



Piling Risk Assessment

E-Scrap Sample Preparation Plant

Britannia Refined Metals Ltd

Prepared by:

SLR Consulting Limited

Mill Barn, 28 Hollingworth Court, Turkey Mill, Maidstone,
ME14 5PP

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Basis of Report

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1.0 Introduction

1.1 Appointment

In January 2024 SLR Consulting Ltd (SLR) was commissioned by Britannia Refined Metals Ltd (BRM) to prepare a Piling Risk Assessment (PRA) for the proposed development of a sample preparation building located within the BRM facility, Botany Road, Northfleet, Gravesend, Kent, DA11 9BG. The site location is presented as Drawing 01 in Appendix A.

This report has been prepared by the SLR Land Quality Group based at Mill Barn, Turkey Mill, Maidstone, ME14 5PP.

1.2 Background and Objectives

In the first instance, SLR was commissioned to undertake a phased geo-environmental ground investigation that was initially devised to consider the original option of raft foundations for two smaller buildings. However, following a review of the ground conditions, and that the design of the proposed development was altered such that it comprised a single large building, it was concluded that a piled foundation solution was most likely to be appropriate.

In conjunction with the geotechnical considerations, based upon the relatively sensitive environmental setting of the site above a principal chalk aquifer and within an Environment Agency (EA) designated Source Protection Zone II (SPZ II), SLR recommended that the selection of the foundation solution should consider the risks posed to groundwater resources. These risks were judged to be of particular significance in this instance as the wider BRM facility has been used for metals processing operations since c.1932, and therefore the presence of significant contamination beneath the study area could not be ruled out.

In light of the above, SLR recommended that the findings of the phased investigation should be used to prepare a PRA that would confirm if the proposed foundation afforded controlled water receptors an appropriate degree of protection.

1.3 Scope of Work

This PRA was completed in accordance with Environment Agency (EA) guidance¹ and considers the following:

- Site conditions in terms of geology, hydrogeology, hydrology and identification of sensitive receptors as established by available map information and the findings of a recent SLR phased ground investigation;
- Consideration of six pollution scenarios whereby piling works may cause pollution due to piling into potentially contaminated land;
- An assessment of each pollution scenario in the context of the site conditions, sensitive receptors and the proposed piling methodology; and
- Recommendation regarding alternative piling methods (should the proposed methodology be considered unsuitable) and any specific measures that would need to be implemented to ensure appropriate protection of identified receptors during the piling operation works.

¹ Environment Agency 2001. Piling and Penetrative Ground Improvement on Land Affected by Contamination: Guidance on Pollution Prevention. Report reference NC/99/73



2.0 Summary of Previous Assessments

2.1 SLR Phase One Geotechnical and Environmental Desk Study (August 2023)

In August 2023 SLR prepared a Phase One Geotechnical and Environmental Desk Study (ref: 402.064683.00001), the aim of which was to provide an initial understanding of the nature of the site, its environmental setting and any conceptual geo-environmental risks that could be posed to the proposed development.

From a review of British Geological Survey (BGS) map information, the ground conditions beneath the study area were anticipated to comprise the following:

- Made Ground, that was mapped on site and across the wider BRM site;
- Superficial deposits of Alluvium, comprising clay, silt, sand and gravel; and
- The underlying Bedrock Geology is recorded as the Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation (Undifferentiated).

In addition to the above, supplied historical reports also indicated that deposits of Boyn Hill Gravel, comprising gravel, occasionally gravelly sand, were likely to be present beneath the Alluvium.

The desk study also established the following:

- Historical maps indicated that the site comprised marshland until c.1932 when it became part of Britannia Lead Works. Although the site remained unoccupied it was noted to be encircled by a flue around the northern, western and southern perimeter boundaries. By c.1955, the flue was no longer evident, and from 1971 onwards the site was depicted a predominantly vacant area with a small rectangular structure in the southwest corner;
- At the time of the Phase One assessment, the site was utilised as a hard surfaced, external storage area within the wider Britannia Refined Metals facility and was located adjacent to the existing silver processing plant;
- From historical ground investigation reports that focused upon the wider BRM facility, it was anticipated that the site would be underlain by Made Ground of depths of some 2m bgl. The underlying superficial soils, comprising soft, silty, locally sandy, peaty, alluvial clay, were proved to some 15m bgl in the vicinity of the site. This was in turn underlain by the Boyn Hill Gravel, described as dense silty sandy gravel and gravelly sand, which was proven to approximately 22m bgl. The underlying solid bedrock geology comprises chalk;
- The superficial alluvium was noted to have been classified as a Secondary Undifferentiated Aquifer whereas the underlying chalk was a Principal Aquifer;
- The site is located within an EA designated SPZ II, although no potable groundwater abstractions were identified within a 2km radius of the site; and
- A series of surface water ditches associated with Botany Marshes were identified some 75m to the west of the site at their closest point. The River Thames is located approximately 180m east.

Based upon the findings of the desk study, the Phase One report concluded that soils beneath the site could be impacted by contaminants due to the presence of historically placed fill materials including clinker and slag. Although these soils were deemed unlikely to pose a long-term risk to users of the proposed commercial development, the report stated that consideration would need to be given to short term impacts to site workers during construction. The report also highlighted a potential risk to the underlying chalk aquifer if piled foundations resulted in the creation of preferential pathways by which shallow contaminants could be readily transmitted to depth.



2.2 SLR Ground Investigation Report (October 2023)

2.2.1 Site Investigation

To investigate the conceptual pollutant linkages identified by the Phase One assessment and obtain information upon ground conditions with which to inform the design of appropriate foundations, SLR implemented a Phase II site investigation that culminated in the preparation of a Ground Investigation Report (GIR).

The scope of works comprised the following:

- Concrete coring at 2No. locations;
- 2No. dynamic sampling boreholes with rotary follow on to 32.20m below ground level (bgl);
- Installation of gas and groundwater monitoring wells in both locations;
- Installation of shallow gas and groundwater monitoring wells and deeper groundwater monitoring wells;
- One round of groundwater monitoring and recovery of samples for laboratory testing;
- Three rounds of ground gas monitoring permed upon the shallow wells with installs located above groundwater level;
- Supervision and logging of all boreholes in accordance with BS5930:2015+A1:2020 by a suitably qualified engineer; and
- Carry out environmental and geotechnical laboratory testing to characterise the underlying soils.

A summary of the ground conditions encountered is provided by **Table 2.1:**

Table 2-1: Summary of Strata Encountered

Ground Type	Formation	Description	Depth Range (m bgl)
Hardstanding	Concrete	Concrete Hardstanding with 1 – 2cm rebar	Ground Level – 0.58
Made Ground	Made Ground	Very soft to firm black/greyish brown/dark grey slightly gravelly sandy clay. Loose to medium dense dark grey sandy gravel. Anthropogenic inclusions of concrete, flint, slag, bricks metal, glass, and asphalt.	0.42 – 4.40
	Reworked Clay	Very soft to firm dark grey/brown clay	1.30 – 4.80
Superficial Deposits	Alluvium	Very soft to soft silty clay. Occasionally gravelly with flint. Occasionally with organic matter and wood.	4.40 – 13.10
	Peat	Soft dark brown spongy peat with frequent wood and organic matter	8.80 – 12.80
	Boyn Hill Gravel Member	Very loose to very dense orangish/yellowish/greyish brown, brown, multicoloured sandy gravel of flint / gravelly sand.	13.10 – 22.50
Solid Deposit	Lewes Nodular Chalk Formation,	Grade Dm - Structureless chalk composed of clay. Clasts are weak low density.	21.70 – 29.50



Ground Type	Formation	Description	Depth Range (m bgl)
	Seaford Chalk Formation And Newhaven Chalk Formation (Undifferentiated).	Grade Dc - Structureless chalk composed of gravel. Clasts are weak and medium density.	29.10 – 32.20

Groundwater was encountered in both exploratory holes. In BH2023-02 shallow perched groundwater was encountered within the Made Ground at 1.1m bgl. Due to adding water during the drilling process it was not possible to observe accurate groundwater strikes. However, on completion of drilling groundwater was observed at 3.1m bgl in BH2023-01 and 4m bgl in BH2023-02.

Both exploratory hole locations were installed with shallow and deep groundwater monitoring wells. The aim of these dual installations was to facilitate the recovery of groundwater samples from both the shallow/perched groundwater within the Made Ground and the deeper groundwater within the underlying natural deposits and establish if piled foundations could result in the creation of a preferential migration pathway linking the two.

Post fieldwork, SLR revisited the site to undertake three rounds of groundwater monitoring in the newly installed boreholes. The 2No. wells were monitored to measure the depth to groundwater and establish the presence/absence of light non aqueous phase liquid (LNAPL). A portable photo ionisation detector (PID) was also used to measure the concentration of volatile organic compounds (VOCs) within the wells.

A summary of the groundwater monitoring data is shown in **Table 2-2**:

Table 2-2: Groundwater Monitoring Data

BH Ref	BH Elevation (mAOD)	Borehole Screen Interval (m bgl)	Date	Well Headspace (ppm)	Depth to Water (m)	Groundwater Elevation (mAOD)	Notes
BH2023-01S	3.85	0.5-1.5	20/09/2023	<1	0.83	3.02	Sampled
			02/10/2023	<1	0.83	3.02	
			06/10/2023	<1	0.93	2.92	
BH2023-01D	3.85	14.0-20.0	20/09/2023	<1	3.48	0.37	Sampled
			02/10/2023	<1	3.44	0.41	
			06/10/2023	<1	3.47	0.38	
BH2023-02S	3.79	1.0-3.0	20/09/2023	<1	Dry	-	
			02/10/2023	<1	Dry	-	
			06/10/2023	<1	Dry	-	
BH2023-02D	3.79	13.0-20.0	20/09/2023	<1	1.03	2.76	Sampled
			02/10/2023	<1	1.21	2.58	
			06/10/2023	<1	1.01	2.78	

mAOD- metres above ordnance datum

An exploratory hole location plan is supplied as Drawing 02 in Appendix A and borehole logs detailing the nature of the strata encountered and the installed monitoring standpipes are included as Appendix B.



2.2.2 Laboratory Analysis

To ascertain whether the soils encountered beneath the study site could pose a significant risk to human and environmental receptors a series of soil samples representative of the ground conditions encountered were recovered from the exploratory holes.

Three Made Ground, two Alluvium, two Boyn Hill Gravel Member and two chalk samples were scheduled for a general suite of commonly occurring potential contaminants that included:

- A suite of metals;
- Poly aromatic hydrocarbons (PAHs);
- Petroleum hydrocarbons (TPH CWG including BTEX and MTBE);
- Volatile Organic Compounds (VOCs);
- Semi-volatile Organic Compounds (SVOCs); and
- Asbestos screen and identification.

The groundwater samples were scheduled for the following:

- Speciated petroleum hydrocarbons (TPH CWG including BTEX and MTBE);
- PAHs;
- VOCs; and
- A suite of metals.

The results of the groundwater analysis are presented in Appendix C.

2.2.3 Generic Quantitative Risk Assessment

To assess the significance of the laboratory data the results were screened against a series of Generic Assessment Criteria (GAC). With regards to the tested soils, this assessment was made against the threshold concentrations that considered the continued commercial end use of the study site.

When considering the potential risks posed to human health, it was noted that the shallow Made Ground soils recovered for analysis recorded significantly elevated concentrations of arsenic and lead that exceeded the corresponding commercial GAC thresholds. Furthermore, chrysotile fibres were also recorded in the sample collected from BH2023-01 at 0.5m bgl. However, the long term risks posed to users of the proposed development were not judged to be significant as the presence of buildings and permanent hardstanding would effectively sever the direct contact exposure pathways. Furthermore, it was considered that the short term risks posed to construction workers could be ameliorated by the use of appropriate health and safety practices.

With regards to controlled waters, the results of the analysis performed upon the shallow and deep samples failed to identify significant impact beneath the site. Although concentrations of fluoranthene, lead and nickel were detected at concentrations greater than the conservative water quality standards (WQS) against which they were screened, the data was judged to be typical of a site underlain by deposits of Made Ground with a history of commercial/industrial use. The data also indicated that there was not a significant difference between the concentrations of contaminants present in shallow perched groundwater and that within the deeper natural deposits.



3.0 Summary of Potential Foundation Options

3.1 Piled Foundations

From the SLR GIR it is anticipated that the load transfer mechanism from the pile to the surrounding soil will be via shaft friction through the length of the pile in combination with end bearing at the pile toe. The ratio of the degree of load transfer is a function of subgrade soil, the chosen pile type and method of installation.

The following section gives a brief overview of the various pile types available and discusses the applicability to the underlying ground conditions.

- Driven Pre-Cast Piles – these may be constructed from concrete or steel and have the advantage that their installation is unaffected by groundwater elevation. In addition, the driving process can act to stabilise soft or loose ground conditions, where present, at the surface. Disadvantages include possible heave and ground disturbance of surrounding soils during installation. The piles are less easily varied in length and may be damaged due to hard driving in hard clay, dense gravel or more competent rock layers.
- Bored or Continuous Flight Auger (CFA) Cast In-situ Piles – these piling options are readily varied in length and can incorporate reinforcement to provide capacity in both compression and tension. There is relatively little noise or vibration generated during installation.
- Helical piles are steel shafts with a series of low pitched circular helical plates installed at strategic positions along the pile shaft. The helical plates give the foundation both tension and compression bearing capacity, and therefore have a wide range of uses across a variety of sectors. Helical piles are generally installed directly into the ground by machine mounted hydraulic powered drilling equipment. Screw piles generally do not produce waste soils, and if any arisings are generated during the installation, these will be drawn upwards to the surface. Further benefits of helical pile foundations include relatively fast installation, and low noise level and vibration during installation.

