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2 VALE ROAD - NORTHFLEET

SUPPLEMENTARY PHASE 2 SITE INVESTIGATION

NON-TECHNICAL SUMMARY	
Site	Vale Road, Northfleet DA11 9RE
Proposed Development	Residential apartment block comprising 14 dwellings with associated amenity space, parking and access. Soft landscaped areas include soft verges, communal gardens and public open space; no private gardens are proposed.
Former Use of the site	Allotments, a chalk pit (infilled) and a garage / Petrol Filling Station (PFS) that included underground storage tanks (tanks located immediately off-site, forecourt on site).
Background	Two phases of investigation (Phase 1 and Phase 2 assessments) have been undertaken previously by Brownfield Solutions Ltd. However, the investigation was considered insufficient to fully characterise risks at the site by the regulators as the investigation had not directly assessed ground conditions around the underground fuel storage tanks or risks groundwater from potential sources of contamination identified onsite.
Objectives	Undertake a supplementary investigation to address additional information requested by the regulators as follows: • additional assessment with respect to a key point source (underground fuel storage tanks) identified during previous investigation works; • to provide information on current groundwater quality beneath the site; and • to provide greater clarity on the potential for contaminants within Made Ground to impact groundwater quality through leaching.
Underground Fuel Storage Tanks	The investigation identified the tank area associated with the former petrol filling station was located adjacent to the rear of the former shop building rather than in the forecourt court area as originally anticipated. This places the tanks **off-site** adjacent to the west of the subject site boundary. The tank area comprised two cylindrical underground fuel storage tanks orientated in an east to west direction; they were estimated to be 1.8m in diameter and approximately 10m in length. Associated pipework infrastructure, however, was identified extending onto the subject site. Both tanks appeared to be in good condition with no evidence of corrosion, damage or loss of integrity. No visual or olfactory evidence of hydrocarbon contamination associated with the tanks was observed within the surrounding soils. Laboratory data and assessment (soils and leachate) demonstrate that there is no risk to either human health or groundwater quality for hydrocarbons associated with the soils around the USTs.
Risk to Groundwater	A borehole (BH201) was drilled to a depth of 28.5m bgl within the subject site to assess risk to groundwater. Made Ground was recorded to a depth of 18.8m bgl which was underlain by natural chalk strata. Groundwater was identified at a depth of 21m bgl. Leachate analysis of Made Ground identified that metals were leachable, however, concentrations were only marginally greater than Water Quality Standards (WQS). Chemical assessment of groundwater identified that all contaminants remained below UK DWS. Minor exceedances of other WQS were noted, however, were not considered significant based on wider site context. Overall, risks to groundwater were therefore considered to be limited. However, with the proposed development changes, this risk may increase during and after construction.
Conclusions and Recommendations	This Supplementary Phase 2 Site Investigation has identified that the USTs and Made Ground present a low risk to human health and controlled waters based on the current site layout. However, both USTs and Made Ground would present higher and potentially unacceptable risks in the context of the proposed development. Mitigation measures will therefore be required to reduce the risks to identified receptors. A Remediation Strategy will be required to detail the methodology for these works and validation requirements.

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PROJECT RECORD	
PROJECT NAME	2 VALE ROAD - NORTHFLEET
CLIENT	BRT PROPERTIES LTD

REPORT DETAILS	
TYPE	PHASE 2 SITE INVESTIGATION (SUPPLEMENTARY)
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REGISTRATION OF AMENDMENTS

REVISION	DATE	AMENDMENT DETAILS	REVISION AUTHOR	REVISION REVIEWER
Rev A	6/1/22	Update of the report to support a new planning application of equal footprint with an increased number of dwellings.	RH	CM

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DRAWING 3869-001

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Welcome to our Search Function…

To keep our reports as concise and simple as possible, we have put background information in a dedicated location. Click the magnifying glass icon seen throughout the report to navigate straight to relevant information in Appendix A.

1.0 INTRODUCTION

1.1 Lustre Consulting Limited (Lustre) has been commissioned by BRT Properties Ltd (Client) to undertake a Supplementary Phase 2 Site Investigation with environmental reporting for the proposed redevelopment of a site located off Vale Road in Northfleet, Gravesend, Kent. The assessment has been undertaken in accordance with our fee proposal and scope of works dated 20/01/2021.

1.2 The subject site, irregular in plan, is centered at National Grid Reference 562810, 173609, and occupies an approximate area of 0.2 ha, as shown in Figure 1. The subject site is currently disused and has been cleared of all former building infrastructure. It is situated along the eastern boundary of a larger site area owned by BRT Properties; the majority of the wider site area is also disused and has been cleared of building infrastructure.

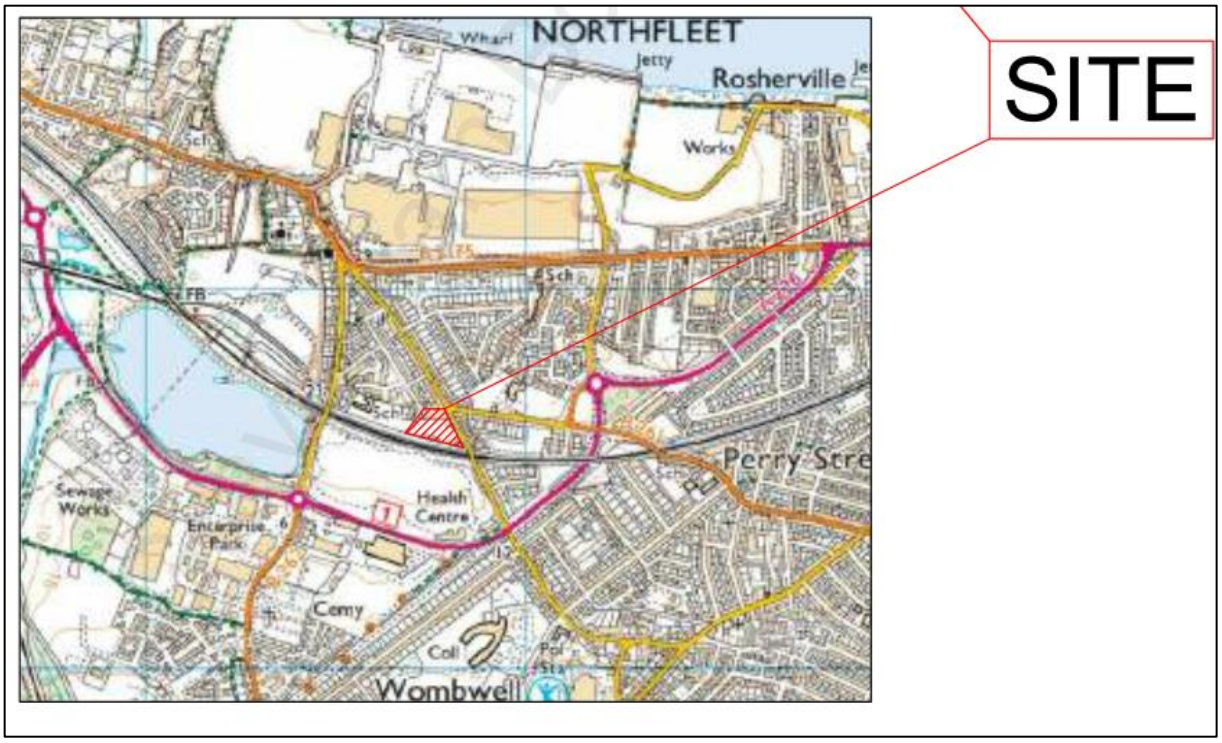

Figure 1: Extract from Desk Study Assessment Report undertaken by Brownfield Solutions Ltd showing wider site area owned by BRT Properties hashed in red

1.3 This report has been prepared to a new planning application for *'Erection of a three-storey building within rooms in the roof space to provide 14 x two bedroom self-contained flats with associated access, car parking and amenity space.'* Soft landscaped areas include soft verges, communal gardens and public open space; no private gardens are proposed.

1.4 Figure 2 illustrates the proposed development scheme.

Figure 2: Proposed site layout for subject site

Background & Approach Investigation

1.5 At the time of writing Lustre understands that two previous phases of investigation have been undertaken by others for the subject site as follows:

- Desk Study Assessment Report by Brownfield Solutions Ltd (reference BM/C3476/6655), dated February 2017; and
- Geo-Environmental Assessment Report by Brownfield Solutions Ltd (reference PD/C3476/8382 Rev A, dated June 2019

1.6 Each report was submitted to the Local Planning Authority (Gravesham Borough Council) for approval under a previous planning application reference (20190727). Proposed redevelopment works at this time comprised *'Erection of a two-storey building within rooms in the roof space to provide 10 x two bedroom self-contained flats with associated access, car*

parking and amenity space.' Amenity space includes the provision of soft landscaping as communal gardens and public open space. No private gardens were proposed.

1.7 It is therefore considered from a contamination perspective that development proposals provided within the new planning application are comparable to those in the previous application; no significant changes that would alter risks to proposed end users / sensitive receptors have been identified.

1.8 A summary of the key findings from each of the previous phases of investigation is provided below as well as a summary of the response from the regulator.

Phase 1 Assessment (Brownfield Solutions Ltd)

1.9 The Phase 1 assessment was undertaken in February 2017; however, it is noted a site walkover was not undertaken. Observations on current land use were taken from aerial imagery.

- Current and Former Site Uses: At the time of writing the subject site was reported to be used for the storage of coaches. Former site uses are identified as allotments, a chalk pit (subsequently infilled) and a garage / Petrol Filling Station (PFS) that included underground storage tanks.

- Geology, Hydrogeology and Hydrology: The site is underlain by bedrock geology of the Seaford Chalk Formation and Newhaven Chalk Formation which is classified as a Principal Aquifer. No superficial deposits were identified. The site is located within an EA Source Protection Zone 1 (inner catchment); however, no active groundwater abstractions were identified within 500m of the site and no potable water abstractions were identified within 1.5km of the site.

- Potential Sources of Contamination: Onsite sources included underground storage tanks, infill materials, and Made Ground associated with previous construction works. Offsite sources included railway land, infilled chalk pits, a historical landfill, garages, a power station and various works

- Initial Risk Ratings: Risks to end users included - Moderate to high risk from landfill gases, moderate risk from vapours associated with tanks and moderate to low risk from general contamination associated with former use of the site as a garage. Risks to controlled waters were deemed to be Moderate from the former use of the site as a garage, presence of tanks, and anticipated Made Ground.

Phase 2 Investigation (Brownfield Solutions Ltd)

1.10 To confirm ground conditions and risks to identified receptors within the Phase 1 Desk Study a combined geotechnical and geo-environmental investigation was undertaken by Brownfield Solutions Ltd in February 2019. This included six windowless sample boreholes to a maximum depth of 5 metres below ground level (m bgl) and three cable percussive boreholes to a maximum depth of 13.45m bgl.

1.11 Ground cover at the site comprised a mixture of asphalt and concrete. This was underlain by Made Ground which varied considerably in depth ranging from 0.4m to 9.8m bgl. Made Ground comprised a mixture of cohesive and granular material. Anthropogenic materials included brick, concrete, metal and glass. Localised ash, clinker and organic deposits were also identified in limited quantities. Along the eastern boundary of the site a thin layer of superficial deposits were identified beneath the Made Ground. Chalk was then encountered beneath either the Made Ground or superficial deposits and remained unproven at the base. No groundwater was encountered in any of the investigation locations.

1.12 Chemical assessments of soils identified the presence of asbestos fibres, as well as elevated concentrations of lead, polyaromatic hydrocarbons (PAHs) and total petroleum hydrocarbons (TPHs). PAHs and TPHs were identified to be associated with shallow asphalt impacted soils whereas lead was encountered within deeper fill materials. Coal tar was also identified as being present within asphalt surfacing materials. There was no indication, however, of volatile contamination as PID readings remained low and elevated concentrations of volatile and semi-volatile organic compounds (VOC / SVOC) compounds were not identified.

1.13 Ground gas assessment did not identify elevated concentrations of ground gases. Based on six monitoring visits the site was characterised as having a very low risk with no ground gas protection measures required. No further assessment was deemed necessary.

1.14 Geotechnical assessments identified the requirement for a piled foundation solution and the presence of aggressive ground conditions.

Regulator Response

1.15 The reports from both phases of investigation undertaken by Brownfield Solutions Ltd were submitted to Gravesham Borough Council by the Client to support the planning application (reference 20190727) and within an application for discharge of condition 5 parts 1 and 2 related to contamination (reference 20210049).

1.16 The consultee response from the Environment Agency (EA) to both these applications identified there was a requirement for further intrusive investigation works prior to discharge of any planning conditions associated with contamination. The response from EA to the planning application identified the following:

'The information on possible contamination submitted with this application goes some way towards addressing our previous concerns, however it is not the full assessment required, as intimated in the planning statement.'

'The site report itself identifies that further investigations are required around the position of old Underground Storage Tanks associated with the previous petrol filling station. In addition, the report indicates that although groundwater was not identified in the chalk immediately beneath the fill materials, the site overlies a principal aquifer and is within a Source Protection Zone 1 for an abstraction. The report indicates that piling would be required for the proposed structure, but that a specialist piling report would be required to determine the type of piling needed. The founding depth of any piles, even Continuous Flight Auger piles, as possibly indicated, would be required to be known. This is because piling and possible grout loss into the chalk at the groundwater interface or within close proximity could lead to grout impacts or turbidity in the raw water abstracted. Therefore, additional assessment is required to assess the Underground Storage Tanks and the possible piling depth and method and where the site groundwater table is in relation to likely pile depths. Groundwater monitoring may then be required if the proposals was to go ahead, to determine water quality before, during and after piling, with contingencies in place with the abstractor if changes were noted down gradient during works. Liaison and consultation will be required with the abstractor.'

1.17 The response from EA to the application to discharge planning condition 5 identified the following:

'The geo-environmental report itself does not address ground water risks adequately, having little regard to leachable materials, or any Detailed Quantitative Risk Assessment for controlled waters. The assumption hard cover will prevent any further risk and the lack of discussion in relation to groundwater risks and piling shows the reporting is incomplete. However, the report does indicate further detailed design of a remedial strategy is required. So additional groundwater risk assessment and monitoring could be incorporated into this reporting. Until such time as this detailed strategy is agreed the relevant conditions should not be discharged.'

