



Evans & Langford

Britannia Refined Metals

Northfleet

New Lead Store Building

Piling Risk Assessment

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ERM 2003 contaminant concentrations contour plan

Britannia Refined Metals - New Lead Store Building

Piling Risk Assessment

Introduction

This document has been prepared in order to support the discharge of a planning condition that is considered likely to be applied to the consent.

At the time of preparing this document, planning consent has not yet been granted for the proposed building. Given the industrial nature of the site, it is envisaged that a piling risk assessment will be required. The condition wording is likely to be similar to the following:

If Piling is proposed, a Piling Risk Assessment must be submitted, written in accordance with Environment Agency guidance document “Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention. National Groundwater & Contaminated Land Centre report NC/99/73”. Hereafter, no building(s) shall be erected until the method for piling foundations has been submitted to and approved in writing by the Council. The piling shall only be undertaken in accordance with the approved details, unless any variation is otherwise first approved in writing by the Council.

Reason: To ensure that the development does not contribute to, or is not put at unacceptable risk from, or adversely affected by, unacceptable levels of water pollution caused by mobilised contaminants in line with paragraph 170 of the National Planning Policy Framework. The site is located on potentially contaminated land. Uncontrolled piling could result in potential contamination of groundwater in the vicinity.

This document has been prepared to address the first sentence of the condition. The method statement will need to be prepared by the appointed piling contractor.

Published Geology and Environmental Setting

The British Geological Survey map at 1:50,000 scale indicates that the site is successively underlain by Alluvium, River Terrace Deposits and the White Chalk Subgroup.

Alluvium comprises normally consolidated, typically soft to very soft, compressible silty clay, but can contain layers of silt, sand, peat and gravel. River Terrace Deposits comprise sand and gravel, locally with lenses of silt, clay or peat, and the White Chalk Subgroup comprises Chalk with flints, with discrete marl seams, nodular chalk, and flint seams throughout.

The site lies outside of any groundwater source protection zones, or recorded environmentally sensitive areas. The Chalk is classified as a Principal Aquifer and the superficial deposits (River Terrace Gravel) as a Secondary A Aquifer.

Ground Investigation

Evans & Langford – May 2023

Evans & Langford carried out ground investigation on the site for the new building in May 2023, comprising one cable percussion borehole, drilled to a depth of 30m. This borehole successively found Made Ground to 2.70m, Alluvium to 13.80m, River Terrace Deposits to 22.60m and Chalk of the White Chalk Subgroup below and to the base of the borehole at 30m.

Below concrete Made Ground was slightly sandy gravel to 0.45m, over gravelly sand, over layers of gravelly clay. Gravel was typically of concrete or brick, with some flint and clinker being locally present.

Alluvium was found to 13.80m and comprised three layers of typically soft grey CLAY. The upper layer, seen to 5.70m, included localised dark grey (organic) staining to 4.00m and orange brown or brown fibrous organic matter below 4.50m. The middle alluvial layer included a little becoming some pale green brown, brown or orange brown fibrous organic matter, locally with dark grey amorphous organic matter, and the lower layer was very soft and very peaty where peat was dark brown or dark grey and amorphous or locally orange brown and fibrous.

The River Terrace Deposits comprised five layers and were found to a depth of 22.60m. The upper layer to 14.00m was dark grey very silty GRAVEL. The remaining four layers were alternating layers of dense to very dense, locally medium dense sandy GRAVEL with rare cobbles, and gravelly SAND. Gravel and cobbles were of flint, and sand was typically medium to coarse.

The White Chalk Subgroup was then proven from 22.60m to the base of the borehole at 30m and was recovered as structureless white CHALK composed of silt with rare fine to medium gravel and rare flint up to cobbles size.

No significant visual or olfactory evidence of contamination was recorded in the borehole or starter pits. Some gravel size fragments of clinker were seen in the Made Ground layers between 0.45m and 0.70m and 0.70m and 1.00m.

A groundwater monitoring well was installed and the water level was measured on two occasions in June 2023. The highest level recorded was 1.61mbgl, approximately 2.59mOD, compared to the ground level of approximately 4.20mOD.

Three samples of the Made Ground and one from the upper part of the Alluvium were subjected to analytical testing for a broad range of potential contaminants. The concentrations of Lead in the four samples tested ranged from 27mg/kg to 7,500mg/kg, with the concentration significantly reducing with depth. The sample from 0.30m, just below the concrete surfacing, contained the highest concentration, with the next sample tested,

from 0.90m, containing only 180mg/kg. Concentrations of other contaminants in all of the samples were not significant in terms of either the risk to human health or controlled waters.

Monitoring of ground gases was not undertaken as part of the 2023 investigation, in view of the low sensitivity of the proposed building, and the lack of previous issues with ground gas for buildings of a similar nature on the BRM site. The site is considered likely to fall into Characteristic Situation 2 in terms of ground gas risk; Made Ground is <3m thick and contains low levels of organic material (Total Organic Carbon content of 0.4% recorded at 0.90m), and whilst the Alluvium, containing peat may generate significant concentrations of methane and carbon dioxide, this is likely to be coupled with very low/no gas flows.

Previous Investigations

In addition, various investigations have been carried out in the vicinity in the past:

- Evans & Langford undertook ground investigation in 2020 in connection with the Pre-melter and Silver Plant, which included two cable percussion boreholes approximately 100m and 140m to the north east of the study site. Both boreholes encountered a similar sequence to that described above, although Made Ground was found to a depth of 3.20m in one borehole, located close to the river wall. Very high concentrations of lead, of up to 17,300mg/kg, were encountered in several samples of Made Ground.
- Amec Foster Wheeler carried out ground investigation for a Water Storage Tank and the Silver Plant Baghouse in July 2017, which included three cable percussion boreholes close to the study site; BH02, approximately 70m to the west, BH03, 25m to the north east and BH04, 60m to the north east. These boreholes encountered a similar profile to that described above (albeit BH3 refused at shallow depth). This investigation did not include any analytical testing on samples.
- Environmental Resources Management prepared a Phase 1b/2 Site Condition Report. Their investigation included four boreholes within 100m of the site, but the deepest of these was only taken to 10m. The report included contour maps of recorded contaminant concentrations. The map for lead indicated an anticipated concentration on the site for the lead store building of approximately 12,000mg/kg, which is greater than the concentration recorded in the May 2023 borehole. They also mapped concentrations of Antimony and Zinc; the former was not recorded in the boreholes closest to the site for the lead store building, whilst the latter map indicated an anticipated concentration of 5,000-10,000mg/kg on the site. Actual concentrations of zinc in the May 2023 borehole were 1,100mg/kg in the shallowest sample, and 640mg/kg in the sample from 0.90m.

ERM found in 2003 that the elevated concentrations of heavy metals in the near-surface made ground had not resulted in a significant groundwater impact; they considered that the metals were likely to be of low-solubility. The low lead concentrations in deeper samples in the 2023 investigation, and in the ERM investigation, just below samples with significantly elevated concentrations, would certainly add weight to this conclusion. As a result of this, the elevated concentrations of lead within the Made Ground are not considered likely to present a significant threat to groundwater below the site.

Reference should be made to the above reports for full details of the ground investigation works completed.

It is of course possible that isolated 'hot spots' of more significant contamination could be encountered.

Piling Risk Assessment

The proposed building will be supported by 300mm square section, driven precast piles, terminating within the River Terrace Deposits. This pile type/method of installation was selected following consultation with several piling specialists. Continuous Flight Auger piling was considered unsuitable, primarily due to the low strength of the Alluvial soils; there would have been a significant risk of defects occurring in the piles, as the surrounding ground would not have been able to support the weight of the wet concrete. Bottom-driven steel tube piles (with concrete fill) were potentially suitable, but were rejected due to the slow rate of installation.

The following assessment is therefore only intended to assess the risks associated with the use of driven precast concrete piles.

Environment Agency report reference NC/99/73, "Piling and Penetrative Ground Improvement on Land Affected by Contamination: Guidance on Pollution Prevention", presents a number of possible pollution scenarios, as follows:

- 1) Creation of preferential pathways through 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 solid contaminants down into an aquifer during pile driving
- 6) Contamination of groundwater and subsequently surface waters by wet concrete, cement paste or grout.

Reference has been made to the following publications:

- a) "Piling in Layered Ground: Risks to Groundwater and Archaeology"; Environment Agency Science Report SC020074/SR, October 2006.
- b) "Piling in Layered Ground: Annual Report 2007-2008"; K Emmett. Research Paper published by The University of Sheffield.

These reports were based on a series of laboratory experiments to model the effects of driving/drilling piles through a clay layer. The second publication built on the work of the first, in particular with regard to square section driven piles.

