Appendix A

FIGURES

DO NOT SCALE

Information Classification:

INTERNAL

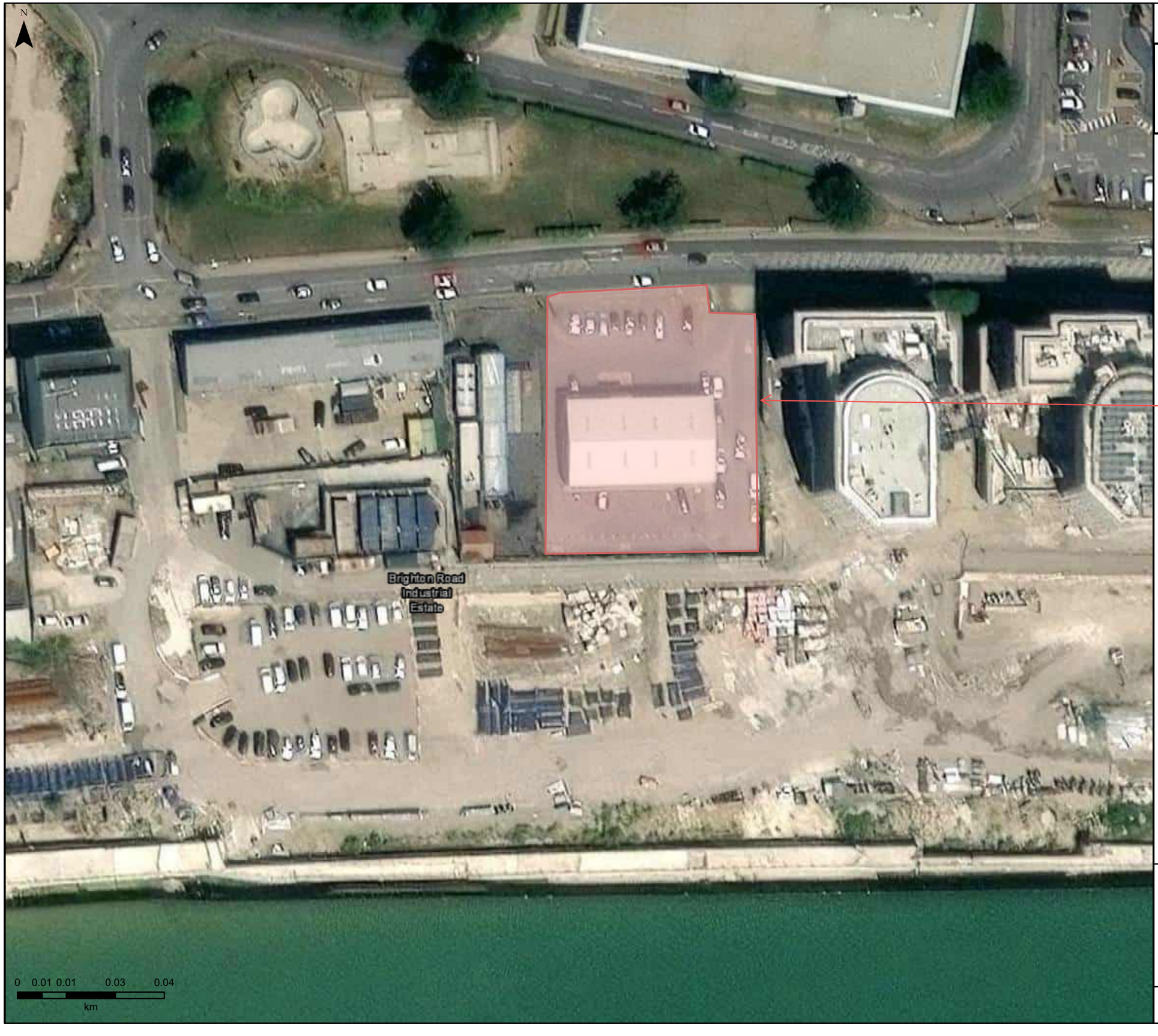
Information that is only intended for internal distribution among WSP employees, independent consultants, contractors, sub-contractors, clients and authorised third parties.

Figure 1: Site Location Plan
Brighton Road, Shoreham-By-Sea

Author : ArcGIS Web AppBuilder

Scale : 1:18,056

Layout : WSP A3 Landscape



DO NOT SCALE

Information Classification:

INTERNAL

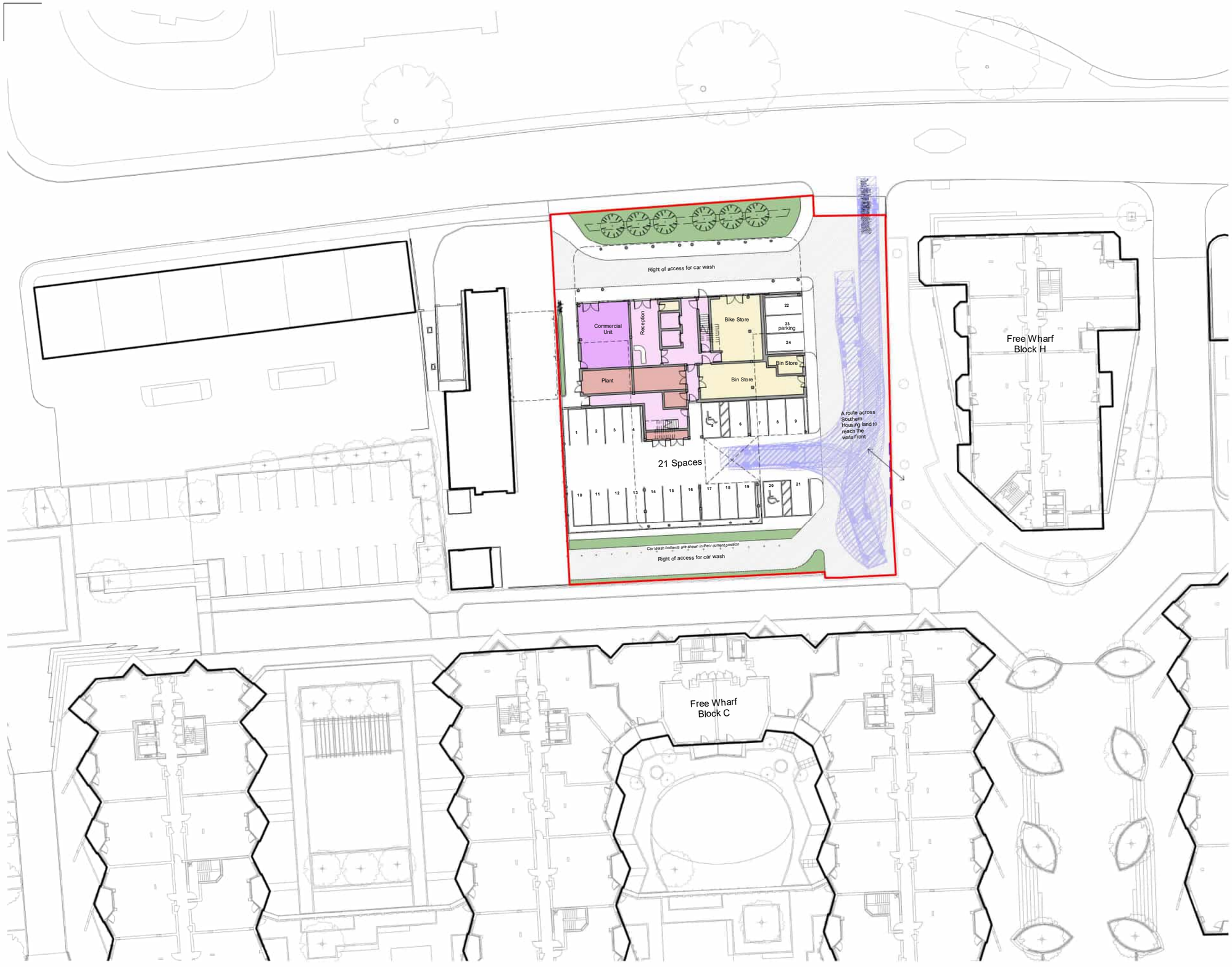
Information that is only intended for internal distribution among WSP employees, independent consultants, contractors, sub-contractors, clients and authorised third parties.

Figure 2: Site Layout Plan
Brighton Road, Shoreham-By-Sea

Author : ArcGIS Web AppBuilder

Scale : 1:1,128

Layout : WSP A3 Landscape



1 **Proposed Site Plan**

1 : 500

5 0 5 10 15 20 25

SCALE 1:500 m

N

Note:

1. The site plan within the site boundary is based on survey drawings completed in March 2024.
2. The Free Wharf plan is indicative only, relying on the latest publicly available drawings.
3. Structural, M&E and Landscape elements are only illustrative at this stage and will be developed by the relevant consultants at a later stage.

Rev	Status	Date	Check	Description
P05	S0	28.04.25	NC	Ground Floor layout amended, parking numbers increased, the main core mirrored.
P04	S0	12.12.24	NC	Undercroft extended
P03	S0	25.09.24	NC	Landscape strip and bin stores amended
P02	S0	10.09.24	NC	General Amendments
P01	S0	29.08.24	NC	First Issue

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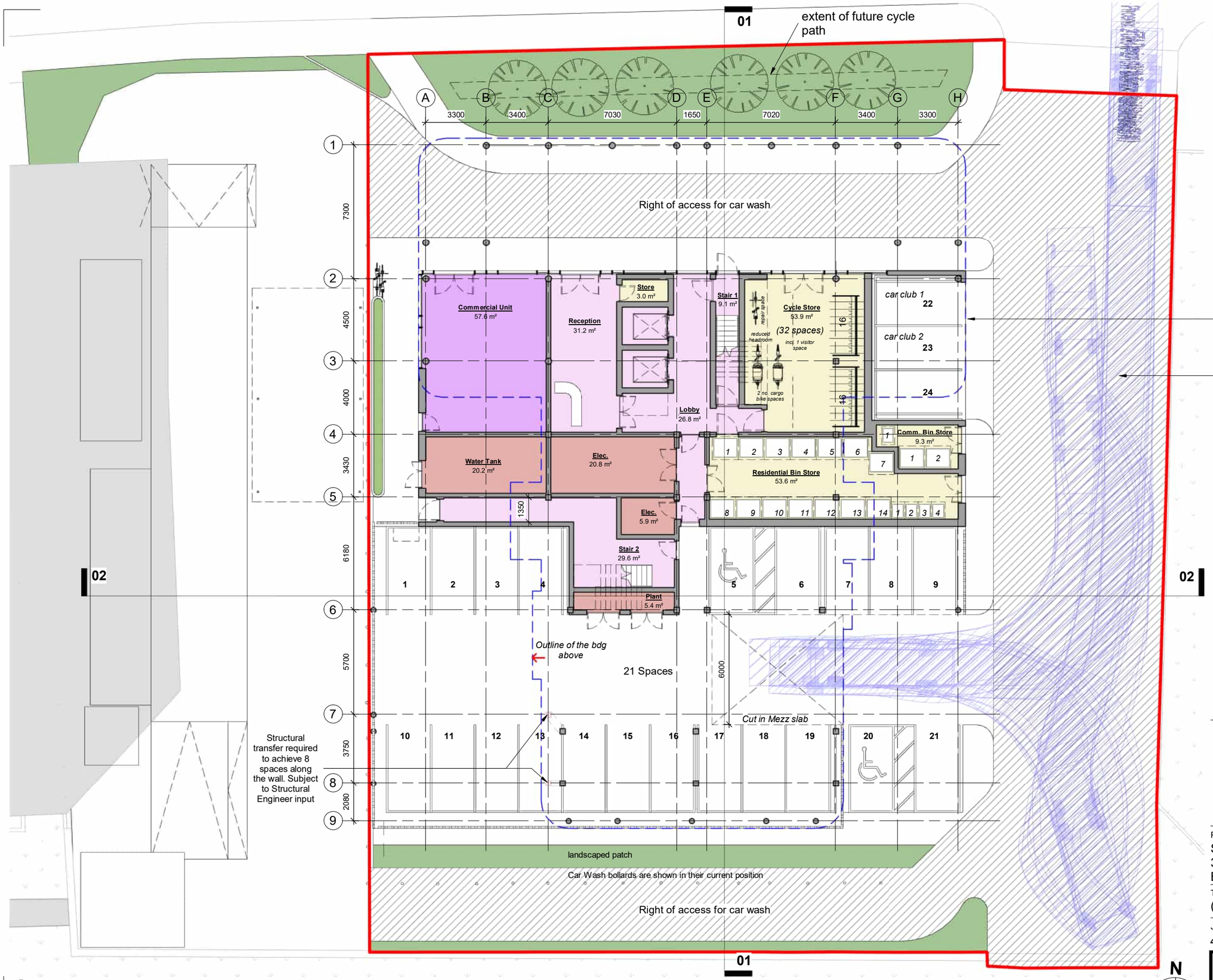
London Cardiff Munich

Project
Shoreham-by-Sea
37-41 Brighton Road
Blenheim Estates

Title
Proposed Site Plan

Job No	Scale at A3	Classification	Status Revision
4713	As indicated	PM_40_40_34	S0 P05

Project - Originator - Functional Breakdown - Spatial Breakdown - Form - Discipline - Number
KFSH-HMA-ZZ-ZZ-D-A-00003



Note:

1. The site plan within the site boundary is based on survey drawings completed in March 2024.
2. The Free Wharf plan is indicative only, relying on the latest publicly available drawings.
3. Structural, M&E and Landscape elements are only illustrative at this stage and will be developed by the relevant consultants at a later stage.

- BOH
- Circulation
- Commercial
- M+E

Rev	Status	Date	Check	Description
P06	S0	28.04.25	NC	Ground Floor layout amended, parking numbers increased, the main core mirrored.
P05	S0	12.12.24	NC	Undercroft extended
P04	S0	06.12.24	NC	Surrounding building heights added
P03	S0	25.09.24	NC	Landscape strip and bin stores amended
P02	S0	10.09.24	NC	General Amendments
P01	S0	29.08.24	NC	First Issue

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Title
(+4.40) Ground Floor Plan

Job No	Scale at A3	Classification	Status	Revision
4713	As indicated	PM_40_40_34	S0	P06

Project - Originator - Functional Breakdown - Spatial Breakdown - Form - Discipline - Number
KFSH-HMA-ZZ-00-D-A-00004

1 **+4.40 (00) - Ground Floor**
1 : 200

SCALE 1:200
2 0 2 4 6 8 10 m

N

Appendix B

LIMITATIONS

REPORT LIMITATIONS - GROUND AND WATER

GENERAL

1. WSP UK Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.

2. Unless explicitly agreed otherwise, in writing, this report has been prepared under WSP UK Limited standard Terms and Conditions as included within our proposal to the Client.

3. Project specific appointment documents may be agreed at our discretion and a charge may be levied for both the time to review and finalise appointments documents and also for associated changes to the appointment terms. WSP UK Limited reserves the right to amend the fee should any changes to the appointment terms create an increase risk to WSP UK Limited.

4. The report needs to be considered in the light of the WSP UK Limited proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

PHASE 1 GEO ENVIRONMENTAL AND PRELIMINARY RISK ASSESSMENTS

Coverage: *This section covers reports with the following titles or combination of titles: phase 1; desk top study; geo environmental assessment; development appraisal; preliminary environmental risk assessment; constraints report; due diligence report; geotechnical development review; environmental statement; environmental chapter; project scope summary report (PSSR), program environmental impact report (PEIR), geotechnical development risk register; and, baseline environmental assessment.*

5. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. WSP UK Limited cannot be held responsible for any disclosures that are provided post production of our report and will not automatically update our report.

6. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, WSP UK Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly.

7. It should be noted that any risks identified in this report are perceived risks based on the information reviewed. Actual risks can only be assessed following intrusive investigations of the site.

8. WSP UK Limited does not warrant work / data undertaken / provided by others.

REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

INTRUSIVE INVESTIGATION REPORTS

Coverage: *The following report titles (or combination) may cover this category of work: geo environmental site investigation; geotechnical assessment; GIR (Ground Investigation reports); preliminary environmental and geotechnical risk assessment; and, geotechnical risk register.*

9. The investigation has been undertaken to provide information concerning either:

- **i.** The type and degree of contamination present at the site in order to allow a generic quantitative risk assessment to be undertaken; or
- **ii.** Information on the soil properties present at the site to allow for geotechnical development constraints to be considered.

10. The scope of the investigation was selected on the basis of the specific development and land use scenario proposed by the Client and may be inappropriate to another form of development or scheme. If the development layout was not known at the time of the investigation the report findings may need revisiting once the development layout is confirmed.

11. For contamination purposes, the objectives of the investigation are limited to establishing the risks associated with potential contamination sources with the potential to cause harm to human health, building materials, the environment (including adjacent land), or controlled waters.