'It is noted that the reporting claims clay layers will prevent downward migration of any near surface pervasive Polycyclic Aromatic Hydrocarbons contamination getting down to the chalk, but Cable Percussion Boreholes were drilled without safe practice, enabling a direct pathway from upper fill layers through to the chalk bedrock. This could have caused contamination of groundwater locally. Existing boreholes that encounter chalk should be fully decommissioned in accordance with relevant

Environment Agency guidance. Further groundwater monitoring boreholes would be required as part of further works linked to the remediation strategy, to be monitored during all construction activity proposed and these must be installed with safe drilling methods and fill layers sealed off from the bedrock. Boreholes should be up and down gradient of local groundwater flow and in positions which can be safeguarded throughout the development.'

1.18 Overall, with respect to site investigation works, it is understood from the two EA responses that additional assessments are required of the following:

- Status and contaminative condition of the underground fuel storage tanks; and
- risks to groundwater including assessment of onsite groundwater quality and consideration of potential for leachable materials to be present within overlying soils.

1.19 Lustre has therefore been commissioned to undertake a supplementary Phase 2 Site Investigation to address the outstanding issues identified within the EA consultee responses. Full reference should be made to each of the previous site investigation reports to understand the preliminary conceptual model and basis of this investigation.

1.20 The requirement for further assessments in the form of a remediation strategy (inclusive of the decommissioning of existing boreholes) and a piling works risk assessment are also noted within the EA responses and will be reported separately.

Objectives

1.21 The main objective of this investigation is to provide the following:

- additional assessment with respect to a key point source (underground fuel storage tanks) identified during previous investigation works;
- to provide information on current groundwater quality beneath the site; and
- to provide greater clarity on the potential for contaminants within Made Ground to impact groundwater quality through leaching.

1.22 It is considered that previous investigation works undertaken were sufficient to characterise potential risks to future site users from ground gas and the presence of contamination within the Made Ground from a human health perspective. No further assessment of these elements has therefore been undertaken.

Reliance and Limitations

1.23 This report has been prepared using published information, information obtained during any site visits and information provided by the Client which were made available at the time of writing only. No liability is extended to any information which has become available since this time.

1.24 No third-party liability or duty of care is extended without express permission in writing by Lustre. Third parties using information contained in this report do so at their own risk. For further details please refer to our terms and conditions.

Report Structure

1.25 The report has been structured to provide an overview of the site investigation methodology in Chapter 2. The elements of investigation related to assessment of underground storage tanks are then discussed in Chapter 3 and the risk to groundwater are covered in Chapter 4. Conclusions and recommendations are then set out in Chapter 5.

2.0 SITE INVESTIGATION METHODOLOGY

Introduction

2.1 The intrusive site investigation works were undertaken on 25 August to 1 September 2021 under the direct co-ordination of a suitably trained and qualified consultant employed by Lustre. The intrusive works were carried out with due regard to existing standards and good practice guidelines including *BS10175: 2011+ A2:2017*[1], *BS5930: 2015*[2] and guidance produced by the *AGS*[3].

Enabling Works

2.2 Prior to commencing with the intrusive works, each exploratory location was checked for any readily detectable shallow services. The method employed to avoid buried services involved the review of up-to-date statutory service plans and on-site surveying for underground services by a suitably qualified service location contractor. Service location also involved scanning the area with a ground penetrating radar (GPR) to detect any below ground features and/or services. Where possible, manhole covers were lifted, and drainage runs approximately identified.

2.3 Prior to undertaking excavations related to the underground storage tanks, a GPR survey was conducted to assist with ascertaining their likely location.

2.4 Prior to advancing boreholes with the drilling equipment, hand dug starter pits were excavated to 1.2m bgl.

2.5 As part of the previous phases of investigation EOD Contracts Ltd undertook an Explosive Ordnance Desk Top Study (reference EOD/19/19152DTS/Vale Road, Northfleet, Kent, dated 31 January 2019). Based on their recommendations, a qualified EOD Engineer from Brimstone Site Investigation Ltd was present throughout the site investigation works in order to detect the presence of ferrous munitions.

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[1] British Standard – Code of Practice for Investigation of potentially contaminated sites. BS 10175: 2011 + A2:2017.
[2] British Standard – Code of Practice for Site Investigation. BS 5930: 2015.
[3] Association of Geotechnical & Geoenvironmental Specialists, AGS Guide to Environmental Sampling, 2010.

Site Investigation Rationale

2.6 Exploratory locations advanced in this investigation are summarised below comments on rationale, termination depth and monitoring installations.

Hole ID	Base Depth (m bgl)	Objective	Monitoring Well
BH201	28.5	Assess groundwater quality and identify presence of leachable materials within overlying made ground	Yes
TP201	1.3	Assess ground conditions around underground fuel storage tanks	No
TP202	1.3		No
TP203	3.8		No
TP204	2.8		No
TP205	4.6		No

2.7 Exploratory holes were located to obtain the required information to meet the project objectives, whilst avoiding services, access and egress routes. Drawing 3869-001 shows the positions of all exploratory locations.

Cable Percussive Boreholes

2.8 One cable percussive borehole (BH201) was advanced on site as detailed above. The cable percussive borehole advanced through the surface soils and into the underlying natural soils, using a conventional A-frame cable tool drilling rig.

2.9 Drilling was undertaken using clean drilling techniques to prevent creation of a preferential pathway between overlying Made Ground and groundwater within the underlying Chalk aquifer.

2.10 A groundwater monitoring well was installed upon completion of the borehole, again ensuring a suitable well design to prevent short circuit pathways for contamination within fill materials. Further detail is provided in the table below.

Trial Pits

2.11 Five trial pits were advanced on site to depths between 1.3m and 4.6m bgl. The trial pits were excavated using a wheeled back-hoe excavator and extended through shallow soils.

2.12 Upon completion, the excavation was backfilled with arisings and soils compacted.

In-Situ Field Tests

2.13 Headspace testing was carried out to determine the volatile content of soils (vapours) using a photo-ionisation detector (PID) with 10.6eV lamp.

Monitoring Installations

2.14 A monitoring standpipe was installed into BH201 following completion of the drilling works as detailed in the table below. The well comprised plain 50mm pipe to a depth of 20m bgl and slotted 50mm diameter pipe to base of the hole at 28m bgl. The annulus surrounding the slotted pipe was filled with washed gravel, which was then plugged with a bentonite seal in excess of 1m surrounding the plain pipe. The monitoring wells were completed with a gas tap and a flush lockable cover and finished to match existing ground cover.

Hole ID	Response Zone	Gas Well	Groundwater Well
BH201	Chalk Aquifer (20-28m bgl)	-	Yes

Groundwater Monitoring

2.15 On two occasions, monitoring wells were developed using a submersible pump and sampled using a dedicated hand bailer. Samples were deposited in suitable containers, prepared and dispatched to a UKAS accredited laboratory in accordance with good practice guidelines. Visual and olfactory observations during purging and sampling were also recorded. Basic field monitoring records are presented in Appendix D.

Chemical Analysis (Environmental)

2.16 Chemical testing of soils was undertaken on samples collected from excavations undertaken in close proximity to the underground fuel storage tanks. In total four soil samples were scheduled for chemical testing of following contaminants:

- Speciated Total Petroleum Hydrocarbons (TPH CWG); and
- BTEX.

2.17 Chemical analysis of leachate was undertaken from soil samples collected within Made Ground during the drilling of BH201 and from soils collected in close proximity to underground

fuel storage tanks. In total six samples were scheduled for 10:1 leachate preparation followed by analysis for the following contaminants:

- Metals and inorganics: arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc;
- pH;
- TPH CWG;
- BTEX; and
- SVOCs, including PAHs

2.18 Chemical analysis of groundwater was undertaken on two samples collected from the monitoring well installed in BH201. The samples were scheduled for a broad range of determinands, which considers the potential contaminants associated with the current/historical site uses, as follows:

- Metals and inorganics: arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, zinc;
- pH;
- Total phenols (monohydric);
- PAHs;
- TPH CWG;
- BTEX; and
- Total Organic Carbon (TOC).

2.19 Generally, where PID results indicated the potential of presence volatile contaminants or visual / olfactory evidence of contamination was noted, appropriate testing was scheduled in preference of those samples.

3.0 INVESTIGATION OF UNDERGROUND STORAGE TANKS

Background

3.1 Underground storage tanks were understood to be present on the subject site associated with the former use as a petrol filling station. These tanks were identified by Brownfield Solutions Ltd and marked on their site investigation location drawing (C3467/03, dated 18 February 2019). As detailed in this Chapter the previously understood location of the tanks was incorrect.

3.2 Two areas of investigation (trial pitting) were undertaken to locate the underground storage tanks (USTs), along with a search request for records from the petroleum officer. The investigation works and assessment is detailed in this Chapter.

Preparation & Enabling Works

3.3 Historical aerial imagery was consulted, and a visual assessment of the former petrol filling station area was undertaken with the landowner prior to the start of the GPR survey. This identified that underground tanks were unlikely to be where Brownfield Solutions Ltd had originally marked them on their plans. The landowner confirmed that the former shop building was present along the western boundary of the site which was further evidenced by the presence of a concrete base in this area. Suspected vent pipes were identified adjacent to the west of the former shop building but no other infrastructure was identified including historical fill point features. An initial attempt to locate the tanks was therefore undertaken using GPR which was targeted to the forecourt area. Unfortunately, a clear signal pattern representing tanks was not identified, but some signals indicating potential underground features were returned.

Intrusive Site Investigation (Trial Pitting)

Excavations in Former Forecourt Area (onsite)

3.4 On 25 August 2021 excavations TP201 and TP202 were progressed to target potential GPR signals identified. TP201 was undertaken in close proximity to the east of the suspected underground structures identified by GPR. Ground conditions in this location were identified as concrete over Made Ground to a depth of 0.3m bgl. This was then underlain by appearance of natural soils comprising orangish brown sandy gravelly CLAY. Natural soils were proved for 1m and the excavation was terminated. These ground conditions are consistent with those outside of the former chalk pit by Brownfield Solution Ltd e.g. WS5 and WS6.

3.5 Following completion of TP201, a second excavation TP202 was undertaken approximately 0.5m to the west. This identified bituminous material to a depth of 0.1m bgl over Made Ground to a depth of 1.3m bgl. Made Ground comprised black sandy gravelly silty CLAY with moderate ash content. Gravels were predominantly anthropogenic including glass, slate, brick, metal and concrete. This was broadly similar to ground conditions identified within the chalk pit by Brownfield Solutions Ltd e.g. BH2.

3.6 Evidence of former petrol filling station infrastructure was identified in the form of orange wiring likely associated with pumps and defunct pipework. Defunct pipework was observed entering the edge of the excavation and was orientated in NW/SE direction. No USTs were identified in these exploratory holes.

Excavations to Rear of Shop (offsite)

3.7 Excavation was then undertaken in a second area to the rear (west) of the former shop building to try and located the tanks (based on anecdotal evidence). This area was located **off-site**, adjacent to the west of the subject site boundary. A visual inspection of the area identified a manhole cover which when lifted contained infrastructure consistent with a UST fill point. A GPR survey was undertaken, however, no further information with respect to the presence of underground tanks could be ascertained.

Manhole cover west of the subject site

Fill point infrastructure within manhole

3.8 Two excavations (TP203 and TP204) were undertaken in the vicinity of the suspected fill point. TP203 was undertaken at the southern boundary of the tanks and TP204 was undertaken at the western boundary of the tanks. The ground surface at both locations was comprised of reinforced concrete to a depth of 0.2m bgl. This was underlain by Made Ground comprising silty sandy GRAVEL with moderate ash content to a depth of 1.3m bgl and was broadly consistent across the two locations. A concrete slab was then identified extending 0.5m south from manhole cover in TP203 and 2m west of the manhole cover in TP204. Both excavations were laterally extended to allow for excavations to continue to assess soil conditions at a depth consistent with the suspected underside depth of any USTs.

TP203

TP204

3.9 Within TP203 ground conditions beyond the concrete slab (logged as side A) were consistent with anthropogenic fill material to a depth of 3.3m bgl. This comprised silty sand gravel with moderate ash content. Gravel was recorded as chalk, brick, glass, slate, concrete and brick. At 3.3m bgl ground conditions were recorded as yellowish brown and greyish brown silty slightly gravelly SAND with gravels comprising flint and chalk. This layer remained unproven to base of the excavation at 3.8m bgl.

3.10 Within TP204, reworked natural soils broadly similar to those encountered in TP203 were identified from a depth of 1.3m bgl in the excavation undertaken adjacent to the concrete slab. The reworked natural soils were described as orangish brown sandy gravelly CLAY. Gravels comprised flint and chalk. This was underlain by natural soils comprising white structureless CHALK at depth of 2.5m to base of the excavation at 2.8m bgl.

TP204

TP204

3.11 Further excavation was then undertaken through the concrete slab as this was suspected to be a protective cap above the USTs. Two cylindrical tanks were identified beneath the concrete. The fill point identified above related to the southern tank, with a second tank identified to the north which had a fill point at the opposite end of the tank. The excavation was progressed to expose the tanks on three sides (northern, southern and western); access

constraints prevented the excavation from completely exposing eastern end of the tanks. Both tanks were orientated from east to west and measured approximately 1.8m in diameter and are estimated to be 10m in length. The depth to the top of the tank was estimated to be 1.7m bgl. It is noted that based on a 1.8m diameter, the base of the tanks would be at an approximately depth of 3.5m bgl. Excavations TP203 and TP204 would therefore have been deep enough to coincide with lower half of the tanks i.e. most likely area of soils to have been impacted by any leaks originating from tanks. Further excavation was then undertaken along the northern side of the tank (TP205). Ground conditions were consistent with reworked naturals encountered in TP204; however, these soils were identified to extend to the base of the hole at 4.6m bgl.

TP204

TP205

3.12 Both tanks appeared to be in good condition with **no evidence of corrosion, damage or loss of integrity**. No visual or olfactory evidence of hydrocarbon contamination associated with tanks was observed. However, a small area of staining (no odour or elevated PID readings) possibly representing a minor historical spill from surface was identified along the northern side of the tanks extending to a depth of approximately 2.4m bgl. As noted above the USTs are located immediately off-site, rather than within the planning boundary.

3.13 The excavation around the tanks has been temporarily re-instated pending arrangement of tank decommissioning and removal at a future date. This comprised backfilling with arisings and sealing of the surface with concrete to prevent infiltration of surface water.