Although all three techniques may be suitable for geotechnical ground improvement at the site, based upon the findings of the geotechnical assessment it was concluded that due to the underlying ground conditions, and the proximity to other site activities and buildings, continuous flight auger (CFA) bored piles would represent the most suitable piling technique in this instance.

In light of the above the selected piling contractor, Piled Solutions Ltd, proposed to design and install the following:

40No. 450mm diameter of CFA Piles with designed depths ranging of 19.8m, all typically reinforced with cages comprising 4B16 bars to 8 metres with a B8 helical. Concrete mix to comprise concrete of C28/35, DC-2, 20mm aggregate and a slump of 150mm.

The following section of this report assess the appropriateness of the proposed methodology and whether other techniques such as those listed above would provide a greater degree of protection to the underlying principal chalk aquifer. For information, the supplied Piled Solutions method statement is attached as Appendix D.



4.0 Piling Risk Assessment

4.1 Methodology

The piling risk assessment has been completed according to the methodology and framework set out in the EA guidance on piling on contaminated land.

This guidance sets out the following six potential pollution scenarios that may occur during piling operations on potentially contaminated sites:

1. Creation of preferential pathways through a low permeability layer (an aquitard) to allow potential contamination of an aquifer.
2. Creation of preferential pathways through a low permeability surface layer, allowing migration of landfill gas, soil gas or contaminant vapours to the surface.
3. Direct contact of site workers and others with contaminated soil arisings that have been brought to the surface.
4. Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of materials.
5. The pushing of contaminants down into an aquifer during pile driving.
6. Contamination of groundwater and subsequently surface waters by wet concrete, cement paste or grout.

Schematic conceptual models of each of these scenarios are included within Appendix E

Based on the outline proposed piling approach, the likelihood and magnitude of risk associated with each of the above pollution scenarios being present at the site are evaluated individually.

4.2 Assessment of Potential Pollution Scenarios

Although bored CFA are the preferred option in this instance, driven precast piles and helical piles are also judged to represent potential foundation solutions for the site development. The following sections discuss how appropriate these various techniques are in relation to the six specified pollution scenarios.

4.2.1 Pollution Scenario 1

Creation of preferential pathways through a low permeability layer (an aquitard) to allow potential contamination of an aquifer.

In this specific instance it is likely that piles will penetrate the clayey alluvium and could therefore have the potential to create a migration pathway between contamination present within shallow Made Ground soils (and groundwater perched within this strata) and the underlying Boyn Hill Gravel. Appropriate mitigation measures would therefore be necessary to reduce risks regardless of the technique ultimately selected.

It is important to note however that monitoring of the shallow groundwater beneath the site failed to identify significant impact and therefore the associated risks to the underlying, more sensitive aquifer are unlikely to be significant.

4.2.2 Pollution Scenario 2

Creation of preferential pathways through a low permeability surface layer, allowing migration of landfill gas, soil gas or contaminant vapours to the surface

To establish the nature and severity of risks associated with Pollution Scenario 2, SLR implemented a programme of ground gas and vapour monitoring after the fieldwork phase. As the three monitoring rounds failed to record elevated concentrations of methane, carbon dioxide or VOCs, it is judged that



the formation of piled foundations will not significantly exacerbate the associated risks to the development and its occupants.

4.2.3 Pollution Scenario 3

Direct contact of site workers and others with contaminated soil arisings that have been brought to the surface

Although site specific investigations recorded concentrations of both arsenic and lead in excess of the corresponding commercial GACs, the nature and extent of contamination encountered was judged to be fairly typical of a site with a history of commercial use that is underlain by deposits of Made Ground. Furthermore, it should also be noted that this pollution scenario is only applicable to CFA piles, and to a lesser extent helical piles, where material is brought to the surface. However, in this instance it is judged that the use of appropriate personal protective equipment and health and hygiene practices by construction workers would effectively ameliorate the associated risks to human health.

4.2.4 Pollution Scenario 4

Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of materials

When considering the history of the site the presence of aggressive chemicals cannot be ruled out at this stage. It should also be noted that hydrocarbon impact can affect the setting and hardening of concrete with a reduction of long-term strength gain of concrete by up to 25%².

When considering the results of the laboratory analysis performed upon both soil and groundwater samples, and that the SLR GIR also provided a geotechnical assessment of aggressive ground conditions and recommended an appropriate design sulphate (DS) and aggressive chemical environment for concrete (ACEC), the risks posed by this specific Pollution Scenario are not judged to be significant.

4.2.5 Pollution Scenario 5

The pushing of contaminants down into an aquifer during pile driving

The use of driven piles could result in any contaminants associated with the ash/slag components of the shallow Made Ground being physically forced downwards into un-impacted strata via material below the 'butt end' of a solid pile or material plugged in a hollow pile. The risk associated with pollution scenario 5 is low for bored CFA and helical piles as material is drawn upwards as arisings. Care should, however, be taken to avoid under-rotation of the augers which could lead to material being pushed downward rather than brought to surface.

Use of solid driven piles would result in an increased risk of Pollution Scenario 5 being applicable at the site. Hollow circular piles have a reduced potential for dragging material downward, though careful monitoring to verify that the open end does not become plugged should be implemented during piling works.

4.2.6 Pollution Scenario 6

Contamination of groundwater by concrete, cement paste or grout

Concrete, cement paste or grout may be lost when introduced to the ground via highly permeable or fractured strata. Piling fluids such as polymers and cements can also contain substances which may present a risk to controlled waters.

The use of driven CFA piles with non-displacement cast-in-place piles may present a risk to shallow/perched groundwater through contamination by bentonite slurry, wet concrete, cement

² Geotechnical Engineering, January 2001. The effects of hydrocarbon contamination on concrete strength. 149 (3):189-193.



paste or grout. However, these risks could be effectively managed by appropriate grout mix design and careful monitoring of grout volumes used during pile formation. Modern piling rigs utilise real time telemetry to monitor 'overbreak' providing an early warning of the loss of drilling fluids and an opportunity to adjust the method accordingly to provide mitigation.

4.2.7 Additional Considerations

Although not part of the six scenarios evaluated after the EA guidance, deep penetrative foundation methods can lead to increased turbidity within the groundwater, and this can be of concern as it can impact the operation of nearby potable groundwater abstractions.

In this instance SLR does not consider any of the evaluated techniques to pose a risk of increased turbidity within the groundwater the piles will not penetrate the deeper chalk aquifer. In light of the absence of any identified potable abstractions or associated SPZ in the vicinity of the site the associated risks are judged to be negligible.

4.3 Summary

A general summary of the applicability of the generic piling and ground improvement methods, with and without appropriate mitigation measures against each of the identified pollution scenarios is given in Table 4-1 below, extracted from the EA 2001 guidance.

Table 4-1: Indicative Hazards Associated with Piling Techniques

Pollution Scenario	CFA Piles	Bored Piles	Helical Piles
1	B	B	B
2	B	B	B
3	B	A	A
4	B	B	B
5	A	C	A
6	B	A	A

Key:

A: Pollution scenario not likely to be an issue if using this method.

B: Subject to appropriate workmanship, mitigation and QA/QC measures.

C: This method may be considered acceptable depending on specific type used and subject to appropriate workmanship, mitigation and QA/QC measures.

D: This method should normally be avoided on sites where this pollution scenario is likely to be an issue.

As the above table indicates, the piling technique that is least likely to impact either human or environmental receptors is helical piles. However, it should be noted that this technique is better suited to smaller structures and may therefore be inappropriate for the proposed sample preparation facility that comprises a single large building.

CFA and driven piles are more commonly adopted for structures of the type proposed, and from this assessment both techniques have their benefits and disadvantages. Driven piles are more likely to result in surface materials being physically pushed deeper, although CFA piles could result in a release of drilling fluids to voids within the Made Ground. However, the use of modern drilling techniques that utilise 'real time' monitoring of progress would likely mitigate this risk. **It is therefore judged that the use of CFA piles is likely to be the most appropriate foundation solution in this instance.**



4.4 Piling Mitigation Measures

Mitigation measures for CFA bored piles may include, but not be limited to:

- Careful progression of augers to avoid over or under rotation.
- Adoption of suitable health and safety measures to protect workforce and environment from contaminated arisings that may contain asbestos;
- Ensure the design tolerances of the piles account for contact with the identified ground conditions with respect to possible reduction in long-term strength gain;
- The use of permanent or temporary casing to minimise loss of concrete into groundwater;
- The avoidance of retarder additives to ensure quicker setting of the concrete; and
- Monitoring of the volumes of concrete used within each pile.



5.0 Summary and Recommendations

It is proposed to construct a new sample preparation facility at the Britannia Refined Metals Ltd (BRM) site located on Botany Road, Northfleet, Gravesend, Kent, DA11 9BG. Due to the nature of the proposed structure and the underlying ground conditions it has been established that a piled foundation solution will be required, and as such a piling contractor was engaged to devise an appropriate strategy.

Based upon the findings of a preceded SLR phased geo-environmental ground investigation, that comprised the formation of exploratory boreholes, recovery of soil and groundwater samples for laboratory testing and the provision of an interpretative Ground Investigation Report (GIR), the selected piling method comprised 40No. 450mm diameter of continuous flight auger (CFA) Piles with designed depths ranging of 19.8m.

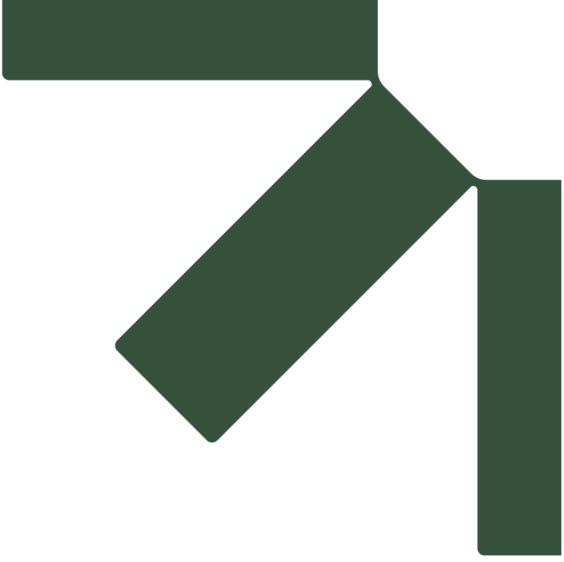
Notwithstanding the above, the contaminated land assessment of the site included within the GIR identified that the site's environmental setting was relatively sensitive as it was located above a principal chalk aquifer and within an Environment Agency (EA) designated Source Protection Zone II (SPZ II). SLR therefore recommended that a supplementary Piling Risk Assessment (PRA) be carried out to ensure that the selected piling method afforded controlled water receptors appropriate protection.

The assessment of the selected piling technique was made against a series of Pollution Scenarios as stipulated by the Environment Agency guidance document entitled Piling and Penetrative Ground Improvement on Land Affected by Contamination: Guidance on Pollution Prevention (Ref: NC/99/73, 2001). When conducting this assessment, the following was taken into account:

- Although Made Ground was identified beneath the site to depths of up to 4.4m bgl, laboratory analysis performed upon recovered soil samples did not record significantly elevated concentrations of potentially mobile contaminants such as fuels and oils. Elevated concentrations of arsenic and lead were identified, although these contaminants were judged to be associated with the observed inclusions of ash and clinker and as such are most likely to be relatively insoluble and immobile in the soil environment;
- Monitoring of groundwater standpipes installed within both the shallow Made Ground and the deeper Boyn Hill Gravel member within which it is proposed to found piles did not record significantly elevated concentrations of the various determinands tested and the results were judged to typical of those anticipated for a site with a history of commercial/industrial use. The data also indicated that there was not a significant difference between the concentrations of contaminants present in shallow perched groundwater and that within the deeper natural deposits; and
- Post fieldwork monitoring did not record elevated concentrations of potentially hazardous ground gases or vapours.

Based upon the nature of the proposed development, the results of the geo-environmental ground investigation and the assessment of the proposed piling technique in accordance with current EA guidance, it is judged that CFA piles are likely to be most appropriate at the site. However, it will be important to ensure that the works are subject to appropriate workmanship, mitigation and QA/QC measures.