12. For geotechnical investigations the purpose is to broadly consider potential development constraints associated with the physical property of the soils underlying the site within the context of the proposed future or continued use of the site, as stated within the report.

13. The amount of exploratory work, soil property testing and chemical testing undertaken has necessarily been restricted by various factors which may include accessibility, the presence of services; existing buildings; current site usage or short timescales. The exploratory holes completed assess only a small percentage of the area in relation to the overall size of the Site, and as such can only provide a general indication of conditions.

14. The number of sampling points and the methods of sampling and testing do not preclude the possible existence of contamination where concentrations may be significantly higher than those actually encountered or ground conditions that vary from those identified. In addition, there may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

15. The inspection, testing and monitoring records relate specifically to the investigation points and the timeframe that the works were undertaken. They will also be limited by the techniques employed. As part of this assessment, WSP UK Limited has used reasonable skill and care to extrapolate conditions between these points based upon assumptions to develop our interpretation and conclusions. The assumption made in forming our conclusions is that the ground and groundwater conditions (both chemically and physically) are the same as have been encountered during the works undertaken at the specific points of investigation. Conditions can change between investigation points and these interpretations should be considered indicative.

16. The risk assessment and opinions provided are based on currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values. Specific assumptions associated

with the WSP UK Limited risk assessment process have been outlined within the body or associated appendix of the report.

17. Additional investigations may be required in order to satisfy relevant planning conditions or to resolve any engineering and environmental issues.

18. Where soil contamination concentrations recorded as part of this investigation are used for commentary on potential waste classification of soils for disposal purposes, these should be classed as indicative only. Due consideration should be given to the variability of contaminant concentrations taken from targeted samples versus bulk excavated soils and the potential variability of contaminant concentrations between sampling locations. Where major waste disposal operations are considered, targeted waste classification investigations should be designed.

19. The results of the asbestos testing are factually reported and interpretation given as to how this relates to the previous use of the site, the types of ground encountered and site conceptualisation. This does not however constitute a formal asbestos assessment. These results should be treated cautiously and should not be relied upon to provide detailed and representative information on the delineation, type and extent of bulk ACMs and / or trace loose asbestos fibres within the soil matrix at the site.

20. If costs have been included in relation to additional site works, and / or site remediation works these must be considered as indicative only and must be confirmed by a qualified quantity surveyor.

EUROCODE 7: GEOTECHNICAL DESIGN

21. On 1st April 2010, BS EN 1997-1:2004 (Eurocode 7: Geotechnical Design – Part 1) became the mandatory baseline standard for geotechnical ground investigations.

22. In terms of geotechnical design for foundations, slopes, retaining walls and earthworks, EC7 sets guidance on design procedures including specific guidance on the numbers and spacings of boreholes for geotechnical design, there are limits to methods of ground investigation and the quality of data obtained and there are also prescriptive methods of assessing soil strengths and methods of design. Unless otherwise explicitly stated, the work has not been undertaken in accordance with EC7. A standard geotechnical interpretative report will not meet the requirements of the Geotechnical Design Report (GDR) under Eurocode 7. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. The report is likely to represent a Ground Investigation Report (GIR) under the Eurocode 7 guidance.

DETAILED QUANTITATIVE RISK ASSESSMENTS AND REMEDIAL STRATEGY REPORTS

23. These reports build upon previous report versions and associated notes. The scope of the investigation, further testing and monitoring and associated risk assessments were selected on the basis of the specific development and land use scenario proposed by the Client and may not be appropriate to another form of development or scheme layout. The risk assessment and opinions provided are based on currently available approaches in the generation of Site Specific Assessment Criteria relating to contamination concentrations and are not considered to represent a risk in a specific land use scenario to a specific receptor. No liability can be accepted for the retrospective effects of any future changes or amendments to these values, associated models or associated guidance.

REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

24. The outputs of the Detailed Quantitative Risk Assessments are based upon WSP UK Limited manipulation of standard risk assessment models. These are our interpretation of the risk assessment criteria.

25. Prior to adoption on site they will need discussing and agreeing with the Regulatory Authorities prior to adoption on site. The regulatory discussion and engagement process may result in an alternative interpretation being determined and agreed. The process and timescales associated with the Regulatory Authority engagement are not within the control of WSP UK Limited. All costs and programmes presented as a result of this process should be validated by a quantity surveyor and should be presumed to be indicative.

GEOTECHNICAL DESIGN REPORT (GDR)

26. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. All the relevant information needs to be provided to allow for a GDR to be produced.

MONITORING (INCLUDING REMEDIATION MONITORING REPORTS)

27. These reports are factual in nature and comprise monitoring, normally groundwater and ground gas and data provided by contractors as part of an earthworks or remedial works.

28. The data is presented and will be compared with assessment criteria.

Appendix C

CIRIA RISK ASSESSMENT

CIRIA RISK DEFINITIONS

Table A1 - Classifications of Probability

Classification	Definition
High Likelihood	There is a pollution linkage / identified geotechnical hazard and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term

Table A2 - Classifications of Consequence

Classification	Definition
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIA. Short-term risk of pollution of sensitive water resource. Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem.
Medium	Chronic damage to Human Health ("significant harm" as defined in DETR, 2000). Pollution of sensitive water resources. A significant change in a particular ecosystem, or organism forming part of such ecosystem.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services (significant harm as defined m the Draft Circular on Contaminated Land, DETR, 2000). Damage to sensitive buildings/structures/services or the environment.
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve, Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.). Easily repairable effects of damage to buildings, structures and services

The risk categories presented in this report, taking into account both probability and severity, are based on the matrix presented in **Table A3** below, following CIRIA C552.

Table A3 - Adopted Risk Categories / Comparison of Consequence Against Probability

Probability	Consequence			
	Severe	**Medium**	**Mild**	**Minor**
High Likelihood	Very High Risk	High Risk	Moderate Risk	Low to Moderate Risk
Likely	High Risk	Moderate Risk	Low to Moderate Risk	Low Risk
Low Likelihood	Moderate Risk	Low to Moderate Risk	Low Risk	Very Low Risk
Unlikely	Low to Moderate Risk	Low Risk	Very Low Risk	Very Low Risk

Appendix D

PREVIOUS REPORTS

GeoDyne

Geotechnical &
Environmental
Consultants

Brighton Road
Shoreham

Review of Previous Reports and Supplementary Phase II Exploratory Investigation

For

The Newbridge Group/Southern Housing Group

GeoDyne Limited
The Granary, Church Lane, Thrumpton, Nottingham, NG11 0AX
Tel: 0115 983 0006 Fax: 0115 983 0009 email: info@geodyne.co.uk

Contents

Executive Summary

Appendices

Project No: 31149		**Date: 30th June 2015**	
Issue/revision	Prepared by	Checked by	Approved by
	Chris Paling BSc (Hons) FGS **Senior Engineer**	Richard Spencer BSc (Hons) MEng MSc **Director**	Richard Spencer BSc (Hons) MEng MSc **Director**
Comments			

EXECUTIVE SUMMARY

Site Summary	Initially, the site area was used for Timber Ponds. Free Wharf was constructed at the southern extent in the 1890s (including timber piled mooring points) which was expanded including warehouse structures into the 1920s. By the 1930s the majority of the site had been developed including warehouses in the eastern and central section of the site. The 1950s map indicates many of the structures present from the 1930s were used as engineering works, a garage, a timber store and possibly a tarmacadam works in the western extent (identified in the 1960s). This area contains a potential large underground concrete structure (conveyor system) and the southern extent had a travelling crane running parallel to the wharf. In the 1960s an oil storage depot is indicated in the southeast of the site in the vicinity of two tank farms (although anecdotally some or all of these tanks may have been used for wine storage). The 1990s map shows the site layout to be broadly similar to that present today with no significant changes evident shown on the most recent map viewed (2012). The site is underlain by an aquifer designated by the Environment Agency as a Principal Aquifer. The site does not lie within a SPZ.
Ground Conditions	<u>Made Ground</u> Beneath the surface materials which typically comprised reinforced concrete or localised Macadam and granular sub-grade, Made Ground deposits were encountered comprising the following: • Soft green sandy gravelly clay. • Loose and dense brown clayey gravel of brick and flint. • Loose grey locally clayey gravel of ash, slag, chalk, ceramic and glass. Locally with small timber fragments. • Loose white clayey gravelly silty Chalk with flints, brick, locally mixed with concrete screed. Also present as soft brown chalky clay or soft putty chalk. The Made Ground (where penetrated) was encountered to depths ranging between 1.45m to 3.85m begl and may be broadly considered to comprise reclaimed land materials. Within trial pit TP1 large sections of tree trunk and a root ball was identified (potentially left over from the timber ponds identified in the 1870s) and within Trench C a large concrete block with a mooring chain was identified. Several trenches also revealed large fragments of concrete slab within the Made Ground. Within borehole WS33 hydrocarbon odours were noted, with free product and staining at 2.20m begl. Hydrocarbon odours and staining were also revealed in TP1 at approximately 2.00m begl. <u>Natural Strata</u> Beneath the Made Ground, Natural Strata was encountered comprising four elements of Head Deposits, Tidal River Deposits, Storm Beach Deposits and Chalk. The Natural Strata units may be described as follows. • Tidal River Deposits – Present as very soft and soft grey or black and locally brown and green slightly silty CLAY with an organic and hydrogen sulphide odour, and extending to depths ranging between 2.00m to 3.95m begl. • Storm Beach Deposits – Present as medium dense greyish brown slightly clayey Sand locally and/or medium dense, locally becoming loose brown sandy fine to coarse grained flint and chalk GRAVEL extending to penetrated depths of between 1.90m to 4.90m begl and to depths in excess of 5.00m, but locally not fully penetrated. • Head Deposits – Broadly encountered across the northern extent of the site comprising locally soft and stiff silty CLAY with chalk and flint gravel which extended to depths to in excess of 4.00m begl. • Tarrant Chalk Member – Encountered in borehole WS22 only as light brown and white gravelly putty Chalk (gravel comprised chalk fragments) which was proven to a maximum depth of 5.00m begl but not fully penetrated. Our previous works included deep cable percussive boreholes which penetrated into the Tarrent Chalk Member to 26.00m begl but was not fully penetrated.
Ground Anchors	Trenching works at the Free Wharf has revealed steel ground anchor cables at varying depths ranging between 1.05m to 2.05m begl, the majority being approximately 1.75m to 2.05m begl that tie into approximately square shaped anchor blocks which appear to be up to 2.00m in dimension, and approximately 0.44m wide. The revealed anchor cables were approximately 2.30m and 2.60m apart. The anchor blocks were encountered at depths ranging between 0.65m and 1.10m begl and were approximately 15.20m to 15.55m distant from the sea wall to the south.

	Previous works at the former Tarmac Wharf revealed 4No. ground anchor ties at intervals of 3.45m, 3.10m, 3.20m and 3.15m respectively. A concrete structure was encountered approximately 11.85m from the north elevation of the sea wall, at an approximate depth of 3.20m begl. The steel anchor cable was noted to enter the southern side of the concrete. It was not possible to ascertain the width or base of the structure but it was deemed to potentially comprise a ground anchor block.
Foundation Design	The most appropriate foundation solution for the site would be piles, potentially driven piles, founded within the Tarrant Chalk Member. The southern boundary of the site comprised a wharf which was retained by steel interlocking sheet piles. The potential presence of ground anchors should be taken into consideration during the site layout planning process. No additional loads should be imposed on the retaining wall at the southern extent of the site until a structural assessment of the retaining wall is undertaken to assess its suitability to accept additional loads. Alternatively, consideration may also be given to the use of ground improvement techniques i.e. vibro-stone or concrete columns, subject to consultation with specialist contractors in terms of ground condition acceptability and proposed column loadings. The columns could support either shallow spread foundations or a raft. The potential presence of ground anchors would also need to be taken into consideration in this instance. Obstructions were encountered during our previous works in boreholes BH2 and BH2A at depths of 2.90m and 1.70m begl, potentially associated with the anchors (these boreholes were visually positioned between the securing bolt spacing centres to attempt to avoid any ground anchors present). Additionally, a variety of underground obstructions were encountered including multiple slabs, concrete blocks, potential timber piles, railway sleepers and sections of tree trunk. Therefore, if a pile foundation option is adopted, the potential presence of obstructions, ground anchors and anchor blocks should be taken into consideration during the site layout planning process.
Floor Slabs	Suspended ground floor slabs are recommended. For any large commercial/industrial units a reinforced ground bearing floor slab may be feasible subject to appropriate preparation/treatment of the formation soils and engineer design.
Ground Gas Precautions	A programme of 6No. ground gas monitoring at the site has revealed that the site falls within Characteristic Situation 2 (CS2) in accordance with CIRIA report C665 by virtue of the presence of methane in excess of 1% and carbon dioxide in excess of 5% and relatively high positive gas flow rates (potentially due to tidal effects). Therefore, suitable CS2 ground gas protective measures should be incorporated into the proposed structures. In summary, residential buildings should be provided with passive sub slab ventilation. In addition, all buildings should be provided with a suitable, certificated, ground gas resistant membrane from a suitable manufacturer/supplier in the floor slab design. The membrane should have suitable tensile strength and puncture resistance, may include an aluminium core (as appropriate) and be of a sufficient thickness to allow any welding to take place without damaging the membrane. The membrane must be suitably lapped and taped and should be extended across wall cavities to effectively exclude ground gases from the footprint of the proposed building. Service penetrations through the membrane should be kept to a minimum and should be suitably sealed to the membrane.
Radon	No precautions required.
Building Near Trees	A medium volume change potential classification should be assumed for the natural cohesive strata. However, the clay soils were predominantly present at depth and therefore may not influence foundation design.
Coal Mining Precautions	No investigations or precautions are required.
Water	The depth to water beneath the site may be largely dependent upon seasonal and tidal variations. Significant dewatering of shallow excavations (i.e. less than 1.00m depth) is considered unlikely to be necessary based on the site observations undertaken to date, but localised removal of perched water may be required. Deeper excavations for sewers are likely to encounter significant water ingress, particularly where in excess of 3.00m. Deep excavations into the Gravel stratum could, theoretically encounter base instability due to positive hydrostatic pressure within the gravel deposits during periods of rising tide.
Excavations and Stability	Shallow foundations may require sidewall support for both construction and health and safety purposes. Deeper excavations at the site are potentially liable to encounter obstructions (former foundations potentially including piles) and underground structures i.e. the conveyor tunnel beneath the western extent of the site, unstable ground and locally shallow groundwater, therefore deep excavations are likely to require trench support and an allowance should be made for breaking out of obstructions.
Sulphate Classification	The site is indicated to fall into Design Sulfate Class DS-2 and an Aggressive Chemical Environment for Concrete (ACEC) classification of AC-2.
CBRs and Pavements	Typically, CBR values of less than 2% would be anticipated for near surface Made Ground materials.

	All CBR values would be subject to confirmation at sub-base level after services construction and proof rolling of the formation, where an improved CBR value may be achieved. Pavement construction may include geotextile reinforcement to reduce capping thickness and improve ground stability.
Soakaways	The use of soakaways for the disposal of surface water is unlikely to be feasible across the site.
Contamination Assessment	Soils The assessment of soil test results has revealed the Made Ground at the site to be contaminated with respect to Arsenic, Lead and total PAH, individual PAH compounds, and locally potentially SVOC compounds assuming a residential (POS1) end use. Asbestos fibres were revealed in two samples of Made Ground comprising chrysotile (white) asbestos and amosite (brown) asbestos. Based on the testing undertaken the Natural Strata may be regarded as being uncontaminated for the proposed end use. Hydrocarbons Whilst visual and olfactory evidence of TPH contamination was revealed in boreholes WS1, WS2, WS4 and WS10 (located adjacent to the USTs within the Frost site, and an AST south of the former packing shed), no significantly elevated concentrations of TPH were identified in the soil samples tested. In addition, samples obtained during the current works were screened with a PID and samples selected for TPH testing. No significantly elevated concentrations of TPH were identified in the soil samples tested. Perched Water and Ground Water Testing on water samples recovered from shallow monitoring points within the Made Ground/superficial deposits revealed elevated concentrations with respect to Arsenic, Lead and Selenium, total PAH, PAH compounds and total TPH, when compared to conservatively adopted Drinking Water Standards. The deeper groundwater samples recovered from installations within the deeper Chalk deposits have revealed slight exceedences with respect to Arsenic and Selenium only, with PAH, SVOC and TPH compounds being present below the Drinking Water Standards or less than the LOD.
Remediation Proposals	Proposed Soft Landscaped Areas The Made Ground was contaminated and noted to be generally aesthetically undesirable containing fragments of brick, concrete, timber, slag and ash. These materials should be covered with a 0.60m thick layer of clean imported topsoil in areas of Public Open Space. Where present beneath hardstanding, no capping would be required other than the hardstanding and geotechnical construction layer themselves. Asbestos Asbestos (Chrysotile and Amosite) has been found locally within the Made Ground at the site. Any Asbestos Containing Material (ACM) excavated during development works may require disposal off-site to a suitably licensed disposal facility. Alternatively, soils containing asbestos fibres may remain in-situ beneath a suitable remedial cap or beneath hard standing areas, placed in accordance with a suitable site specific risk assessment or a Materials Management Plan (MMP). Remediation measures undertaken in sites affected by asbestos should be undertaken to a CAR (Control of Asbestos Regulations 2012) compliant risk assessment in order to protect site staff and members of the public. Whilst we would comment that very little or no significant large quantities or fragments of ACM was revealed during our works within the soil, this does not mean that fragments of ACM sheeting, lagging etc are not present within the Made Ground. Therefore, careful consideration will be required including detailed CAR risk assessment and cost benefit analysis before any decision to remove asbestos impacted materials off-site is made. Above Ground Fuel Storage Tanks and TPH Impaction A watching brief is recommended during removal of any ASTs for visual or olfactory evidence of gross TPH contamination beneath the tanks. Any revealed grossly impacted soils should be removed from site. The sides and base of the resultant excavation should be sampled and the test results validated against current Tier 1 GACs for a residential (POS1) end use.