The main findings of the above reports were as follows:

- Solid cylindrical piles are able to form an effective seal when driven through a clay layer with a thickness of at least two pile diameters.
- Well constructed CFA piles should seal effectively when the clay layer is equal to two pile diameters (although problems were experienced with forming a satisfactory model CFA pile; as a result, we consider that this is a conservative estimate).
- A clay thickness of four times the pile width was sufficient to consistently seal square piles regardless of changes in other parameters such as clay strength, overconsolidation ratio, confining pressure and depth.
- Piles should be at least three pile diameters/widths apart (measured centre to centre)
- The use of pointed pile tips on driven piles will eliminate the possibility of material being trapped by the tip of the pile and pushed downwards.
- There is no evidence that overlying soil will be dragged down to lower levels once the pile tip has entered a clay layer.

It is normal practice to locate piles a minimum of three pile diameters/widths apart and this has been adopted on this site.

The risk assessment presented on the following pages is based on the source of contamination (in the context of groundwater protection) being the Made Ground of approximately 2m thickness, containing high concentrations of lead, albeit lead which has been found by others to be of low solubility and of no appreciable risk to groundwater. A further potential source, comprising a localised hot-spot of more significant contamination, has also been considered.

Groundwater encountered at shallow depth is considered likely to be in hydraulic continuity with groundwater within the River Terrace Deposits and Chalk aquifers. Whilst the Alluvium is predominantly clay, it does not appear to be acting as an aquitard layer, as it was water bearing throughout. The clay Made Ground, found from 0.70-2.70m depth, may be acting as a partial/localised aquitard although it is very unlikely to be completely impermeable, given the significant proportion of coarse material present. It is also likely to vary in composition and thickness across the site.

The following assessment demonstrates that the construction of driven precast piles on this site will not lead to any unacceptable risk to groundwater.

Pink shaded boxes in the following assessment are of direct relevance to groundwater protection. The other pollution scenarios featured in Environment Agency report reference NC/99/73 are included for completeness.

Pollution Scenario	Driven Piles
1: Creation of preferential pathways through an aquitard to allow potential contamination of an aquifer	As noted above, it is doubtful whether either the clay Made Ground or Alluvium is acting as an aquitard layer. However, even if it was, we do not consider that the proposed piling method will result in the creation of preferential pathways to allow contamination of the Secondary or Principal Aquifers below (piles will not extend into the chalk). It has been found that driven piles are effectively sealed when driven through a low permeability layer of at most, four times the pile size. The piles are of 300mm square section, thus would be effectively sealed by a clay layer of 1.20m thickness. The clay Made Ground was found to be 2.00m thick, and the Alluvium was found to be 11.10m thick overall, albeit some horizons will be of greater permeability than others. The uppermost alluvial layer, 3.00m thick, was described as soft grey CLAY with only localised organic matter, and it is considered that this layer alone would be sufficient to seal the piles against any vertical migration. Soft clay will readily remould around the piles as they are installed, so the effect is more or less instantaneous. Risk assessment: Source: Made Ground/Unknown hotspot of previously undetected contamination Pathway: Vertical migration through clay Made Ground/Alluvium, with preferential pathways having formed due to pile installation Target: Groundwater within the River Terrace Deposits Secondary Aquifer, or the Chalk Principal Aquifer Assessed Risk: Very Low. It is very unlikely that a pathway could be created, as explained above.
2: Creation of preferential pathways through a low permeability surface layer, allowing migration of landfill gas, soil gas or contaminant vapours to the surface	If it is assumed that the Alluvium represents a potential ground gas source, then only the clay Made Ground lies between it and the surface. Although the clay Made Ground is not considered likely to be of low permeability, it is nevertheless thick enough that, if it was acting to suppress ground gas emissions, then it is also thick enough to seal the driven piles. If it is, in fact, permeable, i.e. not restricting upwards gas flow at present, then the installation of piles through it will not cause any increased risk. Risk assessment: Source: Ground Gas generated within the Alluvium Pathway: Vertical migration upwards through clay Made Ground, with preferential pathways having formed due to pile installation Target: Occupants of the building/the building structure itself Assessed Risk: Very Low. It is very unlikely that a preferential pathway could be created, as explained above.
3: Direct contact of site workers and others with contaminated soil arisings that have been brought to the surface	The use of driven precast piles will prevent any risk of site workers or others coming into contact with contaminated soil arisings (during piling operations). Pollution Scenario 3 is therefore not relevant to this risk assessment.
4: Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of materials	The ground conditions are not considered to be particularly aggressive. The concrete mix will be designed in order to ensure pile integrity is maintained for the life of the structure. Source: Ground surrounding the piles Pathway: Direct contact with the piles Target: Concrete in piles Assessed Risk: Very Low

Pollution Scenario	Driven Piles
5: The pushing of solid contaminants down into an aquifer during pile driving	The use of piles with pointed tips would negate this risk. However, if flat-ended piles are used then the risks associated with material being pushed into the River Terrace Deposits can be addressed as follows. The Sheffield University study found that material trapped below the toe of a flat-ended pile was gradually displaced as it penetrated a clay layer. In their experiments, which were based on piles penetrating a thin clay layer, there was only a small amount of material remaining below the pile toe when it reached the bottom of the clay layer. By contrast, the Alluvium is 11.10m thick and there is therefore considered to be a minimal risk that a significant volume of material would be pushed through the Alluvium into the River Terrace Deposits. Source: Made Ground/Unknown Hotspot of previously undetected contamination Pathway: Material trapped below the toe of flat ended piles, being pushed through Alluvium, into the River Terrace Deposits. Target: Groundwater within the River Terrace Deposits and, by extension, the Chalk Principal Aquifer Assessed Risk: Very Low
6: Contamination of groundwater and subsequently surface waters by wet concrete, cement paste or grout.	The use of driven precast piles will prevent any contact between wet concrete, cement paste or grout and groundwater. <u>Pollution Scenario 6 is therefore not relevant to this risk assessment.</u>

Conclusion

It is considered that piling works on this site are very unlikely to result in an unacceptable risk to controlled waters, even in the event that more significant contamination is present.

As on any site, if more significant contamination is encountered during construction, then further investigation may be required.

The site-specific PPE and working practices required by BRM for work on this site should of course be adhered to at all times.

Once planning consent is granted, this document should be submitted, along with the piling contractor's method statement, to discharge the relevant condition.

---End---

Appendix A

Relevant Ground Investigation Information:

Evans & Langford Report reference 16083X, dated 28/07/24 (extracts)

ERM 2003 Contaminant Concentrations Contour Plan



Evans & Langford

- ♦ Structural & Civil Engineers
- ♦ Land & Building Surveying
- ♦ Geo-Environmental Engineers
- ♦ Project Managers
- ♦ CDM Consultants
- ♦ Contract Administrators

Engineering your Environment

Our Ref: 16083X/HP/CPS

28 July 2023

Dealt with by: Colin Shackelford

Direct Dial No: 01622 621978

Britannia Refined Metals
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DA11 9BG

For the attention of Mr G Corrigan

Dear Greg,

Proposed Silver Plant Bagging Station, Britannia Refined Metals - Ground Investigation

Further to your purchase order 60081777 dated 16th May 2023 instructing us to carry out ground investigation in connection with the above project, we now write to present our findings.

Background

A series of ground investigations have been undertaken across the Britannia Refined Metals (BRM) site in the past, these include:

- Evans and Langford (E&L) ground investigation in 2020 in connection with the Pre-melter and Silver Plant under reference 15191X, which included two cable percussion boreholes approximately 100m and 140m to the north east of the study site.
- Amec Foster Wheeler (Amec) ground investigation for Water Storage Tank and Silver Plant Baghouse in July 2017 under reference 39166R06i02, included three cable percussion boreholes close to the study site; BH02, approximately 70m to the west, BH03, 25m to the north east and BH04, 60m to the north east.
- Environmental Resources Management carried out a Phase 1b/2 Site Condition Report under reference 9314 in 2003. This investigation included four boreholes within 100m of the site, but the deepest of these was 10m.

The finding of the most relevant boreholes, those from the Amec investigation have been reviewed, although BH03, the closest, refused on concrete at 1.60m. The remaining two deep boreholes successively found Made Ground, Alluvium, Sand and Gravel over Chalk.

Continued



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BH02 and BH04 respectively found Made Ground to 1.70m and 1.05m, Alluvium to 13.10m and 15.20m, gravel and sand to 22.20m and 22.10m, with chalk being proved to the bases at 25m and 30m. Below concrete, Made Ground comprised either slightly gravelly silty sandy clay or gravel, where gravel was of brick, concrete, flint and siliceous material. Alluvium was typically described as sandy and/or silty and often contained decaying organic matter or peat, was soft and very soft in BH02 and soft, firm and locally stiff in BH04. GRAVELS and SANDS were dense and very dense, and gravel was of siliceous material. Within the gravels in BH02, there was a layer of firm slightly gravelly, slightly sandy CLAY between 18.00m and 19.20m. In BH02 groundwater was encountered at 8.00m, with no rise and in BH04 groundwater was encountered at 2.00m which rose to 1.80m. This investigation did not include any analytical testing on samples.