Appendix A Drawings

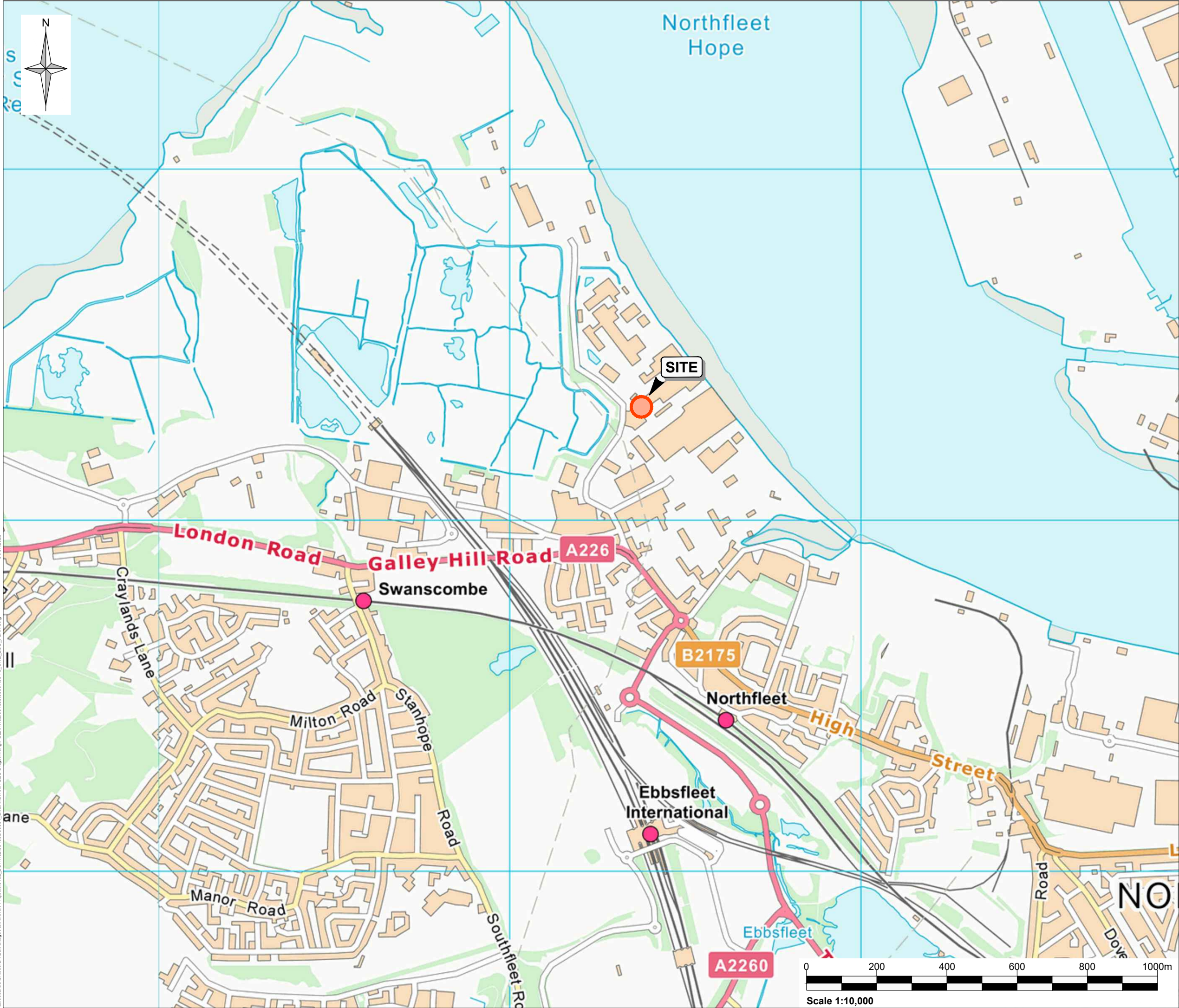
Piling Risk Assessment

E-Scrap Sample Preparation Plant

Britannia Refined Metals Ltd

SLR Project No.: 402.064683.00001

12 February 2024



Notes:

Rev	Amendments	Date	By	Chk	Auth
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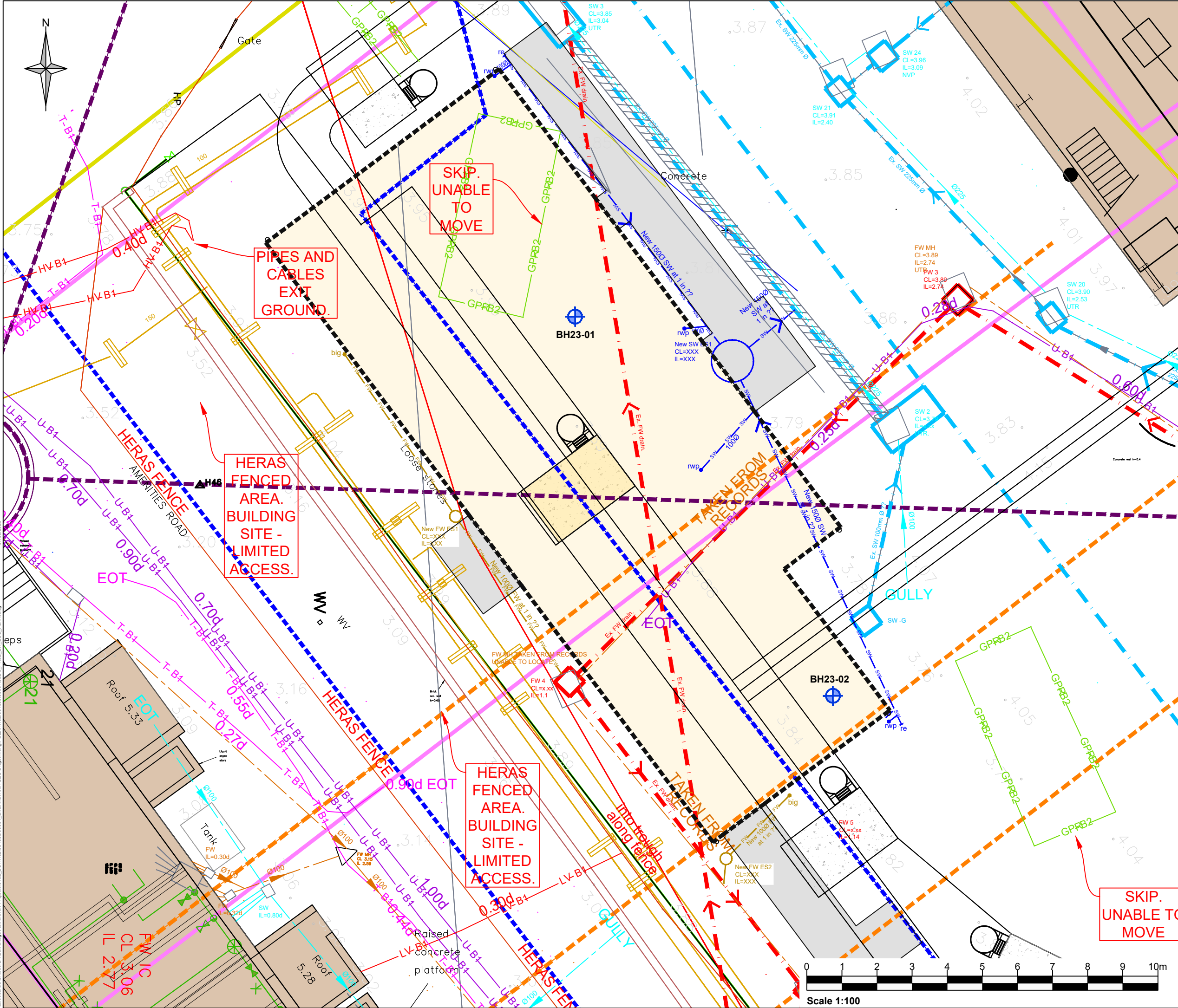
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Client
BRITANNIA REFINED METALS LTD

Project
SAMPLE PREPARATION BUILDING
PILING RISK ASSESSMENT

Figure Title
SITE LOCATION PLAN

Scale 1:10,000	@ A3	SLR Project No. 402.064683.00001	
Designed AK	Drawn TKS	Checked SK	Authorised
Date JULY 2023	Date JULY 2023	Date JULY 2023	Date
Figure Number 01			Rev. 0



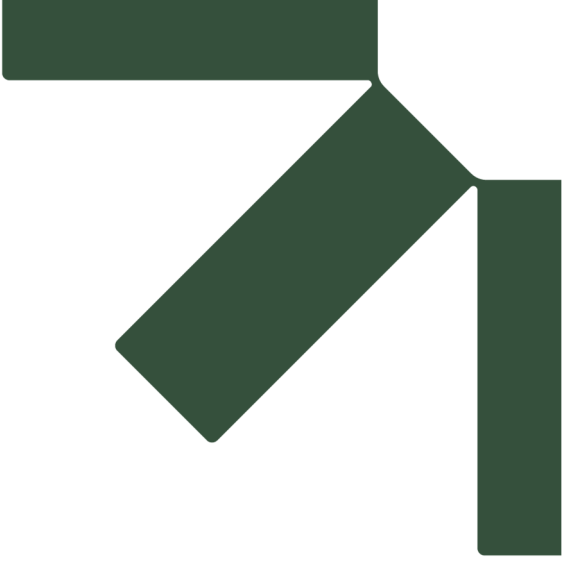
Notes:

1. DRAWING IS BASED ON SLR PLANS UTLS-01 P0 AND SITE LAYOUT SINGLE BUILDING OPTION SK01 P5.

Legend:

	BOREHOLE LOCATION
	LUG GPRB2
	LUG UNIDENTIFIED UTILITIES
	WATER SURFACE
	WATER REDUNDANT
	SLR FW DRAINAGE EXISTING
	LUG FWS
	SLR FW DRAINAGE NEW
	SLR SW DRAINAGE NEW
	SLR SW DRAINAGE EXISTING
	LUG SWS
	DRAINAGE REPAIRS 2009
	FIRE
	ELECTRIC CABLES
	PCME CABLES
	OPTIC NEW
	GAS
	WIFI FORK TRUCK

Rev	Amendments	Date	By	Chk	Auth
www.slrconsulting.com					
Client BRITANNIA REFINED METALS LTD					
Project SAMPLE PREPARATION BUILDING PILING RISK ASSESSMENT					
Figure Title BOREHOLE LOCATION PLAN					
Scale 1:100 @ A3		SLR Project No. 402.064683.00001			
Designed AK	Drawn TKS	Checked SK	Authorised		
Date SEPT 2023	Date SEPT 2023	Date SEPT 2023	Date		
Figure Number 02					Rev. 0



Appendix B Exploratory Hole Logs

Piling Risk Assessment

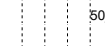
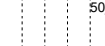
E-Scrap Sample Preparation Plant

Britannia Refined Metals Ltd

SLR Project No.: 402.064683.00001

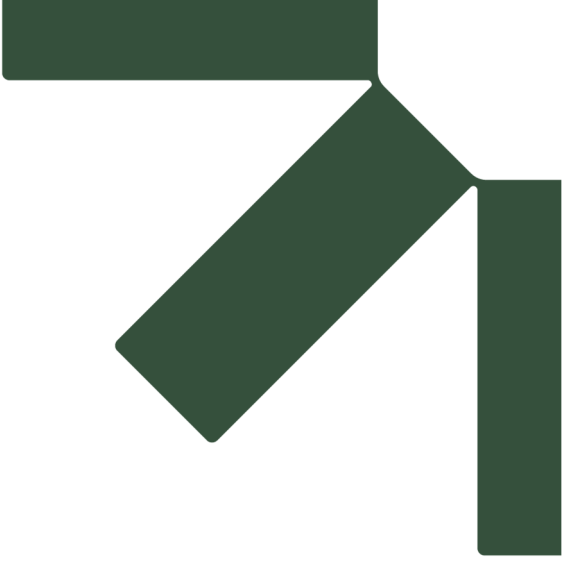
12 February 2024

All dimensions in metres Scale 1:66	Contractor: Geotechnical Engineering Ltd Plant: Commachio 305	Method: CP+RC Hole Size: 300mm	Logged By: DG-J	Approved By: AK
	SLR Consulting, Mill Barn 28 Hollingworth Court Turkey Mill, Maidstone ME14 5PP LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015			

BOREHOLE LOG												BOREHOLE No BH2023-01	
Client: Britannia Refined Metals Ltd													
Project No: 402.064683.00001		Date: 14/08/2023		Ground Level: 3.90m		Co-ordinates: E561382 N175334							
Project: BRM Northfleet												Sheet 4 of 4	
SAMPLES & TESTS										STRATA			Instrument Backfill
Depth	Core Run	TCR (%)	SCR (%)	RQD (%)	Type No.	Test Type	Test Result	SPT N Value 10 20 30 40		Water Level	Legend	Depth	
29.20 - 30.70		7%	0%	0%	D	SPT	N=50			50		(3.10)	Structureless CHALK composed of white rounded, fine to coarse GRAVEL. Clasts are weak medium density white. Occasional rounded, fine to coarse flint gravels. (Grade Dc). LEWES NODULAR CHALK FORMATION, SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED) - CHALK
31													
30.70 - 32.20		7%	0%	0%	SPTLS	SPT	N=50			50	-28.3 0	32.20	Borehole Complete at 32.20m
32													
33													
34													
35													
36													
37													
38													
39													
Boring Progress and Water Observations						Flushing			General Remarks				
Date	Time	Depth	Casing Dpt	Casing Dia	Water Dpt	From	To	Type					
									Service traced. CAT scanned. Concrete cored. Hand dug pit to 1.2m. Environmental seal at 6.70m. Dual installed with 2x50mm monitoring wells.				
All dimensions in metres Scale 1:66			Contractor: Geotechnical Engineering Ltd Plant: Commachio 305			Method: CP+RC Hole Size: 300mm			Logged By: DG-J		Approved By: AK		
SLR Consulting, Mill Barn 28 Hollingworth Court Turkey Mill, Maidstone ME14 5PP LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015													

All dimensions in metres Scale 1:66	Contractor: Geotechnical Engineering Ltd Plant: Commachio 305	Method: CP+RC Hole Size: 300mm	Logged By: DG-J	Approved By: AK
	SLR Consulting, Mill Barn 28 Hollingworth Court Turkey Mill, Maidstone ME14 5PP LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015			