	Localised excavation of impacted soils may be required at the site. The perched water samples locally contained elevated concentrations of total TPH. Therefore, any impacted areas where piles are required to be advanced should be suitably remediated to prevent the introduction of a downward pathway for the hydrocarbon contamination into the Principal Aquifer. Perched water and Groundwater Localised removal of impacted water around identified TPH impaction may be considered (to enable pile foundation installation), no significant widespread remedial measures are recommended with respect to perched waters and deeper groundwater.
Unforeseen Ground Conditions	Should any areas of potentially contaminated soil be encountered during site construction works, we would recommend further consultation to ensure that our recommendations continue to apply. Any potentially contaminated soils should be left in-situ and subjected to further assessment, to potentially include further chemical testing and risk assessment.
Construction Workers	It is likely that gas protection measures, such as ventilated manhole covers etc, will be required at the site. Monitoring of excavations for ground gases should also be undertaken prior to, and during occupation of excavations/chambers by personnel.
Licenses, Permits, Registrations and Approvals	The Contractor/Developer is responsible for, and must ensure that, all necessary licenses, permits, plans, registrations and approvals are in place prior to commencing with the development of the site. We would be pleased to prepare a Materials Management Plan (MMP) upon request.
Asbestos	A pre-demolition asbestos survey should be undertaken in the existing structures to ascertain the presence of ACMs.
Statutory Consultation	A copy of this report should be sent to the Local Planning Authority in advance of construction to obtain written comments and approval of the contents presented herein.
Further Works	The following phased works are recommended for the site: • Additional works in the vicinity of borehole WS33 and TP1 (depending on where they lie in relation to the proposed development) to attempt to delineate the extent and degree of the hydrocarbon impaction. • A watching brief in the location of above ground storage tanks during their removal for any visual or olfactory evidence of gross TPH contamination which should be removed and validated. • A pre-demolition asbestos survey of existing buildings. • Preparation of a Materials Management Plan (if required). • Upon site clearance of the surface concrete, it may be possible to undertake Ground Penetrating Radar (GPR) works to attempt to further ascertain the presence and depths of ground anchor cables and blocks along the southern boundary of the site. This will assist in detailed foundation design.

1.0 INTRODUCTION

1.1 Introduction

GeoDyne Limited has been instructed by the Clients, the Newbridge Group/Southern Housing Group, to undertake a supplementary Phase II Exploratory Investigation at a site located off Brighton Road, Shoreham.

The works were designed to supplement previous works undertaken by GeoDyne (for others) in 2012 and 2013 the findings of which were presented in the following documents.

- GeoDyne Report – *'Brighton Road, Shoreham - Combined Phase I Desk Study and Initial Phase II Exploratory Investigation For Optimisation Developments Ltd'*, referenced 31149, dated 28th September 2012.
- GeoDyne Report – *'Ground Anchor Investigation at Tarmac Wharf/Minelco Site, Brighton Road, Shoreham - Combined Ground Investigation and Geophysical Survey Report For BSCP Ltd and WM Morrisons'*, referenced 31149, dated 9th July 2013.

The entire site for the previous works comprised two properties, the western section being occupied by a Vauxhall Dealership (Frosts) and the eastern extent occupied by wholesale importers, processors and distributers of decorative stone aggregates and scallop shells for processing into other by-products (Minelco Ltd).

The first report was intended as an initial investigation within external areas of the site and did not include a chemical assessment of groundwater beneath the site. The previous report stated that initial findings may need to be resolved by further phases of works in an iterative process to include consultation with Local Planning Authorities and the Environment Agency.

We understand that the current site excludes the western extent (Vauxhall Dealership (Frosts)) and the current works were required to address recommendations placed in the previous report with respect to completing the investigation within existing buildings and undertaking groundwater sampling and testing. We were also requested to re-assess the findings of the previous contamination assessment, in conjunction with current testing, in terms of a currently proposed end use.

Subsequently, we were also requested to undertake supplementary trenching works at the eastern extent of the site to further investigate the ground anchors securing the sheet piled sea wall.

We have made reference to the previous reports, as appropriate, and included excerpts in order to provide a degree of context between the different phases of work. However, this does not replace a full review by the reader of the previous reports or provide reliance on the information contained in the previous reports to the Clients.

1.2 Scope of Works

The scope of the current works includes a review of the previous Phase I Desk Study information.

The scope of the current Phase II Exploratory Investigation works comprised:

- A sub-contracted service avoidance scan of proposed exploratory hole locations.

- An exploratory programme of window sample boreholes in internal areas of the site. Locally, additional boreholes were located in external areas to supplement previous works.
- Geotechnical and environmental soil and water testing.

Additional works were requested by the Structural Engineers (Hemsley Orrell Partnership (HOP)) which included.

- A sub-contracted service avoidance scan of proposed exploratory hole locations.
- An exploratory programme of trenches using a mechanical excavator and breaker attachment to attempt to reveal details of ground anchor cables and anchoring points for the sheet piled sea wall at the southern extent of the site (to supplement previous works).
- An additional trial pit in an external area to supplement our current exploratory investigation works.

1.3 Project Understanding

We understand that it is intended to construct a series of blocks with the majority comprising residential accommodation, although approximately 20% are proposed for ground floor retail units and a hotel/supermarket. The residential properties will be provided with separate parking facilities. No private gardens are envisaged with soft landscaping being formed in communal areas. If our understanding is incorrect, it would be necessary to review our report to ensure it continues to apply.

1.4 Limitations

The conclusions and recommendations made in this report are limited to those that can be made based on the findings of the investigation. Where comments are made based on information obtained from third parties, GeoDyne assumes that all third party information is true and correct. No independent action has been undertaken to validate the findings of third party information, unless specifically stated.

This report has been prepared in accordance with our understanding of current best practice. However, new information or legislation, or changes to best practice may necessitate revision of the report after the date of its issue.

GeoDyne has prepared this report for the sole use and reliance of the Clients, the Newbridge Group and the Southern Housing Group, in accordance with our Standard Conditions and Limitations (included in Appendix IX). This report may not be relied upon by any third party without the explicit written agreement of GeoDyne.

1.5 Confidentiality

The risk assessment undertaken herein remains the intellectual property and trade secret of GeoDyne Limited. The information contained within this report must not be disclosed or divulged to any commercial Consultant or other third party without the prior written agreement of GeoDyne Limited.

2.0 SITE DESCRIPTION & HISTORICAL REVIEW

2.1 Site Description

The site is an irregularly shaped parcel of land the centre of which may be located around approximate Ordnance Survey National Grid Reference 522180E 105080N.

The site lies in a mainly commercial setting with a Vauxhall Dealership (Frosts) to the west, an aggregate distributing company to the east and Brighton Road adjacent to part of the northern boundary with several national companies beyond including Dunelm Mill, B&Q, McDonald's, Kwik-Fit, a car wash facility, Council Offices and a row of small shops and cafes. A row of industrial units, the Ham Business Centre, was present between the centre of the site and Brighton Road. The southern boundary was formed by Free Wharf adjacent to the River Adur (tidal), the western extent of which is also known as Tarmac Wharf. Beyond the River Adur a residential development was present with mudflats to the southwest of the site. The majority of this section of the river was historically used as a wharf, and until recently, was in use as such by Minelco Ltd (trading ceased approximately two years ago), who received deliveries of aggregates and scallop shells by ship. The wharf wall was constructed as a retaining wall supported by steel sheet piles with the height of the retaining wall being approximately 7.00m above the low tide mudflat level of the River Adur.

The steel pile retaining wall is thought to be reinforced with ground anchors which were evident from securing bolts located approximately 2.00m below the level of the wharf, and spaced at approximately 1.00m centres along the length of the southern boundary. Further securing bolts were also visually evident on the southern bank of the River Adur. Larger bolts occur more widely spaced which may represent bolting points for ground anchor cables.

The entire site comprised the former Minelco Ltd business accessed from Humphreys yard (a public access way) located off Brighton Road. The access road lead into a concrete covered receiving area with a small reception office and a weigh bridge. An electricity sub-station was present to the rear of the reception. To the west of the weigh bridge there was an area of concrete surfacing formerly used for car parking, now vacant and the gates secured with a chain/lock and with concrete blocks. The southern extent of the car park was delineated by a raised section of concrete with five or six steel plates located along the length of the raised concrete. We were verbally informed during our previous works by site staff that the raised section of concrete comprised a former underground conveyor tunnel that once used to serve a tarmacadam works that historically occupied this section of the site.

We were further informed during our previous works that the steel plates covered old hopper inlets into the conveyor system, which was anecdotally infilled by Minelco to render the structure safe. We are not aware of the full extent, depth and condition of the underground conveyor system. An employee of Minelco removed and replaced a steel plate which revealed that the underground structure was infilled.

The main Minelco processing and distribution works was present to the east of the access road. Several structures were present across the northern half of the Minelco site and largely comprised steel framed warehouse structures, of varying sizes and three silos for storage of fine dust materials. Many of the structures appeared to be cladded with corrugated materials that may be Asbestos Containing Materials (ACMs). Various processes were undertaken within the structures, from riffling, grading, packaging and storage of aggregates (seven grades were produced by Minelco down to fine dust grade), and crushing of scallop shells into a powder consistency (used in the oil drilling industry as a drilling mud). One shed structure was used as a general maintenance and storage shed. Only limited access was gained into the structures during our previous works for reference purposes only.

At the current time, the entire site was vacant/unused although the current Landowners (LKAB Minerals), kept the site secured and provided personnel with keys to allow access for our works. All of the structures were largely accessible for the current works.

Three Above Ground Storage Tanks (ASTs) were identified across the Minelco site immediately south and east of the former Packing Shed. The main fuel oil tank was of steel construction and located in the central section of the site and was placed within a bund (still present at the current time). The internal area of the bund appeared to be relatively clean. A fuel inlet/outlet pipe in front of the bund was noted to have local oil staining at the ground surface. A second bunded AST was located adjacent to the easternmost warehouse structure (grading shed) located above ground surface level on a brick wall. This tank was constructed of double skinned polyethylene and had been removed at the time of our current works. Other ASTs comprised two double skinned polyethylene tanks placed in a raised steel frame located adjacent to the sites maintenance shed (still present at the current time). No visual evidence of staining was noted beneath the tanks.

The southern extent of the Minelco site comprised a large area of concrete apron from the buildings southward toward the southern wharf boundary. This area was used to offload deliveries from ships, temporary storage and distribution. A mobile conveyor and washing area was present at the eastern end of the concrete apron which was used to wash fines from gravel and shells processed at the site. The wash fines were deposited in a small rectangular settling lagoon, and removed by motorised shovel to a waste stockpile at the southeastern corner of the site.

The concrete apron continued to the eastern end of the site where two very large rectangular shed structures were present, mainly used for storage. An access road was present between the two sheds leading to an enclosure at the sites northeastern corner. This was secured by a locked blue double gate within the site, and by a further locked double gate at the sites northern boundary. This area was used for parking of cars and lorries at the time of our previous works, and also had a weigh bridge (but it is unknown if the weigh bridge was in operation), and contained many 1 tonne bags of apparently excess or unused aggregates and other sundry items such as old tyres, pipework etc. A manhole cover within this compound was found to be a foul sewer pumping station, pumping toward Brighton Road.

A second electricity sub-station was noted beyond the northeastern site boundary at the northern extent.

To the west of the compound a two storey derelict brick structure was present, which was secured with boarding. The use of this building is not known. To the west of this, a third access into the site was present entering between the site and the adjacent Kwik-Fit outlet and car wash facility.

A site location plan (Figure No. 31149/S01) is included in Appendix I, and an annotated site plan showing the main features of the site (Figure No. 31149/S02) is included in Appendix II. General views of the site (external and internal views from the current works) are shown on the plans (Figure No's. 31149/S04 to 31149/S06) included in Appendix III.

2.2 Site History

Historical and contemporary Ordnance Survey publications were reviewed to obtain relevant historical information for the site. A second annotated plan (Figure No. 31149/S03) showing the principal historical uses of the site is presented in Appendix II.

The historical review has been edited from our previous report to exclude the adjacent Vauxhall Dealership which is now without the current site boundary.

The historical review in our previous Phase I Desk Study revealed that site has undergone several phases of development since the earliest map viewed (1870s). Initially the site was undeveloped with the area being use for Timber Ponds. Free Wharf was constructed at the eastern extent in the 1890s along with wooden pile structures (possibly mooring points) which was expanded including warehouse structures into the 1920s. By the 1930s the majority of the site had been developed including warehouses in the eastern and central section of the site. The 1950s map indicates many of the structures present from the 1930s were used as engineering works, a garage, a timber store and possibly a tarmacadam works in the western extent (identified in the 1960s) which included a chimney, tanks, conveyors/hoppers, drying tubes and a travelling crane on the southern boundary.

A new access (Humphreys Gap) was constructed into the site in the 1950s. In the 1960s an oil storage depot is indicated in the southeast of the site. It is unclear how large the oil storage depot was. There are two small tank farms in the vicinity of the depot, but no indication if the tanks were all used to store fuels. The tarmacadam works and the oil storage depot are no longer indicated in the 1980s with much of the southern half of the site appearing vacant or covered with hardstanding. The 1990s map shows the site layout to be broadly similar to that present today with no significant changes evident shown on the most recent map viewed (2012).

On a visit to the site during monitoring after completion of our previous site investigation works a discussion with site staff revealed that historical tanks in the eastern area (i.e. near the former oil storage depot) may have been constructed to store imported wine. Therefore, it may be possible that the oil storage depot annotated on the historical maps was incorrectly labelled by the mapping personnel, or not all of the tanks on the map were used to store fuel.

An annotated historical plan (Figure No. 31149/S03) is included in Appendix II showing the key historical uses on and around the site. A plan (Figure No. 31149/GA6) in Appendix II shows an excerpt obtained during our previous works of an aerial photograph dated 1952 of the western extent of the site (Former Tarmac Wharf and the tarmacadam works) showing the conveyors, hoppers, ancillary buildings and changes in ground level.

3.0 GEOLOGY & ENVIRONMENTAL SETTING

3.1 Geological References

The following geological publications were referred to in our previous works:

- BGS 1:10000 Series Sheet TQ20NW Shoreham by Sea (2005).
- BGS 1:50000 Series Sheet 333 '*Brighton and Worthing*' (2006).
- The Law Society and The Coal Authority document '*Coal Mining and Brine Subsidence Claim Searches, Directory and Guidance, Sixth Edition*' (2006).
- BRE Report BR211 '*Radon: guidance on protective measures for new dwellings'* (2007).
- Construction Industry Research and Information Association (CIRIA) publication C574 *'Engineering in Chalk'*, (2002).

3.2 Geology

The site is indicated to be immediately underlain by Head Deposits across the northern and central areas of the site. The southern extent of the site is indicated to be underlian by Beach and Tidal Flat Deposits possibly underlain by Storm Beach Deposits of Quaternary age. At depth the solid geology beneath the site is indicated to comprise the Tarrant Chalk Member of Cretaceous age

Head Deposits are described on the geological maps as *'Clay, sandy and silty, dark yellow-brown. Pebbly in part and chalky in dry chalk valleys'*. The Beach and Tidal Flat Deposits are described as *'Undifferentiated'* but on the 1:10000 series map these are classified as Tidal River Deposits which comprise *'Mud, sandy, grey to dark grey, pebbly and shelly in part'*. The Storm Beach Deposits are described as *'Gravel and Sand interbedded, mainly rounded flint'*.

The Tarrant Chalk Member is described as comprising *'Chalk, white with seams of large nodular and tabular flints'*.