Findings of the Current Ground Investigation

Evans and Langford attended site between 22nd and 25th May 2023, to cut two cores through the concrete surfacing and drill one cable percussion borehole, to be completed with a water monitoring well. The second core was carried out in case of concrete or other obstruction being encountered within or below the depth of the hand dug starter pit, as has happened on this site (Amec BH03) and other similar sites in the past.

The most recent E&L borehole, BH S1, was drilled to a depth of 30m and successively found Made Ground to 2.70m, Alluvium to 13.80m, River Terrace Deposits to 22.60m and Chalk below and to the base of the borehole at 30m (*Chalk of the Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation undifferentiated, referred to hereafter and on the logs as White Chalk Subgroup*).

The concrete core recovered was between 140mm and 230mm thick, with reinforcing bar of 10mm diameter between 55mm and 85mm depth and of 5mm diameter between 130mm and 135mm depth. Below concrete Made Ground was slightly sandy gravel to 0.45m, over gravelly sand, over layers of gravelly clay. Gravel was typically of concrete or brick, with some flint and clinker being locally present. The other cored hole, just to the north found reinforced concrete to be 220mm - 230mm thick with a further layer of broken concrete below to between 300mm and 400mm depth. Below this to the base of the hand dug pit at 0.45m was sandy gravel of concrete and flint, with rare medium brick. This position was not progressed further, due to two pieces of reinforcing bar of approximately 10mm diameter being encountered across the pit at a depth of 0.40m.

Alluvium was found to 13.80m and comprised three layers of typically soft grey CLAY. The upper layer, seen to 5.70m, included localised dark grey (organic) staining to 4.00m and localised orange brown or brown fibrous organic matter below 4.50m. The middle alluvial layer included a little becoming some pale green brown, brown or orange brown fibrous organic matter, locally with dark grey amorphous organic matter and the lower layer was very soft and very peaty where peat was dark brown or dark grey and amorphous or locally orange brown and fibrous.

The River Terrace Deposits comprised five layers and were found to a depth of 22.60m. The upper layer to 14.00m was dark grey very silty GRAVEL. The remaining four layers were alternating layers of dense to very dense, locally medium dense sandy GRAVEL with rare cobbles, and gravelly SAND. Gravel and cobbles were of flint, and sand was typically medium to coarse.

The White Chalk Subgroup was then proven from 22.60m to the base of the borehole at 30m and was recovered as structureless white CHALK composed of silt with rare fine to medium gravel and rare flint up to cobbles size.

No significant visual or olfactory evidence of contamination was recorded in the borehole or starter pits. Some gravel size fragments of clinker were seen in the Made Ground layers between 0.45m and 0.70m and 0.70m and 1.00m.

Water was encountered during drilling at 1.70m, which rose to 1.50m after the twenty minute monitoring period. At the end of drilling on the first day the water level was at 8.00m, with the hole and casing at 14.00m. At the start of the second day of drilling the water level had risen to 3.30m. On completion of drilling the 30m borehole, the water level was at 4.00m, with the casing at 29.50m. It should be noted that groundwater observations made during fieldwork are not necessarily indicative of the equilibrium groundwater level due to the short time that the holes remained open.

The borehole was completed with a water monitoring well to 10.00m. The water level in the borehole has been record on two occasions as follows:

- 02nd June 2023, water level at 1.76m bgl (2.44mOD)
- 16th June 2023, water level at 1.61m bgl (2.59mOD)
(Ground level at BHS1 is estimated to be 4.20m OD)

It should also be noted that groundwater levels can also vary seasonally and in the long term.

Geotechnical Properties and Foundation Recommendations

Where possible, the strength of the clay layers was measured qualitatively using a hand penetrometer (results are recorded on the logs). Within the Made Ground the results indicated low and medium strength conditions, and within the Alluvium, low strength was typically recorded. Locally within the Alluvium, clay was very low or medium strength.

Standard Penetration Tests were carried out throughout the cable percussion borehole at 1.00m intervals between 1.50m and 6.50m and at 1.50m intervals below, to the base of the borehole. The results are summarised in the table below:

Geological Unit	No. of Tests	SPT 'N' Values	Comments and Trends in Results
Made Ground	2	3 - 4	-
Alluvium	8	0 - 5	All tests above 9.50m, N=0
River Terrace Deposits	6	26 - >50	N > 50 at 15.5m and 17.0m where penetration was 115mm & 170mm respectively
Chalk	6	8 - 20	Generally increases with depth

Note: The SPT at 2.50m (partly in made Ground and partly in Alluvium) has been grouped with Made Ground.

The geotechnical laboratory testing on one sample of Made Ground indicated that it is of high plasticity and medium volume change potential. Four tests on Alluvium demonstrated that the clay soils are of high (1 result) to extremely high (four results) plasticity and medium (1 result) to high (3 results) volume change potential. The laboratory report is appended to this letter.

Particle size determination using the wet sieve method was carried out on four samples of the River Terrace Deposits. The gradings confirm the sample descriptions on the logs.

The results of in-situ and geotechnical laboratory testing on samples recovered from the Amec investigation were consistent with those for BHS1.

The soils encountered on this site are considered unsuitable for conventional spread foundations. The Made Ground was present to 2.70m, is of variable content and is unlikely to have been placed under engineering control or with the subsequent support of heavily loaded structures in mind. Below this was soft becoming very soft alluvial CLAY to 13.80m which contained some decaying organic matter and peat. These soils are of low strength and high compressibility; as such, structures founded upon them would be expected to undergo significant settlement, with structural damage being likely. In addition, groundwater is present at shallow depth, which would inevitably lead to significant difficulty in

maintaining stability during excavation. It is therefore recommended that the loads from the proposed structure, equipment and floor slab be transferred down to the competent SAND and GRAVEL of the River Terrace Deposits at depth, by means of pile foundations.

The choice of pile type and the final pile design are likely to be the responsibility of the piling contractor. They are best placed to provide advice on the suitability of their systems for the particular ground conditions encountered. However, the following factors should be borne in mind:

- It is recommended that piles be designed to terminate within the River Terrace Deposits. This stratum is 8.8m thick at BHS1 and at least 6.9m in the two nearby boreholes carried out by Amec, with SPT N values consistently above 25. The underlying chalk has low SPT N values, not achieving $N > 20$ blows above 30m depth ($N > 25$ would indicate good quality chalk for pile support).
- The pile design should include a detailed assessment of the likely magnitude of negative skin friction that may be imposed upon the piles. This is not anticipated to be a significant factor, given the historic nature of the Fill, and the absence of any proposal to increase ground levels.
- The Alluvial clay was of soft, locally very soft consistency. Care will therefore be needed when designing the concrete mix for any type of cast in-situ pile, to ensure that the integrity of the pile shaft remains intact over their full extent. Concrete of too high a 'slump' value will not be supported by the Alluvium and the pile shaft diameter will inevitably increase. This may not necessarily be a problem for the pile capacity but would result in excessive concrete use.
- Significant obstructions were not encountered within the Made Ground (reinforcement at the second core attempted notwithstanding). However, given the history of the site, and the findings of the nearby Amec BH02, it remains a possibility that large obstructions may be present.
- High groundwater table, with possible tidal influence.
- Pile bores must not act as a pathway for contaminants to migrate downwards. This may not be a problem once the piles are cast but may require controls if the pile bore is open during construction.

Instability could occur within any excavations through the Made Ground, particularly the granular horizons. Excavations in the more cohesive Made Ground may remain largely stable in the short term, but collapses will eventually occur, and these may happen suddenly and without warning. Such collapses will be hastened during the winter months, other extended periods of heavy rainfall or where soils become saturated e.g. below the water table. Excavations that extend into the weak Alluvium below are likely to be subject to significant failures during excavation. Appropriate excavation support will obviously be required if personnel are required to enter excavations, with trench sheets/sheet piles ideally being advanced ahead of the excavation, to ensure that support to adjacent areas is maintained.

Based on the observations made during fieldwork and thereafter, it is likely that any excavations below approximately 1.60m depth will encounter groundwater, although this level may vary seasonally and in the long term, and there may also be tidal variation. Groundwater entry may be difficult to control by pumping from sumps dug in the base of excavations.

The Contractor should seek advice should any ground conditions be encountered which depart significantly from those described in the sections above.

As noted above, piles should extend into the sand and gravel of the River Terrace Deposits, which will provide support to piles by a combination of skin friction and end bearing. For preliminary guidance purposes only, calculations of pile capacity have been undertaken for a single bored and cast in place continuous flight auger pile. Working loads for a range of diameters and depths have been calculated as follows:

Pile toe depth m	Working Loads at Various Pile Diameters, kN		
	300mm	450mm	600mm
17	300	600	1100

Notes:

- 1) Calculations are for preliminary guidance only and are based on a global factor of safety of 3.
- 2) Any positive or negative contributions to load capacity from the materials above 14.00m depth have been ignored. Potential effects of negative skin friction not allowed for.