BOREHOLE LOG													BOREHOLE No BH2023-02	
Client: Britannia Refined Metals Ltd														
Project No: 402.064683.00001			Date: 18/08/2023		Ground Level: 3.80m			Co-ordinates: E561392 N175319						
Project: BRM Northfleet													Sheet 4 of 4	
SAMPLES & TESTS										STRATA				Instrument Backfill
Depth	Core Run	TCR (%)	SCR (%)	RQD (%)	Type No.	Test Type	Test Result	SPT N Value 10 20 30 40		Water Level	Legend	Depth	DESCRIPTION	
29.20 - 30.70		100%	0%	0%	ES D	SPT	N=50	50				(2.70)	Structureless CHALK composed of rounded GRAVEL. Clasts are weak medium density white. Occasional rounded, fine to coarse flint gravels (Grade Dc). LEWES NODULAR CHALK FORMATION, SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED) - CHALK	
30.70 - 32.20								50						32.20
32.20 - 33.00					SPTLS	SPT	N=50	50		-28.40		32.20	Borehole Complete at 32.20m	
33.00 - 34.00								50						
34.00 - 35.00														
35.00 - 36.00														
36.00 - 37.00														
37.00 - 38.00														
38.00 - 39.00														
39.00 - 40.00														
Boring Progress and Water Observations						Flushing			General Remarks					
Date	Time	Depth	Casing Dpt	Casing Dia	Water Dpt	From	To	Type						
									Service traced. CAT scanned. Concrete cored. Hand dug pit to 1.2m. Environmental seal at 6.70m. Dual installed with 2x50mm monitoring wells.					
All dimensions in metres Scale 1:66			Contractor: Geotechnical Engineering Ltd Plant: Commachio 305			Method: CP+RC Hole Size: 300mm			Logged By: DG-J		Approved By: AK			
SLR Consulting, Mill Barn 28 Hollingworth Court Turkey Mill, Maidstone ME14 5PP LOGGING HAS BEEN CARRIED OUT IN ACCORDANCE WITH BS5930:2015														



Appendix C Results of Laboratory Analysis

Piling Risk Assessment

E-Scrap Sample Preparation Plant

Britannia Refined Metals Ltd

SLR Project No.: 402.064683.00001

12 February 2024

SLR Consulting Ltd
28 Mill Barn
Turkey Mill
Maidstone
United Kingdom
ME14 5PP



4225



Attention : James Appleby
Date : 29th September, 2023
Your reference : 402.064683.00001
Our reference : Test Report 23/13757 Batch 1 23/13597 Batch 1 23/13952 Batch 1 23/14070 Batch 1
Location : Northfleet
Date samples received :
Status : Final report
Issue : 1

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 30.191 kg of CO2

Scope 1&2&3 emissions - 71.349 kg of CO2

Authorised By:



Simon Gomery BSc
Senior Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: SLR Consulting Ltd
Reference: 402.064683.00001
Location: Northfleet
Contact: James Appleby

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Job No.	23/13597	23/13597	23/13597	23/13757	23/13952	23/13952	23/13952	23/14070	23/14070	23/14070	Please see attached notes for all abbreviations and acronyms		
EMT Sample No.	1-4	13-16	20-22	7-9	5-8	13-16	29-31	1-3	7-9	10-13			
Sample ID	BH01	BH01	BH01	BH01	BH02	BH02	BH02	BH02	BH02	SKIP			
Depth	0.50	2.70	9.00	28.0	1.30	6.00	15.00	21.0	30.0				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	14/08/2023	15/08/2023	15/08/2023	16/08/2023	22/08/2023	22/08/2023	22/08/2023	23/08/2023	23/08/2023	23/08/2023			
Sample Type	Clay	Clay	Clay	Clay	Clay	Clay	Clayey Sand	Sand	Clay	Clayey Sand			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	17/08/2023	17/08/2023	17/08/2023	19/08/2023	24/08/2023	24/08/2023	24/08/2023	25/08/2023	25/08/2023	25/08/2023	LOD/LOR	Units	Method No.
Arsenic ^{#M}	780 ^{AA}	55	18	0.9	570 ^{AA}	15	9.9	8.0	1.5	8.9	<0.5	mg/kg	TM30/PM15
Barium ^{#M}	-	-	-	-	-	-	-	-	-	45	<1	mg/kg	TM30/PM15
Beryllium	-	-	-	-	-	-	-	-	-	<0.5	<0.5	mg/kg	TM30/PM15
Cadmium ^{#M}	3.3	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.3	<0.1	mg/kg	TM30/PM15
Chromium ^{#M}	79	60	64	9.3	110	64	74	100	7.7	120	<0.5	mg/kg	TM30/PM15
Copper ^{#M}	290 ^{AA}	10	9	5	970 ^{AA}	14	5	8	6	34	<1	mg/kg	TM30/PM15
Lead ^{#M}	4500 ^{AA}	18	18	7	52000 ^{AC}	29	7	14	33	190	<5	mg/kg	TM30/PM15
Mercury ^{#M}	1.2	0.2	0.1	<0.1	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Nickel ^{#M}	65	26	25	2.8	21	30	21	16	3.0	11	<0.7	mg/kg	TM30/PM15
Selenium ^{#M}	2	1	2	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	TM30/PM15
Total Sulphate as SO4 ^{#M}	-	-	-	-	-	-	-	-	-	310	<50	mg/kg	TM50/PM29
Vanadium	-	-	-	-	-	-	-	-	-	20	<1	mg/kg	TM30/PM15
Water Soluble Boron ^{#M}	-	-	-	-	-	-	-	-	-	1.6	<0.1	mg/kg	TM74/PM32
Zinc ^{#M}	1300	83	49	16	18000 ^{AB}	88	21	37	36	180	<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene ^{#M}	0.14	<0.04	<0.04	<0.04	0.10	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene ^{#M}	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene ^{#M}	<0.04	<0.04	<0.04	<0.04	0.08	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene ^{#M}	0.54	<0.03	<0.03	<0.03	0.95	<0.03	<0.03	<0.03	<0.03	0.06	<0.03	mg/kg	TM4/PM8
Anthracene [#]	0.12	<0.04	<0.04	<0.04	0.23	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene ^{#M}	1.1	<0.03	<0.03	<0.03	1.3	<0.03	<0.03	<0.03	<0.03	0.08	<0.03	mg/kg	TM4/PM8
Pyrene [#]	0.99	<0.03	<0.03	<0.03	1.1	<0.03	<0.03	<0.03	<0.03	0.07	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene [#]	0.57	<0.06	<0.06	<0.06	0.59	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	mg/kg	TM4/PM8
Chrysene ^{#M}	0.64	<0.02	<0.02	<0.02	0.63	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene ^{#M}	1.1	<0.07	<0.07	<0.07	0.96	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene [#]	0.66	<0.04	<0.04	<0.04	0.61	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene ^{#M}	0.39	<0.04	<0.04	<0.04	0.30	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene [#]	0.09	<0.04	<0.04	<0.04	0.08	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene [#]	0.45	<0.04	<0.04	<0.04	0.33	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Coronene	-	-	-	-	-	-	-	-	-	<0.04	<0.04	mg/kg	TM4/PM8
PAH 16 Total	6.8	<0.6	<0.6	<0.6	7.3	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.79	<0.05	<0.05	<0.05	0.69	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.31	<0.02	<0.02	<0.02	0.27	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	97	94	94	98	98	99	98	97	95	98	<0	%	TM4/PM8
Methyl Tertiary Butyl Ether ^{#M}	-	-	-	<0.006	<0.006	-	<0.006	-	-	-	<0.006	mg/kg	TM15/PM10
Benzene ^{#M}	-	-	-	<0.005	<0.005	-	<0.005	-	-	-	<0.005	mg/kg	TM15/PM10
Toluene ^{#M}	-	-	-	<0.003	0.005	-	<0.003	-	-	-	<0.003	mg/kg	TM15/PM10
Ethylbenzene ^{#M}	-	-	-	<0.003	<0.003	-	<0.003	-	-	-	<0.003	mg/kg	TM15/PM10
m/p-Xylene ^{#M}	-	-	-	<0.004	<0.004	-	<0.004	-	-	-	<0.004	mg/kg	TM15/PM10
o-Xylene ^{#M}	-	-	-	<0.004	<0.004	-	<0.004	-	-	-	<0.004	mg/kg	TM15/PM10
Surrogate Recovery Toluene D8	-	-	-	97	80	-	100	-	-	-	<0	%	TM15/PM10

Element Materials Technology

Client Name: SLR Consulting Ltd
Reference: 402.064683.00001
Location: Northfleet
Contact: James Appleby

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Job No.	23/13597	23/13597	23/13597	23/13757	23/13952	23/13952	23/13952	23/14070	23/14070	23/14070	Please see attached notes for all abbreviations and acronyms		
EMT Sample No.	1-4	13-16	20-22	7-9	5-8	13-16	29-31	1-3	7-9	10-13			
Sample ID	BH01	BH01	BH01	BH01	BH02	BH02	BH02	BH02	BH02	SKIP			
Depth	0.50	2.70	9.00	28.0	1.30	6.00	15.00	21.0	30.0				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	14/08/2023	15/08/2023	15/08/2023	16/08/2023	22/08/2023	22/08/2023	22/08/2023	23/08/2023	23/08/2023	23/08/2023			
Sample Type	Clay	Clay	Clay	Clay	Clay	Clay	Clayey Sand	Sand	Clay	Clayey Sand			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	17/08/2023	17/08/2023	17/08/2023	19/08/2023	24/08/2023	24/08/2023	24/08/2023	25/08/2023	25/08/2023	25/08/2023	LOD/LOR	Units	Method No.
Surrogate Recovery 4-Bromofluorobenzene	-	-	-	97	66	-	100	-	-	-	<0	%	TM15/PM10
MTBE #	<0.005 ^{SV}	<0.005	<0.005	-	-	<0.005	-	<0.005	<0.005	<0.005	<0.005	mg/kg	TM36/PM12
Benzene #	<0.005 ^{SV}	<0.005	<0.005	-	-	<0.005	-	<0.005	<0.005	<0.005	<0.005	mg/kg	TM36/PM12
Toluene #	<0.005 ^{SV}	<0.005	<0.005	-	-	<0.005	-	<0.005	<0.005	<0.005	<0.005	mg/kg	TM36/PM12
Ethylbenzene #	<0.005 ^{SV}	<0.005	<0.005	-	-	<0.005	-	<0.005	<0.005	<0.005	<0.005	mg/kg	TM36/PM12
m/p-Xylene #	<0.005 ^{SV}	<0.005	<0.005	-	-	<0.005	-	<0.005	<0.005	<0.005	<0.005	mg/kg	TM36/PM12
o-Xylene #	<0.005 ^{SV}	<0.005	<0.005	-	-	<0.005	-	<0.005	<0.005	<0.005	<0.005	mg/kg	TM36/PM12
Xylenes (sum of isomers) #	<0.01 ^{SV}	<0.01	<0.01	-	-	<0.01	-	<0.01	<0.01	<0.01	<0.01	mg/kg	TM36/PM12
EPH >C10-C25 (EH_1D_Total) #M	-	-	-	-	-	-	-	-	-	11	<10	mg/kg	TM5/PM8
EPH >C25-C40 (EH_1D_Total) #M	-	-	-	-	-	-	-	-	-	32	<10	mg/kg	TM5/PM8
EPH >C10-C40 (EH_1D_Total) #M	-	-	-	-	-	-	-	-	-	43	<20	mg/kg	TM5/PM8
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #M	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #M	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #M	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #M	<4	<4	<4	<4	<4	<4	<4	<4	<4	-	<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #M	<7	<7	65	<7	<7	<7	<7	<7	<7	-	<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #M	30	<7	22	<7	<7	<7	<7	<7	<7	-	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35 (EH+HS_CU_1D_AL)	30	<19	87	<19	<19	<19	<19	<19	<19	-	<19	mg/kg	TM5/PM8/PM16/PM12/PM10
Aromatics													
>C5-EC7 (HS_1D_AR) #	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #M	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) #	<4	<4	<4	<4	<4	<4	<4	<4	<4	-	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	22	<7	43	<7	19	<7	<7	<7	<7	-	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	110	<7	<7	<7	<7	<7	<7	<7	<7	-	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 (EH+HS_CU_1D_AR) #	132	<19	43	<19	19	<19	<19	<19	<19	-	<19	mg/kg	TM5/PM8/PM16/PM12/PM10
Total aliphatics and aromatics (C5-35) (EH+HS_CU_1D_Total)	162	<38	130	<38	<38	<38	<38	<38	<38	-	<38	mg/kg	TM5/PM8/PM16/PM12/PM10
Total Phenols HPLC	-	-	-	-	-	-	-	-	-	<0.15	<0.15	mg/kg	TM26/PM21B
Natural Moisture Content	24.9	61.0	170.2	28.4	8.9	61.2	10.1	21.7	25.2	9.6	<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Total Cyanide #M	-	-	-	-	-	-	-	-	-	<0.5	<0.5	mg/kg	TM89/PM45
Sample Type	Clay	Clay	Clay	Clay	Clay	Clay	Clayey Sand	Sand	Clay	Clayey Sand		None	PM13/PM0

Client Name: SLR Consulting Ltd
Reference: 402.064683.00001
Location: Northfleet
Contact: James Appleby

Solids: V=60g VOC jar. J=250g glass jar. T=plastic tub

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: SLR Consulting Ltd
Reference: 402.064683.00001
Location: Northfleet
Contact: James Appleby

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

[illegible]

Client Name: SLR Consulting Ltd
Reference: 402.064683.00001
Location: Northfleet
Contact: James Appleby