The CIRIA publication indicated that, in engineering terms, Chalk:

- *'comprises mostly clay or silt-sized particles*
- *Retained an unusually high porosity for a rock that has been deeply buried.*
- *Retained high natural moisture content (close to saturation value).*
- *Combined high porosity with a high degree of saturation…making soft chalk a frost susceptible material and causing chalk to slurry or become like putty during engineering operations'*.

In addition, the CIRIA report indicated that for chalk *'there are three common dissolution feature types'* i.e.

- Sinkholes *'a closed depression typically having a cone-,bowl-or pipe-like shape in cross-section, generally circular or elliptical in plan, occurring in isolation or in groups. It is normally located at a site of increased discontinuity density, which focuses drainage passing vertically through the rock'*.

- Dissolution pipes *'a cone or pipe-like cavity in vertical section, typically partially or completely infilled with overlying deposits that have subsided into the cavity created by dissolution of the soluble chalk host rock. Pipes are often circular or oval in plan, but may also be irregular and may or may not be accompanied by an overlying closed depression, or sinkhole, seen at the ground surface…'.*

- Swallow Holes *'a surface feature, where a void in the chalk continuously or intermittently ''swallows'' wholly or partially a surface stream i.e. a point at which the stream disappears from the surface to flow underground.'*

We previously comment that, whilst the foregoing statements regarding the engineering and geophysical qualities of chalk remain valid, the anticipated geological sequence at the site i.e. potential significant thicknesses of Made Ground and superficial deposits overlying 'putty' Chalk, suggests that the possibility of dissolution features affecting the site may be considered to be unlikely.

3.3 Faults

No faults were indicated on, or in the immediate vicinity of, the site on the viewed geological maps.

3.4 Made Ground and Disturbed

The geological maps indicated that the site is underlain by an area of Made Ground comprising *'Road, rail, reservoir and screening embankments: flood defences and reclaimed land'*.

Our previous historical review indicated that the site is likely to be underlain by reclaimed land. Since the earliest maps viewed, the site and the immediate vicinity originally largely comprised mud and sand flats (used as timber ponds), which became developed in the early 1900s with the Free Wharf and associated hardstanding areas.

3.5 Groundwater Vulnerability (Hydrogeology)

The site was indicated to be underlain by bedrock designated as a Principal Aquifer.

There was also a superficial aquifer designation of Secondary Aquifer Undifferentiated.

Principal Aquifers are *'layers of rock or drift deposits that have high intergranular and/or fracture permeability- meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer'*.

A Secondary Undifferentiated Aquifer designation *'has been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type'*.

The Source Protection Zone (SPZ) map within the previously commissioned Landmark Report revealed that the site does not lie within a SPZ as designated by the Environment Agency. SPZs relate to the protection of groundwater used for public drinking water supply.

3.6 Hydrology

Our previous report revealed the following information with regards to the flood risk assessment of the site:

Floodplain

The majority of the site is situated within an Indicative Flood Plain as designated by the Environment Agency and is at risk from extreme flooding from rivers or sea without defences (Zone 2).

There are no areas benefiting from flood defences on, or in the immediate vicinity of, the site.

Surface Waters

The nearest surface water feature to the site is indicated to be immediately southwest of the site (the River Adur (tidal)).

3.7 Coal Mining

Our previous report confirmed that the site is not within an area requiring the commission of a Coal Mining Report. This was confirmed by the commissioned Landmark Envirocheck report.

No coal mining precautions or investigations are therefore required at the site.

3.8 Radon

The previously commissioned Landmark Envirocheck report identified that the site is located in a lower probability radon area. The Landmark Envirocheck report stated that no radon protective measures are necessary in the construction of buildings on the site. This assessment is confirmed by BRE Digest 211.

3.9 Landmark Envirocheck Report

A Landmark Envirocheck report was commissioned during our previous works to ascertain the environmental setting of the site. The following key information considered relevant to this investigation is presented below.

- There were four discharge consents indicated for the site, three assigned to Minelco Ltd and one to United Marine Aggregates Ltd (located adjacent to the sites eastern boundary). All of the consents relate to the *'Discharge of other matter – surface water'* to a saline estuary.
- There were four Local Authority Pollution Prevention and Control entries relating to the site. The first is assigned to Frost Cars Ltd for a PG1/14 Petrol Filling Station (now without the current site boundary), listed as Authorised and regulating air pollution control. A second entry for the site is assigned to Montgomery Motors for respraying of road vehicles. The third entry is also assigned to Frost Cars Ltd relating to waste oil burning, this is listed as 'Application Refused or Cancelled'. The fourth entry was assigned to Minelco Ltd for mineral drying and roadstone coating processes, listed as 'Permitted'. There were two entries within 50m of the site relating to processing and packing of bulk cement.
- There were no waste sites (i.e. landfills) identified on the site, or within 250m of the site, in the Landmark Envirocheck report.
- There was a Licensed Waste Management Facility located 226m east of the site (household waste amenity site), a registered Waste Transfer Site located 121m northwest

(non-toxic waste delivered by the public) and a Registered Waste Treatment or Disposal Site located 77m east of the site (licensed lapsed or cancelled and dated October 1989).

- There were no Hazardous Substances issues identified on the site in the Landmark Envirocheck report. There were no entries in the vicinity of the site that are likely to have a significant impact on the proposed re-development.
- There were two entries for the site relating to BGS Recorded Mineral Sites assigned to Minelco Ltd and Kendall Bros (Portsmouth) Ltd relating to the processing of crushed rock and marine sand and gravel, both recorded as 'Active'. The type of activity was listed as 'Wharf', therefore, we would comment that the activities probably related to the importation and processing of crushed rock and aggregates, rather than the local recovery of these commodities.
- There was a BGS Recorded Mineral Site located 244m east of the site (unknown operator) indicating an opencast mining facility for the recovery of 'Common clay and shale'. The status was listed as 'Ceased'.
- A moderate hazard potential for compressible ground stability hazards and running sand ground stability hazards was provided for the site.
- There were six Contemporary Trade Directory entries listed on the site. Two were listed as 'Inactive', relating to car dealers, whilst four were listed as 'Active' relating to Sand, gravel and other aggregates (Kendall Bros Ltd), car body repairs (Frost Cars Ltd), Garage Services (Frosts Services Ltd) and mineral merchants (Minelco Ltd).
- There were two Fuel Station Entries listed in the vicinity of the site. The first was located 139m east of the site (Corralls HGV Oil terminal) and the second was located 160m west (Frosts Cars Ltd) listed as 'Obsolete'. The second entry was likely to relate to the Frost section (of the former site) and covered the now (apparently) decommissioned underground fuel storage tanks. These tanks are no longer located within the revised site boundary.
- The site was indicated to be within a Nitrate Vulnerable Zone. In our experience a majority of the country is assigned as such and this is unlikely to have a significant impact on the proposed re-development.

None of the foregoing entries are anticipated to have the potential to significantly impact the proposed re-development.

BGS Estimated Soil Chemistry

The Landmark report contained estimates of the anticipated soil chemistry beneath the site. The report identified arsenic to be present at concentrations ranging between 15-25mg/kg, cadmium <1.8mg/kg, chromium to be present at concentrations between 60 to 90 mg/kg, lead to be present at concentrations <150mg/kg and Nickel to be present at concentrations between 15 to 30 mg/kg. We would comment that these concentrations would not be considered to be a significant risk to the proposed redevelopment of the site, taking account of the nature of the proposed residential end use. However, the foregoing data does not take into account anthropogenic activities and should only be used as a guide and would be subject to confirmation following a programme of sampling and testing.

BGS Borehole Log Records

We previously obtained five BGS borehole records for borehole logs advanced in the vicinity of the site, generally located to the north along Brighton Road. Copies of the BGS borehole records are presented in Appendix V.

Four of the boreholes (referenced TQ 20 NW/34, NW/35, NW/38 and NW39) were advanced by Ground Exploration Ltd in 1969 and may be summarised as follows.

Strata	Depth to Base of Strata
Made Ground	0.31m to 2.44m
Soft and stiff brown CLAY with chalk and flint	2.44m to 6.71m
Gravel	5.49m
Medium hard white matrix of Putty CHALK with flints	9.14m to 13.72m
Hard white putty CHALK With pieces of rock chalk	>18.59m

In addition, a borehole record referenced TQ 20 NW/82 may be summarised as follows.

Strata	Depth to Base of Strata
Gravel and Clay	2.13m
Clay with flints	6.71m
Marl (putty Chalk) with flints	14.63m
CHALK and flints	>76.20m

In summary, the historical borehole records undertaken in the vicinity of the site broadly indicate Natural Strata comprising soft and stiff Clay with chalk gravel commencing at shallow depth and extending to depths ranging between 2.44m and 6.71m, locally underlain by Gravel (up to 5.49m in depth). The superficial deposits were underlain by soft putty Chalk extending to depths ranging between 9.14m to 14.63m underlain by hard Chalk which was proven to depths in excess of 76.20m.

3.10 Land Use Assessment

As part of the previous land use assessment, reference was made to the '*Desk Reference Guide to potentially Contaminative Land Uses*' produced by Mr P Syms and published jointly by the ISVA (The professional Society for Valuers and Auctioneers) in association with The Royal Institution of Chartered Surveyors (RICS) and the Chartered Institute of Environmental Health (CIEH).

Reference has also been made to the DEFRA publication CLR8 '*Potential contaminants for the assessment of land*' (March 2002).

3.10.1 On Site Assessment

The previous Phase I Desk Study information revealed that the site has undergone several phases of development since the earliest map viewed (1870s).

Initially, the site area was used for Timber Ponds. Free Wharf (with wooden pile mooring points) was constructed at the eastern extent in the 1890s which was expanded including warehouse structures into the 1920s. By the 1930s the majority of the site had been developed including warehouses in the eastern and central section of the site. The 1950s map indicates many of the structures present from the 1930s were used as engineering works, a garage, a timber store and possibly a tarmacadam works in the western extent (identified in the 1960s). This area contains a potential large underground concrete structure (conveyor system) and the southern extent had a travelling crane running parallel to the wharf. In the 1960s an oil storage depot is indicated in the southeast of the site in the vicinity of two tank farms (although anecdotally some or all of these tanks may have been used for wine storage). The 1990s map shows the site layout to be broadly similar to that present today with no significant changes evident shown on the most recent map viewed (2012).

Therefore, based on our previous works, experience of similar sites and the findings of our Phase I Desk Study enquiries, the following key contaminants may be present (but not limited to) at the site.

- Metals associated with any Made Ground or Natural Metal Enrichment (NME) in Natural Strata.
- Sulphate/acid contaminated soils.
- Polycyclic Aromatic Hydrocarbons (PAHs) derived from any ashy inclusions in the near surface soils.
- Petroleum hydrocarbons (TPH) i.e. fuels, oils etc.
- Asbestos.
- Ground gases (i.e. methane and carbon dioxide) from organic soils and Made Ground beneath the site.

Other potential contaminants which may be locally present but not assessed at the initial stage of works may include:

- Volatile Organic Compounds (VOCs).
- PCBs.
- Detergents.
- Organic solvents/thinners.

3.10.2 Off Site Assessment

The previous Phase I information revealed several significant sources of off site contamination that may be considered to be a risk to the proposed development of the site. These include railway land with a goods yard north of the site, tramway lines on embankments north of the site, a coal yard east and west of the site, electricity sub-station northeast of the site, a ship building yard south of the River Adur, Shoreham Harbour west of the site and a scrapyard immediately north of the site.

We would comment that, taking account of the historical industrial activity located on the site, the foregoing industrial activity in the vicinity of the site is unlikely to significantly increase the range of contaminants that are likely to be present beneath the site, although onsite migration of contaminants, including ground gases cannot be discounted at this stage.

The current works were designed to supplement the previous works and include a programme of ground water sampling and testing.

4.0 EXPLORATORY INVESTIGATION

4.1 Introduction

Exploratory investigation works were undertaken between the 19th and 21st June 2015 and comprised the following:

- A sub-contracted utility avoidance scan of exploratory hole locations.
- Advancement of 16No. window sample boreholes (designated WS20 to WS35 – the numbering was continued from previous works where 19No. boreholes were advanced in external areas) across accessible internal, and external areas of the site to depths ranging between 0.85m and 5.00m below existing ground level (begl). Boreholes were terminated in hard strata, or upon achieving nominally competent strata.
- Advancement of 1No. mechanically excavated trial pit (designated TP1) to a depth of 2.00m begl.

A plan (Figure No. 31149/S07) indicating the approximate location of the exploratory holes at the site is included in Appendix IV. Exploratory hole logs are included as Appendix V. General views of selected exploratory holes are shown on the Plates S07 to S15 included in Appendix VIII.

4.2 Ground Conditions

The following summary is based on the findings of the current boreholes inside the buildings and a single trial pit. Reference has been made to trenching works (undertaken to identify anchor blocks) but these are reported in the following Section.

Further description of the ground conditions encountered at the site are presented in our previous report.

The ground conditions recently encountered across the site may be summarised as follows:

Surface Materials

Surface materials comprising reinforced concrete and locally Macadam was encountered across the site which extended to depths ranging between 0.13m and 0.85m begl.

Several locations were found to be underlain by buried concrete slabs, or multiple slabs which locally it was not possible to penetrate. Buried slabs were encountered in boreholes WS20 to WS24, WS33 and WS34. Boreholes WS23 was terminated due to the presence of buried slabs or concrete obstructions at a depth of 0.85m begl.

Boreholes WS34 and WS35 identified the surface slab to be underlain by dense materials potentially comprising weakly cemented Pulverised Fuel Ash (PFA). It was not possible to penetrate the PFA and these boreholes were terminated at a depth of 0.90m begl.

Made Ground

Beneath the surface materials, Made Ground was present beneath the entire site. The Made Ground was present as a variety of materials. The main compositions identified included:

- Soft green sandy gravelly clay.

- Loose and dense brown clayey gravel of brick and flint.
- Loose grey locally clayey gravel of ash, slag, chalk, ceramic and glass. Locally with small timber fragments.
- Loose white clayey gravelly silty Chalk with flints, brick, locally mixed with concrete screed. Also present as soft brown chalky clay or soft putty chalk.

The Made Ground (where penetrated) was encountered to depths ranging between 1.45m to 3.85m begl and may be broadly considered to comprise reclaimed land materials.

Within trial pit TP1 large sections of tree trunk and a root ball was identified (potentially left over from the timber ponds identified in the 1870s). Railway timbers were revealed in Trench A associated with a former travelling crane, and within Trench C a secondary slab, railway timber and a large concrete block with a mooring chain was revealed. Several trenches also revealed large fragments of concrete slab within the Made Ground.

Within borehole WS33 hydrocarbon odours were noted, with free product and staining at 2.20m begl. Hydrocarbon odours and staining were also revealed in TP1 at approximately 2.00m begl, particularly within the perched water ingress.

A plan (Figure No. 31149/S08) showing the depth to the base of the Made Ground is included in Appendix IV. Plates S01, S02 and S07 in Appendix VIII show some of the obstructions encountered.

Natural Strata

Beneath the Made Ground, Natural Strata was encountered comprising four elements of Head Deposits, Tidal River Deposits, Storm Beach Deposits and Chalk. The Natural Strata units may be described as follows.

- Tidal River Deposits – Present as very soft and soft grey or black and locally brown and green slightly silty CLAY with an organic and hydrogen sulphide odour, and extending to depths ranging between 2.00m to 3.95m begl.
- Storm Beach Deposits – Present as medium dense greyish brown slightly clayey Sand locally and/or medium dense, locally becoming loose brown sandy fine to coarse grained flint and chalk GRAVEL extending to penetrated depths of between 1.90m to 4.90m begl and to depths in excess of 5.00m, but locally not fully penetrated.
- Head Deposits – Broadly encountered across the northern extent of the site comprising locally soft and stiff silty CLAY with chalk and flint gravel which extended to depths to in excess of 4.00m begl.
- Tarrant Chalk Member – Encountered in borehole WS22 only as light brown and white gravelly putty Chalk (gravel comprised chalk fragments) which was proven to a maximum depth of 5.00m begl but not fully penetrated.

Our previous works included deep cable percussive boreholes which penetrated into the Tarrant Chalk Member, which was identified as comprising:

- *'Initially present as highly weathered very weak off white 'putty CHALK, recovered as very soft off white and light brown clayey silt with gravel of brittle white chalk and flints, locally with large flint cobbles, which generally extended to 16.00m begl. The highly weathered CHALK then graded into moderately weathered to fresh CHALK which was proven to a maximum depth of 26.00m begl but not fully penetrated'*.

We would comment that the findings of our previous investigation broadly concurred with the BGS borehole data in terms of thicknesses of Natural Strata (with the omission of Tidal River Deposits in the BGS borehole records) and depth to the base of the putty Chalk. Our current works also broadly concur with our previous investigation in relation to multiple layers of concrete, obstructions in the Made Ground (including large sections of tree), depth of Made Ground and depth of superficial deposits (Tidal Flat and Storm Beach Deposits). The top of the Chalk was only encountered in one location during the current works (WS22).

