADE GROUND: CONCRETE.	
		0.20 - 0.30	ES		0.20				
		0.20 - 0.60	ES		0.40			MADE GROUND: Firm dark brown gravelly CLAY. Gravel is angular to subangular fine to coarse of chert, mudstone and brick. Vegetation present.	
		0.60 - 0.70	ES		0.60			MADE GROUND: Reddish brown gravelly fine to coarse SAND. Gravel is angular to subrounded fine to medium of brick, mudstone and chalk. Firm brown gravelly CLAY. Gravel is angular to subangular fine to medium of siltstone and quartz.	
		1.20		N=7 (1,1/1,1,2,3)					1
		1.50	D						
					2.00			End of borehole at 2.00 m	2
									3
									4
									5

Remarks

1. Location cleared of services using handheld CAT scanner. 2. Concrete Coring carried out to 0.20m bgl. 3. Hand dug inspection pit carried out to 1.2m bgl. 4. No groundwater encountered. 5. Borehole terminated at 2.0m bgl due to SPT refusal. 6. Borehole backfilled with arisings to 0.15m bgl and concrete to ground level.



Probe Log

Borehole No.

DP01

Sheet 1 of 1

Project Name: NEW SILO BASE, MARSHALL'S YARD

Project No.
GRO-23266

Co-ords: -

Hole Type
DP

Location: NEWPORT

Level:

Scale
1:25

Client: MARSHALLS

Dates: 09/07/2024 -

Logged By
LA

[illegible]

Remarks

1. Location cleared of services using hand held CAT scanner. 2. DPHS undertaken to 0.8m.

Fall Height

Hammer Wt	64
-----------	----

Probe Type	DPSH
------------	------

Cone Base Diameter

Final Depth	0.80
-------------	------

Log Scale	1:25
-----------	------





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Probe Log

Borehole No.

DP03

Sheet 1 of 1

Project Name: NEW SILO BASE, MARSHALL'S YARD

Project No.
GRO-23266

Co-ords: -

Hole Type
DP

Location: NEWPORT

Level:

Scale
1:25

Client: MARSHALLS

Dates: 09/07/2024 -

Logged By
LA

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0					
0					
	10				
	15				
	20				
					50
1					
2					
3					
4					
5					

Remarks
1. Location cleared of services using hand held CAT scanner. 2. DPSH undertaken to 0.6m.

Fall Height

Hammer Wt 64

Probe Type DPSH

Cone Base Diameter

Final Depth 0.60

Log Scale 1:25





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Probe Log

Borehole No.

DP05

Sheet 1 of 1

Project Name: NEW SILO BASE, MARSHALL'S YARD

Project No.
GRO-23266

Co-ords: -

Hole Type
DP

Location: NEWPORT

Level:

Scale
1:25

Client: MARSHALLS

Dates: 09/07/2024 -

Logged By
LA

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0					
0					
	7				
		25			
					50
1					
2					
3					
4					
5					

Remarks

1. Location cleared of services using hand held CAT scanner. 2. DPSH undertaken to 0.5m.

Fall Height

Hammer Wt 64

Probe Type DPSH

Cone Base Diameter

Final Depth 0.50

Log Scale 1:25



Trial Pit Log

Trialpit No

PLT01

Sheet 1 of 1

Project Name: NEW SILO BASE, MARSHALL'S YARD

Project No.
GRO-23266

Co-ords: -
Level:

Date
10/07/2024

Location: NEWPORT

Dimensions
(m):

2

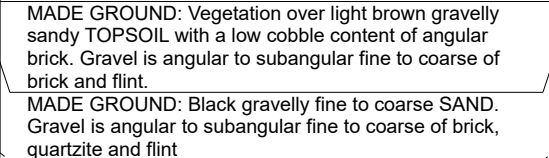
Scale
1:25

Client: MARSHALLS

Depth
0.50

0.5

Logged
LA

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.20 - 0.50	ES		0.20			MADE GROUND: Vegetation over light brown gravelly sandy TOPSOIL with a low cobble content of angular brick. Gravel is angular to subangular fine to coarse of brick and flint.	
				0.50			MADE GROUND: Black gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of brick, quartzite and flint	
							End of pit at 0.50 m	

Remarks:	1. location cleared of services using handheld CAT scanner. 2. Trial pit excavated to 0.5m bgl. 3. Plate load test undertaken at 0.5m bgl. 4. Trial pit backfilled with arisings.
----------	---

Stability: Stable

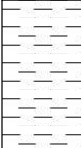




				Trial Pit Log			Trialpit No PLT03 Sheet 1 of 1			
Project Name: NEW SILO BASE, MARSHALL'S YARD				Project No. GRO-23266		Co-ords: - Level:		Date 10/07/2024		
Location: NEWPORT				Dimensions (m):		2		Scale 1:25		
Client: MARSHALLS				Depth 0.50				Logged LA		
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
	Depth	Type	Results							
	0.20 - 0.50	ES		0.20			MADE GROUND: CONCRETE.			
				0.50			MADE GROUND: Dark brown gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of quartzite and flint.			
							----- End of pit at 0.50 m			
							1			
							2			
							3			
							4			
							5			
Remarks: 1. location cleared of services using handheld CAT scanner. 2. Trial pit excavated to 0.5m bgl. 3. Plate load test undertaken at 0.5m bgl. 4. Trial pit backfilled with arisings.										
Stability: Stable										