SVOC Report : Solid

EMT Job No. EMT Sample No.	23/13757 7-9	23/13952 5-8	23/13952 29-31								Please see attached notes for all abbreviations and acronyms		
Sample ID	BH01	BH02	BH02										
Depth	28.0	1.30	15.00										
COC No / misc													
Containers	V J T	V J T	V J T										
Sample Date	16/08/2023	22/08/2023	22/08/2023										
Sample Type	Clay	Clay	Clayey Sand										
Batch Number	1	1	1								LOD/LOR	Units	Method No.
Date of Receipt	19/08/2023	24/08/2023	24/08/2023										
SVOC MS													
Phenols													
2-Chlorophenol ^{#M}	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
2-Methylphenol	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
2-Nitrophenol	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
2,4-Dichlorophenol ^{#M}	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
2,4-Dimethylphenol	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
2,4,5-Trichlorophenol	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
2,4,6-Trichlorophenol	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
4-Chloro-3-methylphenol	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
4-Methylphenol	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
4-Nitrophenol	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
Pentachlorophenol	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
Phenol ^{#M}	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
PAHs													
2-Chloronaphthalene ^{#M}	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
2-Methylnaphthalene ^{#M}	<0.01	0.10	<0.01								<0.01	mg/kg	TM16/PM8
Phthalates													
Bis(2-ethylhexyl) phthalate	<0.1	<0.1	<0.1								<0.1	mg/kg	TM16/PM8
Butylbenzyl phthalate	<0.1	<0.1	<0.1								<0.1	mg/kg	TM16/PM8
Di-n-butyl phthalate	<0.1	<0.1	<0.1								<0.1	mg/kg	TM16/PM8
Di-n-Octyl phthalate	<0.1	<0.1	<0.1								<0.1	mg/kg	TM16/PM8
Diethyl phthalate	<0.1	<0.1	<0.1								<0.1	mg/kg	TM16/PM8
Dimethyl phthalate ^{#M}	<0.1	<0.1	<0.1								<0.1	mg/kg	TM16/PM8
Other SVOCs													
1,2-Dichlorobenzene	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
1,2,4-Trichlorobenzene ^{#M}	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
1,3-Dichlorobenzene	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
1,4-Dichlorobenzene	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
2-Nitroaniline	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
2,4-Dinitrotoluene	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
2,6-Dinitrotoluene	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
3-Nitroaniline	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
4-Bromophenylphenylether ^{#M}	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
4-Chloroaniline	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
4-Chlorophenylphenylether	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
4-Nitroaniline	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
Azobenzene	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
Bis(2-chloroethoxy)methane	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
Bis(2-chloroethyl)ether	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
Carbazole	<0.01	0.12	<0.01								<0.01	mg/kg	TM16/PM8
Dibenzofuran ^{#M}	<0.01	0.08	<0.01								<0.01	mg/kg	TM16/PM8
Hexachlorobenzene	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
Hexachlorobutadiene ^{#M}	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
Hexachlorocyclopentadiene	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
Hexachloroethane	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
Isophorone ^{#M}	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
N-nitrosodi-n-propylamine ^{#M}	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
Nitrobenzene ^{#M}	<0.01	<0.01	<0.01								<0.01	mg/kg	TM16/PM8
Surrogate Recovery 2-Fluorobiphenyl	92	110	110								<0	%	TM16/PM8
Surrogate Recovery p-Terphenyl-d14	78	110	100								<0	%	TM16/PM8

Element Materials Technology

Client Name: SLR Consulting Ltd
Reference: 402.064683.00001
Location: Northfleet
Contact: James Appleby

VOC Report : Solid

EMT Job No. EMT Sample No.	23/13757 7-9	23/13952 5-8	23/13952 29-31							Please see attached notes for all abbreviations and acronyms		
Sample ID	BH01	BH02	BH02									
Depth	28.0	1.30	15.00									
COC No / misc Containers	V J T	V J T	V J T									
Sample Date	16/08/2023	22/08/2023	22/08/2023									
Sample Type	Clay	Clay	Clayey Sand									
Batch Number	1	1	1							LOD/LOR	Units	Method No.
Date of Receipt	19/08/2023	24/08/2023	24/08/2023									
VOC MS												
Surrogate Recovery Toluene D8	97	80	100							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	97	66	100							<0	%	TM15/PM10
Dichlorodifluoromethane	<0.002	<0.002	<0.002							<0.002	mg/kg	TM15/PM10
Methyl Tertiary Butyl Ether ^{#M}	<0.006	<0.006	<0.006							<0.006	mg/kg	TM15/PM10
Chloromethane [#]	<0.003	<0.003	<0.003							<0.003	mg/kg	TM15/PM10
Vinyl Chloride	<0.002	<0.002	<0.002							<0.002	mg/kg	TM15_A/PM10
Bromomethane	<0.001	<0.001	<0.001							<0.001	mg/kg	TM15/PM10
Chloroethane ^{#M}	<0.006	<0.006	<0.006							<0.006	mg/kg	TM15/PM10
Trichlorofluoromethane ^{#M}	<0.003	<0.003	<0.003							<0.003	mg/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) ^{#M}	<0.006	<0.006	<0.006							<0.006	mg/kg	TM15/PM10
Dichloromethane (DCM) [#]	<0.007	<0.007	<0.007							<0.007	mg/kg	TM15/PM10
trans-1-2-Dichloroethene [#]	<0.003	<0.003	<0.003							<0.003	mg/kg	TM15/PM10
1,1-Dichloroethane ^{#M}	<0.006	<0.006	<0.006							<0.006	mg/kg	TM15/PM10
cis-1-2-Dichloroethene ^{#M}	<0.007	<0.007	<0.007							<0.007	mg/kg	TM15/PM10
2,2-Dichloropropane	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
Bromochloromethane ^{#M}	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
Chloroform ^{#M}	<0.005	<0.005	<0.005							<0.005	mg/kg	TM15/PM10
1,1,1-Trichloroethane ^{#M}	<0.005	<0.005	<0.005							<0.005	mg/kg	TM15/PM10
1,1-Dichloropropene [#]	<0.003	<0.003	<0.003							<0.003	mg/kg	TM15/PM10
Carbon tetrachloride ^{#M}	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
1,2-Dichloroethane ^{#M}	<0.005	<0.005	<0.005							<0.005	mg/kg	TM15/PM10
Benzene ^{#M}	<0.005	<0.005	<0.005							<0.005	mg/kg	TM15/PM10
Trichloroethene (TCE) ^{#M}	<0.005	<0.005	<0.005							<0.005	mg/kg	TM15/PM10
1,2-Dichloropropane ^{#M}	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
Dibromomethane ^{#M}	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
Bromodichloromethane ^{#M}	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
cis-1-3-Dichloropropene	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
Toluene ^{#M}	<0.003	0.005	<0.003							<0.003	mg/kg	TM15/PM10
trans-1-3-Dichloropropene	<0.003	<0.003	<0.003							<0.003	mg/kg	TM15/PM10
1,1,2-Trichloroethane ^{#M}	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
Tetrachloroethene (PCE) [#]	<0.003	<0.003	<0.003							<0.003	mg/kg	TM15/PM10
1,3-Dichloropropane ^{#M}	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
Dibromochloromethane ^{#M}	<0.005	<0.005	<0.005							<0.005	mg/kg	TM15/PM10
1,2-Dibromoethane [#]	<0.003	<0.003	<0.003							<0.003	mg/kg	TM15/PM10
Chlorobenzene ^{#M}	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
1,1,1,2-Tetrachloroethane ^{#M}	<0.005	<0.005	<0.005							<0.005	mg/kg	TM15/PM10
Ethylbenzene ^{#M}	<0.003	<0.003	<0.003							<0.003	mg/kg	TM15/PM10
m/p-Xylene ^{#M}	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
o-Xylene ^{#M}	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
Styrene	<0.003	<0.003	<0.003							<0.003	mg/kg	TM15_A/PM10
Bromoform	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
Isopropylbenzene [#]	<0.003	<0.003	<0.003							<0.003	mg/kg	TM15/PM10
1,1,2,2-Tetrachloroethane ^{#M}	<0.003	<0.003	<0.003							<0.003	mg/kg	TM15/PM10
Bromobenzene	<0.002	<0.002	<0.002							<0.002	mg/kg	TM15/PM10
1,2,3-Trichloropropane ^{#M}	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
Propylbenzene [#]	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
2-Chlorotoluene	<0.003	<0.003	<0.003							<0.003	mg/kg	TM15/PM10
1,3,5-Trimethylbenzene [#]	<0.003	<0.003	<0.003							<0.003	mg/kg	TM15/PM10
4-Chlorotoluene	<0.003	<0.003	<0.003							<0.003	mg/kg	TM15/PM10
tert-Butylbenzene [#]	<0.005	<0.005	<0.005							<0.005	mg/kg	TM15/PM10
1,2,4-Trimethylbenzene [#]	<0.006	<0.006	<0.006							<0.006	mg/kg	TM15/PM10
sec-Butylbenzene [#]	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
4-Isopropyltoluene	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
1,3-Dichlorobenzene ^{#M}	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
1,4-Dichlorobenzene [#]	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
n-Butylbenzene	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
1,2-Dichlorobenzene ^{#M}	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
1,2-Dibromo-3-chloropropane	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
1,2,4-Trichlorobenzene	<0.007	<0.007	<0.007							<0.007	mg/kg	TM15/PM10
Hexachlorobutadiene	<0.004	<0.004	<0.004							<0.004	mg/kg	TM15/PM10
Naphthalene	<0.027	0.054	<0.027							<0.027	mg/kg	TM15/PM10
1,2,3-Trichlorobenzene	<0.007	<0.007	<0.007							<0.007	mg/kg	TM15/PM10

Mass of sample taken (kg)	0.1058	Moisture Content Ratio (%) =	17.8
Mass of dry sample (kg) =	0.09	Dry Matter Content Ratio (%) =	84.9
Particle Size <4mm =	>95%		
EMT Job No	23/14070	Landfill Waste Acceptance Criteria Limits	
Sample No	12		
Client Sample No	SKIP		
Depth/Other			
Sample Date	23/08/2023		
Batch No	1		
Solid Waste Analysis		Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non- Hazardous Landfill
Total Organic Carbon (%)	0.13	3	5
Loss on Ignition (%)	1.1	-	10
Sum of BTEX (mg/kg)	<0.025	6	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-
Mineral Oil (mg/kg) (EH_CU_1D_AL)	<30	500	-
PAH Sum of 17(mg/kg)	<0.64	100	-
pH (pH Units)	9.2	-	>6
ANC to pH 7 (mol/kg)	0.06	-	to be evaluated
ANC to pH 4 (mol/kg)	5.8	-	to be evaluated
Eluate Analysis	10:1 conc ⁿ leached		Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg
	C ₁₀ mg/l	A ₁₀ mg/kg	
Arsenic	0.033	0.33	0.5
Barium	0.079	0.79	2
Cadmium	<0.0005	<0.005	100
Chromium	0.0019	0.019	300
Copper	0.03	0.30	0.04
Mercury	<0.001	<0.01	1
Molybdenum	0.023	0.23	5
Nickel	0.004	0.04	0.5
Lead	0.014	0.14	10
Antimony	3.8	38	70
Selenium	0.005	0.05	2
Zinc	0.008	0.08	0.01
Chloride	380	3800	0.2
Fluoride	0.7	7	0.5
Sulphate as SO ₄	110	1100	10
Total Dissolved Solids	1000	10000	50
Phenol	<0.01	<0.1	100
Dissolved Organic Carbon	19	190	0.06
			0.7
			0.1
			0.5
			7
			200
			25000
			500
			50000
			100000
			-
			1000

Client Name: SLR Consulting Ltd
Reference: 402.064683.00001
Location: Northfleet
Contact: James Appleby

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Asbestos sub-samples are retained for not less than 6 months from the date of analysis unless specifically requested.

The LOQ of the Asbestos Quantification is 0.001% dry fibre of dry mass of sample.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

Where trace asbestos is reported the amount of asbestos will be <0.1%.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
23/13597	1	BH01	0.50	3	Charlotte Taylor	07/09/2023	General Description (Bulk Analysis)	brown soil/stones
					Charlotte Taylor	07/09/2023	Asbestos Fibres	Fibre Bundles
					Charlotte Taylor	07/09/2023	Asbestos ACM	ACM Debris
					Charlotte Taylor	07/09/2023	Asbestos Type	Chrysotile
23/13952	1	BH02	1.30	7	Charlotte Taylor	07/09/2023	General Description (Bulk Analysis)	brown soil/stones
					Charlotte Taylor	07/09/2023	Asbestos Fibres	NAD
					Charlotte Taylor	07/09/2023	Asbestos ACM	NAD
					Charlotte Taylor	07/09/2023	Asbestos Type	NAD
23/14070	1	SKIP		13	Catherine Coles	11/09/2023	General Description (Bulk Analysis)	brown soil,stone
					Catherine Coles	11/09/2023	Asbestos Fibres	NAD
					Catherine Coles	11/09/2023	Asbestos ACM	NAD
					Catherine Coles	11/09/2023	Asbestos Type	NAD

Element Materials Technology

Notification of Deviating Samples

Client Name: SLR Consulting Ltd **Matrix : Solid**

Reference: 402.064683.00001

Location: Northfleet

Contact: James Appleby

Notification of Deviating Samples

Matrix : Solid

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 23/13757 23/13597 23/13952 23/14070

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution
AB	x10 Dilution
AC	x50 Dilution

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 23/13757 23/13597 23/13952 23/14070

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes	Yes	AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes

EMT Job No: 23/13757 23/13597 23/13952 23/14070

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	No
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
TM17	Modified US EPA method 8270D v5:2014. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3:1990/USEPA 160.1/3 (TDS/TS: 1971) Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.			AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO ₂ generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Preparation of Soil and Marine Sediment Samples for Total Organic Carbon.	Yes		AD	Yes
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes

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Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry); WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry); WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes	Yes	AD	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	A hot hydrochloric acid digest is performed on a dried and ground sample, and the resulting liquor is analysed.	Yes	Yes	AD	Yes

EMT Job No: 23/13757 23/13597 23/13952 23/14070

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 Second edition (2021)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes	Yes	AD	Yes
TM77	Modified DDCE/TS method 15364:2006. Determination of Acid Neutralization Capacity by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	No
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes	Yes	AR	Yes
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.			AR	Yes
TM170	Determination of Trace Metals by ICP-MS (Inductively Coupled Plasma – Mass Spectrometry): Modified USEPA Method 200.8, Rev. 5.4, 1994; Modified EPA Method 6020A, Rev.1, Feb 2007; Modified BS EN ISO 17294-2:2016	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes		AR	Yes
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 9214 - 340.2 (EPA 1998)	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes

EMT Job No: 23/13757 23/13597 23/13952 23/14070

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
NONE	No Method Code	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	
TM15_A	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