Chemical Assessment of Soils (USTs)

3.14 Chemical assessment of soil samples taken from the base of the excavation on three sides of the tank confirmed that TPH concentrations within the soils were low. Concentrations were recorded as follows:

- TPH aliphatic >C21-35 maximum concentration identified 45 mg/kg
- TPH aromatic >C16-21 maximum concentration identified 21mg/kg
- TPH aromatic >C21-35 maximum concentration identified 40 mg/kg

3.15 All other TPH bands were recorded at concentrations below the laboratory limit of detection.

3.16 One further sample was taken targeted at the localised area of staining identified by visual assessment during the excavation along the northern side of the tanks. The origin of the staining appeared to be a historical spill from surface; a sample was taken at a depth of approximately 2.2m bgl to target the worst visually impacted area. Chemical analysis identified low TPH concentrations (>C10-12 up to >C21-35) as follows:

- TPH aliphatic >C12-16 at concentration of 2.8 mg/kg
- TPH aliphatic >C16-21 at concentration of 10 mg/kg
- TPH aliphatic >C21-35 at concentration of 110 mg/kg
- TPH aromatic >C10-12 at concentration of 4.5mg/kg
- TPH aromatic >C12-16 at concentration of 12mg/kg
- TPH aromatic >C16-21 at concentration of 120mg/kg
- TPH aromatic >C21-35 at concentration of 440mg/kg

Generic Quantitative Risk Assessment – Human Health

3.17 A Generic Quantitative Risk Assessment in accordance with Environment Agency 'Model Procedures for the Management of Land Contamination, CLR 11' report was undertaken to consider the potential risks to human health from the TPH concentrations identified. It is noted that the risks to human health are primarily focused on potential impact of vapours as the depth of the contamination would preclude direct contact and ingestion pathways. Based on this, the results were compared against LQM/CIEH Suitable 4 Use Levels (S4ULs) for a residential without homegrown produce land use.

3.18 None of the TPH fractions analysed exceeded the risk thresholds and therefore soils adjacent the underground storage tanks are not considered to present a risk to human health. Data assessment tables showing comparison between results and the screening levels is provided in Appendix E.

Controlled Waters Risk Assessment (Leachate)

3.19 Two samples (collected from southern and western sides of the tank) also underwent 10:1 leachate preparation followed by chemical analysis for BTEX and TPH. None of contaminants analysed were identified above the laboratory limit of detection. It is therefore considered that

no evidence of readily leachable hydrocarbon contamination was identified within soils associated with the USTs.

Summary of UST Investigation

3.20 Site investigation works identified that the tank area (two USTs) associated with the former petrol filling station is located **outside of the subject site area**. Only the associated pipework between tanks and former fuel pumps is located within the subject site boundary.

3.21 The tanks were observed to be in good condition with no evidence of hydrocarbon contamination within surrounding soils. Laboratory data and assessment (soils and leachate) demonstrate that there is no risk to either human health or groundwater quality for hydrocarbons associated with the soils around the USTs.

Desk Based Petroleum Officer Search

3.22 To confirm that the tanks identified are all the tanks present on/near the site, a records search was requested from Petroleum Officer. A plan (reference GP/07/1C dated 1966) was provided which identified the presence of a tank area to the west of the former shop building connected by 4 inch ducts to a set of four pumps within the forecourt area. The tank area was shown as comprising 2 double compartment petrol tanks. Each tank was recorded as being able to hold 6000 gallons which converts to 27, 276 litres.

3.23 The accompanying letter report details that there are records of three tanks beneath the site as follows:

- Tank 1: Petrol holding 27,276 litres
- Tank 2: Disused 13, 638 litres
- Tank 3: Petrol holding 13,638 litres

3.24 It states that one tank is recorded as a single compartment tank and the other is recorded as double compartment. When the capacity of Tanks 2 and 3 are taken together this matches the 27,276 litres of Tank 1 and is consistent with the expectation of two 6,000 gallon tanks identified on the plan provided.

3.25 The Petroleum Officer did not have any records relating to decommissioning of the tanks.

3.26 There are no records for provision of below ground diesel tanks which is consistent with anecdotal evidence provided by the landowner.

3.27 A copy of the information provided via the Petroleum Officer search is provided within Appendix F.

4.0 INVESTIGATION OF ONSITE GROUNDWATER QUALITY

4.1 A single deep borehole was drilled within the subject site to provide a groundwater monitoring well and to obtain additional information on the potential for leachable contamination within the infilled Made Ground. The borehole (BH201) was drilled in an area of the site to the south of the former petrol filling station and northwest of the proposed building.

Ground Conditions in BH201

4.2 Ground cover at this location comprised bituminous hardstanding to a depth of 0.15m bgl. Made Ground was then encountered to a depth of 18.8m bgl followed by Chalk which remained unproven at the base of the hole at 28.5m bgl. Groundwater was encountered at a depth of 21m bgl rising to a depth of 20.2m bgl after 20 minutes. Further details on ground conditions are provided below.

Made Ground / Infilled Ground

4.3 Made Ground was encountered from a depth of 0.15m bgl to a depth of 18.8m bgl and comprised a mixture of both granular and cohesive material.

4.4 Granular Made Ground was encountered to a depth of 2.7m bgl which was broadly similar to Made Ground encountered within trial pit excavations undertaken both in the former forecourt of the petrol filling station and offsite adjacent to the west of the former shop footprint. However, slight hydrocarbon odour was noted from 0.15 to 0.6m bgl likely associated with coal tar within bituminous materials.

BH201 – hand pit

BH201 arising to 2.7m bgl

4.5 This was underlain by predominantly cohesive Made Ground to a depth of 10.3m bgl. Cohesive Made Ground comprised slightly sandy gravelly silty CLAY with varying amounts and types of anthropogenic constituents. Localised high proportions of metal were

encountered throughout the cohesive Made Ground as well as occasional coarse gravel size fragments of coal tar with an accompanying slight hydrocarbon odour. Suspected ACM cement was encountered from 4.7m to 6.5m bgl. Organic clay and inclusions of wood were encountered within cohesive Made Ground from 7.9m bgl to 9.3m bgl.

BH201 representative arisings 2.7-6.5m

BH201 representative arisings 7.9 – 9.3m bgl

4.6 From a depth of 10.3m bgl to base of Made Ground at 18.8m bgl Made Ground was granular and predominantly comprised black silty sand GRAVEL with high ash content. This material was considered to be consistent with bottom ash. Other anthropogenic materials in minor quantities included metal, brick, wood and slate. Suspected ACM cement was encountered at a depth of 11m bgl. From 18m to 18.8m bgl materials appeared to comprise demolition rubble and included degraded coal tar likely from felt roofing as well as brick, slate and concrete.

BH201 – representative arisings 10.3-18m bgl

BH201 – representative arisings 18-18.8m bgl

4.7 No visual or olfactory evidence of significant hydrocarbon or solvent-type contamination was noted within the Made Ground. In-situ PID headspace reading did not identify any elevated concentrations of volatile compounds.

Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation (Undifferentiated) - Chalk.

4.8 Chalk arisings were encountered from a depth of 18.8m bgl. These became damp from approximately 20m bgl and were recovered as silty water from below the water strike at 21m bgl. A band of flint was encountered from 25 to 25.3m bgl.

4.9 It appears from early recovery of arisings that chalk is likely structured at this depth, however, recovery was limited and became structureless in appearance when damp. Chalk arisings were therefore described as structureless chalk composed of cream slightly gravelly SILT. Gravel is medium density and white with rare inclusions of flint gravel.

4.10 No visual or olfactory evidence of hydrocarbon or solvent contamination was identified. No elevated concentrations were identified from in-situ PID headspace readings.

BH201 – Chalk arisings 18.8 to 20m bgl

BH201 – chalk arisings circa 25m bgl

Comparison With Previous Site Investigation (Ground Conditions)

4.11 The depth of Made Ground encountered within BH201 was significantly deeper than any of the boreholes undertaken during the previous site investigation works. Made Ground within BH201 extended to a depth of 18.8m bgl compared to previous maximum depth of 9.8m bgl encountered by Brownfield Solution Ltd within BH2.

4.12 The type of Made Ground identified by the previous site investigation works are considered to be broadly similar to those described within BH201 up to a depth of approximately 10.3m bgl with the exception of presence of rare, suspected ACM fragments identified by Lustre. The type of Made Ground encountered within BH201 from 10.3m bgl to 18.8m bgl (suspected bottom ash), however, was not recorded within logs from the previous site investigation works.

Potential for Vapours & Ground Gas Risk

4.13 As stated above, notable differences in the thickness and depth of Made Ground (18.8m bgl compared to 9.8m bgl) was observed and a significantly higher proportion of ash recorded

during the Lustre site investigation. The reason for the discrepancy is due to the intentional placement of BH201 close to the western boundary within a deeper area of the former chalk pit compared to Brownfield Solutions exploratory locations.

4.14 The thicker and ashy infilled ground may increase the risks previously identified by Brownfield Solutions to human health, with the primary pathway being via the inhalation of vapours and ground gases. However, based on the points below, an increase in risk (above low as determine previously) is not considered likely:

- No odours or elevated in-situ headspace readings indicative of volatile compounds were identified.
- Monitoring wells installed previously would have picked up any ground gases migrating from deeper fill and reaching the surface and so would have considered any impact from deeper fill, even if its presence was not known.
- Monitoring wells installed by Brownfield Solutions Ltd were targeted within and adjacent to the proposed building footprint. Based on the current proposed site layout drawing this is the only area of the site where accumulation of ground gas could be a concern.

4.15 No further assessment of vapours or ground gases is therefore considered necessary from a human health perspective. However, if the proposed site layout is altered then additional risk assessments may be required.

Controlled Waters Risk Assessment (Leachate)

4.16 No previous assessment had been undertaken to determine the leachability of contamination within soils and therefore the risk of leaching from Made Ground to impact groundwater from has not been fully considered.

4.17 Four samples from the Made Ground from BH201 were selected for leachate preparation and chemical analysis. Samples were selected to target Made Ground which contained high proportions of anthropogenic materials as well as soils in close proximity to groundwater.

4.18 Samples underwent 10:1 leachate preparation followed by chemical analysis for the following determinands pH, inorganics and metals, BTEX, TPH, PAH and SVOCs. The water quality risk assessment adopted in this review is based on the conceptual model of the site and the potential use of, and risks to, controlled waters. The water quality standards have been implemented in the following hierarchy: UK DWS then EQS FW and then WHO DWS.

4.19 The leachate assessment, set out in Appendix E, compares determinand concentrations against available screening values to determine the risk posed to groundwater quality. This identified that the following determinands pose a potential risk to groundwater quality:

- Lead (UK DWS 10µg/l) in two samples from BH201 as follows 11.0-11.1m bgl at 17µg/l and 17.0-17.1m bgl at 25µg/l;
- Nickel (UK EQS Freshwater 1 µg/l) in all four samples from BH201 concentrations ranged from 2.4 to 8.4 µg/l; the maximum concentration was identified in two samples taken at a depth of 17-17.1m bgl and 18.5-18.6m bgl; and
- Zinc (UK EQS Freshwater 75 µg/l) in two samples from BH201 as follows 17-17.1m bgl at 92 µg/l and 18.5-18.6m bgl at 110 µg/l.

4.20 No evidence of leachable concentrations of TPH, BTEX, PAH or SVOCs was identified in any of the soil samples collected from BH201; all results were recorded as less than limited of detection (<LOD).

4.21 In summary, leachate analysis has identified that metals have the potential to be liberated from Made Ground within BH201 at concentrations with potential to impact groundwater quality. Further consideration of the risk to controlled waters from onsite soil contamination is therefore required (see below).

Controlled Waters Risk Assessment (Groundwater)

4.22 Groundwater samples were taken from BH201 on two occasions to confirm current groundwater quality and determine if any historical or offsite impacts have negatively affected onsite groundwater.

Field Based Assessments

4.23 During the return monitoring, groundwater was recorded at a depth of 20.15m bgl (2.52 m AOD) within the Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation (Undifferentiated).

4.24 The presence of LNAPL was not detected at the surface of the water column by the dual phase meter. In addition, no visual or olfactory evidence of hydrocarbon contamination was observed during well development or sampling.

Chemical Assessment

4.25 Both samples underwent chemical analysis for the following determinands pH, inorganics and metals, BTEX, TPH and PAH. The water quality risk assessment adopted in this review is based on the conceptual model of the site and the potential use of, and risks to, controlled waters. The water quality standards have been implemented in the following hierarchy: UK DWS then EQS FW and then WHO DWS.

4.26 The groundwater assessment, set out in Appendix E, compares determinand concentrations against available screening values to determine the risk posed to groundwater quality. This identified that the following determinands were elevated with respect to one or more water quality standard:

- Boron (WHO 300µg/l) at maximum concentration of 860µg/l; and
- Nickel (UK EQS Freshwater 1 µg/l) at a maximum concentration of 12µg/l.

4.27 It is noted that TPHs, PAHs and phenols were not detected above laboratory limit of detection.

Controlled Waters Discussion

4.28 Overall site investigation works (drilling of BH201) identified that groundwater was present beneath the subject site at depth of 21m bgl in close proximity to the interface between the base of the infilled Made Ground and top of the natural chalk strata. During return groundwater monitoring, no significant impacts from contamination were identified by visual or olfactory assessment.

4.29 The leachate testing, undertaken to ascertain whether contaminants identified in the infilled ground had the potential to impact groundwater, has identified that metals (lead, nickel and zinc) within the Made Ground were readily leachable. However, concentrations of these metals in leachate were only **marginally** in excess of the WQS and do not indicate a significant potential to impact groundwater quality. It is also noted that whilst nickel has been identified as a contaminant of concern by leachate testing; Made Ground is not a significant source of this contaminant. Previous chemical assessments undertaken by Brownfield Solutions Ltd of 11 samples identified consistently low concentrations ranging from 4.2 to 53 mg/kg. Nonetheless, the infilled Made Ground has the **potential** to impact groundwater quality if conditions exist that enable or enhance the leaching of soils.

4.30 Chemical assessment of groundwater samples has identified that none of the contaminants analysed were identified in excess of the UK DWS screening criteria. Minor elevations of two metals, nickel and boron, were identified above one of their respective water quality standards (UK EQS Freshwater for nickel and WHO for boron). It is noted that groundwater at the site is

sensitive due to its abstraction / use as potable water and therefore the DWS are considered the most relevant WQS. Given that this groundwater aquifer is locally unlikely to support freshwater environments, the presence of nickel above the EQS FW criteria is not considered a concern. Also, the presence of boron above the WHO criteria is not considered an issue as this is likely naturally occurring boron loading of the dissolved phase within the chalk aquifer. As such, the groundwater risk assessment has demonstrated that the infilled ground in its current state is not giving rise to a significant deterioration in groundwater quality.

4.31 Considering that the groundwater data recovered demonstrates lower concentrations of contaminants than the leachate assessment, this supports the observation that the existing site conditions, which largely prevents infiltration of surface water, is assisting in preventing the deterioration of groundwater quality.