4.3 Summary

The findings from the recent exploratory holes are summarised in Table 1.

TABLE 1 – SUMMARY OF EXPLORATORY HOLE FINDINGS

Stratum	Exploratory Holes Encountered	Depth to Base of Stratum (m begl)	Description
SURFACE MATERIALS	All locations	0.05m to 0.40m 0.45m to 0.85m >0.90m	Reinforced concrete and Macadam. Secondary slabs, and locally a third buried slab were encountered in boreholes WS20 to WS24, WS33 and WS34. Potential weakly cemented PFA in WS34 and WS35.
MADE GROUND	All locations	1.45m to 3.85m	• Soft green sandy gravelly clay. • Loose and dense brown clayey gravel of brick and flint. • Loose grey locally clayey gravel of ash, slag, chalk, ceramic and glass. Locally with small timber fragments. • Loose white clayey gravelly silty Chalk with flints, brick, locally mixed with concrete screed. Also present as soft brown chalky clay or soft putty chalk. Within trial pit TP1 large sections of tree trunk and a root ball was identified (potentially left over from the timber ponds identified in the 1870s). Railway timbers were revealed in Trench A associated with a former travelling crane, and within Trench C a secondary slab, railway timber and a large concrete block with a mooring chain was revealed. Several trenches also revealed large fragments of concrete slab within the Made Ground. Hydrocarbon odours noted in TP1 and WS33.
TIDAL RIVER DEPOSITS	WS20-WS22, WS24 to WS26, WS29 to WS33	2.00m to 3.95m	Very soft and soft grey or black and locally brown and green slightly silty CLAY with an organic and hydrogen sulphide odour
STORM BEACH DEPOSITS	WS20-WS22, WS24 to WS27, WS29 to WS33	1.90m to 4.90m	Medium dense greyish brown slightly clayey Sand locally and/or medium dense, locally becoming loose brown sandy fine to coarse grained flint and chalk GRAVEL.
HEAD DEPOSITS	WS25, WS27 and WS28	>4.00m	Soft and stiff silty CLAY with chalk and flint gravel.
TARRANT CHALK MEMBER	WS22	Base of stratum not encountered	Highly weathered very weak gravelly 'putty' CHALK.

4.4 Water

Water was encountered within the majority of the exploratory boreholes across the site at depths ranging between 1.80m and 3.80m begl.

We would comment that the depth to water beneath the site will be largely dependent upon seasonal and tidal variations.

4.5 Stability and Excavations

The sides of the boreholes in the Made Ground became locally unstable during advancement, casing was locally used to support the boreholes sides.

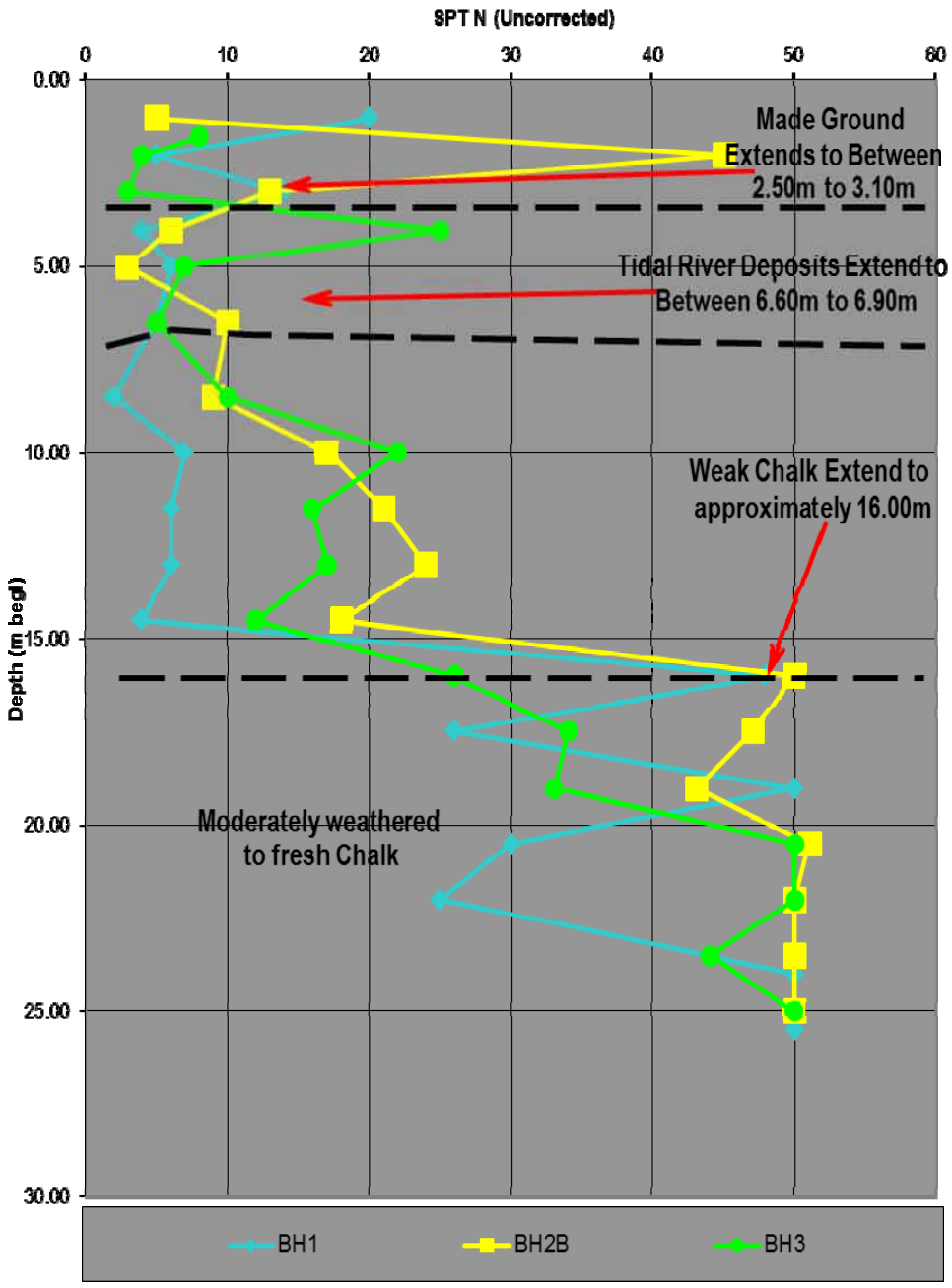
4.6 Standard Penetration Testing (SPT)

SPTs were undertaken at 1.00m intervals in all of the previous window sample boreholes which revealed SPT N-Values at 1.00m depth ranging between 2 and 20 (i.e. SPT refusal).

All of the cable percussive boreholes undertaken during our previous works were terminated where the SPT N-Value was equal to or greater than 50 (i.e. SPT refusal).

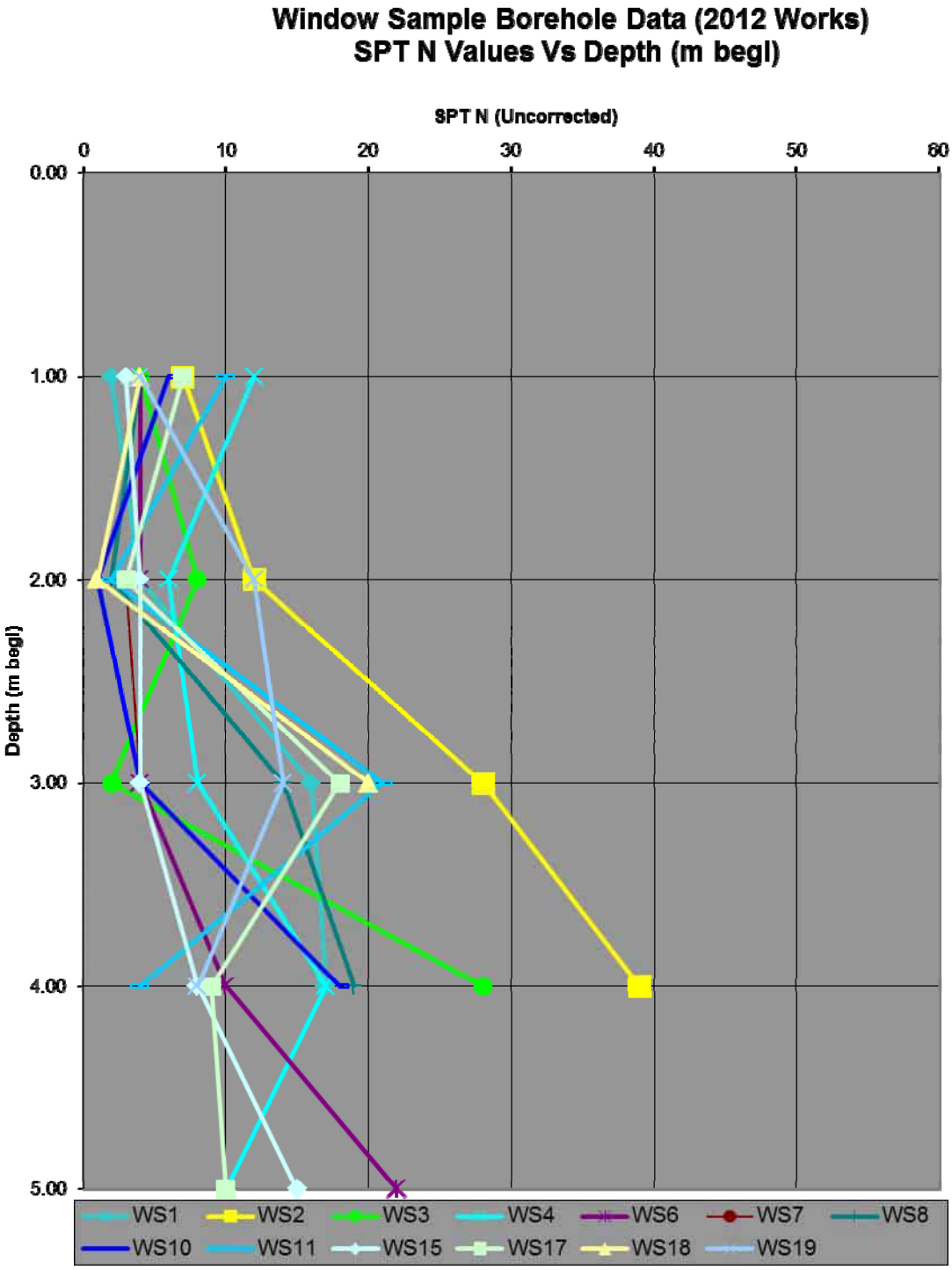
A SPT/Depth chart is presented below for the previous cable percussive boreholes BH1, BH2B and BH3, which were advanced into the Tarrant Chalk Member during our previous works.

Brighton Road, Shoreham



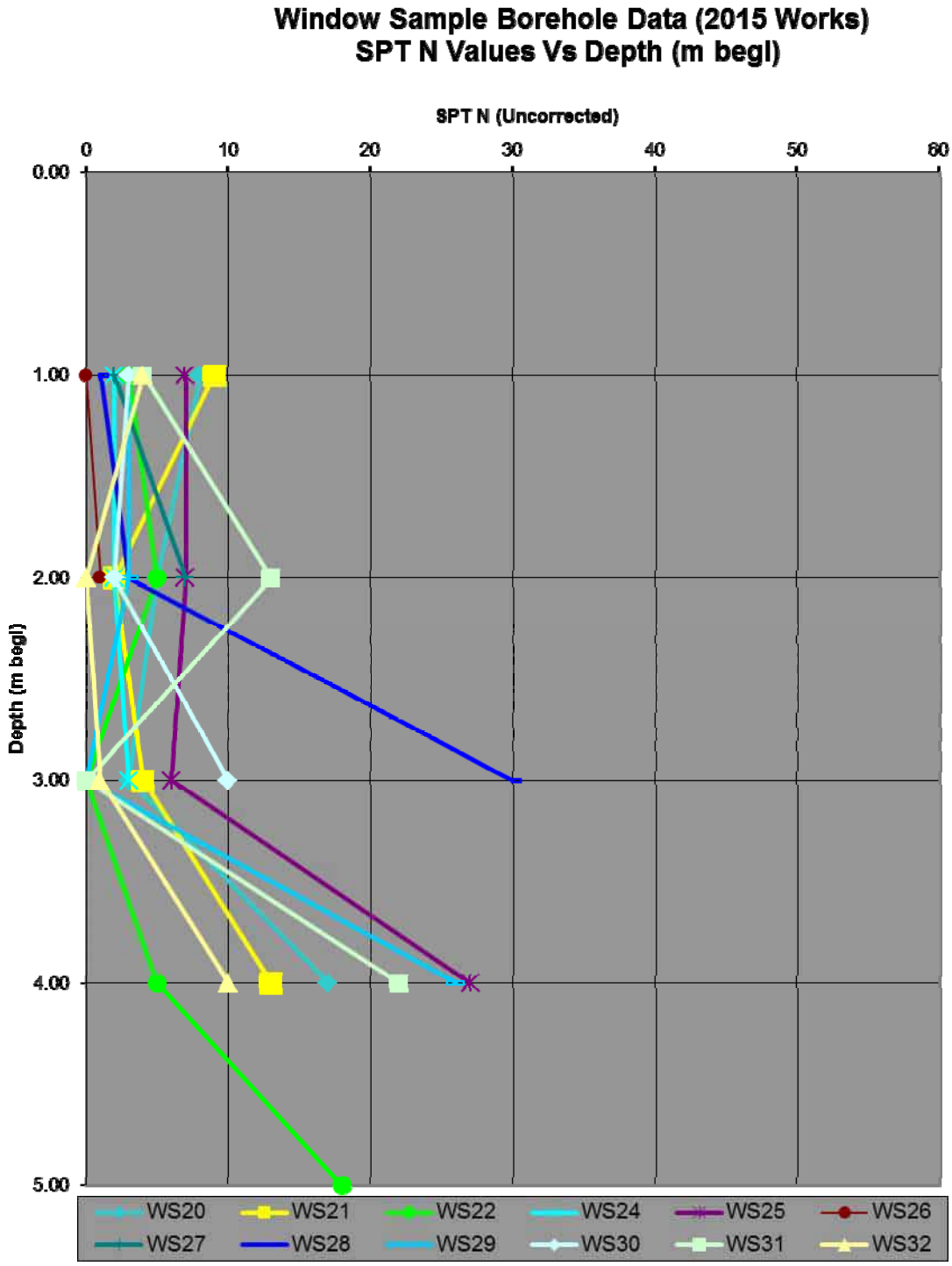
A second chart below shows the SPT N-Values within the previous 2012 window sample boreholes advanced across the site within external areas of the site.

Brighton Road, Shoreham



The third chart below reveals the SPT N-Values from the window sample boreholes advanced during our current works primarily within internal areas of the site.

Brighton Road, Shoreham



4.7 Plates

Views of selected exploratory holes are presented in Plates S07 to S15 in Appendix VIII.

5.0 TRENCHING WORKS FOR GROUND ANCHORS

5.1 Introduction

The 2013 investigation works were scheduled to comprise two parts, an initial geophysical survey followed by localised intrusive investigation works located at the southwestern extent of the current site immediately south of the concrete hopper structure potentially containing the former tarmacadam works conveyor system. Geophysics works were also undertaken in the Frosts site and at the southeastern extent of the Free Wharf.

The current 2015 works were commissioned as additional works at the request of HOP Engineers to further confirm ground anchors at the southwestern and southeastern extent of the current site along the Free Wharf.

5.2 Site Work

Terradat Geophysical Survey (2013)

It was emphasised by Terradat before the previous works commenced, and understood by the prior Client that geophysical methods may not be the most appropriate method for detecting such underground structures, and works proceeded on this basis. Upon review of their field data, Terradat indicated that the findings may provide information which could assist the prior Client with future works, and so consent was provided by the prior Client to process and report the findings.

Geophysical survey works were undertaken by Terradat on Tuesday 18th June 2013 and comprised the following:

- Electromagnetic (EM-61) and Magnetic (G-858-Magnetometer) surveys of the Frost Site and the Tarmac Wharf area of the Minelco site to attempt to reveal the locations of potential anchor cables, their spacing and any fixed anchor blocks within this part of the site. Works were undertaken within the Frost site on 2.00m grid spacing from the sea wall to 20m into the site. Works within the Minelco site were also undertaken on 2.00m spacing from the sea wall to the concrete hopper structure. The car park area north of the concrete hopper comprised reinforced concrete and revealed only surface scatter from reinforcement bars.

- A third area located at the southeastern extent of the Minelco site intended for residential usage was also initially surveyed my EM-61 methods. The prior Client requested these works to attempt to evaluate the presence, location and spacing of anchor ties and blocks in this vicinity. The initial EM survey however revealed surface scatter from near surface concrete reinforcement and so no further works were considered by Terradat to be of benefit.