SLR Consulting Ltd
28 Mill Barn
Turkey Mill
Maidstone
United Kingdom
ME14 5PP



4225



Attention : Dominic Goodchild-James
Date : 13th October, 2023
Your reference : 402.064683.00001
Our reference : Test Report 23/15592 Batch 1
Location : BRM, Northfleet
Date samples received : 21st September, 2023
Status : Final Report
Issue : 1

Three samples were received for analysis on 21st September, 2023 of which three were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 5.43 kg of CO₂

Scope 1&2&3 emissions - 12.833 kg of CO₂

Authorised By:



Simon Gomery BSc
Senior Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: SLR Consulting Ltd
Reference: 402.064683.00001
Location: BRM, Northfleet
Contact: Dominic Goodchild-James
EMT Job No: 23/15592

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
 H=H₂SO₄, Z=ZnAc, N=NaOH, HN=HNO₃

EMT Sample No.	1-3	4-6	7-9								Please see attached notes for all abbreviations and acronyms		
Sample ID	BH23 - 01A	BH23 - 01B	BH23 - 02A										
Depth	3.48	0.83	1.03										
COC No / misc													
Containers	V G	V G	V G										
Sample Date	20/09/2023	20/09/2023	20/09/2023										
Sample Type	Ground Water	Ground Water	Ground Water										
Batch Number	1	1	1										
Date of Receipt	21/09/2023	21/09/2023	21/09/2023								LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 #	<0.01	<0.01	<0.01								<0.01	mg/l	TM36/PM12
>C6-C8 #	<0.01	<0.01	<0.01								<0.01	mg/l	TM36/PM12
>C8-C10 #	<0.01	<0.01	<0.01								<0.01	mg/l	TM36/PM12
>C10-C12 #	<0.005	<0.005	<0.005								<0.005	mg/l	TM5/PM16/PM3
>C12-C16 #	<0.01	<0.01	<0.01								<0.01	mg/l	TM5/PM16/PM3
>C16-C21 #	<0.01	<0.01	<0.01								<0.01	mg/l	TM5/PM16/PM3
>C21-C35 #	<0.01	<0.01	<0.01								<0.01	mg/l	TM5/PM16/PM3
Total aliphatics C5-35 #	<0.01	<0.01	<0.01								<0.01	mg/l	TM5/PM16/PM3/PM10
Aromatics													
>C5-EC7 #	<0.01	<0.01	<0.01								<0.01	mg/l	TM36/PM12
>EC7-EC8 #	<0.01	<0.01	<0.01								<0.01	mg/l	TM36/PM12
>EC8-EC10 #	<0.01	<0.01	<0.01								<0.01	mg/l	TM36/PM12
>EC10-EC12 #	<0.005	<0.005	<0.005								<0.005	mg/l	TM5/PM16/PM3
>EC12-EC16 #	<0.01	<0.01	<0.01								<0.01	mg/l	TM5/PM16/PM3
>EC16-EC21 #	<0.01	<0.01	<0.01								<0.01	mg/l	TM5/PM16/PM3
>EC21-EC35 #	<0.01	<0.01	<0.01								<0.01	mg/l	TM5/PM16/PM3
Total aromatics C5-35 #	<0.01	<0.01	<0.01								<0.01	mg/l	TM5/PM16/PM3/PM10
Total aliphatics and aromatics(C5-35) #	<0.01	<0.01	<0.01								<0.01	mg/l	TM5/PM16/PM3/PM10
pH #	7.5	7.7	7.7								<0.01	pH units	TM73/PM0
Dissolved Arsenic #	NDP	0.0091	0.0083								<0.0009	mg/l	TM170/PM14
Dissolved Cadmium #	NDP	<0.00003	<0.00003								<0.00003	mg/l	TM170/PM14
Total Dissolved Chromium #	NDP	<0.0002	<0.0002								<0.0002	mg/l	TM170/PM14
Dissolved Copper #	NDP	<0.001	<0.001								<0.001	mg/l	TM170/PM14
Dissolved Lead #	NDP	0.0041	0.0019								<0.0004	mg/l	TM170/PM14
Dissolved Mercury #	NDP	<0.0005	<0.0005								<0.0005	mg/l	TM170/PM14
Dissolved Nickel #	NDP	0.01	0.0042								<0.0002	mg/l	TM170/PM14
Dissolved Selenium #	NDP	<0.0012	<0.0012								<0.0012	mg/l	TM170/PM14
Dissolved Zinc #	NDP	0.0065	0.0072								<0.0015	mg/l	TM170/PM14
Hexavalent Chromium	<0.002	<0.002	<0.002								<0.002	mg/l	TM38/PM0

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: SLR Consulting Ltd
Reference: 402.064683.00001
Location: BRM, Northfleet
Contact: Dominic Goodchild-James
EMT Job No: 23/15592

VOC Report : Liquid

EMT Sample No.	1-3	4-6	7-9									
Sample ID	BH23 - 01A	BH23 - 01B	BH23 - 02A									
Depth	3.48	0.83	1.03									
COC No / misc												
Containers	V G	V G	V G									
Sample Date	20/09/2023	20/09/2023	20/09/2023									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1									
Date of Receipt	21/09/2023	21/09/2023	21/09/2023									
VOC MS										LOD/LOR	Units	Method No.
Dichlorodifluoromethane	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.0001	<0.0001	<0.0001							<0.0001	mg/l	TM15/PM10
Chloromethane #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
Vinyl Chloride #	<0.0001	<0.0001	<0.0001							<0.0001	mg/l	TM15/PM10
Bromomethane	<0.001	<0.001	<0.001							<0.001	mg/l	TM15/PM10
Chloroethane #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
Trichlorofluoromethane #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
Dichloromethane (DCM) #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
trans-1-2-Dichloroethene #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
1,1-Dichloroethane #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
cis-1-2-Dichloroethene #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
2,2-Dichloropropane	<0.001	<0.001	<0.001							<0.001	mg/l	TM15/PM10
Bromochloromethane #	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
Chloroform #	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
1,1,1-Trichloroethane #	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
1,1-Dichloropropene #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
Carbon tetrachloride #	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
1,2-Dichloroethane #	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
Benzene #	<0.0005	<0.0005	<0.0005							<0.0005	mg/l	TM15/PM10
Trichloroethene (TCE) #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
1,2-Dichloropropane #	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
Dibromomethane #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
Bromodichloromethane #	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
cis-1-3-Dichloropropene	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
Toluene #	<0.005	<0.005	<0.005							<0.005	mg/l	TM15/PM10
trans-1-3-Dichloropropene	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
1,1,2-Trichloroethane #	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
Tetrachloroethene (PCE) #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
1,3-Dichloropropane #	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
Dibromochloromethane #	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
1,2-Dibromoethane #	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
Chlorobenzene #	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
Ethylbenzene #	<0.001	<0.001	<0.001							<0.001	mg/l	TM15/PM10
m/p-Xylene #	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
o-Xylene #	<0.001	<0.001	<0.001							<0.001	mg/l	TM15/PM10
Styrene	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
Bromoform #	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
Isopropylbenzene #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<0.004	<0.004	<0.004							<0.004	mg/l	TM15/PM10
Bromobenzene #	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
1,2,3-Trichloropropane #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
Propylbenzene #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
2-Chlorotoluene #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
1,3,5-Trimethylbenzene #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
4-Chlorotoluene #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
tert-Butylbenzene #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
1,2,4-Trimethylbenzene #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
sec-Butylbenzene #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
4-Isopropyltoluene #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
1,3-Dichlorobenzene #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
1,4-Dichlorobenzene #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
n-Butylbenzene #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
1,2-Dichlorobenzene #	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
1,2,4-Trichlorobenzene	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
Hexachlorobutadiene	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
Naphthalene	<0.002	<0.002	<0.002							<0.002	mg/l	TM15/PM10
1,2,3-Trichlorobenzene	<0.003	<0.003	<0.003							<0.003	mg/l	TM15/PM10
Surrogate Recovery Toluene D8	96	96	100							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	120	110	110							<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Matrix : Liquid

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Element Materials Technology **Notification of Deviating Samples**

Client Name:	SLR Consulting Ltd
Reference:	402.064683.00001
Location:	BRM, Northfleet
Contact:	Dominic Goodchild-James

Notification of Deviating Samples

Matrix : Liquid

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 23/15592

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

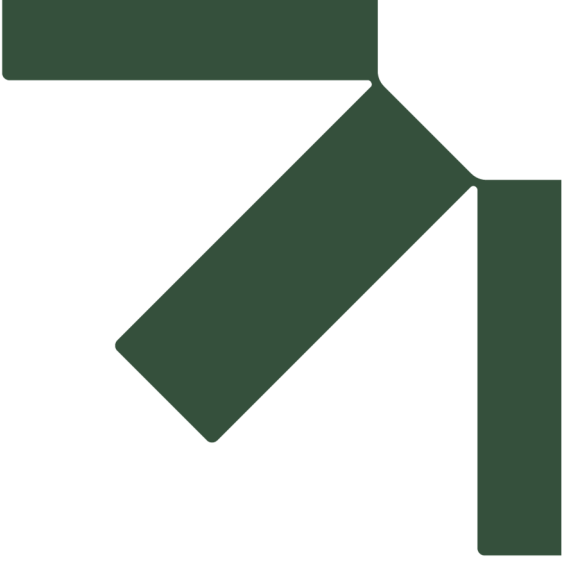
HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 23/15592

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013	PM0	No preparation is required.				
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			

EMT Job No: 23/15592

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM170	Determination of Trace Metals by ICP-MS (Inductively Coupled Plasma – Mass Spectrometry): Modified USEPA Method 200.8, Rev. 5.4, 1994; Modified EPA Method 6020A, Rev.1, Feb 2007; Modified BS EN ISO 17294-2:2016	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			



Appendix D Piling Contractor Method Statement

Piling Risk Assessment

E-Scrap Sample Preparation Plant

Britannia Refined Metals Ltd

SLR Project No.: 402.064683.00001

12 February 2024

METHOD STATEMENT 04	CONTINUOUS FLIGHT AUGER BORED PILING (CFA) using GEAX EK75				
Description of the Task/Activity	Creating and filling bored holes using GEAX EK75 piling rig as per required designs and drawings.				
Project Name	Britannia Refined Metals Ltd	Project Ref	3627		
Site Address/ Location	Botany Road Northfleet Gravesend DA11 9BG	Start Date	Wc 19.02.2024		
		End Date	tbc		
		Duration	tbc		
Works Supervisor	Barry Braine	Role	Visiting	Tel	07555 100618
Introduction	Piled Solutions Limited have been instructed by the client to proceed with the design and installation of a maximum of 40No. piles which will later form the foundations required at the above development.				
Emergency Procedures	Site emergency procedures and rules will be followed as directed at the induction which is attended by all employees and subcontractors. Simulations/drills will take place for projects as necessary in accordance with client/site procedures/policies.				
Key plant and Tools Required	- Hydraulic piling rig plus attachments - Concrete Pump & Compressor - Pressure Washer - Excavator - Dumper - Foreman's Van - Hand tools/Power Tools				
Specific Staff Training Requirements	- Piling rig operator - Slinger signaller/Rig attendant - Concrete pump operator - Site induction - CPCS/CSCS/NPORS - Manual Handling - Work at Height - Abrasive Wheels An excavator operative is being provided by the client for the duration of the piling works. The piling foreman will check the machine operator's plant operator's CPCS/NPORS card and ensure that the operator is included in all Piled Solutions' site safety inductions and toolbox talks. Operations and Safety Manual read by all operatives				
Key Materials/Products Required	- Premix Concrete - Steel Reinforcement - Diesel - Hydraulic Oil - Grease - Petrol - AdBlue				

Risk Assessments	RA01 Manual Handling RA02 Working at Height RA03 Lone Working RA04 Use of Hand Tools RA05 Use of Power Tools RA06 Refueling of Plant and Vehicles RA07 Young Persons RA08 Hazardous Substances RA09 Site Working RA11 Noise RA14 Driving for Business Purposes RA15 Asbestos RA16 Loading and Unloading Wagons RA17 Plant Operation – Piling Rig GEAX EK75 RA18 Plant Operation – 360 Excavator RA19 Plant Operation – Dumper truck RA21 Wet Concrete Use RA23 Fabricating Pile Cages RA28 Use of Pressure Washer RA31 Plant Operation – Concrete Pumps & Pipelines RA32 Plant Operation – Air Compressor RA33 Handling of Augers, Cages and Casings				
COSHH Assessments	COSHH03 Hydraulic Oil COSHH04 Concrete (pumped) COSHH05 Morris Grease K2EP COSHH06 No Nonsense Line Marker Spray Paint COSHH07 Unleaded Petrol COSHH08 Prime a Pump COSHH09 Hand Sanitiser Gel COSHH11 AdBlue COSHH12 White Diesel				
Personal Protective Equipment					
There is a risk that the ground may contain contaminants. To alleviate the risk full protection hazmat suits and appropriate face masks will be provided by the main contractor.					
Safety helmet	y	Suitable gloves	y	Respiratory Protection	
Safety boots	y	Eye protection	y	Safety harness	y
High visibility vest	y	Ear protection	y	Other	
Fall Protection Measures	No work at height shall be undertaken without adequate fall arrest systems or collective measures such as air bags/netting. Any work to be undertaken which involves height will be risk assessed and agreed with the Director beforehand. A rescue plan will be created if work at height is deemed necessary.				
Safety Checks	Pre user checks on dumper, excavator and piling rig Pre user checks on hand tools/power tools				
Method of Access and Egress to the work area	Open Site with security gates				

Emergency Procedures		Site rules will be followed as directed at the induction which is attended by all employees and subcontractors. Regular simulations of the emergency procedures will be undertaken for projects which are expected to take long periods of time.
Welfare Facilities		The welfare facilities available should meet the minimum requirements of the HSE. This is namely access to a clean toilet, a suitable dry room with appropriate heating and tables and chairs, hot and cold running water and electrical supply. See the enclosed HSE leaflet "Provision of welfare facilities during construction work", for further details.
First Aid Facilities 	Name of On-Site First Aider	Displayed on H & S poster in site office
	First Aid Box Location	Site Office
	Location of Nearest Hospital	Displayed on H & S poster in site office

SCOPE OF WORKS

These piling works comprise the design and installation of 40No. 450mm diameter of CFA Piles with designed depths ranging of 19.8m, all typically reinforced with cages comprising 4B16 bars to 8 metres with a B8 helical. Concrete mix to comprise concrete of C28/35, DC-2, 20mm aggregate and a slump of 150mm. These piling works are provisionally booked for w/c 19/02/2024 and will take place over a contractual period of 2 weeks.