Risks in the Development Context

4.32 The proposed development includes communal soft landscaping in the form of gardens and public play areas. In addition, the development would generate surface water run-off which would typically be discharged to ground via soakaways. Both of these features would result in an increase in overall infiltration at the site and enhanced leaching in these specific areas. As such, development proposals would require appropriate mitigation measures to prevent infiltration to ground.

4.33 Noting the thickness of fill materials, piling into the chalk bedrock would be required to support the new building. The physical activity of piling and the preferential pathways that piling will create, may place the groundwater body at risk. Mitigation measures during groundworks and piling will be required to protect groundwater.

5.0 CONCLUSIONS & RECOMMENDATIONS

5.1 A Supplementary Phase 2 Site Investigation has been undertaken to support the proposed redevelopment of a site located off Vale Road in Northfleet, Gravesend, Kent as part of a new planning application.

5.2 Previous site investigation works (Phase 1 and Phase 2 assessments) have been undertaken as part of previous planning application for the subject between 2017 and 2019 by Brownfield Solutions Ltd. The findings, however, were considered insufficient by regulators to discharge planning conditions associated with contamination (planning condition 5 part 2).

5.3 The object of the supplementary site investigation was therefore to address the outstanding issues identified within the EA consultee response as follows:

- additional assessment with respect to a key point source (underground fuel storage tanks) identified during previous investigation works;
- to provide information on current groundwater quality beneath the site; and
- to provide greater clarity on the potential for contaminants within Made Ground to impact groundwater quality through leaching.

Contamination Risk

5.4 The supplementary site investigation has identified that at the time of the site investigation potential sources of contamination beneath the site in its current layout present a **low** risk to both human health and controlled waters.

5.5 Assessments have demonstrated that gross contamination is not present around the fuel tanks and that groundwater quality is not adversely impacted by the infilled Made Ground.

5.6 However, existing sources of contamination could present higher and **potentially unacceptable risks in context of the proposed development**. Mitigation measures will therefore be required to reduce the risks to identified receptors.

5.7 In summary, the supplementary site investigation has identified the following risks which require either further assessment or management to ensure that the site is safe and compliant. All risks can be effectively mitigated using routine remedial measures.

(i) **ISSUE 1** – Potential risk of leaching from lead, nickel and zinc within the infilled Made Ground into groundwater beneath the site where infiltration pathway remains open i.e., beneath areas of proposed soft landscaping, due to soakaways etc. **Moderate** risk to controlled waters. **POTENTIAL MITIGATION MEASURE – Closed Drainage**

System, no infiltration of surface water to be allowed through the infilled ground as part of the site's drainage scheme. All current soft landscaped areas will either need to be converted to impermeable hardstanding or a capped drainage system implemented at the base of the clean cover system (see below) in these areas. In addition, no infiltration from the drainage system (e.g. soakaways) should be permitted to flow through infilled ground. Alternative surface water disposal options should be considered such is discharge to nearby surface water or sewer. As a last option, deep bore soakaways could be assessed, ideally where the infilled Made Ground is not as deep/thick.

(ii) **ISSUE 2** – Presence of residual hydrocarbon and/or volatile compounds within pipework and USTs. **Moderate/low** risk to human health and controlled waters. **MITIGATION MEASURE –** Removal of pipework infrastructure located beneath the subject site followed by capping of remaining pipework at the boundary. Following removal underlying soils should be inspected to confirm absence of residual hydrocarbon contamination. Removal of any impacted soils as required.

5.8 Previous site investigation works also identified the following risks which will require provision of appropriate remedial measures

- Provision of suitable potable water supply pipes in accordance with assessment criteria in accordance with UKWIR (**barrier pipe**);
- Removal of contaminated Made Ground from all areas of soft landscaping and provision of a **clean cover system** to a depth of 450mm taking into account their proposed usage as communal gardens and public open space. A high visibility barrier or 100mm of compacted clean coarse material was also recommended to act as an anti-dig barrier (along with the capped drainage system noted above); and

Remediation Strategy & Piling Risk Assessment

5.9 A Remediation Strategy and Piling Risk Assessment will be required by the local planning authority to confirm the exact scope of the remedial and piling works summarised above. Both reports will need to be approved by the LPA Gravesham Borough Council before any remediation or construction works commence.

5.10 The Remediation Strategy will formulate in detail the proposed remedial works based on final formation levels, building construction method, site layout etc. In addition, the strategy would confirm the necessary testing and validation requirements for validating the satisfactory completion of these works.

5.11 During the remedial works, verification would be needed to demonstrate that the remedial works have been completed and typically involves site inspections and testing. Records of any off-site disposal of excavated soils, with the conveyance and waste transfer notes would also be collected. A Verification Report is required under planning condition 5 part 4.

Planning Considerations

5.12 This Phase 2 report should be submitted to the local planning authority for approval prior to commencement of construction works. As noted above, additional works are required, in the form of remediation and verification.

Non-specialist Environmental Watching Brief

5.13 It is prudent to ensure a watching brief is carried out by a suitable person on-site throughout the works who is experienced and capable of identifying signs of potential contamination, including, but not limited to, staining, unfamiliar odours and visual evidence of potentially contaminated/ hazardous materials such as asbestos.

5.14 If any suspected ground contamination such as unusual odours, visually impacted soils/water, suspected asbestos or any potentially hazardous waste not recorded during this investigation is encountered during the works, further sampling and testing should be carried out under supervision by an appropriately qualified Environmental Consultant. This will allow the determination of the appropriate management and mitigation measures to address any potential risks as part of the development of the site.

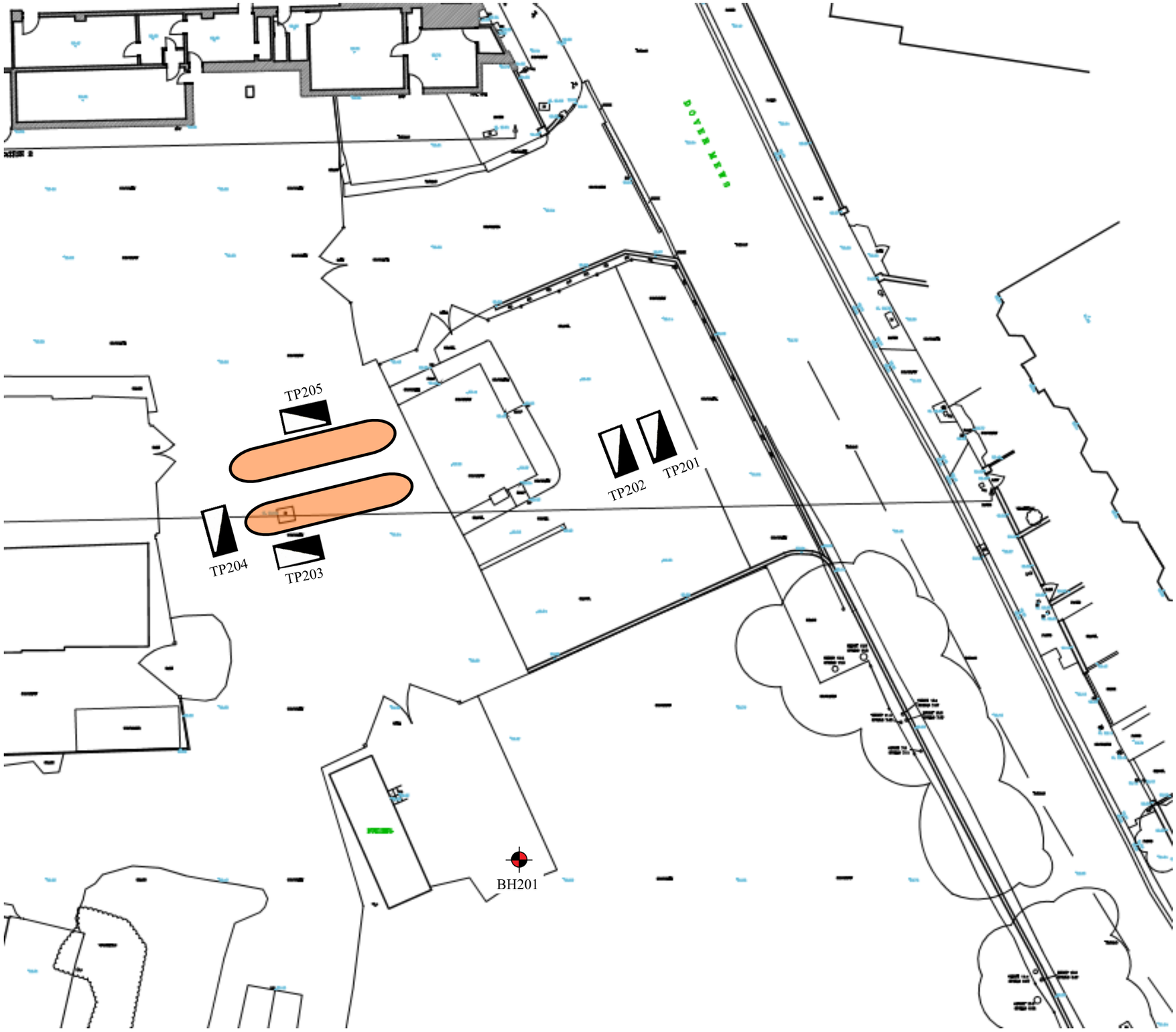
Unforeseen Ground Contamination

5.15 A reasonable amount of skill and care, as expected, has been used to deliver this investigation in accordance with the agreed scope of work and meet the required objectives. However, the potential for unforeseen contamination to be present, or encountered during future groundworks, maintenance works and/or site clearance/redevelopment works cannot be entirely eliminated. This will be particularly important when working within the vicinity of areas that were not investigated, or the method of investigation employed was limited due to safety (i.e. live underground services), access, financial, public relations, third party intervention and/or risk etc. which influenced the scope of the investigation. A site investigation can only provide a snapshot of the ground conditions encountered at the time covering a relatively small proportion of the site, with samples only representing discrete parcels of ground. Care and diligence are advised even if a site investigation records a low or very low risk of contamination.

Lustre cannot be held responsible for unforeseen contamination that may be present or encountered in the future.

DRAWINGS

RETURN



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Key

- Site Boundary
- Trial Pit
- Cable Percussive Borehole
- Underground Storage Tank (UST)

Notes

Do not scale from this drawing. Approximate positions only. Report all errors and omissions to author.

Rev	Date	Description

Client / Project

BRT PROPERTIES LTD
VALE ROAD
NORTHFLEET

Drawing Title

Site Investigation Plan

Project Number	Drawing Number	Date	Designed by	Approved by
3689	001	14.10.21	CM	ML

Lustre Consulting Limited
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APPENDIX A: REFERENCE INFORMATION

PHASE 2 REFERENCE INFORMATION

APPROACH TO INVESTIGATIONS & CONTAMINATED LAND DEFINITIONS

RETURN

Environmental site investigations are prepared in keeping with best practice and current planning guidance, where practicable and in accordance with the approved scope of work. The National Planning Policy Framework (NPPF)[4] advises regulatory consultees to ensure that adequate site investigation information is provided at the initial planning stage, whilst the Land contamination risk management guidance (LCRM, October 2020) requires a phased, risk based approach when dealing with land affected by contamination in the UK.

References to the term "contaminated land" in our reports relate to the statutory definition of contaminated land under the recently published Contaminated Land Statutory Guidance unless otherwise stated (also known as Category 1 and 2 under Part 2A). That definition is: "any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances on in or under the land that –

a) Significant harm is being caused or there is a significant possibility of such harm being caused; or
b) Significant pollution of water environment is being caused or there is significant possibility of such pollution being caused".

Other terms such as "land affected by contamination" or "land contamination" refer to the much broader categories of land where contaminants are present but usually not at a significant level of risk to be classified as contaminated land under the definition Part 2A (also known as Category 3 or Category 4 under Part 2A).

The National Planning Policy Framework (NPPF) states that "land should be suitable for its new use and as a minimum, after carrying out remediation (if required), the land should not be capable of being determined as contaminated land under Part 2A of the Environmental Protection Act 1990".

NOTES ON LOGGING & SAMPLING

RETURN

For all exploratory holes excavated, soil arisings are recovered and logged to BS5930: 2015[5]. Where possible, observations on groundwater ingress and excavation stability are made. Soil arisings are then typically inspected for visual and olfactory evidence of contamination with samples recovered at varying depths for analysis depending on the scope of works. Disturbed and undisturbed samples (where applicable) are taken in accordance with guidance and deposited in suitable containers, prepared and dispatched to a UKAS (United Kingdom Accreditation Service) accredited laboratory.

If appropriate to the nature of the works, soil samples from the Made Ground or potentially contaminated soils are also deposited in sealable plastic bags to allow on-site headspace analysis. Samples are then left for at least 20 minutes before analysis and a photo-ionisation detector (PID) with 10.6eV lamp used to measure the

[4] Department for Communities and Local Government, National Planning Policy Framework, 2019.
[5] British Standard – Code of Practice for Site Investigation. BS 5939: 2015.

concentration of volatile organic compounds (VOC) within the headspace. Soil samples are gently agitated during analysis to encourage the release of any volatiles.

QUANTITATIVE RISK ASSESSMENTS

RETURN

Human Health GQRA

To determine whether contamination presents an unacceptable level of risk to human health, concentrations of potential contaminants are screened against risk threshold values. Historically, these values had been in the form of Generic Assessment Criteria (GAC) and Soil Guideline Values (SGVs), published by regulatory and advisory bodies. However, in response to revised Part 2A Statutory Guidance, Defra published Category 4 Screening Levels (C4SLs) for six determinands to provide a simple test for deciding when land is 'suitable for use' and demonstrably not 'contaminated land'. The supporting documentation from Defra[6] acknowledges that where C4SLs exist, these values represent a greater risk threshold (i.e. low risk) rather than the previous SGVs/GACs (i.e. no risk). Acknowledging that the C4SLs were primarily intended for use under Part 2A Statutory Guidance, LQM in collaboration with the Chartered Institute of Environmental Health (CIEH), subsequently published a third set of generic assessment criteria known as LQM/CIEH Suitable 4 Use Levels (S4ULs)[7]. The S4ULs are based on the 'minimal or tolerable level of risk' as defined in previous Environment Agency guidance (namely SR2[8]) which underpinned all previous SGVs/GACs. The National Planning Policy Framework (NPPF)[9] requires that planning decisions undertaken by the Local Planning Authority should decide if a site is suitable for its new use and not just whether the site is determinable under Part 2A. Whilst Defra states that the C4SLs could be applied under the planning regime, it is acknowledged that these screening levels were primarily published to support the Part 2A Statutory Guidance. Taking this into account, the S4ULs are often used in the first instance. Where an exceedance above these levels is identified, comparison against C4SLs will generally be undertaken, with consideration given to the applicability of a less conservative threshold.