Buried Concrete

The results of the chemical tests on four samples between 0.30m and 3.50m indicate that Design Sulphate Class 1 conditions exist on this site, in accordance with BRE Special Digest 1:2005, "Concrete in Aggressive Ground". The nature of the site (brownfield, to the definition in SD1), pH (alkaline, pH 9.6-12.1) and groundwater conditions (mobile) on site are commensurate with an Aggressive Chemical Environment for Concrete (ACEC) classification of **AC-1**.

Contamination Assessment

Three samples of the Made Ground and one from the upper part of the Alluvium were sent to a UKAS accredited analytical laboratory for a comprehensive suite of testing for a range of common contaminants. The full laboratory report is appended.

The results of the analytical testing have been assessed with respect to human health using the 'At Risk Soil' generic soil screening values (SSVs) published by Atkins Consultants. Reference has also been made, where appropriate, to the 'Category 4 Screening Levels' (C4SL) published by Defra.

Concentrations of contaminants measured were typically below the SSVs relevant for a commercial land use, where available. However, there are some results which require further consideration.

The Soil Screening Values for Mercury were withdrawn in 2018, and there are no alternative screening values currently available for use. The former SSVs varied depending on the type present. Elemental Mercury (the pure metal), although not the most common type of Mercury found in UK soils, had the lowest SSV, of 7.95mg/kg. However, for inorganic Mercury, which is the most common form in UK soils, the former SSV is much higher, at 3,600mg/kg. The laboratory test determines the *total* Mercury concentration (i.e. all types of mercury; speciated testing for mercury being very expensive). All four samples tested had a total Mercury concentration of less than the limit of detection of 0.3mg/kg, and as such, it can reasonably be concluded that there is unlikely to be a risk associated with Mercury concentrations on the site.

The C4SL value for Lead in a commercial setting is 2,310mg/kg. The concentrations of Lead in the four samples tested ranged from 27mg/kg to 7,500mg/kg, with the concentration significantly reducing with depth. The sample from 0.30m contained the highest concentration, just below the concrete surfacing, the next sample tested, from 0.90m contained only 180mg/kg, a very significant reduction and the concentration is also well below the C4SL. For reference the concentration at 0.90m is also below the most stringent screening value, that for a residential land use where consumption of home grown produce is considered. Given the nature of the site, these results are not particularly surprising. The health and safety measures already taking place with respect to the concentration of Lead at BRM, including regular blood testing and wearing of overalls and helmets with filters and fan are believed to be sufficient to mitigate the risk to human health relating to Lead and it not considered that soil remediation is required to protect human health. In the long term, the site will be entirely hard covered so there will be no risk of exposure.

Concentrations of petroleum hydrocarbon and polyaromatic hydrocarbons were below the SSV in all cases where available and a number of concentrations were also below the limit of detection.

In addition to the above testing, the three samples of Made Ground were also subjected to screening for asbestos fibres. No asbestos containing materials or fibre bundles were detected in any of these three samples. In addition, during site works, no suspected asbestos containing materials were observed in the soils recovered.

The elevated concentrations of lead are confined to the shallow Made Ground, with the results at 0.90m and below all falling below the residential screening value. Groundwater risk assessment was not part of the scope of this investigation but ERM found in 2003 that the elevated concentrations of heavy metals in the near-surface made ground had not resulted in a significant groundwater impact; they considered that the metals were likely to be of low-solubility. The low lead concentrations in deeper samples in the current investigation, and in the ERM investigation, just below samples with significantly elevated concentrations, would certainly add weight to this conclusion.

Waste Disposal

Two Waste Acceptance Criteria (WAC) analyses were carried out on samples of Made Ground, from 0.90m and 2.50m. Concentrations of determinands typically fell below the limiting values for inert landfills, however, there were the following exceptions:

- Arsenic – 0.557mg/kg at 0.90m and 3.01mg/kg at 2.50m compared to inert landfill limit of 0.5mg/kg. The limiting value for stable non-reactive hazardous waste in a non-hazardous landfill is 2mg/kg and it is 25mg/kg for a hazardous waste landfill.
- Antimony – 1.9mg/kg at 0.90m and 0.52mg/kg at 2.50m compared to inert landfill limit of 0.06mg/kg. The limiting value for stable non-reactive hazardous waste in a non-hazardous landfill is 0.7mg/kg and it is 5mg/kg for a hazardous waste landfill.
- Fluoride – 21mg/kg at 0.90m compared to inert landfill limit of 10mg/kg. The limiting value for stable non-reactive hazardous waste in a non-hazardous landfill is 150mg/kg.

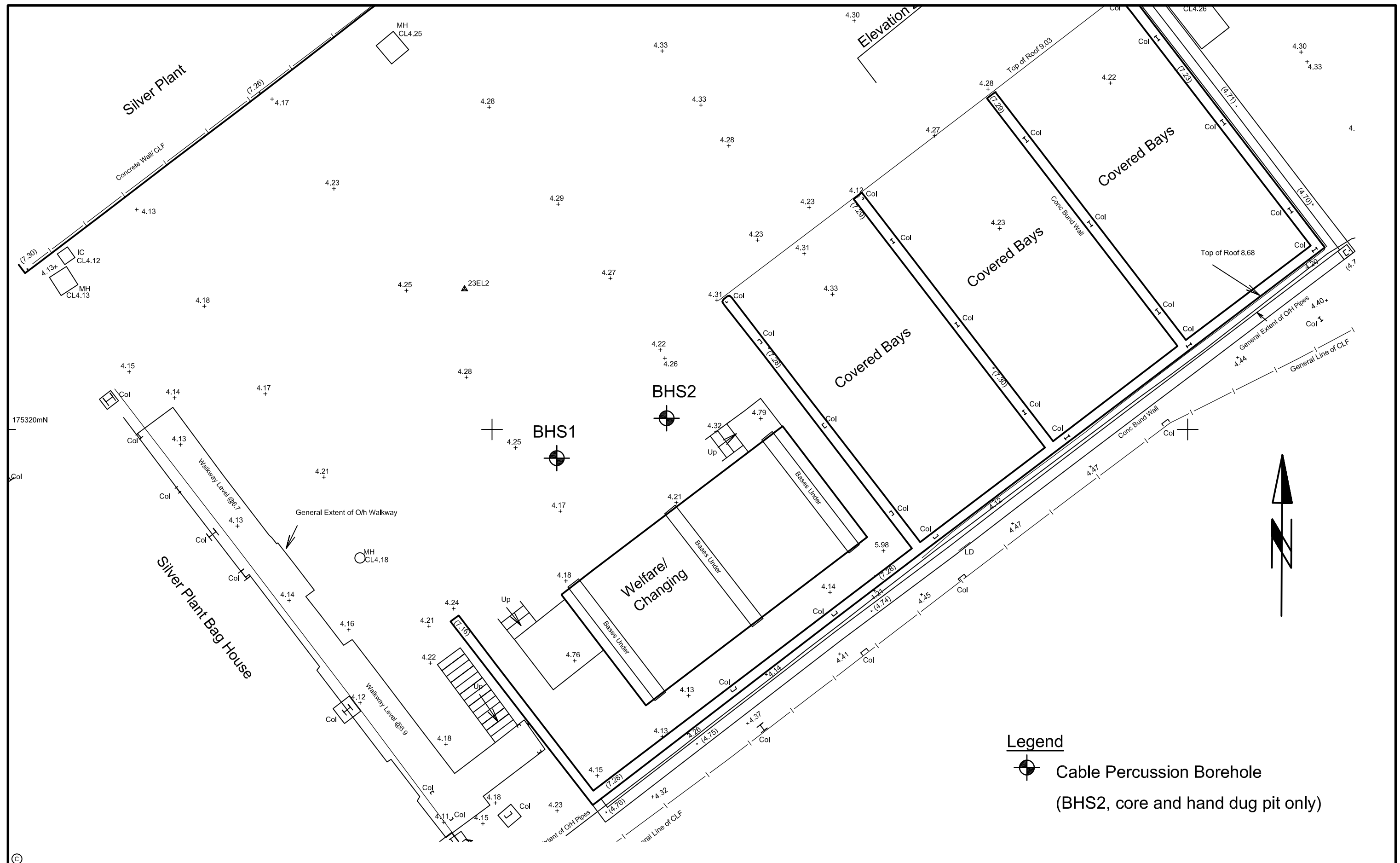
The waste acceptance criteria are mainly based on the results of leaching tests, but there are certain parameters that are determined on the waste as sampled. These include PAH and mineral oil, both of which were determined on samples as part of the testing regime carried out for the investigation (mineral oil is defined as carbon range C₁₀-C₄₀, which is approximately equivalent to the total petroleum hydrocarbon test). All concentrations of PAH in samples tested fell below the inert criteria of 100mg/kg, and all levels of mineral oil/TPH fell below the inert acceptance criteria of 500mg/kg.