Initially our works will comprise the delivery of the Piling Rig, ancillary equipment and steel reinforcement straight bar and helical via the use of hiab and arctic lorries.

Where possible these deliveries will unload directly onto the piling area. However, in the majority of instances this will not be possible and all equipment and materials will need to be unloaded at the site entrance. The piling rig will then be tracked to the piling area by our trained operatives, while the ancillary equipment and materials will be carried round by the attendant excavator.

SEQUENCE OF OPERATIONS

On Arrival to Site

1. All staff to attend the site induction and read the relevant work instructions before starting any work on site.
2. The site will be inspected for any foreseeable hazards prior to works commencing and a site-specific risk assessment created.
3. Operatives to don the Personal Protective Equipment (PPE) as instructed by the risk and COSHH assessments. Replacements will be available from the Director as needed. Operatives will be trained in safe and effective use of PPE.
4. Products and materials delivered or taken to site will be offloaded from the vehicle using good manual handling techniques (including use of mechanical aids if possible) and taken to an allocated area within the site boundaries.
5. Pre user checks undertaken on plant/machinery/tools and results recorded.
6. Operations and Safety instructions and other Manufacturer's instructions available and read by workers.
7. Piled Solutions staff shall discuss with site staff a suitable place to erect reinforcement cages, together with an adjacent area for storage of reinforcement bars, helical and completed cages. This area needs to be segregated from traffic by fencing or similar, to avoid danger to steel fixers or damage to cages.

Equipment arriving, leaving or on Site

8. Wagons will deliver the piling rig and other required equipment with a banksman in place. Handbrake engaged and lorry restraints placed prior to climbing onto the wagon bed.
9. Unloading of the wagon will take place using an agreed and safe sequence and equipment/materials left in designated area.
10. Wagons will be escorted off site with a banksman.
11. To reduce noise pollution all engines will be switched off when not in use and keys removed for security.
12. All equipment will be checked at the beginning of each day for oil/water levels etc and recorded as per PUWER Regulations.
13. Piling rigs and other equipment will be operated, erected and by authorised, competent personnel only in accordance with manufacturer's instructions, conforming to best practice and as trained.
14. Persons will not climb onto the piling rig or other equipment unless to access the cab using the steps available.
15. Site traffic management plan will be complied with as per induction information.

Setting up of agitator and concrete pump

16. Upon arrival to site the hiab will place an agitator on a prop stand in the relevant area as discussed between Piled solutions operatives and site
17. A secondary hiab will then place the concrete pump in a suitable place as so the chute from the agitator will feed the concrete pump
18. The next process will be to place the relevant pipe work connecting the agitator to the concrete pump and the concrete pipes to feed the piling rig
19. Each hose connection should have a rubber gaskets and grease to allow sufficient movement and to stop any pipework forming kinks, Pipes shall be connected together using steel clamps and rubber gaskets, after the connection have been secured safety pins/clips shall be placed into the steel concrete clamps to stop them from opening during movement and pumping operations.
20. A primer solution shall be made to lubricate the lines before any concrete is passed through.
21. Upon concreting the banksman shall bank and concrete wagon onto the pump.
22. The pump driver shall communicate with the concrete lorry operator to ensure the correct mix details have arrived and slump, pumping slow for priming the lines shall commence first then the engine revs shall be raised to commence the pile filling method.

Setting up of concrete pump without agitator

23. Upon arrival to site a hiab shall place the concrete pump in a relevant position as discussed with Piled Solutions operatives and site staff
24. All relevant pipework to the task shall be connected to the concrete pump and piling machine.
25. A primer solution shall be made to lubricate the lines before any concrete is passed through.
26. Upon concreting the banksman shall bank and concrete wagon onto the pump.
27. The pump driver shall communicate with the concrete lorry operator to ensure the correct mix details have arrived and slump, pumping slow for priming the lines shall commence first then the engine revs shall be raised to commence the pile filling method.

Rigging Up without MEWP

1. Rigging up of the piling machine will be done on a firm level tested working platform
2. If applicable the tracks will be extended to the proper fully extended position.
3. The mast will be erected into the vertical position as per the manufacturers user manual.
4. The correct augers and auger guides will be selected as per the relevant pile schedule for the job.
5. When building the augers a pre bored hole will be augered to a depth of approx 4.5m a 6M follow auger will be dropped into this and locking pins will be inserted into the couplings to secure them to the piling machine, this method will be continued until the auger building task is completed.
6. If this method cannot be achieved then an excavator will hold the augers in place for the piling machine to attach itself to the augers, then a able bodied person will be attached to the machine using a bosuns chair

who will then be take up by the machines auxillary winch to the height of the couplings to insert the auger pins.

Rigging Up with MEWP

7. Rigging up of the piling machine will be done on a firm level tested working platform
8. If applicable the tracks will be extended to the proper fully extended position.
9. The MEWP on site operator will put on a safety harness, start the MEWP on the ground and lower the boom, when lowered operator will climb into the basket and attach the lanyard to the anchor point.
10. The mast will be erected into the vertical position as per the manufacturers user manual this will usually need to be bolted together, any work involving working at height a MEWP will be used.
11. The correct augers and auger guides will be selected as per the relevant pile schedule for the job.
12. An attendant excavator shall hold the first auger in a vertical position for the piling machine to attach itself to, a member of the team will then use the MEWP in a safe working manor to take themselves upto the auger coupling to insert the auger pins.
13. This process will be repeated until the auger building exercise is completed.

On Site Fabrication of Pile Cages

14. Reinforcement cages are usually supplied and prepared by a CARES approved supplier to the specifications provided. A suitable fabrication area will need to be available. The procedure detailed in (17-27) shall be followed.
15. The straight bar and helical shall be lifted to the appropriate work area either directly from the delivery vehicle, or via the attendant excavator. All lifting equipment must be considered appropriate under LOLER (1998).
16. Straight bars will be split into single lift bundles, while helicals will either be delivered in bundles or within lifting sacks. If items are delivered in lifting sacks or with strops attached, it is a requirement that these are inspected and confirmed as being appropriate for their intended use.
17. Straight bars will be lifted onto the purpose built cage stands, this will either be by hand or via mechanical aid. Lifting onto cage stands must only be by trained operatives and should only take place when it is safe to do so. Stability of cage stands must be monitored at all times.
18. When steel lengths are lifted onto the cage stands by hand it is usually B12 - B16 bar @4-7m.
19. A spiral helical is placed over the end of the reinforcement and dragged up the length of the bars – usually in 2 or 3 parts
20. One bar is tied to the helical along the entire length of the cage using 12-gauge tying wire and a pair of cutting nippers (snips)
21. The bar is shifted back on the stand and then the next bar is tied in place using the wire and snips. This process is repeated for each bar until the cage is complete.
22. As each cage is completed it is removed from the assembly stands either by hand in the case of lightweight cages, or by mechanical means i.e., crane/excavator for heavier cages.
23. After fabrication, the cages are to be stored on timbers or clean hardcore to avoid contamination by soil
24. Heavyweight cages may need strengthened lifting points to enable them to be moved and lifted safely. This will normally consist of three turns of helical securely wired or welded to each main bar. Alternatively, a purpose made welded band can be used. Heavy cages are lifted by mechanical means i.e. crane, digger.
25. Should reinforcement bars require trimming or cutting then a hacksaw or disc cutter will be utilised.

Set Up and Boring

26. Drawings and design are checked by the foreman if all correct the rig attendant will fit an 'end cap' to the base of the auger to seal the hollow stem against the ingress of ground water and soil.
27. One rig attendant is to be always on duty in front of the rig when in operation to ensure it is working correctly and other personnel are kept clear.
28. A Permit to Dig must be obtained before any boring begins.

29. All auger guards/gates prior to the commencement of the drilling operations.
30. The piling rig will be tracked into position with the assistance of a banksman.
31. Boring can commence and continue to the required depth and any spoil is then removed from the auger by the auger cleaner. Excess spoil around the bore shall be removed by the attendant digger.
32. Dependent on the ground conditions, the augers may require back spinning at various times, to remove spoil from the augers and to ensure that the weight of the spoil on the auger flights does not prevent the auger removal process. Climbing of the augers is not permitted.
33. If obstructions are encountered, piling will be suspended and the procedure for obstruction removal followed as per training.
34. Once at target depth, the augers are rotated to remove excess spoil from the shaft. The design depth shall then be checked, and the augers extracted.
35. When extracting the augers, spoil on the auger shall be cleared using hand tools, and or, by the 360° excavator available. Cleaning of the auger by hand may be necessary when working close to other operations or avoid excessive splashing.
36. The rig operator and banksman are responsible for ensuring that spoil does not ride up the augers by more than 1.5 metres to prevent injury from falling pile arisings.

Concreting

37. At the target depth the auger is rotated to allow spoil to rise and the auger is lifted a maximum of 150mm to allow the bung to be blown out and the concrete to exit.
38. The concrete pump is operated to supply concrete through the delivery hoses and down the auger central stem to form the pile as the auger is withdrawn. Bore spoil and concrete over-break is removed from the pile head by a 360° excavator in attendance.
39. The concrete is pumped and constructed to ground level.
40. Pile shaft concrete cannot be left below the existing piling platform and therefore a difference in cast level to pile trim level of no less than 500mm is necessary to ensure sound concrete at the pile head.

Placing Pile Cages

41. The attendant excavator will clear the spoil and concrete slurry from the pile position to a stockpile for disposal by the waste contractor.
42. The pile head will be located by the piling crew and a small amount of concrete dug out to define the pile position.
43. The reinforcement cage shall then be fitted with plastic wheel type spacers and is then either manually lifted into position or lowered by the excavator or the rig service line into the concrete. Where necessary the cage may need to be pushed down by hand, or applying weight to the cage by carefully stepping on the helical binder. The cage may also be pushed down by the back face of the attendant machine's digger bucket.
44. The rig attendant will check the reinforcement cage on completion to ensure it is central in the pile.
45. Any reinforcing bars that project above the piling platform will be fitted with yellow plastic protective caps fitted to protect against stab, puncture, and trip hazards.
46. The piling rig then sets up onto a new position with the aid of the rig attendant and the process is repeated.

Works Procedure for the Sampling and Testing of Concrete

47. The Foreman will be informed of the Concrete mix specifications in the Technical pack handed over at site start-up. This information will be briefed to the Pump Operator.
48. When a mixer truck arrives on site, the pump operator will check the delivery ticket prior to discharge to ensure the mix is as specified.
49. If required sampling and testing of the concrete mix will be carried out by an approved testing consultant on our behalf. There is an additional charge for this as per the estimate.

Temporary Supports

50. Where non cohesive stratum is encountered and the pile shaft is considered unstable, concreting will take place through the central hollow stem. Where non cohesive soils are close to the surface another option can be to install temporary liners to hold the granular soils back and keep the bore open.

At the end of each shift

51. At the end of each shift the cleaning out of the concrete pump and lines shall commence this comprises of 2 different methods depending on set up either with an agitator or just a concrete pump.
52. With an agitator a diverter valve shall be placed into the position as such the feed will be feeding the agitator itself from the pump
53. The concrete pump shall be placed into reverse mode to alleviate any pressure in such lines removing risk of blow back from pressurized lines.
54. The pipe shall then be disconnected from the concrete pump, a sponge ball placed inside, then a cleaning out canon that is air fed connected with a steel clamp and gasket to the end of the pipe, safety pins inserted then the clean out method shall commence
55. Once the concrete is cleaned through, buckets of water shall be poured into the pipe, a sponge ball placed again, clean out canon connected with a steel clamp and gasket with safety clip, the process is then repeated.
56. Clean out of the concrete lines shall commence in the same manor but with the diverter valve moved by a hydraulic method into the piling rig feed lines.
57. For clean out without an agitator the concrete pump shall be pumped empty, placed into reverse mode until pressure is alleviated from the lines, it is then disconnected from the concrete pump and the clean out method shall commence in the same manor.
58. After all concrete is cleaned from the pipework the cleaning out equipment shall be cleaned out and placed back in a safe environment removing any trips hazards from staff.