Water Pipeline Suitability Test

Often, at the time of site investigation, the route of any proposed potable water pipes are not known, or are largely inaccessible if an existing development is present. As such, potable water pipe assessments are based on the shallow soils across the site as a whole. In accordance with UKWIR guidance, we consider determinands for assessment based on the historical use of the site. Available analytical data is then compared against the UKWIR thresholds. The assessment of ethers, nitrobenzene, ketones, aldehydes and amines are often not considered applicable. The assessment of mineral oil is undertaken using the results from any speciated TPH test data, which provides a breakdown of the hydrocarbon fractions.

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[6] SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document, March 2014

[7] The LQM/CIEH S4ULs for Human Health Risk Assessment, 2015. Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3455. All rights reserved

[8] Environment Agency, Human Health Toxicological Assessment of Contaminants in Soil (SR2), January 2009

[9] Department for Communities and Local Government, National Planning Policy Framework, 2019

Groundwater GQRA

When assessing the risks to groundwater, the screening criteria adopted includes the UK Drinking Water Standards (DWS) as specified in Water Quality Regulations 2000[10], Environmental Quality Standards (EQS) for freshwater[11] and World Health Organisation (WHO) standards for drinking water quality[12]. The hierarchy that these are adopted is based on the conceptual site model and the most sensitive receptors in the context of the site and the local use of any groundwater. In the absence of UK published guidance values for total petroleum hydrocarbons, the WHO guideline values (provided in Petroleum Products in Drinking Water guidance) are adopted[13]. The use of the lowest screening criteria for an individual TPH fraction has been adopted as set out in the guidance, which provides a conservative assessment for TPH.

Ground Gas Risk Assessments

Ground gases such as methane and carbon dioxide can be generated naturally from the ground, particularly where decaying organic matter is present. These gases can also be generated by buried degradable waste or other organic compounds in Made Ground / infilled ground. Carbon dioxide and methane can migrate through the soil over significant distances and enter buildings via the subfloor void or other entry points. The hazard associated with methane is explosion, whilst for carbon dioxide the hazard is asphyxiation, particularly in confined spaces. BS 8485:2015[14] sets out a series of gas screening values to enable the assessment of risk, depending on the type and sensitivity of the proposed buildings on site.

CONCEPTUAL MODEL & QUALITATIVE RISK ASSESSMENTS

RETURN

The objective of a conceptual model is to firstly identify potential contaminant sources, pathways and receptors relating to the site and surrounding area based on the findings of this investigation. This information is then collated, and a qualitative risk assessment carried out in line with good practice and current guidance[15,16] to assess any viable source-pathway-receptor pollution linkages. The potential for a pollution event to occur is then evaluated using a risk classification tool[17]. The level of risk is assigned by considering the likelihood that a pollution event might occur with the consequence its occurrence. The consequence is essentially a measurement of the severity of a hazard or source (e.g. contaminated soil) and sensitivity of the receptor (e.g. aquifer type or end user).

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[10] The Water Supply (Water Quality) Regulations 2000
[11] Environmental Quality Standards, The Water Supply (Water Quality) Regulations 2002
[12] World Health Organisation (WHO) Guidelines for Drinking Water Quality, 1984
[13] Petroleum Products in Drinking-water, WHO (WHO/SDE/WSH/05.08/123)
[14] BS 8485:2015+A1:2019 Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings.
[15] Guidance for the Safe Development of Housing on Land Affected by Contamination R&D66, NHBC, 2008.
[16] Construction Industry Research and Information Association (CIRIA). Contaminated Land Risk Assessment. A Guide to Good Practice. CIRIA C552 2001.
[17] Department of the Environment, Transport and the Regions, Environment Agency and Institute of Environmental Health. Guidelines for Environmental Risk Assessment and Management. HMSO July 2000.

REMEDIATION AND VALIDATION

RETURN

Following the identification of unacceptable risks to receptors in a site investigation, either more investigation is required to better understand the risk, or often remediation is required. Remediation aims to lower the risk to an acceptable level by either removing the source or breaking / reducing the pathway. The methodology for carrying out any remediation is documented in a Remediation Strategy, and typically forms the third stage in the iterative risk-based approach. The strategy requires regulatory approval before commencing the actual remedial work. Remediation requires careful management and planning, with inspections and testing by the consultant to verify that the remediation has been undertaken in accordance with Remediation Strategy. Information collected over the course of the remedial work is then compiled into a Verification Report in line with the Environment Agency's Evidence, Verification of Remediation of Land Contamination[18].

NOTES ON WASTE CLASSIFICATION (SOILS)

RETURN

Guidance set out in the Waste Framework Directive and the Environment Agency's Technical Guidance WM3 Hazardous Waste , provides information and controls on how sites should manage and control waste soils. The first stage of the waste assessment, as set out in Technical Guidance WM3 Hazardous Waste, requires the chemical composition of the soils to be determined by analytical testing, in order to determine if the soils should be classified as hazardous or not hazardous. The second stage requires a Waste Acceptance Criteria (WAC) test to determine the case of inert or non-hazardous waste disposal routes for the soil. Landfills have set criteria for wastes which they can legally accept, and the WAC test therefore provides information on which type of landfill can accept the waste.

Only contaminated soils which are excavated will require classification and assessment for waste disposal as under the Waste Framework Directive, as these soils cannot be re-used on site. In-situ, unexcavated contaminated soils do not require classification. Also uncontaminated soils and other naturally occurring material excavated in the course of construction activities, when it is certain that the material will be used for the purposes of construction in its natural state, on the site from which it was excavated, also do not require classification.

Waste Classification Methodology

The first stage of this assessment is to assign a waste code to the soils requiring classification. This is obtained from the 20 Chapters of The List of Waste (England) Regulations 2005 and includes the consideration of both mirror entries and absolute entries. For mirror entries the soils requiring disposal will be assessed within the HazWasteOnline tool to determine if hazardous properties are present and therefore if the mirror hazardous or mirror non-hazardous code is applicable to the waste classification.

The results of the laboratory analysis are screened in a propriety hazardous waste assessment tool (HazWasteOnline) to determine if the soils would be considered hazardous from a waste disposal perspective. Concentrations of each contaminant are screened to determine if they exceed any of the sixteen hazardous

[18] Environment Agency, Evidence, Verification of Remediation of Land Contamination, SC030114/R1, 2010

properties (HP) and/or statements as set out the Environment Agency's Technical Guidance WM3 (Guidance on the classification and assessment of waste, 1st edition 2015).

The initial waste assessment on HazWasteOnline identifies those contaminants which exceed any of the sixteen hazardous properties / statements. This is based on the presence of individual anions or cations identified during the chemical analysis of the soils. However, this analysis does not always identify which specific components are present. Where possible, further information has been obtained on which precise substances are likely to be present within the soils, based on the known historical and current site uses and operations. This information can be used to rule out the presence of 'worst case' substances within the HazWasteOnline tool. Further information on the specific assumptions made during the waste assessment are provided in the Assumptions Section below and in the HazWasteOnline output sheet included as an attachment to this letter report.

Following the application of project specific assumptions, a detailed waste assessment has been generated. As part of the detailed waste assessment, consideration has also been given to whether the soils should be considered as a single population or as sub populations based on field observations or the presence of specific contaminants.

Waste Assessment Assumptions

Based on our current understanding of historical and current site operations, the following assumptions have been applied within the HazWasteOnline tool, unless explicitly stated in Chapter 7:

- HP3 Flammable has been discounted as a viable Hazardous Property as the soils considered within this assessment are a solid waste without a free draining liquid phase. This is likely due to advice from the laboratory indicates that testing for flammability was not appropriate due to the low level of TPH. The waste does not display this hazardous property.

- Metallic compounds are not considered to be present in their chromate form as the laboratory analysis has demonstrated that insufficient concentrations of hexavalent chromium are present to enable the formation of chromates within the soils.

- Based on the data available it is considered likely that any metallic compounds present within the soils underlying the site are most likely present in their oxide form, rather than as chlorides, sulphates, sulphides, carbonates or phosphates.

APPENDIX B: EXPLORATORY HOLE LOGS

RETURN

Borehole Log

Borehole No. **BH201**

Project Name: 2 Vale Road	Project No. 3869	Co-ords: 562794.08 - 173612.73	Hole Type BH
Location: Northfleet		Level: 22.67	Scale 1:75
Client: BRT Properties Ltd		Dates: 31/08/2021 -	Logged By Claire Munns

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description	
					0.15	22.52		Bitumenous hardstanding (TARMACADAM)	
				PID=1				Greyish black silty sandy fine to coarse subangular to subrounded GRAVEL of brick, clinker, concrete with medium ash content. Sand is fine to coarse. Slight hydrocarbon odour. (MADE GROUND)	1
		0.30 - 0.40	ES		0.60	22.06			
				PID=1					
		0.80 - 0.90	ES						
					1.50	21.16		Brownish grey silty sandy fine to coarse subangular to subrounded GRAVEL of brick, clinker, concrete and glass with a low ash content. Sand is fine to coarse. (MADE GROUND)	2
				PID=2					
		2.00 - 2.10	ES						
					2.70	19.96		Black clayey silty sandy fine to coarse subangular to subrounded GRAVEL of clinker, chalk, brick, slate, glass, flint, plastic with medium ash content. Sand is fine to coarse. (MADE GROUND)	3
								Soft brown slightly sandy gravelly silty CLAY with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded of brick, clinker, slate, flint, chalk, glass. Cobbles are subangular to subrounded of brick. (MADE GROUND)	4
		4.50	ES		4.50	18.16			
				PID=3	4.70	17.96			
								Reddish brown silty sandy fine to medium subangular to subrounded GRAVEL of metal, brick, clinker, wood. Sand is fine to coarse. (MADE GROUND)	5
		5.50 - 5.60	ES						
								Soft brown slightly sandy gravelly silty CLAY with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded of metal, slate, clinker, wood, ceramic, brick, cement (suspected ACM). Cobbles are subangular to subrounded of brick. (MADE GROUND)	6
		6.50	ES		6.50	16.16			
				PID=1					7
		7.60	ES					Soft light brown slightly sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded of chalk, brick, slate. (MADE GROUND)	
				PID=1	7.90	14.76			8
		7.90	ES						
				PID=1					
		8.00	ES					*Fine to coarse gravel subangular to subrounded of clinker and coal tar, with a slight hydrocarbon odour.*	
				PID=1					
		8.50	ES					Soft multicoloured slightly sandy gravelly silty CLAY with a low cobble content and low ash content. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded of chalk, brick, clinker, flint, slate, wood. Cobbles are subangular to subrounded of chalk, flint. Slight hydrocarbon and organic odour. Occasional black staining. (MADE GROUND)	9
				PID=1	9.30	13.36			
		9.50	ES						
				PID=1					
					10.30	12.36			10
		11.00	ES					Soft multicoloured sandy gravelly silty CLAY with medium ash content. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded of metal, clinker, chalk, wood, flint, slate. (MADE GROUND)	11
				PID=1					
								Black silty sandy fine to coarse subangular to subrounded GRAVEL of clinker, metal, brick, wood, slate with high ash content. Sand is fine to coarse. Rare medium to coarse sized fragments of cement (suspected ACM). (MADE GROUND)	12
									13
		14.00	ES						14
				PID=0					
		15.00	ES						15

Continued on next sheet

Remarks
Hand pitting carried out.

Borehole Log

Borehole No. **BH201**

Project Name: 2 Vale Road	Project No. 3869	Co-ords: 562794.08 - 173612.73	Hole Type BH
Location: Northfleet		Level: 22.67	Scale 1:75
Client: BRT Properties Ltd		Dates: 31/08/2021 -	Logged By Claire Munns

Samples and In Situ Testing						
Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		PID=0				
17.00	ES	PID=0				
			18.00	4.66		Black silty sandy fine to coarse subangular to subrounded GRAVEL of clinker, brick, slate, concrete, coal tar with a low cobble content and high ash content. Sand is fine to coarse. Cobbles are subangular to subrounded of brick, concrete. Slight hydrocarbon odour. (MADE GROUND)
18.50	ES	PID=1	18.80	3.86		Recovered as structureless chalk composed of cream slightly gravelly SILT. Gravel is fine to medium subangular to subrounded medium density white. Rare fine to coarse angular to subrounded gravel of flint. (LEWES NODULAR CHALK FORMATION, SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED) - CHALK)
19.80	ES	PID=2				
20.80	ES	PID=1				
						Fine to coarse angular to subangular gravel and subrounded cobble of flint.
			28.50	-5.84		End of borehole at 28.50 m

Well | Water Strikes

16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Remarks
Hand pitting carried out.