We trust that the above is clear, but please do not hesitate to contact us if you have any queries.

Yours sincerely
For and on behalf of Evans & Langford

Enc

Figure 1 Ground Investigation Layout Plan
Figure 2 Borehole Log, BHS1
Laboratory Testing Reports



Evans & Langford
Engineering your Environment

- ♦ Structural & Civil Engineers
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Revisions		Checked	Date

Proposed Silver Plant Bagging Station
 Britannia Refined Metals
 Northfleet

Ground Investigation Layout Plan

Scale 1:100 At A3	Drawn HP	
	Date July 23	
	Checked CPS	
	Date July 23	
	Approved CPS	
	Date July 23	
Drg No.		Rev.
16083X		-



Evans & Langford

Borehole Log

BH No: BHS1

Sheet 1 of 4

Location: BRM, Silver Plant Bagging Station

Job No.: 16083X

Final Depth: 30m

Diameter

Casing

GL (mOD)

Start

Finish

200mm

GL to 29.5m

4.20

23/05/2023

25/05/2023

Samples & insitu tests

STRATA DETAILS

Depth	Type	Test Result	Water	Reduced Level	Legend	Depth/ Thickness	Description	Installation/ Backfill
0.30	●					(0.45)	Concrete (to 0.14m, locally to 0.23m) over concrete recovered as fine to medium gravel, locally with coarse gravel and cobbles. Locally a little sand.	
0.60	●			3.75		0.45		
0.90	●			3.50		0.70	10mm reinforcing bars between 55mm and 85mm and 5mm reinforcing bars between 130mm and 135mm.	
				3.20		1.00		
1.50	●	pp=1.1 N=5				(0.70)	(Made Ground) Brown gravelly sand with some gravel size lenses of firm sandy clay. Gravel is of concrete with some flint, clinker and red and yellow brick.	
1.50-1.95	●	pp=0.8		2.50		1.70	(Made Ground)	
2.00-2.50	●	pp=0.5				(1.00)	Grey brown, locally dark grey/black gravelly clay. Gravel is medium to coarse, locally fine of yellow and red brick with rare medium clinker.	
2.00	●	pp=1.2					(Made Ground)	
2.50	●	N=3		1.50		2.70	Grey gravelly clay. Gravel is of red and yellow brick.	
2.50-2.95	●						(Made Ground)	
3.00-3.50	●	pp=0.5					Grey brown slightly gravelly clay. Gravel is fine to medium of red brick and concrete.	
3.00	●						(Made Ground)	
3.50	●	pp=0.5					Soft grey CLAY.	
3.50-3.95	●	N=0 pp=0.6						
4.00	●	pp=0.5				(3.00)	Localised dark grey (organic) staining to 4.00m.	
							Localised orange brown or brown, fibrous organic matter below 4.50m.	
4.50	●	pp=0.6 N=0					(Alluvium)	
4.50-4.95	●	pp=0.5						
5.00	●	pp=0.5						
5.50	●	pp=0.5 N=0		-1.50		5.70	Soft grey CLAY with a little, becoming some pale green brown, brown or orange brown fibrous organic matter.	
5.50-5.95	●	pp=0.6						
6.00	●	pp=0.5					Localised dark grey amorphous organic matter.	
6.50	●	pp=0.7 N=0					(Alluvium)	
6.50-6.95	●	pp=0.6						
7.00	●	pp=0.5						
		pp=0.5						
7.50	●	pp=0.5						
8.00	●	pp=0.4 N=0						
8.00-8.45	●							
8.50	●	pp=0.4						
9.00-9.50	●	pp=0.4				(6.80)		
9.00	●							
9.50	●	N=2						
9.50-9.95	●	pp=0.9						
10.00	●	pp=0.6						

Remarks

Hand dug trial pit to 1.00m to check for buried obstructions.
Casing diameter reduced from 200mm to 150mm at 17.00m.
Water level at 3.30m at start of drilling on 24/05/23.
Ground level is approximate.

Chiselling Details

From To Time

Water added From To

Scale: 1:50

Figure No.:

2

Method: Cable Percussion Boring

Logged

HP

Checked

CPS

Approved

CPS



Evans & Langford

Borehole Log

BH No: BHS1

Sheet 2 of 4

Location: BRM, Silver Plant Bagging Station

Job No.: 16083X

Final Depth: 30m

Diameter

Casing

GL (mOD)

Start

Finish

200mm

GL to 29.5m

4.20

23/05/2023

25/05/2023

Samples & insitu tests

STRATA DETAILS

Depth	Type	Test Result	Water	Reduced Level	Legend	Depth/ Thickness	Description	Installation/ Backfill
10.50	●	pp=0.4					Soft grey CLAY with a little, becoming some pale green brown, brown or orange brown fibrous organic matter. Localised dark grey amorphous organic matter. (Alluvium)	
11.00	●	pp=0.5						
11.00-11.45	—	N=1						
11.50-12.00	●	pp=0.9						
11.50	↕							
12.00	●	pp=0.6						
12.50	●	pp=0.7		-8.30		12.50		
12.50-12.95	—	N=5					Very soft, dark brown very peaty CLAY. Peat is dark brown or dark grey and amorphous, and locally orange brown and fibrous. (Alluvium)	
13.00	●	pp=0.2				(1.30)		
13.50	●	pp=0.2						
14.00	●			-9.60		13.80		
14.00-14.45	—	N=40		-9.80		14.00	Dark grey very silty GRAVEL. Gravel is rounded to sub angular, medium of flint. (River Terrace Deposits)	
14.50-15.00	—						Dense to very dense, dark grey, locally pale grey sandy GRAVEL with rare cobbles and fine fragments of off-white shell. Gravel and cobbles are sub angular to angular.	
14.50	↕					(2.00)	(River Terrace Deposits)	
15.00	●							
15.50-16.00	—	N=50 (115mm)		-11.80		16.00	Very dense, orange very gravelly SAND. Gravel is rounded to sub rounded, fine to medium of flint. (River Terrace Deposits)	
15.50	↕							
15.50-15.95	—							
17.00-17.50	—	N=50 (170mm)				(2.40)		
17.00-17.45	↕							
18.50-19.00	—	N=49		-14.20		18.40	Dense becoming medium dense, orange sandy GRAVEL with rare cobbles. Gravel and cobbles are rounded to sub rounded of flint. Sand is medium to coarse. (River Terrace Deposits)	
18.50-18.95	↕							
20.00-20.50	—					(3.00)		

Remarks

Hand dug trial pit to 1.00m to check for buried obstructions.
Casing diameter reduced from 200mm to 150mm at 17.00m.
Water level at 3.30m at start of drilling on 24/05/23.
Ground level is approximate.

Chiselling Details

From To Time

Water added From To

Scale: 1:50

Figure No.:

2

Method: Cable Percussion Boring

Logged

HP

Checked

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Borehole Log

BH No: BHS1

Sheet 3 of 4

Location: BRM, Silver Plant Bagging Station

Job No.: 16083X

Final Depth: 30m

Diameter

Casing

GL (mOD)

Start

Finish

200mm

GL to 29.5m

4.20

23/05/2023

25/05/2023

Samples & insitu tests

STRATA DETAILS

Depth	Type	Test Result	Water	Reduced Level	Legend	Depth/ Thickness	Description	Installation/ Backfill
20.00-20.45	↓	N=26					Dense becoming medium dense, orange sandy GRAVEL with rare cobbles. Gravel and cobbles are rounded to sub rounded of flint. Sand is medium to coarse. (River Terrace Deposits)	
21.50-22.00 21.50-21.95	↓	N=35		-17.20		21.40 (1.20)	Dense, orange gravelly fine to medium SAND. Gravel is rounded to angular, fine to medium of flint. Rare fine gravel of off-white shell fragments. (River Terrace Deposits)	
23.00-23.50 23.00-23.45	↓	N=10		-18.40		22.60	Chalk recovered as: Structureless white CHALK composed of silt with rare fine to medium gravel. Rare coarse gravel and cobble size flints. At the top of the layer chalk gravel is occasional. (White Chalk Subgroup)	
24.50-24.95	↓	N=8						
26.00-26.50 26.00-26.45	↓	N=9				(7.40)		
27.50-27.95	↓	N=10						
28.50-29.00	↓							
29.00-29.45	↓	N=17						
30.00-30.45				-25.80		30.00		

Remarks

Hand dug trial pit to 1.00m to check for buried obstructions.
Casing diameter reduced from 200mm to 150mm at 17.00m.
Water level at 3.30m at start of drilling on 24/05/23.
Ground level is approximate.