Full details of the methods employed and of the findings are presented in the Terradat report contained within our previous report. We have reproduced some of the Terradat scans with comments within section 5.4 of this report.

Trenching (2013)

A JCB 3CX excavator and hydraulic breaker were mobilised to site on 19th June 2013 to attempt to establish the presence, condition and spacing of ground anchor ties, and the location of any anchor blocks at the specific accessible location within the site.

No excavation works were undertaken in the Frost section of the (former) site to avoid excessive disturbance to the ground surface and inconvenience to the site occupiers at the time. Excavation works were concentrated in a section of land between the Tarmac Wharf wall and the infilled underground conveyor concrete hoppers within the southwestern extent of the Minelco site (Tarmac Wharf). The prior Client did not require excavations at the southeastern extent of the Minelco site.

An initial trial pit (designated Trench 1) was excavated adjacent to an apparent anchor tie revealed in the Tarmac Wharf construction. This revealed a 65mm diameter steel cable embedded within the inner face of the concrete sea wall. The trial pit was then trenched northwards as far as the concrete hopper structure.

A second trench (designated Trench 2) was then advanced from Trench 1, parallel to the wharf wall (approximately 1.20m north of the wharf) to attempt to reveal ground anchor tie spacing.

The location of the former trenches is shown on the views (Figure No. 31149/GA3) presented in Appendix VI. Photographs and sketched cross-section of the sheet pile wall and trenches are presented in Figure No's 31149/GA7, 31149/GA9 to 31149/GA11along with Plates GA1 to GA6 also in Appendix VI.

Trenching (2015)

A JCB 3CX excavator and hydraulic breaker were mobilised to site on 10th June 2015 for three days to attempt to establish the presence, condition and spacing of ground anchor ties, and the location of any anchor blocks beneath the site.

Excavation works were concentrated in the southwestern and southeastern sections of the former Free Wharf in areas indicated by HOP.

- The Southwestern Extent of Free Wharf

An initial trial pit (designated Trench A) was excavated parallel to the sea wall to attempt to reveal the location and spacing of the anchor cables. The trench was located a minimum 7.00m from the sea wall for health and safety reasons. This was supplemented by a perpendicular trench to Trench A (Trench B) to expose the cable and anchor point. Trench B was further extended north as Trench B1 and then east-west as Trench B2 to expose the northern face of the anchor block.

- The Southeastern Extent of Free Wharf

An initial trial pit (designated Trench C) was excavated parallel to the sea wall to attempt to reveal the location and spacing of the anchor cables. The trench was located 11.00m from the sea wall for health and safety reasons. A perpendicular trench (Trench D) was excavated to reveal the anchor block, and an east-west trench (Trench E) excavated to reveal the northern side of two anchor blocks.

The location of the trenches is shown on the plan (Figure No. 31149/GA12) presented in Appendix VI. Sketched cross-section of the trenches are presented in Figure No's 31149/GA13 to 31149/GA17 also in Appendix VI along with logs of trenches A, B/B1, B2, C and D. Plates GA7 to GA15 are also presented in Appendix VI showing views of the trenches.

The findings of the trenching are briefly discussed below.

5.3 Ground Conditions and Underground Structures

5.3.1 Ground Conditions

- Tarmac Wharf (2013 Works)- The ground conditions encountered immediately adjacent to the wharf wall comprised Made Ground materials of medium dense brown clayey sandy gravel, cobbles and boulders of chalk extending to 3.00m below existing ground level (begl) but not fully penetrated. Trenching toward the north revealed Made Ground comprising loose angular limestone gravel extending to approximately 1.15m begl underlain by loose clayey gravel of flint with soft brown clayey pockets, extending to approximately 3.80m begl. Locally, at the northern extent of Trench 1, potential Natural Strata was encountered commencing at 3.80m begl comprising very soft grey clayey Silt. Trench 1 was extended from the wharf wall to approximately 11.85m northward.

  The ground conditions in Trench 2 also comprised medium dense brown clayey sandy gravel and cobbles of chalk. Trench 2 was extended to a maximum depth of approximately 1.50m begl and terminated upon identifying 4No. further ground anchor cables east of Trench 1. Trench 2 was extended from Trench 1 to approximately 12.90m eastwards.

- Free Wharf (2015 Works) – The trenches at both locations revealed multiple concrete slabs with the upper layer comprising hard reinforced concrete to 0.27m begl, underlain locally by secondary slabs to a maximum depth of 0.70m begl, and within Trench A, railway timbers considered to be a remnant of the former travelling crane known to run parallel to the wharf sea wall. Beneath the surface materials, Made Ground was encountered comprising: loose sandy flint Gravel or loose and medium dense brown clayey gravel of chalk and flint which extended to a maximum depth of 2.65m but was not fully penetrated. Locally, large fragments of concrete slab, concrete block with a mooring chain and buried railway timbers were revealed. The Made Ground was noted to be unstable, and water ingress occurred in Trench E at 2.70m begl (noted to be high tide at the time).

5.3.2 Underground Structures

Several underground structures were identified comprising steel sheet piles, concrete walls/foundations, anchor blocks and steel anchor ties.

<u>Tarmac Wharf (2013 Works)</u>

- Sea Wall and Steel Cable- Initial visual inspections at the sea wall revealed potentially two concrete walls (totalling 1.075m wide, including a 75mm central gap) apparently tied by an anchor. The initial trial pit revealed that the walls extended to a depth of 1.15m begl and that these were positioned adjacent to the inner (i.e. northern) side of the steel sheet piles of the sea wall. A 65mm diameter steel ground anchor penetrated the inner (northernmost) concrete wall at 0.70m begl. The steel cable was noted to be corroded with a thin layer of rusted residual metal on the outer surface.

- Concrete Structure – Approximately 5.15m from the northern elevation of the sea wall, a second concrete structure was encountered at ground level. This was 0.45m wide and extended to approximately 1.15m begl. This structure may have been a foundation for a former crane gantry that was apparently located in this area of the site and may be potentially present on the aerial photograph shown in Figure No. 31149/GA6 in Appendix II. The steel anchor tie was noted to pass under the possible foundation at an approximate depth of 2.20m begl.

- Possible Ground Anchor - Approximately 11.85m from the north elevation of the sea wall, a third concrete structure was encountered at an approximate depth of 3.20m begl. The steel anchor cable was noted to enter the southern side of the concrete. It was not possible to ascertain the width or base of the structure. It was however noted that there appeared to be wooden cladding on the sides of the concrete and potential Natural Strata (soft Silt) was excavated from this vicinity. This structure was deemed to potentially comprise a ground anchor block. This was in close proximity to the concrete conveyers and hopper structures.

- Ground Anchor Spacing – A second trench (Trench 2) revealed a further 4No. ground anchor ties at intervals of 3.45m, 3.10m, 3.20m and 3.15m respectively east of Trench 1.

Free Wharf (Current Works)

- Trench A revealed a 65mm diameter steel cable at a depth of 0.95m begl. The trench was extended westwards to reveal a second steel cable 3.60m from the first cable at a depth of approximately 1.95m begl. A second trench (designated Trench B) was then advanced from Trench A, perpendicular to the wharf wall to attempt to reveal the ground anchor. The cable within Trench B was revealed at a depth of 2.05m begl and tied into a concrete structure located approximately 15.55m north of the sea wall. Trench B was extended further north as Trench B1 which revealed the anchor point to comprise a concrete structure at a depth of 1.10m begl, and 0.44m wide. The concrete structure was noted to have a steel lifting key set within the top of the concrete.

- A third trench (Trench B3) was excavated east to west to attempt to reveal the northern face of the concrete structure. The northern face was revealed to be a concrete block with a low pyramidal structure and a centrally located black steel anchor plate and bolt. The full width of the block was not exposed, however,the distance between the top of the block (1.10m begl) and the top of the anchor bolt (1.70m begl) was 0.60m, therefore assuming a symmetrical shape to the block an approximate depth to the base of the block may be assumed as 2.30m begl (0.60m x 2 = 1.20m, plus the block depth of 1.10m = 2.30m begl).

- Trench C revealed a 65mm diameter steel cable at a depth of 1.75m begl. The trench was extended eastwards to reveal a second steel cable 2.30m from the first cable at a depth of approximately 1.80m begl. A second trench (designated Trench D) was then advanced north of Trench A, perpendicular to the wharf wall to attempt to reveal the ground anchor for the western cable. The cable was not uncovered within Trench D since the trench was located using the information previously gained to attempt to target the concrete anchor point. The top of the anchor block was located approximately 15.20m north of the sea wall. Trench D was extended further north which revealed the anchor point to comprise a concrete structure at a depth of 0.65m begl, and 0.44m wide. The concrete structure was noted to have a steel lifting key set within the top of the concrete.

- A third trench (Trench E) was excavated east to west to attempt to reveal the northern face of the concrete structure for both cables revealed in Trench C. The northern face of both anchors was revealed to be a concrete block with a low pyramidal structure and a centrally located black steel anchor plate and bolt.

- The western anchor block was uncovered more than the eastern block and revealed the block to be 0.44m wide. The top of each block was at a depth of 0.65m begl (western block) and 0.95m begl (eastern block). The two blocks were noted to be approximately 0.50m apart. The distance between the top of the western block (0.65m begl) and the top of the anchor bolt (1.65m begl) was 1.00m, therefore assuming a symmetrical shape to the block an assumed depth to the base of the block was taken as 2.65m begl (1.00m x 2 = 2.00m, plus the block depth of 0.65m = 2.65m begl).

- The distance between the two anchor plates and bolts was approximately 2.80m. The eastern anchor block was not fully exposed but it was noted that the top of the block was at a depth of 0.95m begl, and the depth to the anchor bolt was 1.95m begl.

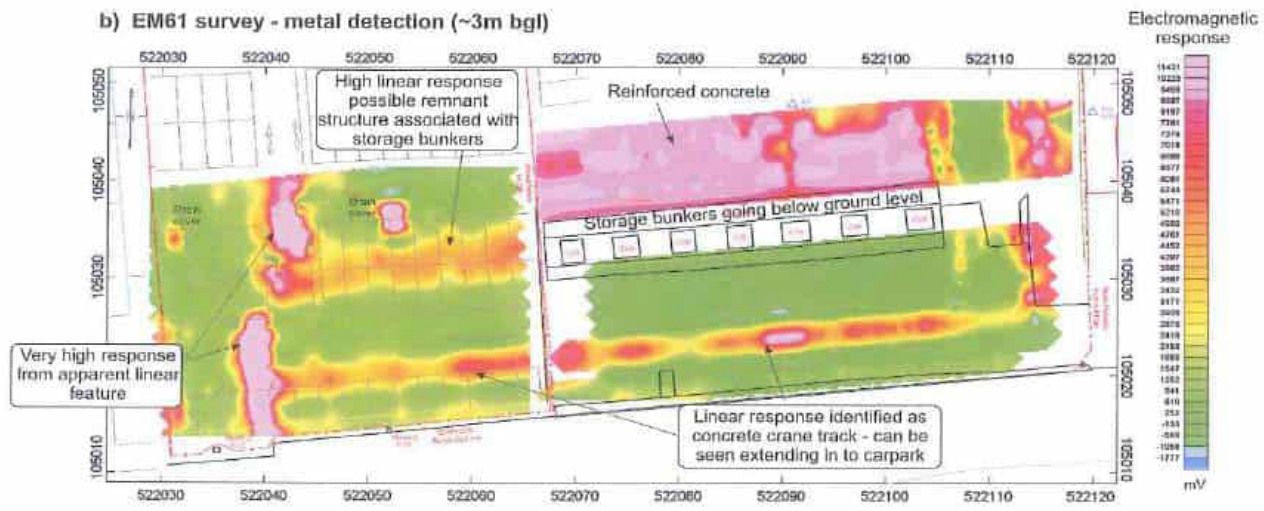
It was not possible to uncover the entirety of each block, therefore the above dimensions and depths are provided in good faith, but cannot be relied upon unless the area of the blocks is fully broken out and excavated.

5.3.3 Geophysical Works (2013)

Geophysical works comprising electromagnetic and magnetic surveys were undertaken within the frosts site and at the southwestern extent of the Minelco site. A third area at the southeastern extent (proposed residential area) was initially scanned by EM methods, but only revealed surface scatter from reinforcement bars within surface concrete.

Tarmac Wharf - Minelco Site – Electromagnetic Survey

We have reproduced the Terradat Figure 2 below which shows the results of the electromagnetic survey across the Frost/Minelco section of Tarmac Wharf. The scan was superimposed by Terradat on a topographical drawing of the site which clearly shows the concrete hopper/conveyor structure. The Frost/Minelco boundary and the parking bays of the Frost car park are also evident.

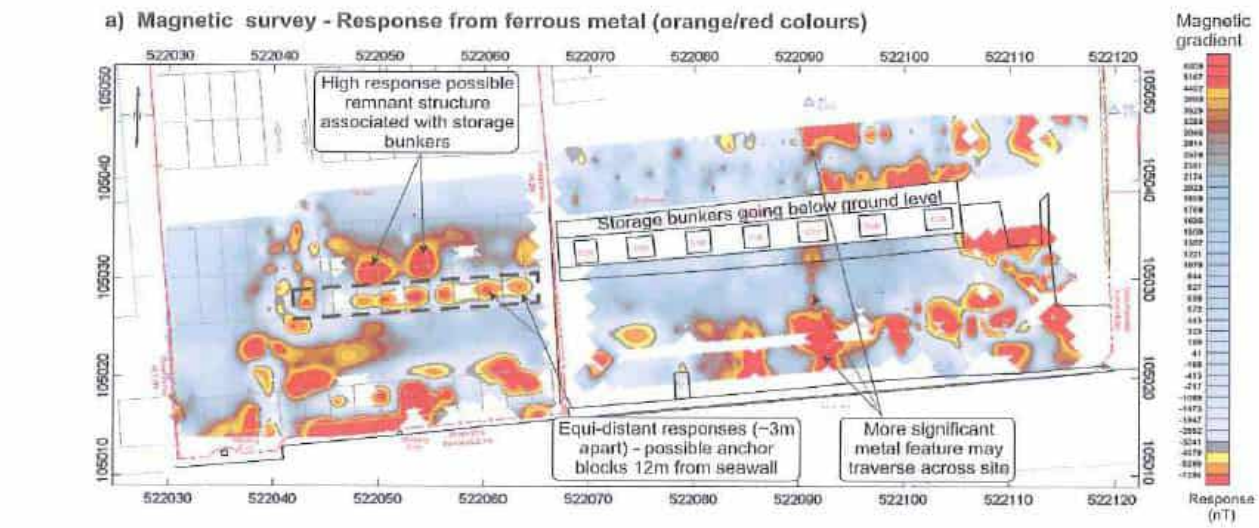


Within the eastern section of the area there is a high linear response approximately 5.00m north of the sea wall which is consistent with the concrete foundation structure identified in Trench 1 as a possible foundation for a former crane. A high response zone at the eastern extent of the area may be buried foundations associated with former structures adjacent to the concrete hoppers and further excavations may confirm this. No further significant features were identified within the Minelco site. The area north of the concrete hoppers comprised reinforced concrete which is shown as an overall high response zone i.e. shows surface scatter.

The linear high response 5.00m from the sea wall continues westward into the Frost site. Approximately 6.00m north of this there is a second linear high response which is reminiscent of a continuation of the concrete hoppers. However, historical maps and aerial photographs do not confirm this (the 1952 historical map reproduced in Appendix II shows the hoppers to extend to the Frost boundary – the area of the Frosts car park had not been re-claimed at this time).