Trial Pit Log

LUSTRE CONSULTING	Trial Pit Log		Trialpit No **TP201** Sheet 1 of 1
Project Name: 2 Vale Road	Project No. 3869	Co-ords: - Level:	Date 25/08/2021
Location: Northfleet		Dimensions (m): Depth 1.30	Scale 1:25
Client: BRT Properties Ltd			Logged Claire Munns

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.15			CONCRETE
				0.30			Grey and black silty sandy fine to coarse subangular to subrounded GRAVEL of concrete, brick and clinker. With a high cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded of concrete. Medium ash content. (MADE GROUND)
							Soft to firm orangish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular of chalk. (HEAD DEPOSIT)
				1.30			End of pit at 1.30 m

Remarks:

Stability:

AGS

Trial Pit Log

Trialpit No
TP202
Sheet 1 of 1

Project Name: 2 Vale Road	Project No. 3869	Co-ords: - Level:	Date 25/08/2021
Location: Northfleet		Dimensions (m): Depth 1.30	Scale 1:25
Client: BRT Properties Ltd			Logged Claire Munns

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.10			TARMACADAM
							Soft to firm black sandy gravelly silty CLAY with a low cobble content. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded of glass, slate, brick, flint, metal and concrete. Cobbles are subangular to subrounded of UNKNOWN. (MADE GROUND)
							Orange wiring, defunct pipework and coarse gravel sized fragment of coal tar. Slight hydrocarbon odour.
				1.30			End of pit at 1.30 m

1
2
3
4
5

Remarks:

Stability:

Trial Pit Log

LUSTRE CONSULTING	Trial Pit Log		Trialpit No **TP203 Side A** Sheet 1 of 1
Project Name: 2 Vale Road	Project No. 3869	Co-ords: - Level:	Date 25/08/2021
Location: Northfleet		Dimensions (m): Depth 3.80	Scale 1:25
Client: BRT Properties Ltd			Logged Claire Munns

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20			REINFORCED CONCRETE
	1.00 - 1.10	ES	PID=0	1.30			Grey and black silty sandy fine to coarse subangular to subrounded GRAVEL of concrete, brick and clinker, with a high cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded of concrete and brick. (MADE GROUND)
	2.00 - 2.10	ES	PID=0	3.30			Black silty sandy fine to coarse subangular to subrounded GRAVEL of chalk, brick, glass, slate, concrete and brick. Sand is fine to coarse. (MADE GROUND)
	3.50 - 3.70	ES	PID=2	3.80			Yellowish brown and greyish brown silty slightly gravelly fine to coarse SAND. Gravel is fine to medium subangular to subrounded of flint and chalk. (LEWES NODULAR CHALK FORMATION AND SEAFORD CHALK FORMATION (UNDIFFERENTIATED))
							End of pit at 3.80 m

Remarks:

Stability:

AGS

Trial Pit Log

LUSTRE CONSULTING	Trial Pit Log		Trialpit No **TP203 Side C** Sheet 1 of 1
Project Name: 2 Vale Road	Project No. 3869	Co-ords: - Level:	Date 25/08/2021
Location: Northfleet		Dimensions (m): Depth 3.80	Scale 1:25
Client: BRT Properties Ltd			Logged Claire Munns

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
							REINFORCED CONCRETE
				0.20			Grey and black silty sandy fine to coarse subangular to subrounded GRAVEL of concrete, brick and clinker with a high cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded of concrete and brick. (MADE GROUND)
	1.00 - 1.10	ES	PID=0				
				1.30			CONCRETE
				1.40			Soft to firm light brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded of chalk and flint. (LEWES NODULAR CHALK FORMATION AND SEAFORD CHALK FORMATION (UNDIFFERENTIATED))
				3.80			End of pit at 3.80 m

1 2 3 4 5

Remarks:

Stability:

AGS

Trial Pit Log

Trialpit No **TP204**

Sheet 1 of 1

Project Name: 2 Vale Road	Project No. 3869	Co-ords: - Level:	Date 25/08/2021
Location: Northfleet		Dimensions (m): Depth 2.80	Scale 1:25
Client: BRT Properties Ltd			Logged Claire Munns

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.05			TARMACADAM
				0.20			Brown fine to coarse subangular to subrounded GRAVEL of brick with a low cobble content. Cobbles are subangular to subrounded of brick. (MADE GROUND)
	1.00 - 1.10	ES	PID=1				Grey and black silty sandy fine to coarse subangular to subrounded GRAVEL of concrete, brick and clinker. With a high cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded of concrete and brick. (MADE GROUND)
				1.30			Soft to firm orangish brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded of flint and chalk. (LEWES NODULAR CHALK FORMATION AND SEAFORD CHALK FORMATION (UNDIFFERENTIATED))
	2.60 - 2.80	ES	PID=2	2.50			White structureless CHALK composed of silty sandy fine to medium subangular to subrounded GRAVEL. Sand is fine to coarse. (LEWES NODULAR CHALK FORMATION AND SEAFORD CHALK FORMATION (UNDIFFERENTIATED))
				2.80			End of pit at 2.80 m

1 2 3 4 5

Remarks: Concrete layer identified within Side C (eastern wall) at 1.3-1.4m bgl.

Stability:

Trial Pit Log

LUSTRE CONSULTING	Trial Pit Log		Trialpit No **TP205** Sheet 1 of 1
Project Name: 2 Vale Road	Project No. 3869	Co-ords: - Level:	Date 02/09/2021
Location: Northfleet		Dimensions (m): Depth 4.60	Scale 1:25
Client: BRT Properties Ltd			Logged Claire Munns

Water Strike	Samples and In Situ Testing: Depth	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
				0.20			REINFORCED CONCRETE
				1.30			Grey and black silty sandy fine to coarse subangular to subrounded GRAVEL of concrete, brick and clinker. With a high cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded of concrete and brick. (MADE GROUND)
				1.40			CONCRETE
	2.20 - 2.40	ES	PID=2				Soft to firm light brown slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse subangular to subrounded of flint and chalk. (LEWES NODULAR CHALK FORMATION AND SEAFORD CHALK FORMATION (UNDIFFERENTIATED))
	3.50 - 3.60	ES	PID=1				
	4.50 - 4.60	ES	PID=1	4.60			End of pit at 4.60 m

Remarks:

Stability:

AGS

APPENDIX C: LABORATORY TEST CERTIFICATES

RETURN

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Analytical Report Number : 21-11557

Project / Site name:	Vale Road	**Samples received on:**	22/09/2021
Your job number:	3869	**Samples instructed on/ Analysis started on:**	22/09/2021
Your order number:		**Analysis completed by:**	28/09/2021
Report Issue Number:	1	**Report issued on:**	29/09/2021
Samples Analysed:	1 water sample		

Signed:

Joanna Wawrzeczko
Technical Reviewer (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

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

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

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 21-11557
Project / Site name: Vale Road

Lab Sample Number				2019614
Sample Reference				BH201
Sample Number				6WVP
Depth (m)				None Supplied
Date Sampled				22/09/2021
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
General Inorganics				
pH	pH Units	N/A	ISO 17025	6.8
Total Cyanide	µg/l	10	ISO 17025	< 10
Sulphate as SO4	mg/l	0.045	ISO 17025	319
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	3.03
Hardness - Total	mgCaCO3/l	1	ISO 17025	815
Total Phenols				
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10
Speciated PAHs				
Naphthalene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01
Total PAH				
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16
Heavy Metals / Metalloids				
Boron (dissolved)	µg/l	10	ISO 17025	700
Calcium (dissolved)	mg/l	0.012	ISO 17025	270
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0
Magnesium (dissolved)	mg/l	0.005	ISO 17025	36
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.99
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	8.0
Copper (dissolved)	µg/l	0.5	ISO 17025	6.2
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	12
Selenium (dissolved)	µg/l	0.6	ISO 17025	6.2
Zinc (dissolved)	µg/l	0.5	ISO 17025	58

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 21-11557
Project / Site name: Vale Road

Lab Sample Number				2019614
Sample Reference				BH201
Sample Number				6WVP
Depth (m)				None Supplied
Date Sampled				22/09/2021
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Monoaromatics & Oxygenates				
Benzene	µg/l	1	ISO 17025	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0
Petroleum Hydrocarbons				
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number : 21-11557
Project / Site name: Vale Road

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Monohydric phenols in water	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total organic carbon in water	Determination of dissolved organic carbon in water by TOC/DOC NDIR analyser. Accredited matrices: SW PW GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' 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.

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Analytical Report Number : 21-13413

Project / Site name:	Vale Road	**Samples received on:**	30/09/2021
Your job number:	3869	**Samples instructed on/ Analysis started on:**	30/09/2021
Your order number:		**Analysis completed by:**	06/10/2021
Report Issue Number:	1	**Report issued on:**	06/10/2021
Samples Analysed:	1 water sample		

Signed: Karolina Marek

Karolina Marek
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

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

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

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 21-13413
Project / Site name: Vale Road

Lab Sample Number				2030170
Sample Reference				BH201
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				29/09/2021
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
General Inorganics				
pH	pH Units	N/A	ISO 17025	7.0
Total Cyanide	µg/l	10	ISO 17025	< 10
Sulphate as SO4	mg/l	0.045	ISO 17025	345
Total Organic Carbon (TOC)	mg/l	0.1	ISO 17025	3.80
Hardness - Total	mgCaCO3/l	1	ISO 17025	946
Total Phenols				
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10
Speciated PAHs				
Naphthalene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01
Total PAH				
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16
Heavy Metals / Metalloids				
Boron (dissolved)	µg/l	10	ISO 17025	860
Calcium (dissolved)	mg/l	0.012	ISO 17025	310
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0
Magnesium (dissolved)	mg/l	0.005	ISO 17025	41
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.84
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	5.7
Copper (dissolved)	µg/l	0.5	ISO 17025	6.4
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	12
Selenium (dissolved)	µg/l	0.6	ISO 17025	6.2
Zinc (dissolved)	µg/l	0.5	ISO 17025	53

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Analytical Report Number: 21-13413
Project / Site name: Vale Road

Lab Sample Number				2030170
Sample Reference				BH201
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				29/09/2021
Time Taken				None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Monoaromatics & Oxygenates				
Benzene	µg/l	1	ISO 17025	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0
Petroleum Hydrocarbons				
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

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Analytical Report Number : 21-13413
Project / Site name: Vale Road

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Total Hardness of water	Determination of hardness in waters by calculation from calcium and magnesium. Accredited Matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L045-PL	W	ISO 17025
Monohydric phenols in water	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Total organic carbon in water	Determination of dissolved organic carbon in water by TOC/DOC NDIR analyser. Accredited matrices: SW PW GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' 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.

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Analytical Report Number : 21-95434

Project / Site name:	Vale RO, Northfleet	**Samples received on:**	26/08/2021
Your job number:	3869	**Samples instructed on/ Analysis started on:**	26/08/2021
Your order number:		**Analysis completed by:**	03/09/2021
Report Issue Number:	1	**Report issued on:**	03/09/2021
Samples Analysed:	2 leachate samples - 2 soil samples		

Signed:

Joanna Wawrzeczko
Technical Reviewer (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.

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

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Analytical Report Number: 21-95434
Project / Site name: Vale RO, Northfleet

Lab Sample Number				1987615	1987616
Sample Reference				Tank Base S1	Tank Base S2
Sample Number				None Supplied	None Supplied
Depth (m)				3.50-3.70	2.60-2.80
Date Sampled				25/08/2021	25/08/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	13	18
Total mass of sample received	kg	0.001	NONE	2.0	1.1

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	45	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	50	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	21
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	40	35
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	47	56

U/S = Unsuitable Sample I/S = Insufficient Sample

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Analytical Report Number: 21-95434
Project / Site name: Vale RO, Northfleet

Lab Sample Number				1987617	1987618
Sample Reference				Tank Base S1	Tank Base S2
Sample Number				None Supplied	None Supplied
Depth (m)				3.50-3.70	2.60-2.80
Date Sampled				25/08/2021	25/08/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Monoaromatics & Oxygenates					
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10
Petroleum Hydrocarbons					
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

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Analytical Report Number : 21-95434
Project / Site name: Vale RO, 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 *
1987615	Tank Base S1	None Supplied	3.50-3.70	Brown loam and clay with gravel and vegetation.
1987616	Tank Base S2	None Supplied	2.60-2.80	Beige clay and sand with gravel.

Analytical Report Number : 21-95434
Project / Site name: Vale RO, Northfleet

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' 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.

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Analytical Report Number : 21-96809

Replaces Analytical Report Number: 21-96809, issue no. 1
Client sampling date amended.

Project / Site name:	Vale Road	**Samples received on:**	01/09/2021
Your job number:	3869	**Samples instructed on/ Analysis started on:**	03/09/2021
Your order number:		**Analysis completed by:**	09/09/2021
Report Issue Number:	2	**Report issued on:**	13/09/2021
Samples Analysed:	4 leachate samples		

Signed: A. Czerwińska

Agnieszka Czerwińska
Technical Reviewer (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.

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

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Analytical Report Number: 21-96809
Project / Site name: Vale Road

Lab Sample Number				1995710	1995711	1996618	1996619
Sample Reference				BH201	BH201	BH201	BH201
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				11.00-11.10	17.00-17.10	4.50-4.70	18.50-18.60
Date Sampled				31/08/2021	31/08/2021	31/08/2021	31/08/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
General Inorganics							
pH	pH Units	N/A	ISO 17025	7.7	7.7	8.0	7.7
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10
Sulphate as SO4	mg/l	0.1	ISO 17025	320	622	80.3	1080
Heavy Metals / Metalloids							
Arsenic (dissolved)	µg/l	1	ISO 17025	< 1.0	1.1	< 1.0	< 1.0
Barium (dissolved)	µg/l	0.05	ISO 17025	41	49	49	35
Beryllium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	0.4	< 0.2	< 0.2
Boron (dissolved)	µg/l	10	ISO 17025	110	170	98	200
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08	0.30
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.7	0.6	0.9	1.6
Copper (dissolved)	µg/l	0.7	ISO 17025	22	19	16	17
Lead (dissolved)	µg/l	1	ISO 17025	17	25	5.2	5.8
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	4.4	8.4	2.4	8.4
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0	< 4.0	< 4.0
Vanadium (dissolved)	µg/l	1.7	ISO 17025	< 1.7	< 1.7	< 1.7	< 1.7
Zinc (dissolved)	µg/l	0.4	ISO 17025	37	92	14	110
Monoaromatics & Oxygenates							
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10	< 10	< 10
Petroleum Hydrocarbons							
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number: 21-96809
Project / Site name: Vale Road

Lab Sample Number				1995710	1995711	1996618	1996619
Sample Reference				BH201	BH201	BH201	BH201
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				11.00-11.10	17.00-17.10	4.50-4.70	18.50-18.60
Date Sampled				31/08/2021	31/08/2021	31/08/2021	31/08/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
SVOCs							
Aniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Phenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Hexachloroethane	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Nitrobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
4-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Isophorone	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Naphthalene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
4-Chloroaniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2-Methylnaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Dimethylphthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Dibenzofuran	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Diethyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
4-Nitroaniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01
Azobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	µg/l	0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02
Phenanthrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01
Carbazole	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Anthraquinone	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01

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Analytical Report Number: 21-96809
Project / Site name: Vale Road

Lab Sample Number				1995710	1995711	1996618	1996619
Sample Reference				BH201	BH201	BH201	BH201
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				11.00-11.10	17.00-17.10	4.50-4.70	18.50-18.60
Date Sampled				31/08/2021	31/08/2021	31/08/2021	31/08/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01

U/S = Unsuitable Sample I/S = Insufficient Sample

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Analytical Report Number : 21-96809
Project / Site name: Vale Road

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
Metals by ICP-OES in leachate	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
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In house method.	L005-PL	W	ISO 17025
Semi-volatile organic compounds in leachate	Determination of semi-volatile organic compounds in leachate by extraction in dichloromethane followed by GC-MS.	In-house method based on USEPA 8270	L070-PL	W	NONE
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
Total cyanide in leachate	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	ISO 17025
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' 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.