De-rigging with MEWP

55. The rig driver will be banked into a flat, stable and safe area to de-rig.
56. The MEWP on site operator will put on a safety harness, start the MEWP on the ground and lower the boom, when lowered operator will climb into the basket and attach the lanyard to the anchor point.
57. The MEWP operator will drive the MEWP into position to swing into the rig. The rig driver will lower the auger on to the ground and the banksman will open the gates, the MEWP operator will swing the MEWP into a position to remove the auger pins in the coupling, when removed the MEWP operator will signal to the rig driver via banksman to raise the second line, when in correct position the MEWP operator will attach a sling chain to the auger and on the swivel hook, the MEWP operator will then swing the MEWP away from the rig. Under instruction from the banksman the rig driver will raise the head and when the augers come apart will lift the second line and then lower the auger into a position to be collected. This procedure is done until the augers are removed.
58. When the augers have been dismantled the banksman instructs the rig driver to lower the head to the bottom, the MEWP operator will swing in and signal to the rig driver via the banksman to raise the second line, when in position he will attach the swivel hook to the reaction bar and swing away from the rig, a pin will be removed by the banksman at the base of the bar and he will signal to the rig driver to lift the second line, when clear he will signal to the rig driver to lower the bar on to the ground into a position for loading, the banksman will disconnect the swivel hook. Once the whole process is completed rig driver will lower into a position for loading.
59. Operatives will ensure the slew pin is placed in position and lower the mast and place the tracks into de-rigging position, the cradle will then be fitted to the mast and the rig banked into a position for loading.
60. All of the concrete pump equipment will be taken apart by the pump operator

Derigging without MEWP

1. A safe location will be determined between site staff and our employees to deconstruct the augers.
2. A pilot hole will then be bored to approximately 4.5m the augers will then be extracted from the ground and covered with the foot section of the machine to remove any open excavations from staff
3. The lead auger will then be lowered onto the ground, auger pins removed and the lead auger removed from the machine.

4. An auger bung will then be inserted into the next auger which shall be lowered into the open pilot hole to remove the next auger, the auger pins will then be extracted and the augers separated.
5. The piling machine will be moved away from the auger that is in the pilot hole, a chain will be attached and the attendant excavator will remove the auger using the certified chain and shackle in place
6. This method will be continued until all augers are removed.
7. The machine will be dismantled as per the manufacturers instruction manual until it is placed into transport mode.

At the end of each project

1. Working areas are to be always kept clean and tidy. Supervision will be in place and records kept of any inspections.
2. Clear any other debris at end of the shift.
3. When piling is complete the rig will be put back into transport mode and tracked onto wagon using banksman in accordance with manufacturers instructions.

Spills management

1. Eliminate sources of ignition. Contain spillage in spill kits and dispose of them appropriately.

Service Strikes

1. Electric - Switch machine off & evacuate all personnel on the ground. The rig operator must remain in the rig. Do not attempt to disengage the cable from the auger. Do not touch exposed cables.
2. Gas - Switch all machinery off & evacuate all personnel to safe distance. Extinguish all naked flames. No smoking. Gas emergency number is 0800 111 999

All work will be undertaken by qualified competent persons with experience of the type of work described above, and in all cases in full accordance with safety procedures specified in the company's Health and Safety Policy.

Prepared by: Barry Braine

Position: Director

Date: 16.01.2024



Acceptance of Method Statement

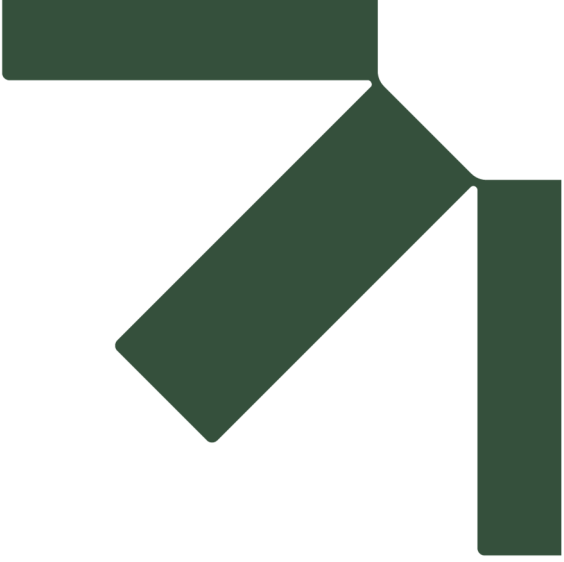
Site: Britannia Refined Metals Ltd, Botany Road, Northfleet, Gravesend DA11 9BG

Job No: 3627

This method statement has been brought to my attention and the nature of the task, hazards and risks have been explained.

I am aware of the actions to be taken for this task to be undertaken safely and hereby confirm that I will act in a safe manner using the prescribed safety features contained within this assessment

Print Name	Signature	Date of understanding and acceptance



Appendix E Piling Pollution Scenarios

Piling Risk Assessment

E-Scrap Sample Preparation Plant

Britannia Refined Metals Ltd

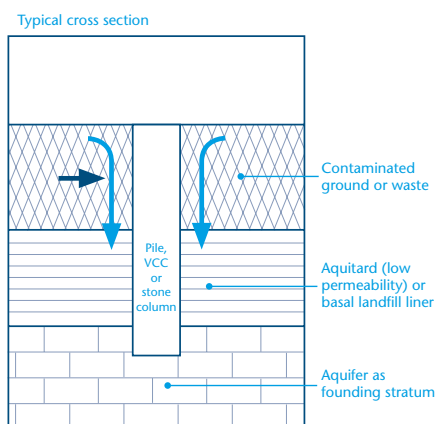
SLR Project No.: 402.064683.00001

12 February 2024

Table 2. Pollution scenarios and summary of the Source–Pathway–Receptor linkages

Pollution Scenario 1

Creation of preferential pathways through an aquitard to allow potential contamination of an aquifer



Source –

contaminated made ground, waste or contaminated perched groundwater

Pathway –

pile/stone column, pile/soil interface or disturbed ground around pile

Receptor –

groundwater in aquifer; typically in solid strata in which pile is founded

Examples –

1) contaminated ground above clay deposits, which sit on permeable solid strata such as the Chalk. Disturbance of aquitard layer could create a migration pathway for contaminated perched water in the made ground

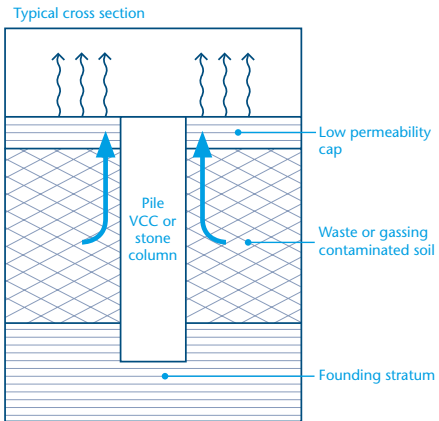
2) similar to 1) above: a closed landfill with a basal liner, to be redeveloped, with structural loads supported on piles founded in permeable solid strata below the basal liner

Issues to consider

- **Polluting substances** – leachable/mobile form?
- **Groundwater** – directly beneath the site/in strata penetrated by piles/Major or Minor Aquifer/in hydraulic continuity with a surface water body?
- **Aquitard/Aquifer** – Will the piling or ground improvement method breach aquitard/the basal liner of a landfill site/penetrate an aquifer?
- **Migration** – Could contaminants in near surface deposits migrate into underlying aquifer or surface water body?
- **Pile material** – Is the pile made out of a material that could allow passage of contaminants?
- **Preferential flowpath** – Will the piling or ground improvement method create a flow path for migration of contaminated perched water/leachate into an aquifer/surface water body?

Pollution Scenario 2

Creation of preferential pathways through a low permeability surface layer, allowing migration of landfill gas, soil gas or contaminant vapours to the surface



Source –

gassing landfilled waste or contaminated ground

Pathway –

pile/stone column, pile/soil interface or disturbed ground around pile

Receptor –

users of built development/structures

Examples –

1) development on old landfill, or “brownfield” site when ground levels have been raised using gas-generating fill. Disturbance of an impermeable capping layer installed to manage the existing gassing regime may create migration pathways for landfill gas, air-flow pathways rendering a gas extraction system ineffective or increase the rate of degradation and volume of gas generated

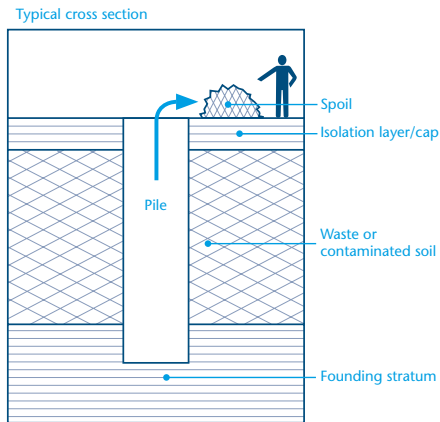
2) similar to 1) above: where land has been contaminated with volatile compounds, such as petroleum spirit

Issues to consider

- **Polluting substances/gas** – Is the contamination present a potential source of landfill gas or vapours?
- **Preferential flowpath** – Will the piling or ground improvement method create a flow path for the migration of gas/vapour to surface?
- **Gas risk** – Is there a risk from accumulation of gas/vapours in enclosed spaces in the proposed development? Will they be mitigated by using standard gas protection measures?
- **Air quality** – Are gas releases to atmosphere acceptable?

Pollution Scenario 3

Direct contact of site workers and others with contaminated soil arisings that have been brought to the surface



Source –

contaminated soil or waste

Pathway –

direct contact with excavated arisings, run-off to surface waters

Receptor –

human receptors (construction workers, site users, etc) and surface water

Examples –

1) piling creates arisings which contain contamination that could come into contact with sensitive receptors. The piling process is likely to mix contaminated and uncontaminated soils, producing an increased volume of contaminated materials for disposal. Contaminated piling arisings may also cause cross-contamination to isolated layers

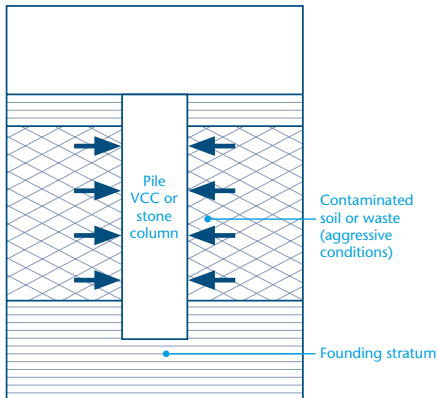
Issues to consider

- **Contamination hazard** – Are contaminants present in the soil/groundwater at sufficient concentrations to pose a hazard to human health or the environment?
- **Arisings** – Could the piling or ground improvement method bring potentially contaminated soil arisings to the surface?
- **Disposal** – Are measures in place to contain/dispose of arisings in a safe manner?

Pollution Scenario 4

Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of materials

Typical cross section



Source –

contaminated soil, waste or leachate

Pathway –

direct contact with pile

Receptor –

built development (and users)

Examples –

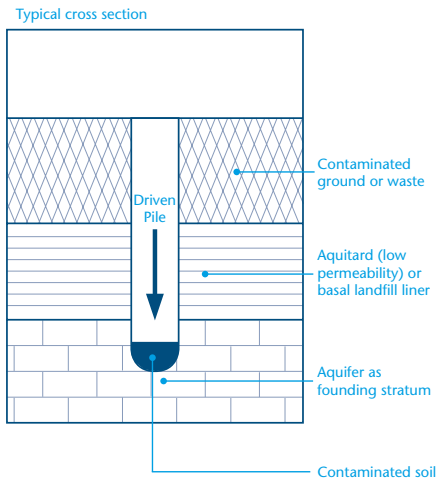
1) some contaminants in soil/leachate may be aggressive to pile materials causing degradation of piles, reducing or eliminating their load carrying capacity, and possibly creating further migration pathways

Issues to consider

- **Degradation** – Do the soils or their leachability present a risk to the performance or durability of the pile material?

Pollution Scenario 5

The pushing of solid contaminants down into an aquifer during pile driving



Source –

contaminated soil

Pathway –

driving down of soil in contact with the sides/butt end of pile, or “plugging” of open-ended pile

Receptor –

groundwater in aquifer, typically in solid strata in which pile is founded

Examples –

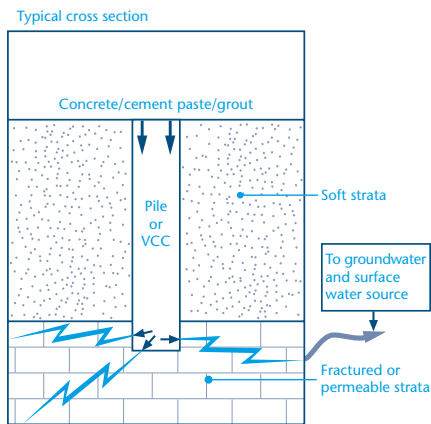
- 1) soil in contact with the sides of a driven pile and material below the butt end of a solid or closed-end pile dragged down
- 2) open-ended tubular piles become “plugged” with soil, enabling material captured near the surface to be transported downwards within the tube towards the founding level

Issues to consider

- **Polluting substances** – leachable/mobile form?
- **Groundwater** – directly beneath the site/in strata penetrated by piles/Major or Minor Aquifer/in hydraulic continuity with a surface water body?
- **Aquitard/Aquifer** – Will the piling or ground improvement method breach aquitard/the basal liner of a landfill site/penetrate an aquifer?
- **Drag down** – Does the piling method involve the use of blunt-ended solid or closed-end piles that could drag down soil or open-ended tubular piles that could become “plugged” with soil?

Pollution Scenario 6

Contamination of groundwater and, subsequently, surface waters by wet concrete, cement paste or grout



Source –

concrete, cement paste or grout introduced to the ground

Pathway –

flow within highly permeable or fractured strata

Receptor –

groundwater and surface water

Examples –

1) loss of wet concrete, cement paste or grout in fast-flowing groundwater, associated with fractured/jointed rocks e.g. limestones, Chalk or permeable gravel formations. If retardant additives are used pile materials could take several hours to set.

Issues to consider

- **Contamination** – Does the method involve introducing wet concrete, cement paste or grout into the ground?
- **Groundwater** – directly beneath the site/in strata penetrated by piles/Major or Minor Aquifer/in hydraulic continuity with a surface water body?
- **Aquifer** – Highly fissured or granular strata? Is the groundwater in the aquifer fast-flowing?

Note: Other scenarios may be identified in particular circumstances.



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