Chiselling Details

From To Time

Water added From To

Scale: 1:50

Figure No.:

2

Method: Cable Percussion Boring

Logged

HP

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BH No: BHS1

Sheet 4 of 4

Job No.:16083X

Final Depth: 30m

Diameter

Casing

GL (mOD)

Start

Finish

200mm

GL to 29.5m

4.20

23/05/2023

25/05/2023

STRATA DETAILS

Depth

Type

Test Result

Water

Reduced
Level

Legend

Depth/
Thickness

Description

Installation/
Backfill

N=20

Remarks

Hand dug trial pit to 1.00m to check for buried obstructions.
Casing diameter reduced from 200mm to 150mm at 17.00m.
Water level at 3.30m at start of drilling on 24/05/23.
Ground level is approximate.

Chiselling Details

From

To

	<i>Time</i>
--	-------------

Water added

From	
------	--

	To
--	------

Scale: 1:50

Figure No.:

2

Method: Cable Percussion Boring

Logged

HP	
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Checked

	CPS
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Approved

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Analytical Report Number : 23-38052

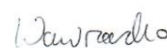
Replaces Analytical Report Number: 23-38052, issue no. 1

Additional analysis undertaken.

Mercury added to all samples by laboratory.

The report has been updated to the current Schedule of Accreditation

Project / Site name:	Bagging Plant, Britannia Refined Metals, Northfleet	Samples received on:	06/06/2023
Your job number:	16083X	Samples instructed on/ Analysis started on:	06/06/2023
Your order number:		Analysis completed by:	20/06/2023
Report Issue Number:	2	Report issued on:	23/06/2023
Samples Analysed:	4 soil samples		



Signed:

Joanna Wawrzeczko
 Reporting Specialist
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

Analytical Report Number: 23-38052

Project / Site name: Bagging Plant, Britannia Refined Metals, Northfleet

Lab Sample Number				2705864	2705865	2705866	2705867
Sample Reference				BHS1	BHS1	BHS1	BHS1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.90	2.50	3.50
Date Sampled				23/05/2023	23/05/2023	23/05/2023	23/05/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	84	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	8.5	21	22	38
Total mass of sample received	kg	0.001	NONE	1.3	1	1	1

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	11.9	9.6	12.1	9.6
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	410	370	810	450
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.2	0.18	0.41	0.23
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	204	184	406	227
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	23	12	900	2500**
Organic Matter (automated)	%	0.1	MCERTS	0.4	0.6	2.3	1.3
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
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Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.35	1.2	0.27	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.21	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.53	1.8	0.33	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.41	1.6	0.29	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.3	0.85	0.2	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.31	0.97	0.17	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.41	0.93	0.28	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.16	0.32	0.08	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.23	0.63	0.16	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.17	0.38	0.13	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.1	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.19	0.44	0.15	< 0.05
Coronene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Total WAC-17 PAHs	mg/kg	0.85	NONE	3.06	9.41	2.06	< 0.85
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Analytical Report Number: 23-38052

Project / Site name: Bagging Plant, Britannia Refined Metals, Northfleet

Lab Sample Number				2705864	2705865	2705866	2705867
Sample Reference				BHS1	BHS1	BHS1	BHS1
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.30	0.90	2.50	3.50
Date Sampled				23/05/2023	23/05/2023	23/05/2023	23/05/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	180	56	390	52
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	U/S#	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15	19	33	47
Copper (aqua regia extractable)	mg/kg	1	MCERTS	100	39	31	17
Lead (aqua regia extractable)	mg/kg	1	MCERTS	7500	180	120	27
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	15	14	23	30
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	1100	640	160	94

Magnesium (water soluble)	mg/kg	5	NONE	< 5.0	9.3	< 5.0	72
Magnesium (leachate equivalent)	mg/l	2.5	NONE	< 2.5	4.7	< 2.5	36

Petroleum Hydrocarbons

TPH C10 - C40 _{EH, CU, 1D, TOTAL}	mg/kg	10	MCERTS	48	< 10	< 10	< 10
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TPH (C10 - C12) _{EH, CU, 1D, TOTAL}	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16) _{EH, CU, 1D, TOTAL}	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
TPH (C16 - C21) _{EH, CU, 1D, TOTAL}	mg/kg	1	MCERTS	7.3	4.1	< 1.0	< 1.0
TPH (C21 - C25) _{EH, CU, 1D, TOTAL}	mg/kg	10	NONE	< 10	< 10	< 10	< 10
TPH (C35 - C40) _{EH, CU, 1D, TOTAL}	mg/kg	10	NONE	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-38052

Project / Site name: Bagging Plant, Britannia Refined Metals, Northfleet

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2705864	BHS1	None Supplied	0.3	Brown sand with gravel and stones.
2705865	BHS1	None Supplied	0.9	Brown clay and sand with gravel.
2705866	BHS1	None Supplied	2.5	Brown clay and sand with gravel.
2705867	BHS1	None Supplied	3.5	Brown clay.

Analytical Report Number : 23-38052

Project / Site name: Bagging Plant, Britannia Refined Metals, Northfleet

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270.	L064-PL	D	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE

Analytical Report Number : 23-38052

Project / Site name: Bagging Plant, Britannia Refined Metals, Northfleet

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

****Result was reported from high dilution and should be interpreted with care**

#\$Unsuitable for analysis due to high colour intensity.

Sample Deviation Report



Analytical Report Number : 23-38052

Project / Site name: Bagging Plant, Britannia Refined Metals, Northfleet

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BHS1	None Supplied	S	2705864	c	Free cyanide in soil	L080-PL	c
BHS1	None Supplied	S	2705864	c	TPH in (Soil)	L076-PL	c
BHS1	None Supplied	S	2705864	c	Total cyanide in soil	L080-PL	c
BHS1	None Supplied	S	2705865	c	Free cyanide in soil	L080-PL	c
BHS1	None Supplied	S	2705865	c	TPH in (Soil)	L076-PL	c
BHS1	None Supplied	S	2705865	c	Total cyanide in soil	L080-PL	c
BHS1	None Supplied	S	2705866	c	Free cyanide in soil	L080-PL	c
BHS1	None Supplied	S	2705866	c	TPH in (Soil)	L076-PL	c
BHS1	None Supplied	S	2705866	c	Total cyanide in soil	L080-PL	c
BHS1	None Supplied	S	2705867	c	Free cyanide in soil	L080-PL	c
BHS1	None Supplied	S	2705867	c	TPH in (Soil)	L076-PL	c
BHS1	None Supplied	S	2705867	c	Total cyanide in soil	L080-PL	c

HANNAH PAL

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Analytical Report Number : 23-38053

Project / Site name:	Bagging Plant, Britannia Refined Metals, Northfleet	Samples received on:	06/06/2023
Your job number:	16083X	Samples instructed on/ Analysis started on:	06/06/2023
Your order number:		Analysis completed by:	14/06/2023
Report Issue Number:	1	Report issued on:	14/06/2023
Samples Analysed:	2 10:1 WAC samples		



Signed:

Anna Goc
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

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Waste Acceptance Criteria Analytical Results

Report No:	23-38053						
					Client: EVANSLA		
Location	Bagging Plant, Britannia Refined Metals, Northfleet						
Lab Reference (Sample Number)	2705868 / 2705869				Landfill Waste Acceptance Criteria		
Sampling Date	23/05/2023				Limits		
Sample ID	BHS1				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Depth (m)	0.90						
Solid Waste Analysis							
TOC (%)**	0.4				3%	5%	6%
Loss on Ignition (%) **	2.0				--	--	10%
BTEX (µg/kg)**	< 5.0				6000	--	--
Sum of PCBs (mg/kg)**	< 0.007				1	--	--
Mineral Oil (mg/kg) EH, ID, CU, AL	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	5.66				100	--	--
pH (units)**	8.6				--	>6	--
Acid Neutralisation Capacity (mmol / kg)	36				--	To be evaluated	To be evaluated
Eluate Analysis		10:1		10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)		mg/l		mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.0707			0.557	0.5	2	25
Barium *	0.0020			0.0160	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	< 0.0004			< 0.0040	0.5	10	70
Copper *	0.0026			0.021	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	0.0018			0.0143	0.5	10	30
Nickel *	0.0004			< 0.0030	0.4	10	40
Lead *	0.0014			0.011	0.5	10	50
Antimony *	0.25			1.9	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.0028			0.022	4	50	200
Chloride *	1.1			8.8	800	15000	25000
Fluoride*	2.7			21	10	150	500
Sulphate *	20			160	1000	20000	50000
TDS*	80			630	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	3.35			26.4	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.0						
Dry Matter (%)	79						
Moisture (%)	21						
Results are expressed on a dry weight basis, after correction for moisture content where applicable.					* = UKAS accredited (liquid eluate analysis only)		
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation					** = MCERTS accredited		

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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Waste Acceptance Criteria Analytical Results