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Analytical Report Number : 21-97045

Project / Site name:	Vale Road	**Samples received on:**	03/09/2021
Your job number:	3869	**Samples instructed on/ Analysis started on:**	03/09/2021
Your order number:		**Analysis completed by:**	10/09/2021
Report Issue Number:	1	**Report issued on:**	10/09/2021
Samples Analysed:	2 soil samples		

Signed: Izabela Wójcik

Izabela Wójcik
Technical Reviewer (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

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

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

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 21-97045
Project / Site name: Vale Road

Lab Sample Number				1997076	1997077
Sample Reference				Tank N Side	Tank N Side
Sample Number				None Supplied	None Supplied
Depth (m)				2.20-2.30	4.50-4.60
Date Sampled				02/09/2021	02/09/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	6.0	19
Total mass of sample received	kg	0.001	NONE	1.2	1.2

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	2.8	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	10	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	110	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	120	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	4.5	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	12	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	120	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	440	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	570	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

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The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number : 21-97045
Project / Site name: Vale Road

* 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 *
1997076	Tank N Side	None Supplied	2.20-2.30	Brown loam and sand with gravel.
1997077	Tank N Side	None Supplied	4.50-4.60	Brown clay and loam with gravel and chalk.

Analytical Report Number : 21-97045
Project / Site name: Vale Road

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
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
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' 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.

APPENDIX D: FIELD MONITORING RECORDS

RETURN

Template Ref: L-209

WELL DEVELOPMENT PURGE LOG

LUSTRE CONSULTING

Project No.:	3869	Date:	22/09/2021
Project Name:	2 Vale Road - Northfleet	Initials:	JW

	PRE PURGE				DURING PURGE			POST PURGE	
BH ID	Depth to GW	Depth to Base	Water Col Length	Well Vol	Recharge Rate	Did well run dry?	Purge Method	Vol Purged	Depth to GW
	(m bgl)	*(m bgl)*	*(m)*	*(l)*	*	*(Y/N)*	**	*(l)*	*(m bgl)*
BH201 (1 Well Vol)	20.13	26.25	6.12	45.9	F	N	Sub	50	20.15
BH201 (3 Well Vol)	20.13	26.25	6.12	134.7	F	N	Sub	150	20.15
BH201 (6 Well Vol)	20.13	26.25	6.12	269.3	F	N	Sub	275	20.15

*** Recharge Rate**: *S = Slow, M = Moderate, F = Fast*

**** Purge Methods**: *B = Bailer, Sub = Submersible Pump, LF = Low Flow Peristaltic*

3x Purge Lookup Table *(based on 50mm standpipe)*

SI Method	Casing Dia (mm)	Litres per Metre (l)
WS	80	9
WS	100	12
CP, 5 inch	150	22
CP, 8 inch	200	37
CP, 10 inch	250	55

Template Ref: L-209

WELL DEVELOPMENT PURGE LOG

LUSTRE CONSULTING

Project No.:	3869	Date:	29/09/2021
Project Name:	2 Vale Road - Northfleet	Initials:	JW

	PRE PURGE				DURING PURGE			POST PURGE	
BH ID	Depth to GW	Depth to Base	Water Col Length	3 x Well Vol	Recharge Rate	Did well run dry?	Purge Method	Vol Purged	Depth to GW
	(m bgl)	*(m bgl)*	*(m)*	*(l)*	*	*(Y/N)*	**	*(l)*	*(m bgl)*
BH201	20.16	26.04	5.88	129.4	F	N	Sub	140	20.17

*** Recharge Rate**: *S = Slow, M = Moderate, F = Fast*

**** Purge Methods**: *B = Bailer, Sub = Submersible Pump, LF = Low Flow Peristaltic*

3x Purge Lookup Table *(based on 50mm standpipe)*

SI Method	Casing Dia (mm)	Litres per Metre (l)
WS	80	9
WS	100	12
CP, 5 inch	150	22
CP, 8 inch	200	37
CP, 10 inch	250	55

APPENDIX E: ENVIRONMENTAL ASSESSMENT TABLES

RETURN

HUMAN HEALTH QUANTITATIVE RISK ASSESSMENT - SOILS

MADE GROUND

3869

2 Vale Road - Northfleet

LUSTRE CONSULTING

Assessment Scenario:	Residential without homegrown produce
Assessment Criteria Source:	SGVs, GACs and S4ULs
Soil Organic Matter (%):	SOM = 1%

DETERMINAND	UNITS	MINIMUM	AVERAGE	MAXIMUM	No. of TESTS	ASSESSMENT CRITERIA	No. > AC	1987615 Tank Base S1 3.50-3.70	1987616 Tank Base S2 2.60-2.80	1997076 Tank N Side 2.20-2.30	1997077 Tank N Side 4.50-4.60		
						Sample Ref							
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	<LOD	<LOD	<LOD	4	42.00	0	<LOD	<LOD	<LOD	<LOD		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	<LOD	<LOD	<LOD	4	100.00	0	<LOD	<LOD	<LOD	<LOD		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	<LOD	<LOD	<LOD	4	27.00	0	<LOD	<LOD	<LOD	<LOD		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	<LOD	<LOD	<LOD	4	130.00	0	<LOD	<LOD	<LOD	<LOD		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	<LOD	1.08	2.80	4	1100.00	0	<LOD	<LOD	2.8	<LOD		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	<LOD	2.88	10.00	4	32500.00	0	<LOD	<LOD	10	<LOD		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	<LOD	40.25	110.00	4	32500.00	0	45	<LOD	110	<LOD		
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	<LOD	<LOD	<LOD	4	370.00	0	<LOD	<LOD	<LOD	<LOD		
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	<LOD	<LOD	<LOD	4	860.00	0	<LOD	<LOD	<LOD	<LOD		
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	<LOD	<LOD	<LOD	4	47.00	0	<LOD	<LOD	<LOD	<LOD		
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	<LOD	1.50	4.50	4	250.00	0	<LOD	<LOD	4.5	<LOD		
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	<LOD	3.38	12.00	4	1800.00	0	<LOD	<LOD	12	<LOD		
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	<LOD	35.50	120.00	4	1900.00	0	<LOD	21	120	<LOD		
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	<LOD	129.50	440.00	4	1900.00	0	40	35	440	<LOD		
Benzene	mg/kg	<LOD	<LOD	<LOD	4	0.38	0	<LOD	<LOD	<LOD	<LOD		
Toluene	mg/kg	<LOD	<LOD	<LOD	4	880.00	0	<LOD	<LOD	<LOD	<LOD		
Ethylbenzene	mg/kg	<LOD	<LOD	<LOD	4	83.00	0	<LOD	<LOD	<LOD	<LOD		
p & m-xylene	mg/kg	<LOD	<LOD	<LOD	4	79.00	0	<LOD	<LOD	<LOD	<LOD		
o-Xylene	mg/kg	<LOD	<LOD	<LOD	4	88.00	0	<LOD	<LOD	<LOD	<LOD		
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	<LOD	<LOD	<LOD	4	49.00	0	<LOD	<LOD	<LOD	<LOD		

RISK ASSESSMENT FOR LEACHABLE CONTAMINANTS

3869
2 Vale Road - Northfleet

Water Quality Standard (WQS) Selection Hierarchy:	
Level 1	UK DWS
Level 2	EQS FW
Level 3	WHO DWS

Average $CaCO_3$:
50 µg/l

Data Source: Environment Agency H1 Environmental Risk Assessment – Annex J, v2.0, April 2010 & Petroleum Products in Drinking-Water, WHO (WHO/SDE/WSH/05.08/123)

												Sample Ref	1995710	1995711	1996618	1996619	1987617	1987618
DETERMINAND	UNITS	MINIMUM	AVERAGE	MAXIMUM	No. of TESTS	UK DWS	No. > AC	EQS FW	No. > AC	WHO	No. > AC		BH201	BH201	BH201	BH201	Tank Base S1	Tank Base S2
													31/08/2021	31/08/2021	31/08/2021	31/08/2021	25/08/2021	25/08/2021
pH	NA	7.70	7.78	8.00	4	No criteria	0	No criteria	0	No criteria	0		7.7	7.7	8	7.7		
Total Cyanide	µg/l	<LOD	<LOD	<LOD	4	No criteria	0	No criteria	0	No criteria	0		<LOD	<LOD	<LOD	<LOD		
Sulphate as SO_4	µg/l	80	526	1080	4	250000	0	400000	0	250000	0		320	622	80.3	1080		
Hardness - Total	mg/l	<LOD	<LOD	<LOD	0	No criteria	0	No criteria	0	No criteria	0							
Total Organic Carbon (TOC)	µg/l	<LOD	<LOD	<LOD	0	No criteria	0	No criteria	0	No criteria	0							
Arsenic (dissolved)	µg/l	1.10	1.10	1.10	4	10.00	0	50.00	0	10.00	0		<LOD	1.1	<LOD	<LOD		
Boron (dissolved)	µg/l	<LOD	<LOD	<LOD	0	1000.00	0	2000.00	0	300.00	0							
Copper (dissolved)	µg/l	16.00	18.50	22.00	4	2000.00	0	50.00	0	2000.00	0		22	19	16	17		
Lead (dissolved)	µg/l	5.20	13.25	25.00	4	10.00	2	50.00	0	10.00	2		17	25	5.2	5.8		
Mercury (dissolved)	µg/l	<LOD	<LOD	<LOD	4	1.00	0	1.00	0	1.00	0		<LOD	<LOD	<LOD	<LOD		
Nickel (dissolved)	µg/l	2.40	5.90	8.40	4	20.00	0	1.00	4	20.00	0		4.4	8.4	2.4	8.4		
Selenium (dissolved)	µg/l	<LOD	<LOD	<LOD	4	10.00	0	No criteria	0	10.00	0		<LOD	<LOD	<LOD	<LOD		
Zinc (dissolved)	µg/l	14.00	63.25	110.00	4	5000.00	0	75.00	2	3000.00	0		37	92	14	110		
Arsenic (dissolved)	µg/l	<LOD	<LOD	<LOD	0	10.00	0	50.00	0	10.00	0							
Cadmium (dissolved)	µg/l	<LOD	<LOD	<LOD	0	5.00	0	5.00	0	3.00	0							
Chromium (dissolved)	µg/l	<LOD	<LOD	<LOD	0	50.00	0	150.00	0	50.00	0							
Total Phenols (monohydric)	µg/l	<LOD	<LOD	<LOD	0	0.50	0	30.00	0	No criteria	0							
TPH-CWG - Aliphatic >C10 - C12	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	No criteria	0	300.00	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH-CWG - Aliphatic >C12 - C16	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	No criteria	0	300.00	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH-CWG - Aliphatic >C16 - C21	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	No criteria	0	300.00	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH-CWG - Aliphatic >C21 - C35	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	No criteria	0	300.00	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH-CWG - Aliphatic >C5 - C6	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	No criteria	0	15000.00	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH-CWG - Aliphatic >C6 - C8	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	No criteria	0	15000.00	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH-CWG - Aliphatic >C8 - C10	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	No criteria	0	300.00	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH-CWG - Aromatic >C10 - C12	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	No criteria	0	100.00	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH-CWG - Aromatic >C12 - C16	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	No criteria	0	100.00	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH-CWG - Aromatic >C16 - C21	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	No criteria	0	90.00	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH-CWG - Aromatic >C21 - C35	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	No criteria	0	90.00	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH-CWG - Aromatic >C5 - C7	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	No criteria	0	10.00	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH-CWG - Aromatic >C7 - C8	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	50.00	0	300.00	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
TPH-CWG - Aromatic >C8 - C10	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	20.00	0	300.00	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Anthracene	µg/l	<LOD	<LOD	<LOD	4	No criteria	0	0.02	0	No criteria	0		<LOD	<LOD	<LOD	<LOD		
Fluoranthene	µg/l	<LOD	<LOD	<LOD	4	No criteria	0	0.02	0	No criteria	0		<LOD	<LOD	<LOD	<LOD		
Naphthalene	µg/l	<LOD	<LOD	<LOD	4	No criteria	0	10.00	0	No criteria	0		<LOD	<LOD	<LOD	<LOD		
Benzo(a)pyrene	µg/l	<LOD	<LOD	<LOD	4	0.01	0	0.03	0	0.70	0		<LOD	<LOD	<LOD	<LOD		
Benzo(b)fluoranthene	µg/l	<LOD	<LOD	<LOD	4	No criteria	0	No criteria	0	No criteria	0		<LOD	<LOD	<LOD	<LOD		
Benzo(ghi)perylene	µg/l	<LOD	<LOD	<LOD	4	No criteria	0	No criteria	0	No criteria	0		<LOD	<LOD	<LOD	<LOD		
Benzo(k)fluoranthene	µg/l	<LOD	<LOD	<LOD	4	No criteria	0	No criteria	0	No criteria	0		<LOD	<LOD	<LOD	<LOD		
Indeno(1,2,3-cd)pyrene	µg/l	<LOD	<LOD	<LOD	4	No criteria	0	No criteria	0	No criteria	0		<LOD	<LOD	<LOD	<LOD		
MTBE (Methyl Tertiary Butyl Ether)	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	No criteria	0	No criteria	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Benzene	µg/l	<LOD	<LOD	<LOD	6	1.00	0	30.00	0	10.00	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Ethylbenzene	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	No criteria	0	300.00	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Toluene	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	50.00	0	700.00	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
p & m-xylene	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	No criteria	0	No criteria	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
o-xylene	µg/l	<LOD	<LOD	<LOD	6	No criteria	0	No criteria	0	No criteria	0		<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
1,3-Dichlorobenzene	µg/l	<LOD	<LOD	<LOD	4	No criteria	0	No criteria	0	No criteria	0		<LOD	<LOD	<LOD	<LOD		
1,4-Dichlorobenzene	µg/l	<LOD	<LOD	<LOD	4	No criteria	0	No criteria	0	300.00	0		<LOD	<LOD	<LOD	<LOD		
1,2-Dichlorobenzene	µg/l	<LOD	<LOD	<LOD	4	No criteria	0	No criteria	0	1000.00	0		<LOD	<LOD	<LOD	<LOD		
Hexachlorobutadiene	µg/l	<LOD	<LOD	<LOD	4	No criteria	0	0.10	0	0.60	0		<LOD	<LOD	<LOD	<LOD		

CONTROLLED WATERS RISK ASSESSMENT

3869
2 Vale Road - Northfleet

Water Quality Standard (WQS) Selection Hierarchy:	
Level 1	UK DWS
Level 2	EQS FW
Level 3	WHO DWS

Average $CaCO_3$:
880500 µg/l

Data Source: Environment Agency H1 Environmental Risk Assessment – Annex J, v2.0, April 2010 & Petroleum Products in Drinking-Water, WHO (WHO/SDE/WSH/05.08/123)