Tarmac Wharf - Minelco Site – Magnetic Survey

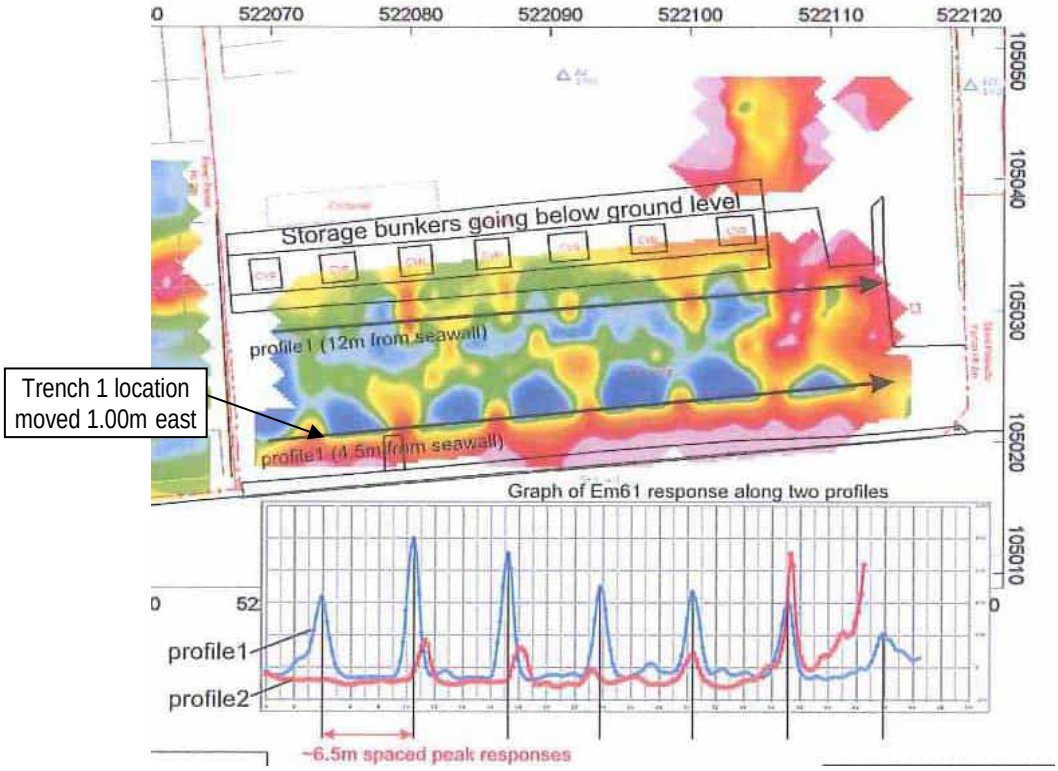
We have reproduced the Terradat Figure 2 below which shows the results of the magnetic survey across the Frost/Minelco section of Tarmac Wharf.



The magnetic survey within the Minelco site does not reveal any further significant features other than potentially a linear metal feature traversing the site south to north (which may be an anchor cable tie). The magnetic survey in the Frost site appears to confirm the presence of a potential structure in line with the concrete hopper structure but also identifies linear equidistant responses approximately 12.00m from the sea wall that may represent further anchor blocks.

Tarmac Wharf - Minelco Site – Electromagnetic Survey (Refined Data)

Terradat produced a third scan showing refined electromagnetic data which revealed regularly spaced peaks at approximately 6.50m intervals across the Minelco area which may be associated with alternate anchor tie bars



Indeed, the second peak response from the left of the graph is in line with Trench 1 which is indicated in the south of the profile drawing.

The location of Trench 1 is approximately 1.00m east of the Terradat surveyed location, the position was moved the following day to coincide with the identified potential anchor tie bar within the wall construction.

5.4 Water

Water seepage was revealed in Trench 1 at an approximate depth of 3.80m begl. Water was also noted to enter trench E at a depth of 2.70m begl (the tide was approaching High Tide at the time).

5.5 Excavation Stability

The sidewalls of Trench 1 became unstable in the Made Ground during site works. The sidewalls of Trench A, Trench C and Trench E became unstable during excavation.

5.6 Plates

A photographic record of the exploratory investigation was obtained during both phases of the intrusive works, with selected photographs of the revealed structures and cables provided on Plates GA1 to GA15 included in Appendix VI.

5.7 Visual and Olfactory Evidence of Contamination

No visual or olfactory evidence of gross hydrocarbon contamination was observed during the course of the trenching works.

6.0 LABORATORY TESTING & CONTAMINATION ASSESSMENT

6.1 Introduction

The following initial environmental soil testing was carried out in 2012 on visually representative samples recovered from the exploratory holes, broadly based on the land use assessment for the site provided in our previous report.

The following represented an initial chemical assessment and was not intended as a detailed programme of assessment, which would be undertaken as part of supplementary works.

- 18 No. Standard contamination suites (including speciated PAH and Total Organic Carbon).
- 14No. speciated fraction banded Total Petroleum Hydrocarbon (TPH) tests.
- 4No. Asbestos Identification Screens.
- 3No. Waste Acceptance Criteria (WAC) tests

Geotechnical soil testing comprised the following.

- 7No Plasticity Index (PI) tests.
- 10No. Water soluble sulphate tests.
- 22No. pH tests.

The current works (primarily located within internal areas of the site) comprised supplementary testing to compliment the previous works.

- 15 No. Standard contamination suites (including speciated PAH and Total Organic Carbon).
- 18No. speciated fraction banded Total Petroleum Hydrocarbon (TPH) tests.
- 6No. Volatile Organic Compound and Semi-Volatile Organic Compound (VOC/SVOC) screens.
- 9No. Polychlorinated Biphenyl (PCB) screens.
- 8No. Asbestos Identification Screens.

Geotechnical soil testing comprised the following.

- 5No Plasticity Index (PI) tests.
- 4No. Water soluble sulphate tests.
- 15No. pH tests.

The laboratory soil test results from both phases of works are presented in Appendix VII of this report.

6.2 Geotechnical Soil Test Results

Water Soluble Sulphate/pH

Water soluble sulphate testing was undertaken on 14No. soil samples (5No. Made Ground and 9No. Natural Strata) and revealed concentrations of <0.1 to 1.2 g/l SO_4. The pH values of the soil samples analysed ranged between 7.2 and 11.0.

Adopting the mean of the highest 20% of water soluble sulphate concentrations (0.67 g/l) and the mean of the lowest 20% of the pH values (7.6), in accordance with the Building Research Establishment publication Special Digest 1 '*Concrete in Aggressive Ground*' (2005) the site falls into Design Sulphate Class DS-2 and an Aggressive Chemical Environment for Concrete (ACEC) classification of AC-2. The foregoing designation assumes a brown field location with mobile groundwater.

The foregoing designation confirms our previous works.

Plasticity Index Testing

Plasticity Index (PI) testing was undertaken on 12No. samples of visually cohesive Natural Strata.

In accordance with BRE Digest 240 '*Low-rise buildings on shrinkable clay soils: Part 1*' (1993) and NHBC standards chapter 4.2-D5(b) the reported PI value may be modified based on the portion of the sample retained on the 425μm sieve.

The results of the PI analysis are summarised in Table 2.

TABLE 2 – SUMMARY OF PLASTICITY INDEX (PI) DATA

Sample Ref.	Reported PI Value (%)	Portion Passing 425μm Sieve (%)	Modified PI Value (%)	Volume Change Potential
BH1, 12.0m	13	80	10	Low
BH2, 2.50m	18	94	17	Low
BH3, 3.80m	NA	NA	NA	Non Plastic
WS2, 1.50m	19	91	17	Low
WS6, 3.00m	26	93	24	Medium
WS10, 2.80m	16	94	15	Low
WS17, 2.75m	31	97	30	Medium
WS21, 4.00m	27	95	26	Medium
WS24, 2.00m	NA	NA	NA	Non-Plastic
WS25, 3.75m	12	90	11	Low
WS29, 2.90m	25	100	25	Medium
WS31, 2.75m	37	100	37	Medium

In accordance with BRE Digest 240/NHBC Standards Chapter 4.2, the adjusted PI values reveal that the Natural Strata comprising Clay and Chalk may be classified as having a variable low and medium volume change potential. Locally, superficial deposits were shown to be non-plastic. The medium volume change potential classification should be used for design purposes. This is considered typical for the type of soils encountered at the site and may be considered representative of the site conditions.

6.3 Contamination Assessment Rationale

It is understood that it is proposed to redevelop the site with a primarily high rise residential end use. We have selected the Residential (POS1) CIEH/LQM category as being the most appropriate assessment criteria for the site for a Tier 1 contamination assessment.

6.4 Appropriate Guidance

Reference has been made to documents reflecting current best practice, including (but not limited to) the following:

- Environment Agency Contaminated Land Report 11 '*Model Procedures for the Management of Land Contamination*', September 2004, ISBN: 1844322955.
- British Standard BS10175:2011+A1:2013, '*Investigation of potentially contaminated sites. Code of practice*', March 2011.
- Nathanial, C.P., McCaffrey, C. Gillett, A.G, Ogden, R.C. and Nathanial, J.F 2015. '*The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham. "Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3026. All rights reserved."*'
- DEFRA publication '*SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*', Final Project Report (Revision 2), dated 24th September 2014 and Erratum dated December 2014.
- DEFRA publication '*SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*' – Policy Companion Document, dated December 2014.
- EIC/AGS/CL:AIRE publication '*Soil Generic Assessment Criteria for Human Health Risk Assessment*', January 2010, ISBN 978-1-905046-20-1.
- Department of Environment, Food and Rural Affairs (DEFRA) and the Environment Agency publication – *'Contaminated Land Exposure Assessment (CLEA) model'* (March 2002).
- Environment Agency Science Report, *'Using Soil Guideline Values'*, SC050021/SGV, March 2009.
- R & D Draft Technical Report P5-079/TR1 *'Review of the Fate and Transport of Selected Contaminants in the Soil Environment'* dated 2003.
- CL:AIRE/CIEH *'Guidance on Comparing Soil Contamination Data with a Critical Concentration'* (May 2008).
- Environment Agency Science Report SC050021/SR7 *'Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values',* dated November 2008, ISBN 978-84432-964-9.
- Environment Agency Science Report Final SC050021/SR2 *'Human health toxicological assessment of contaminants in soil',* dated January 2009, ISBN 978-84432-858-1.
- Environment Agency Science Report SC050021/SR3 *'Updated technical background to the CLEA model',* dated January 2009, ISBN 978-84432-856-7.
- Environment Agency Science Report SC050021/SR4 *'CLEA Software (Version 1.05) Handbook',* dated September 2009, ISBN 978-1-84911-105-8.

6.4.1 Selection of Appropriate Tier 1 Screening Values

Soil Guideline Values/Generic Assessment Criteria (SGV/GAC)

The assessment of contaminated land in the UK was historically undertaken with reference to ICRCL Guidance Note 59/83 together with successive versions of the CLEA model (inc. CLEA2002 (2002), CLEA UK (2005), CLEA V1.03 beta (2008), CLEA V1.04 (January 2009), CLEA V1.05 (September 2009) and CLEA V1.06 (October 2009)).

The CLEA V1.06 model is a deterministic quantitative risk assessment (QRA) model, which has historically been utilised by the Environment Agency to produce Soil Guideline Values (SGVs) for several contaminants, and has been used and modified by the authors of the LQM/CIEH S4UL publication and the authors of the DEFRA SP1010 series of documents in the derivation of their respective human health screening values.

Of key importance is the basis on which these two differing sets of commercially available screening criteria have been created, with the SP1010 values reflective of a '*Low Level of Toxicological Concern*' (LLTC) and the S4UL values based on a '*Minimal Risk Level*' (MRL).

Based on our understanding of current good practice within the contaminated land field, we have adopted the S4UL values (representing a compatible approach to risk assessments undertaken since the initial derivation of the CLEA model, and based on an established and fully justifiable methodology) as our initial Generic Assessment Criteria (GAC) values for human health. In the absence of a suitable S4UL value (such as lead), reference has been made to the relevant C4SL, and these have been adopted where considered justifiable and as appropriate (further consideration of their use is provided below).

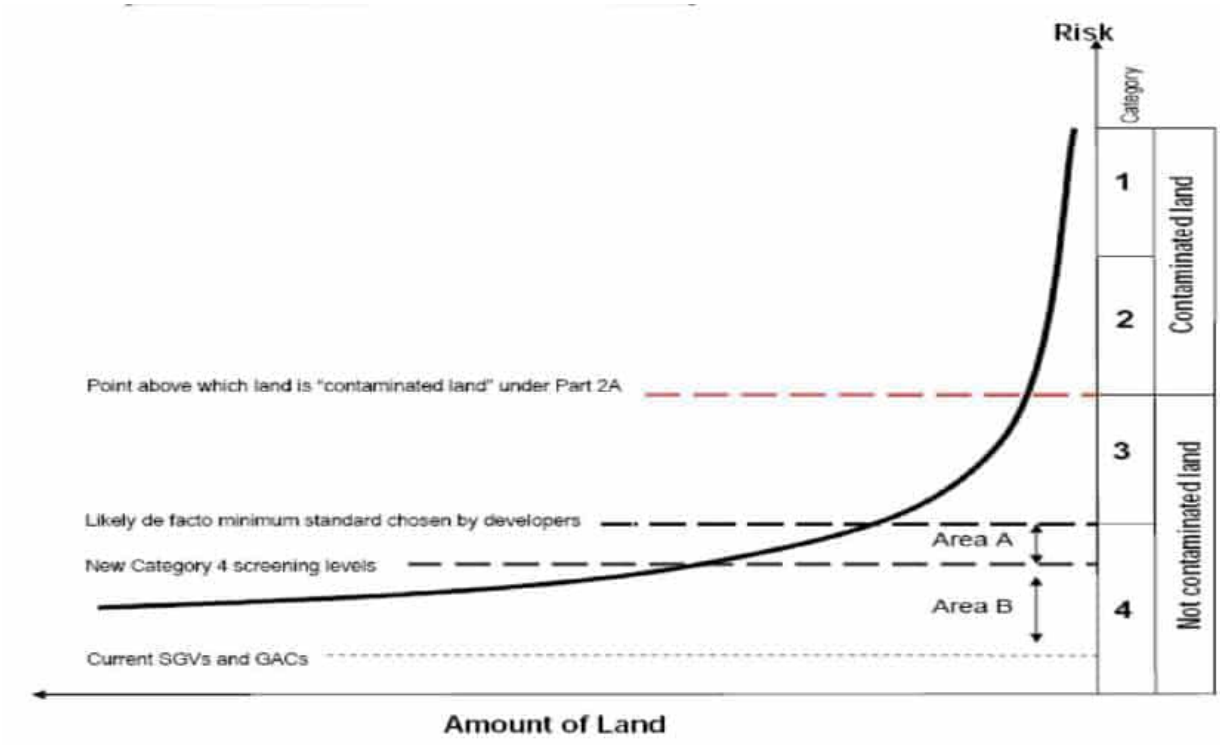
We would additionally note that other GAC values are commercially available, such as the Atkins ATRISKSOIL values (to which GeoDyne subscribe) and the EIC/AGS/CL:AIRE values for organic substances; and these have been referred to where relevant to the site.

Category 4 Screening Levels

Revised Statutory guidance for the assessment of land under Part 2A of the Environmental Protection Act 1990 was published by the Department for Environment, Food and Rural Affairs (Defra) in April 2012. The guidance introduced a new four-part category system for classifying land under Part 2A; Section 4.17 of the Guidance states:

'*In deciding whether or not land is contaminated land on grounds of significant possibility of significant harm to human health, the local authority should use the categorisations described in paragraphs 4.19 – 4.30...Categories 1 and 2 would encompass land which is capable of being determined as contaminated land on the grounds of significant possibility of harm to human health. Categories 3 and 4 would encompass land which is not capable of being determined on such grounds'.*

The foregoing categories are depicted in diagrammatical form in the following graph (taken from Defra publication SP1010):



Defra has subsequently commissioned the production of Category 4 Screening Levels (C4SLs) for a total of six substances (cadmium, benzo(a)pyrene, benzene, arsenic, lead and chromium VI), which are detailed within the SP1010 document titled '*Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document*', dated March 2014. The C4SL values represent a level below which a contaminant concentration is considered to have a 'Low' risk to human health. The C4SL values are stated within the SP1010 document (page 7) as still remaining '*strongly precautionary*' and represent a more pragmatic approach to contaminated land risk assessment than the minimal risk values represented by the SGV/GAC levels.

In addition to the use of C4SLs in contaminated land risk assessment, the SP1010 document states the following with respect to background levels of contaminants:

'The outputs of Defra-funded research to determine 'normal' background concentrations of various contaminants in England and Wales and the outputs of this research project to develop new screening levels for contaminants in soil, are both designed as tools to be used by contaminated land risk assessors to inform decisions about whether or not it is necessary to proceed to a Detailed Quantitative Risk Assessment (DQRA) on a particular site taking into account the broad aims of the regime as set out in Section 1 of the Statutory Guidance. Questions have been raised about how these tools relate and interact.

41. Ultimately, it is up to individual risk assessors to make the most appropriate decisions on a site-by-site basis and to use the most appropriate tools in each case. However, with reference to the Part 2A Statutory Guidance, which states that 'normal' background concentrations should not be considered to cause a site to be determined as contaminated under Part 2A unless there is a reason to consider otherwise, it is envisaged that, where available, Category 4 Screening Levels should be the initial value against which site concentrations can be compared. Where a value on a particular site exceeds the Category 4 Screening Level for that substance, reference can then be made to the normal background concentration for that contaminant in that area. If concentrations are higher than the relevant Category 4 Screening Level but within 'normal' background concentrations for that area, it is not envisaged that a site would be determined as contaminated under Part 2A (unless there was a reason to consider otherwise).