Report No:	23-38053					
				Client: EVANSLA		
Location	Bagging Plant, Britannia Refined Metals, Northfleet					
Lab Reference (Sample Number)	2705870 / 2705871			Landfill Waste Acceptance Criteria		
				Limits		
Sampling Date	23/05/2023			Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	BHS1					
Depth (m)	2.50					
Solid Waste Analysis						
TOC (%)**	1.3			3%	5%	6%
Loss on Ignition (%) **	6.1			--	--	10%
BTEX (µg/kg)**	< 5.0			6000	--	--
Sum of PCBs (mg/kg)**	< 0.007			1	--	--
Mineral Oil (mg/kg) EH, ID, CU, AL	< 10			500	--	--
Total PAH (WAC-17) (mg/kg)	16.8			100	--	--
pH (units)**	8.7			--	>6	--
Acid Neutralisation Capacity (mmol / kg)	23			--	To be evaluated	To be evaluated
Eluate Analysis	10:1		10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l		mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.439		3.01	0.5	2	25
Barium *	0.0089		0.0614	20	100	300
Cadmium *	< 0.0001		< 0.0008	0.04	1	5
Chromium *	0.0046		0.032	0.5	10	70
Copper *	0.059		0.41	2	50	100
Mercury *	< 0.0005		< 0.0050	0.01	0.2	2
Molybdenum *	0.0227		0.156	0.5	10	30
Nickel *	0.0067		0.046	0.4	10	40
Lead *	0.0094		0.064	0.5	10	50
Antimony *	0.076		0.52	0.06	0.7	5
Selenium *	0.0041		< 0.040	0.1	0.5	7
Zinc *	0.013		0.089	4	50	200
Chloride *	58		400	800	15000	25000
Fluoride*	0.94		6.4	10	150	500
Sulphate *	59		410	1000	20000	50000
TDS*	260		1800	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010		< 0.10	1	-	-
DOC	6.67		45.7	500	800	1000
Leach Test Information						
Stone Content (%)	< 0.1					
Sample Mass (kg)	1.0					
Dry Matter (%)	78					
Moisture (%)	22					
Results are expressed on a dry weight basis, after correction for moisture content where applicable.				* = UKAS accredited (liquid eluate analysis only)		
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation				** = MCERTS accredited		

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.



Analytical Report Number : 23-38053

Project / Site name: Bagging Plant, Britannia Refined Metals, Northfleet

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2705868	BHS1	None Supplied	0.9	Brown clay and sand with gravel.
2705870	BHS1	None Supplied	2.5	Brown clay and sand with gravel.

Analytical Report Number : 23-38053

Project / Site name: Bagging Plant, Britannia Refined Metals, Northfleet

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance""	L046-PL	W	NONE
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270.	L064-PL	D	MCERTS
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH at 20oC in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Total BTEX in soil (Poland)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073-PL	W	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025

Analytical Report Number : 23-38053

Project / Site name: Bagging Plant, Britannia Refined Metals, Northfleet

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by EC probe using a factor of 0.6.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L031	W	ISO 17025
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Sample Deviation Report



Analytical Report Number : 23-38053

Project / Site name: Bagging Plant, Britannia Refined Metals, Northfleet

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis. Please note that the associated result(s) may be unreliable and should be interpreted with care.

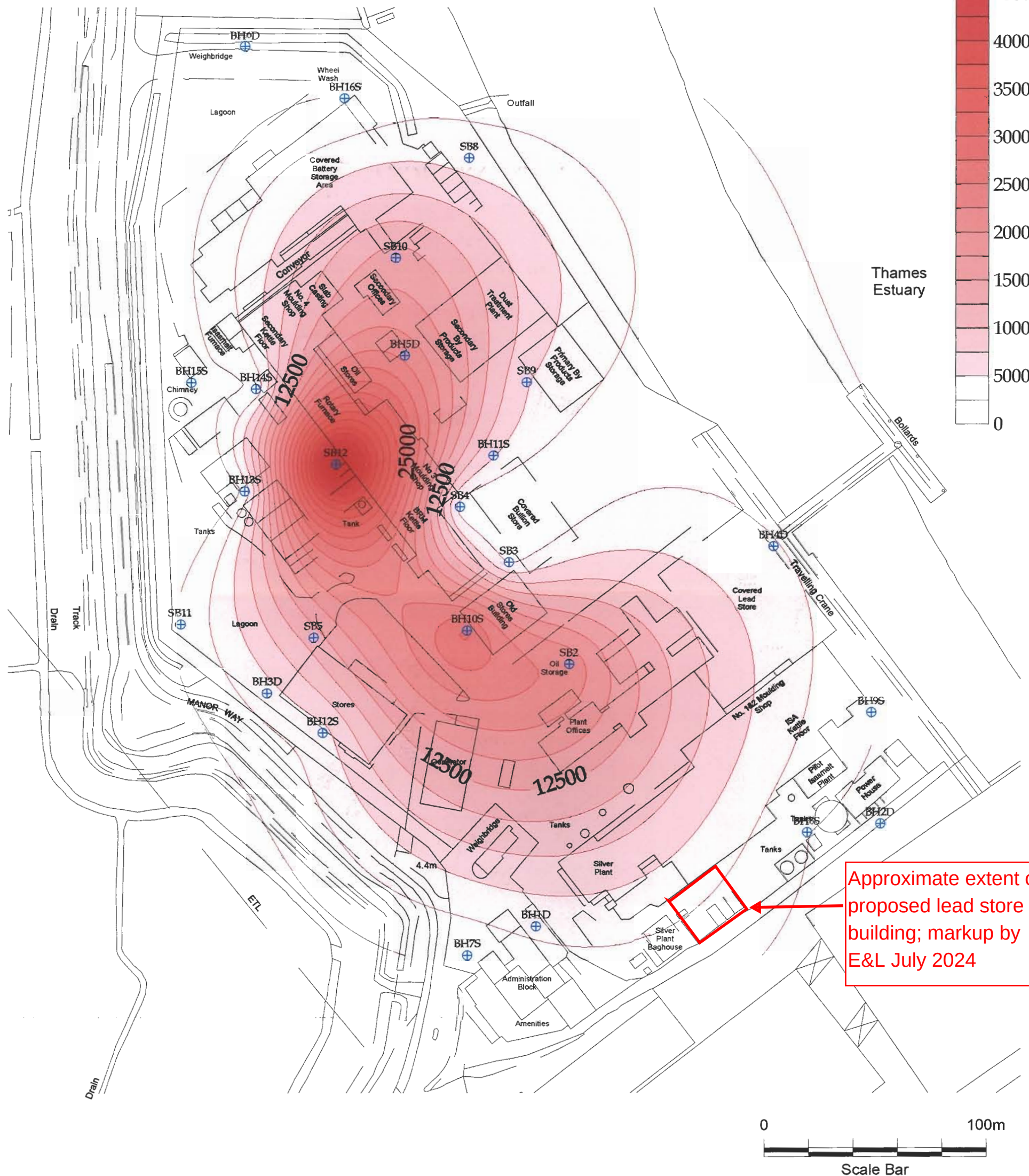
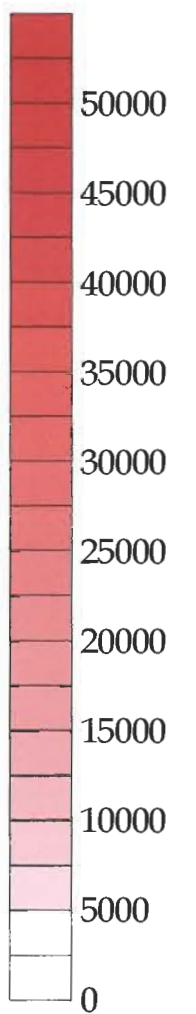
Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BHS1	None Supplied	S	2705868	c	BTEX in soil (Monoaromatics)	L073B-PL	c
BHS1	None Supplied	S	2705868	c	Total BTEX in soil (Poland)	L073-PL	c
BHS1	None Supplied	S	2705870	c	BTEX in soil (Monoaromatics)	L073B-PL	c
BHS1	None Supplied	S	2705870	c	Total BTEX in soil (Poland)	L073-PL	c

ERM Contaminant Concentrations Contour Plans
from Phase 1b/2 Site Condition Report, 2003



Concentration (mg/kg)



Approximate extent of
proposed lead store
building; markup by
E&L July 2024

Client
Britannia Refined Metals Ltd

A3

Title
**Figure 7.1a:
Maximum Concentrations of
Antimony in
Made Ground (mg/kg)**

ERM
Eaton House
Walbrook Court
North Hinksey Lane
Oxford OX2 0QS
Telephone 01865 384800
Facsimile 01865 204982