DETERMINAND	UNITS	MINIMUM	AVERAGE	MAXIMUM	No. of TESTS	UK DWS	No. > AC	EQS FW	No. > AC	WHO	No. > AC	Sample Ref	2019614	2030170		
													BH201	BH201		
													22/09/2021	29/09/2021		
pH	NA	6.80	6.90	7.00	2	No criteria	0	No criteria	0	No criteria	0		6.8	7		
Total Cyanide	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	No criteria	0		<LOD	<LOD		
Sulphate as SO_4	µg/l	319	332	345	2	250000	0	400000	0	250000	0		319	345		
Hardness - Total	mg/l	815.00	880.50	946.00	2	No criteria	0	No criteria	0	No criteria	0		815	946		
Total Organic Carbon (TOC)	µg/l	3.03	3.42	3.80	2	No criteria	0	No criteria	0	No criteria	0		3.03	3.8		
Boron (dissolved)	µg/l	700.00	780.00	860.00	2	1000.00	0	2000.00	0	300.00	2		700	860		
Arsenic (dissolved)	µg/l	0.84	0.92	0.99	2	10.00	0	50.00	0	10.00	0		0.99	0.84		
Cadmium (dissolved)	µg/l	<LOD	<LOD	<LOD	2	5.00	0	5.00	0	3.00	0		<LOD	<LOD		
Chromium (dissolved)	µg/l	5.70	6.85	8.00	2	50.00	0	250.00	0	50.00	0		8	5.7		
Copper (dissolved)	µg/l	6.20	6.30	6.40	2	2000.00	0	28.00	0	2000.00	0		6.2	6.4		
Lead (dissolved)	µg/l	<LOD	<LOD	<LOD	2	10.00	0	250.00	0	10.00	0		<LOD	<LOD		
Mercury (dissolved)	µg/l	<LOD	<LOD	<LOD	2	1.00	0	1.00	0	1.00	0		<LOD	<LOD		
Nickel (dissolved)	µg/l	12.00	12.00	12.00	2	20.00	0	1.00	2	20.00	0		12	12		
Selenium (dissolved)	µg/l	6.20	6.20	6.20	2	10.00	0	No criteria	0	10.00	0		6.2	6.2		
Zinc (dissolved)	µg/l	53.00	55.50	58.00	2	5000.00	0	500.00	0	3000.00	0		58	53		
Total Phenols (monohydric)	µg/l	<LOD	<LOD	<LOD	2	0.50	0	30.00	0	No criteria	0		<LOD	<LOD		
TPH-CWG - Aliphatic >C10 - C12	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	300.00	0		<LOD	<LOD		
TPH-CWG - Aliphatic >C12 - C16	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	300.00	0		<LOD	<LOD		
TPH-CWG - Aliphatic >C16 - C21	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	300.00	0		<LOD	<LOD		
TPH-CWG - Aliphatic >C21 - C35	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	300.00	0		<LOD	<LOD		
TPH-CWG - Aliphatic >C5 - C6	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	15000.00	0		<LOD	<LOD		
TPH-CWG - Aliphatic >C6 - C8	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	15000.00	0		<LOD	<LOD		
TPH-CWG - Aliphatic >C8 - C10	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	300.00	0		<LOD	<LOD		
TPH-CWG - Aromatic >C10 - C12	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	100.00	0		<LOD	<LOD		
TPH-CWG - Aromatic >C12 - C16	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	100.00	0		<LOD	<LOD		
TPH-CWG - Aromatic >C16 - C21	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	90.00	0		<LOD	<LOD		
TPH-CWG - Aromatic >C21 - C35	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	90.00	0		<LOD	<LOD		
TPH-CWG - Aromatic >C5 - C7	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	10.00	0		<LOD	<LOD		
TPH-CWG - Aromatic >C7 - C8	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	50.00	0	300.00	0		<LOD	<LOD		
TPH-CWG - Aromatic >C8 - C10	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	20.00	0	300.00	0		<LOD	<LOD		
Anthracene	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	0.02	0	No criteria	0		<LOD	<LOD		
Fluoranthene	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	0.02	0	No criteria	0		<LOD	<LOD		
Naphthalene	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	10.00	0	No criteria	0		<LOD	<LOD		
Benzo(a)pyrene	µg/l	<LOD	<LOD	<LOD	2	0.01	0	0.03	0	0.70	0		<LOD	<LOD		
Benzo(b)fluoranthene	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	No criteria	0		<LOD	<LOD		
Benzo(ghi)perylene	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	No criteria	0		<LOD	<LOD		
Benzo(k)fluoranthene	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	No criteria	0		<LOD	<LOD		
Indeno(1,2,3-cd)pyrene	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	No criteria	0		<LOD	<LOD		
MTBE (Methyl Tertiary Butyl Ether)	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	No criteria	0		<LOD	<LOD		
Benzene	µg/l	<LOD	<LOD	<LOD	2	1.00	0	30.00	0	10.00	0		<LOD	<LOD		
Ethylbenzene	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	300.00	0		<LOD	<LOD		
Toluene	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	50.00	0	700.00	0		<LOD	<LOD		
p & m-xylene	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	No criteria	0		<LOD	<LOD		
o-xylene	µg/l	<LOD	<LOD	<LOD	2	No criteria	0	No criteria	0	No criteria	0		<LOD	<LOD		

APPENDIX F: PETROLEUM OFFICER SEARCH

RETURN

Kent County Council
kent.gov.uk

Mr M Larkin
Lustre Consulting
Suite 1, Second Floor North
The Fitted Rigging House
Historic Dockyard
Chatham ME4 4TZ

TRADING STANDARDS
P O Box 320
Ashford
Kent TN24 8AS
Tel: 03000 412020

Our Ref: JKE/173866/EIR
Email: Jeremy.kennett@kent.gov.uk
Ask for: Mr J Kennett
Date: 17 September 2021

Dear Sir

Environmental Information Regulations 2004
2 Vale Road, Gravesend DA11 9RE

Thank you for your recent enquiry made under these Regulations. I confirm receipt of your payment of £85 for this search.

This premise is recorded on an archived file held by this service and is noted to have become disused as a petrol filling station during 2001. There were three underground tanks shown on the file, as below: -

Tank 1	27270 litres	Petrol	1966
Tank 2	13630 litres	Disused	1966
Tank 3	13630 litres	Petrol	1966

All three tanks were probably constructed of single skin steel, though there is no information on file to confirm this.

There is no record on file nor on our database of how or when the tanks may have been made safe, either by filling with foam or concrete slurry, or by removal from the ground.

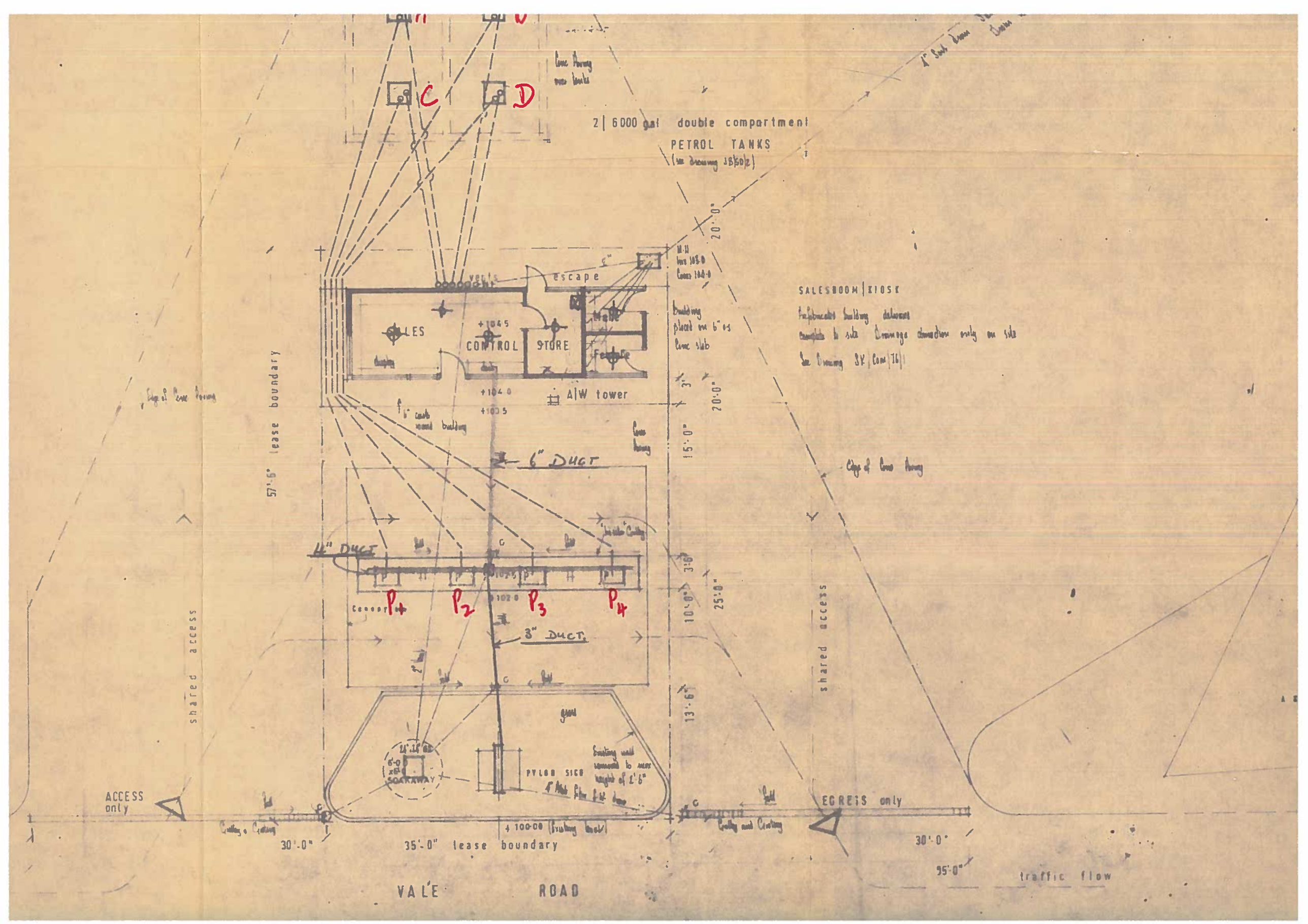
I attach two copies taken from a plan held on file, indicating the site layout and some further information. There is no clear date on this plan to identify when it was drawn. The file details suggest that rather than two 6000 gallon two-compartment tanks, one was in fact a single compartment.

This information has been retrieved from archived file and database records and is not within the personal knowledge or experience of the undersigned officer. KCC Trading

Standards cannot take responsibility for any inaccuracies that may be identified with the information provided.

Yours faithfully

Jeremy Kennett
Trading Standards Officer



C
D
2 | 6000 gal double compartment
PETROL TANKS
(see drawing JB/SD/2)
vents
escape
SALES
CONTROL
STORE
+104.5
+104.0
+103.5
A/W tower
SALESBOOM | KIOSK
Prefabricated building delivered
complete to site. Drainage connection only on site
See Drawing SK/Com/76/1
Building placed on 6" o.s. Conc slab
6" DUCT
4" DUCT
3" DUCT
P4
P2
P3
P4
20'-0"
15'-0"
25'-0"
10'-0"
13'-6"
57'-6" lease boundary
shared access
shared access
Edge of Conc Paving
Edge of Conc Paving
PYLON SIGN
SOAKAWAY
ACCESS only
EGRESS only
30'-0"
35'-0" lease boundary
30'-0"
95'-0"
traffic flow
VALE ROAD

SIGNED

P.P. GEM SELF SERVICE STATIONS LTD WATFORD

REDEVELOPMENT OF FORECOURT

A & H HARDY LTD SITE

VALE ROAD

NORTHFLEET

KENT

SCALE 1" = 8'0"

DATE March 66

DRAWN BY

DRAWING No. GP | 07 | 1C

APPENDIX G: NOTES ON LIMITATIONS

LUSTRE CONSULTING, ENVIRONMENTAL AND GEOTECHNICAL CONSULTANCY SERVICES
NOTES ON LIMITATIONS

General

Lustre Consulting have completed the attached report for the use of the Client detailed on the front cover and those parties to whom Lustre Consulting has agreed to provide and has provided an executed warranty agreement, or to whom an assignment of the benefit of this report has been agreed.

Third parties are not entitled to use or rely upon the contents of the report unless written approval has been given by Lustre Consulting; (due to legal requirements, a charge may be levied as a condition of such approval, in which case approval shall not be effective unless and until such a charge has been paid in full).

Lustre Consulting accepts no responsibility or liability for:

a) any use of this report for any purpose or project other than that for which it was commissioned, and

b) any use of this report by any third party to whom approval for use has not been given and any conditions applicable to such use have been met.

Phase I Environmental Risk Assessments, Desk Studies and Site Audits

The work completed and utilised to provide this report comprises a study of available documentation. The opinions and results presented in this report have been arrived at by utilising the finite amount of data available at the time of writing and are relevant only to the purpose for which the report was commissioned. The data which has been reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative information pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, Lustre Consulting reserves the right to review this information and, if warranted, to modify the opinions presented in the report accordingly.

It should be noted that the risks which are identified in this report are perceived risks based on the available information at the time of writing and that the actual risks associated can only be assessed following a physical investigation of the site.

Phase II Site Investigations

The intrusive investigation has been completed to provide information concerning the type and degree of contamination present along with ground and groundwater conditions which facilitates a reasonable risk assessment to be completed. The stated objectives of the ground investigation have been limited to assessing the proven risks which are associated with potential human targets, building materials, the environment (including adjacent land), and to surface water and groundwater.

The amount of exploratory work, chemical testing and monitoring completed as part of this project has potentially been restricted by the short timescale available, and the locations of exploratory holes undertaken have potentially been restricted to areas unoccupied by buildings(s) and buried services. A more comprehensive post demolition / decommission investigation may be required if the site is to be redeveloped. For these reasons any costs included in relation to site remediation must be considered as tentative only at this time.

The exploratory holes investigate only a small volume of the ground in relation to the size of the site and therefore, can only provide a “snap shot” or general indication of ground conditions located on the site. The fact that the site has been investigated does not preclude the existence of localised “hotspots” of contamination where concentrations may be significantly higher than those actually encountered.

The risk assessment and opinions provided in this report take into account currently available guidance values relating to acceptable contamination concentrates; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

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Fitted Rigging House
The Historic Dockyard
Chatham, Kent, ME4 4TZ
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