				Trial Pit Log			Trialpit No PLT04 Sheet 1 of 1		
Project Name: NEW SILO BASE, MARSHALL'S YARD				Project No. GRO-23266		Co-ords: - Level:		Date 10/07/2024	
Location: NEWPORT				Dimensions (m): Depth 0.35		2 0.5		Scale 1:25	
Client: MARSHALLS								Logged LA	
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.20 - 0.40	ES		0.20			MADE GROUND: CONCRETE.		
				0.35			MADE GROUND: Black gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of brick, quartzite and flint. End of pit at 0.35 m		
									1
									2
									3
									4
									5
Remarks: 1. location cleared of services using handheld CAT scanner. 2. Trial pit excavated to 0.35m bgl. 3. Plate load test undertaken at 0.45m bgl. 4. Trial pit backfilled with arisings.									
Stability: Stable									

				Trial Pit Log				Trialpit No PLT05 Sheet 1 of 1	
Project Name: NEW SILO BASE, MARSHALL'S YARD				Project No. GRO-23266		Co-ords: - Level:		Date 10/07/2024	
Location: NEWPORT				Dimensions (m):		2		Scale 1:25	
Client: MARSHALLS				Depth 0.40				Logged LA	
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description		
	Depth	Type	Results						
	0.10 - 0.40	ES		0.10			MADE GROUND: CONCRETE.		
				0.40			MADE GROUND: Black gravelly fine to coarse SAND with a low cobble content of brick. Gravel is angular to subangular fine to coarse of brick quartzite and flint.		
							----- End of pit at 0.40 m		
							1		
							2		
							3		
							4		
							5		
Remarks: 1. location cleared of services using handheld CAT scanner. 2. Trial pit excavated to 0.4m bgl. 3. Plate load test undertaken at 0.40m bgl. 4. Trial pit backfilled with arisings.									
Stability: Stable									

				Trial Pit Log				Trialpit No PLT06 Sheet 1 of 1		
Project Name: NEW SILO BASE, MARSHALL'S YARD				Project No. GRO-23266		Co-ords: - Level:		Date 10/07/2024		
Location: NEWPORT				Dimensions (m): Depth 0.80		2 0.5		Scale 1:25		
Client: MARSHALLS								Logged LA		
Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description			
	Depth	Type	Results							
▼	0.00 - 0.30	ES		0.30			MADE GROUND: Yellow gravelly fine to coarse SAND. Gravel is angular to subangular fine to medium of brick flint and quartzite.			
							Firm brownish grey clay.			
					0.80			----- End of pit at 0.80 m		
							1			
							2			
							3			
							4			
							5			
Remarks: 1. location cleared of services using handheld CAT scanner. 2. Trial pit excavated to 0.4m bgl. Groundwater seepage encountered at 0.45m bgl. 3. Plate load test undertaken at 0.8m bgl. 4. Trial pit backfilled with arisings.										
Stability: Stable										

APPENDIX 4 - Geo-Environmental Testing Results



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WN7 3XJ

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e: LA@groundtechconsulting.com

i2 Analytical Ltd.
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Croxley Green
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Watford,
Herts,
WD18 8YS

t: 01923 225404

f: 01923 237404

e: reception@i2analytical.com

Analytical Report Number : 24-031072

Project / Site name: Newport Silo Base

Your job number: GRO 23266

Your order number: ORD 23266 4238

Report Issue Number: 1

Samples Analysed: 6 soil samples

Samples received on: 16/07/2024

**Samples instructed on/
Analysis started on:** 17/07/2024

Analysis completed by: 23/07/2024

Report issued on: 23/07/2024

Signed:

Dominika Liana
Junior Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41-711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 24-031072
Project / Site name: Newport Silo Base
Your Order No: ORD 23266 4238

Lab Sample Number				258842	258843	258844	258845	258846
Sample Reference				WS01	WS02	WS04	WS06	PLT02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.60	0.50	0.60	0.35
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Test Limit of detection	Test Accreditation Status					

Stone Content	%	0.1	NONE	< 0.1	53.5	4.2	< 0.1	18.8
Moisture Content	%	0.01	NONE	16	8.4	5.7	12	9.8
Total mass of sample received	kg	0.1	NONE	0.2	1.2	1.3	0.3	1.2

Asbestos

Asbestos in Soil Detected/Not Detected	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	JSW	JSW	JSW	JSW	JSW

General Inorganics

pH (L099)	pH Units	N/A	MCERTS	7.7	9.3	9.3	8.6	10.4
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	370	160	43	120	450
Water Soluble SO ₄ 16hr extraction (2:1)	mg/l	1.25	MCERTS	184	77.8	21.4	59.7	225
Organic Matter (automated)	%	0.1	MCERTS	7.7	0.8	0.6	3	2.2

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	0.42	< 0.05	< 0.05	0.4	0.16
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.06	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.36	0.06	0.05	0.51	0.14
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.08	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.27	< 0.05	0.06	0.8	0.18
Pyrene	mg/kg	0.05	MCERTS	0.23	< 0.05	0.06	0.67	0.17
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.19	< 0.05	< 0.05	0.49	0.1
Chrysene	mg/kg	0.05	MCERTS	0.31	< 0.05	0.06	0.59	0.14
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.33	< 0.05	0.06	0.74	0.18
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.12	< 0.05	< 0.05	0.26	0.06
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.19	< 0.05	< 0.05	0.49	0.11
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.15	< 0.05	< 0.05	0.28	0.09
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.17	< 0.05	< 0.05	0.28	0.14

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	2.79	< 0.80	< 0.80	5.72	1.48
-----------------------------	-------	-----	-----------	------	--------	--------	------	------

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	21	10	4.3	15	23
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	2.4	< 0.2	< 0.2	0.8	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	230	12	9.1	29	21
Copper (aqua regia extractable)	mg/kg	1	MCERTS	130	75	6.2	89	50
Lead (aqua regia extractable)	mg/kg	1	MCERTS	720	38	8	100	39
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	1.2	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	43	24	4.3	21	21
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.6	< 1.0	< 1.0	< 1.0	1.6
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	370	230	36	190	140