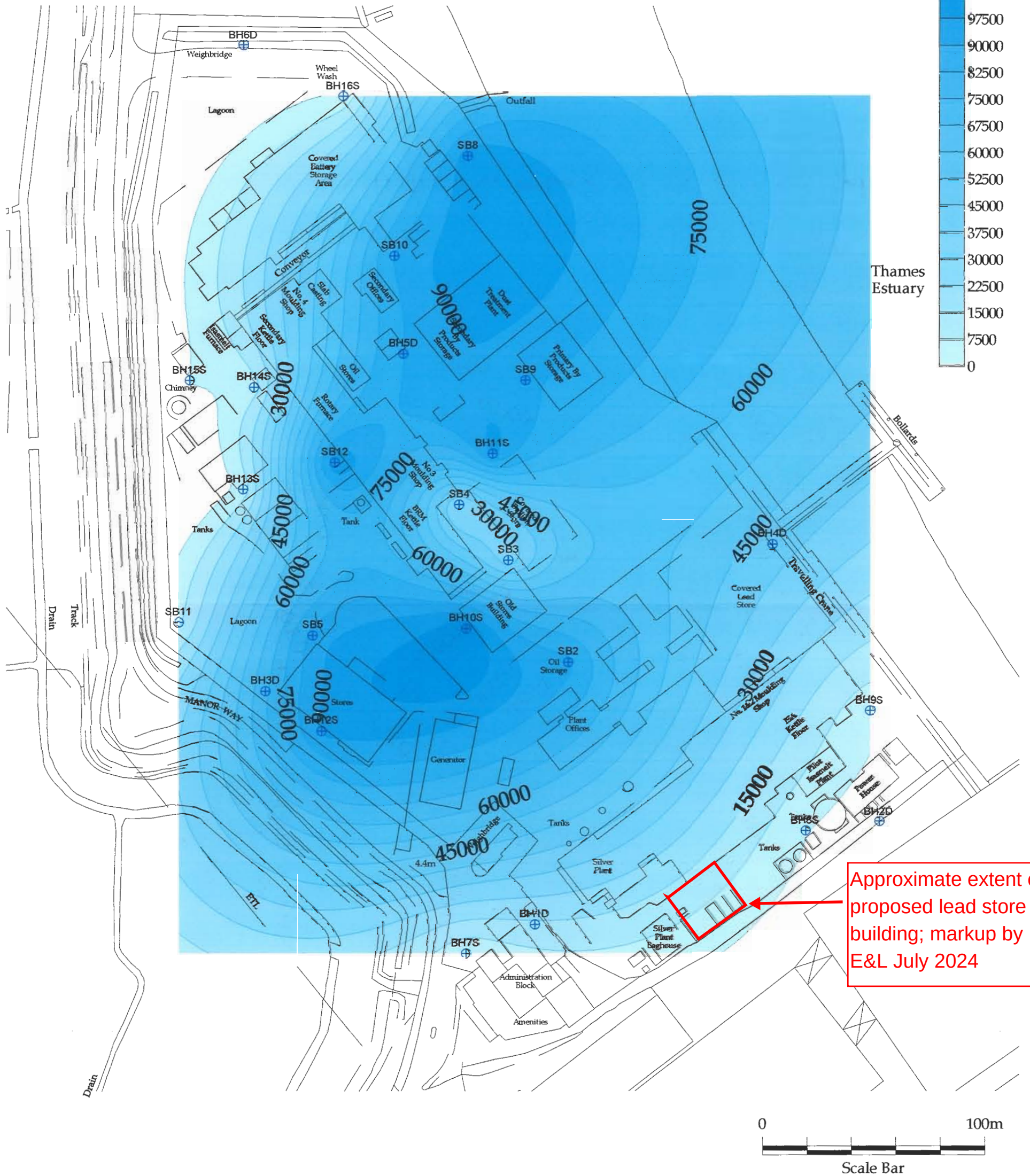
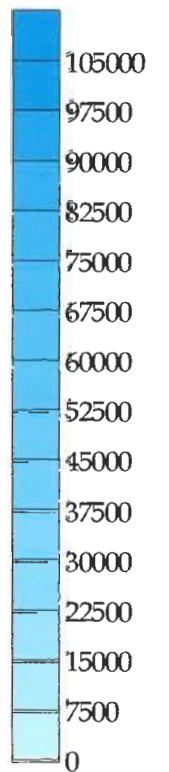
Date November 2002	Checked	Project 9314
Drawn HS	Approved	Scale

Drawing No:

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Concentration (mg/kg)



Approximate extent of
proposed lead store
building; markup by
E&L July 2024



Client:
Britannia Refined Metals Ltd

A3

Title:
**Figure 7.1b
Maximum Concentrations
of Lead in
Made Ground (mg/kg)**

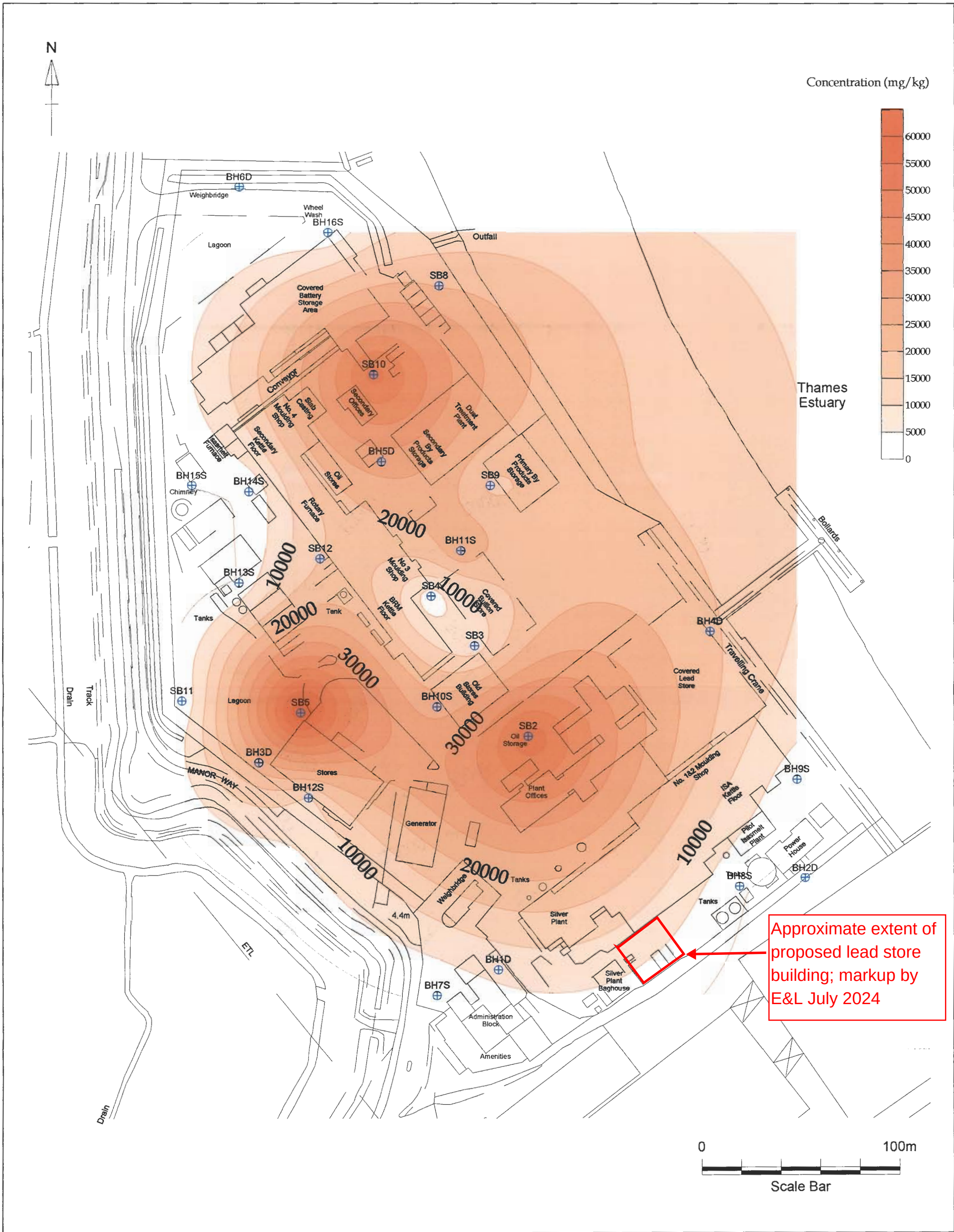
ERM
Eaton House
Wallbrook Court
North Hinksey Lane
Oxford OX2 0QS
Telephone 01865 384800
Facsimile 01865 204982



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Date November 2002	Checked	Project 9314
Drawn HS	Approved	Scale

Drawing No:



Client: Britannia Refined Metals Ltd		A3		Title: Figure 7.1c Maximum Concentrations of Zinc in Made Ground (mg/kg)	
ERM Eaton House Wallbrook Court North Hinksey Lane Oxford OX2 0QS Telephone 01865 384800 Facsimile 01865 204982				Date November 2002	Checked
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				Project 9314	Scale