42. The British Geological Survey has derived 'normal' background concentrations for lead for England and Wales. In England, the 'normal' background concentrations of lead are 180 mg/kg for the 'principal' domain, 2,400 mg/kg for the 'mineralisation' domain and 820 mg/kg for the 'urban' domain (Defra, 2012) (see table below). In Wales the 'normal' background concentrations are 230 mg/kg for the 'principal' domain, 280 mg/kg for the 'mineralisation' domain and 890 - 1300 mg/kg for the 'urban' domain (Defra, 2013). Current advances in our understanding of the toxicology of lead have resulted in Category 4 Screening Levels for Residential, Allotments and Public Open Space 1 that are lower than the 'normal' background concentration of lead in ***urban*** *areas. This was also the case for the (now withdrawn) Soil Guideline Value for lead of 450 mg/kg.*

43. The report identifies other relevant considerations that may have a bearing on the final choice of Category 4 Screening Levels and the background level in soil is one of these. A pragmatic approach for lead would be to recommend the use of the 'normal' background concentration when the land use and domain permit (for example, providing other site and contaminant specific characteristics such as chemical form, bioavailability, soil depth, site use, etc. are comparable between the background and the site under investigation) so as not to disproportionately target land where there is widespread diffuse pollution of lead.

Normal background concentrations of contaminants in England

Substance	Principal domain	Urban domain	Mineralisation domain 1	Mineralisation domain 2	Ironstone	Chalk South
Arsenic	32 mg/kg		290 mg/kg		220 mg/kg	
Benzo-a-pyrene	0.5 mg/kg	3.6 mg/kg				
Cadmium	1.0 mg/kg	2.1 mg/kg	17 mg/kg	2.9 mg/kg		2.5 mg/kg
Lead	180 mg/kg	820 mg/kg	2400 mg/kg			

Where a valid Soil Guideline Value exists for a contaminant where a Category 4 Screening Level has also been derived, it is anticipated that risk assessors will use the Category 4 Screening Level in line with the Part 2A Statutory Guidance. In the absence of a suitable C4SL, risk assessors should identify and select appropriate generic assessment criteria in accordance with established good practice....'

The approach indicated in the SP1010 document has been adopted in this report (as appropriate).

National Planning Policy Framework (NPPF)

In relation to the requirements of a contaminated land risk assessment, the Department for Communities and Local Government publication titled '*National Planning Policy Framework*' (NPPF), dated March 2012, provides the following commentary:

'*121. Planning policies and decisions should also ensure that:*

- *the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;*

- *after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and*

- *adequate site investigation information, prepared by a competent person, is presented.*'

The Defra SP1010 document states: '***The Part 2A Statutory Guidance and accompanying Impact Assessment were developed on the basis that Category 4 Screening Levels could be used under the planning regime, as they would be in Part 2A investigations directly***' [GeoDyne emphasis added].

Summary

Taking account of the foregoing, we consider that industry good practice is currently best represented by GAC (variously LQM/CIEH, Atkins ATRISKSOIL or EIC/AGS/CL:AIRE) that adopt a MRL as the basis for its derivation. In the case of Lead (which is modelled on blood lead concentrations rather than typical exposure scenarios applicable to other contaminants), the relevant C4SL value has been adopted, as this incorporates the most up-to-date toxicological information in the derivation of the various end-use specific screening criteria.

In relation to the remaining C4SL values, these have been adopted as a second tier of generic assessment criteria, and may be utilised where the GAC has been exceeded at a Tier 1 generic level and where justified in a site-specific context. Whilst representing a LLTC, the C4SL values are considered to represent a suitably conservative assessment tool, given that they fall comfortably within Category 4.

In the following sections, screening criteria have collectively been referred to as Generic Assessment Criteria (GAC). The GAC values adopted for the current assessment are primarily the S4UL values assuming a residential end use (POS1) based on the scenario proposed by CIEH/LQM, and the values are detailed in the tables included in Section 6.7.

Note that the soil test results from both phases of investigation have been combined to form a single dataset for the entire site. Four samples from WS1, WS3 and WS4 were located in the Frost Vauxhall site (now no longer part of the current site). However, these results cannot be removed from the previous test certificates and so have been included in the assessment since the ground conditions encountered were typical for the general vicinity.

6.4.2 Selection of Soil Organic Matter (SOM) Content

The SOM content and soil type are used to provide an assessment of the applicability of the Tier 1 SAC adopted (the CLEA SGV are based on the default assumption of a UK Sandy Loam soil with 6% SOM, whilst the LQM GAC values are based upon SOM of 1%, 2.5% and 6%, as applicable).

Determinands have in the first instance, been compared to standard CLEA SGVs together with CIEH/LQM GAC (adopting a conservative SOM of 1%). For BTEX determinands, GeoDyne has utilised CLEA V1.04 final to derive SGVs relevant to 1% and 2.5% SOM. Where the determinand exceeds the relevant SAC at 1% SOM, a site specific SOM may be adopted as appropriate to derive new GAC and the dataset reassessed.

6.5 Statistical Considerations

Statistical tests relating to contaminated land, typically referred to as a Mean and Maximum Value Tests, were detailed in Department for Environment, Food and Rural Affairs and The Environment Agency publication CLR 7 '*Assessment of Risks to Human Health From Land Contamination: An Overview of the Development of Soil Guideline Values and Related Research*', dated 2002, ISBN 1-857-05732-5. This guidance was superseded by publication of CL:AIRE/CIEH '*Guidance on Comparing Soil Contamination Data with a Critical Concentration*' dated May 2008.

6.5.1 Null and Alternative Hypothesis

In consideration of statistical guidance jointly published by CL:AIRE/CIEH '*Guidance on Comparing Soil Contamination Data with a Critical Concentration*', statistical convention requires consideration of the Null Hypothesis (expressed as H_o) or an Alternative Hypothesis (expressed as H_1). Appropriate statistical tests are then applied to the data to assess whether the strength of evidence favours the Null or the Alternative Hypothesis.

For the purpose of the following contamination assessments and in accordance with the CL:AIRE/CIEH guidance the key question for the site is as follows.

Question - '*Is there sufficient evidence that the true mean concentration of a contaminant in soil (μ) is less than some critical concentration (Cc)?*'

The Null and Alternative hypotheses are therefore defined as follows.

The Null Hypothesis (H_o)

$\mu \geq Cc$ (i.e. Tier 1 or 2 Assessment Criteria).
The Alternative Hypothesis (H_1) (the question the selected statistical test is designed to answer)

μ < Cc (i.e. Tier 1 or 2 Assessment Criteria).

6.5.2 95th Percentile Upper Confidence Level Mean Values

The selected relevant statistical assessment undertaken to evaluate the Null and Alternative Hypotheses requires consideration of the 95th Percentile Upper Confidence Level Mean value (this is abbreviated as the UCL). The UCL value takes account the number of samples tested, the data set mean and the standard deviation of the data set and applies a correction factor to take account of the uncertainty of the data set.

The CL:AIRE/CIEH guidance states that '*…since the 95% UCL is at most times greater than the true population mean, it follows that if the 95% UCL is less than Cc, the assessor will know (with a defined high level of confidence) that the true population mean (μ, the value which is not known) is also likely to be less than Cc*'.

6.5.3 Considerations for Appropriate Dataset(s)

The CL:AIRE/CIEH statistical guidance requires consideration of the appropriateness of the dataset being subjected to the statistical testing and notes the following three key elements to be considered.

- Consideration of any non-detects within the dataset.
- Consideration of potential outliers within the dataset.
- Consideration of the statistical distribution of the data (i.e. normality/non normality).

6.5.4 Consideration of Normality of Dataset

CL:AIRE/CIEH statistical guidance notes that the choice of statistical test to be applied to the dataset will depend on the assumptions about the distribution of the data being tested. The assumptions of the statistical test adopted therefore must be appropriate to the distribution assumptions of the data being considered.

The CL:AIRE/CIEH statistical guidance details the following two key statistical tests.

- **The one-sample t test** - assumes the data being assessed is approximately normally distributed.
- **The one-sided Chebychev Theorem** - assumes the data being assessed does not demonstrate normality (method makes no assumption about the shape of the distribution).

CL:AIRE/CIEH statistical guidance, however notes '*…with large datasets, minor deviations from normality may be flagged as statistically significant even though small deviations from a normal distribution will not affect the reliability of the one sample t-test*'. The guidance goes on to note '*Conversely, datasets with a small sample size more easily pass normality tests.* ***Failing, however to detect non-normality in a small dataset is unlikely to compromise the validity of the one sample t-test***' [GeoDyne emphasis added].

CL:AIRE/CIEH statistical guidance further notes '*When considering which of the two tests to use, however, assessors should bear in mind that, in general, the one-sample t-test is more powerful that the method based on the Chebychev Theorem…****Given that the one sample t-test is also not sensitive to moderate departures from normality, it is recommended that assessors use the t-test unless there is good evidence that the dataset departs significantly from normality***' [GeoDyne emphasis added]**.**

On the basis of the above, an assumption of data normality has been made and the one-sample t-test adopted accordingly.

6.5.5 Consideration of Non-Detects within the Dataset.

The dataset may reveal the presence of non-detects for a number of the determinands tested. Where this occurs, we have adopted the LOD as the chemical concentration, which provides a suitably conservative approach.

However, please note that SACs have only been used for determinands where they are present at concentrations in excess of the LOD on at least one occasion.

6.5.6 Consideration of Outliers

The CL:AIRE/CIEH statistical guidance advises that '…*if outliers are identified, assessors have to decide whether they represent genuine soil concentrations or are the result of an error*'.

The guidance further notes that outliers should only be excluded from a dataset where they '…*are obviously and demonstrably the result of an error that can be identified and explained*' or '…*clearly indicate that more than one soil population exists within the dataset and this can be justified by (or informs the further development of) the conceptual model- in which case the different population expressed by the outlier(s) should be explored in more detail*'.

Taking account of the foregoing, we have adopted a policy of interrogating the relevant dataset to calculate the UCL and to ascertain the possible presence of statistical outliers (where relevant). At this point the possible relevance of statistical outliers to the interpretation of the data is considered, in accordance with the following matrix.

TABLE 3 OUTLIER DECISION MATRIX

	UCL < GAC	UCL > GAC
Outlier Test reveals No Hotspot(s)	Determinand present at acceptable concentrations.	Pervasive contamination present in soil at unacceptable concentrations.
Outlier Test reveals Hotspot(s)	Determinand present at acceptable concentrations. Possible second population identified. Only of potential concern where outlier is at an individual concentration in excess of the Tier 1 SAC.	Pervasive contamination present in soil at unacceptable concentrations with possible hotspots of contamination identified.

It should be noted that where the UCL of a determinand, and all individual determinand concentrations, is below the SAC, the Outlier Test has not been interrogated/interpreted.

6.5.7 CLEA Averaging Area

The CLEA Model requires consideration of an averaging area, i.e. an area within which the UCL is calculated and compared to the Tier 1 SAC. Within our assessments the entire site area has been adopted as the averaging area in the first instance.

6.6 Sampling Strategy

Our sampling strategy for the site is based on the land use assessment provided in our previous report and the proposed site use, together with the current setting of the site and the ground conditions encountered during our works.

The ground conditions encountered during our previous and current Phase II works revealed the presence of two predominant soil types i) Made Ground (predominantly materials used to reclaim the land) and, ii) underlying Natural Strata.

Representative samples of these materials were obtained during our Phase II works from across the site, with selected near surface samples subjected to chemical analysis for a suite of contaminants deemed appropriate based on our Land Use Assessment.

6.7 Contamination Soil Test Results

6.7.1 Made Ground

Our Tier 1 contamination assessment for the Made Ground at the site is summarised in Table 4. For the purposes of this assessment we have combined the data from the previous 2012 and current 2015 works. Please note that only those determinands elevated above the limit of detection of the laboratory method of analysis have been included in our Tier 1 assessment.

TABLE 4 – SUMMARY OF TIER 1 SITE ACCEPTANCE CRITERIA DATA ASSESSMENT RESIDENTIAL POS (POS1) END-USE – MADE GROUND

Contaminants – Potentially Harmful to Human Health	No. of Samples Tested	Concentration Range (mg/kg)	Tier 1 GAC (mg/kg)	C4SL (mg/kg)	UCL (mg/kg)	Tier 1 GAC Exceeded @ UCL (Yes/No)
Metals						
Arsenic	21	7.3-110	79 S4UL	37		Yes
Cadmium	21	<1-1	120 S4UL			No
Chromium III	21	5.4-130	1500 S4UL	-		No
Lead	21	29-6300	630 C4SL	-		Yes
Selenium	21	<3-3	1100 C4SL	200		No
Inorganic Mercury	21	<1-1	120 S4UL			No
Nickel	21	5.9-130	230 S4UL	-		No
Copper	21	4.2-8500	12000 S4UL			No
Zinc	21	18-2800	81000 S4UL	-		No
PAHs						
Acenaphthene	21	<0.1-18	1500 S4UL			No
Acenaphthylene	21	<0.1-1.4	1500 S4UL			No
Anthracene	21	<0.1-88	74000 S4UL	-		No
Benzo(a)anthracene	21	<0.1-230	29 S4UL	-		Yes
Benzo(a)pyrene	21	<0.1-160	5.7 S4UL	5		Yes
Benzo(b)fluoranthene	21	<0.1-170	7.1 S4UL	-		Yes
Benzo(k)fluoranthene	21	<0.1-110	190 S4UL			No
Benzo(ghi)perylene	21	<0.1-90	640 S4UL	-		No
Chrysene	21	<0.1-190	15 S4UL	-		Yes
Dibenzo(ah)anthracene	21	<0.1-23	0.57 S4UL	-		Yes
Indeno(123cd)pyrene	21	<0.1-76	82 S4UL			No
Fluoranthene	21	<0.1-370	3100 S4UL	-		No
Fluorene	21	<0.1-22	9900 S4UL	-		No
Naphthalene	21	<0.1-1.7	4900 S4UL	-		No
Phenanthrene	21	<0.1-360	3100 S4UL	-		No
Pyrene	21	<0.1-310	7400 S4UL	-		No

TABLE 4 – SUMMARY OF TIER 1 SITE ACCEPTANCE CRITERIA DATA ASSESSMENT RESIDENTIAL POS (POS1) END-USE – MADE GROUND						
Contaminants – Potentially Harmful to Human Health	No. of Samples Tested	Concentration Range (mg/kg)	Tier 1 GAC (mg/kg)	C4SL (mg/kg)	UCL (mg/kg)	Tier 1 GAC Exceeded @ UCL (Yes/No)
Key S4UL – LQM/CIEH S4ULs for Human Health Risk Assessment, 2015. Copyright Land Quality Management Limited reproduced with permission; publication number S4UL3026. C4SL – Category 4 Screening Level. Detailed within DEFRA SP1010 Policy Companion Document dated December 2014. **Geometric Mean						

The assessment of the Made Ground soil test results has revealed individual exceedences within the Made Ground in excess of the residential (POS1) end use Tier 1 SAC for the following contaminants:

- Arsenic - Within boreholes WS17 and WS24.
- Lead – Within boreholes WS17, WS24 and WS33.
- Benzo(a)anthracene – Within borehole WS28
- Benzo(a)pyrene – Within boreholes WS1, WS17, WS23, WS28 and WS33
- Benzo(b)fluoranthene – Within boreholes WS1, WS8, WS17, WS28 and WS33
- Chrysene – Within boreholes WS17 and WS28
- Dibenzo(ah)anthracene – Within boreholes WS1, WS8, WS17, WS23, WS28, WS32 and WS33.

At this stage, taking account of the nature of the sites historical usage, the widespread presence of a variety of Made Ground (due to land reclamation in the late 1800s and early to mid-1900s) and the proposed primarily high rise residential end use (with managed public open space i.e. residential POS1 end use), it was considered not to be necessary to undertake further chemical assessment of the dataset in accordance with CL:AIRE guidance.

Therefore, the Made Ground may be considered to be contaminated with respect to Arsenic, lead and PAH compounds.

The remaining determinands were found to be present at individual concentrations below the appropriate Tier 1 SAC for a residential end use (Residential POS1) or Limit of Detection of the method of analysis.

6.7.2 Natural Strata

Our Tier 1 contamination assessment for the Natural Strata at the site is summarised in Table 5. Please note that only those determinands elevated above the limit of detection of the laboratory method of analysis have been included in our Tier 1 assessment.

TABLE 5 – SUMMARY OF TIER 1 SITE ACCEPTANCE CRITERIA DATA ASSESSMENT RESIDENTIAL POS (POS1) END-USE – NATURAL STRATA						
Contaminants – Potentially Harmful to Human Health	No. of Samples Tested	Concentration Range (mg/kg)	Tier 1 GAC (mg/kg)	C4SL (mg/kg)	UCL (mg/kg)	Tier 1 GAC Exceeded @ UCL (Yes/No)
Metals						

TABLE 5 – SUMMARY OF TIER 1 SITE ACCEPTANCE CRITERIA DATA ASSESSMENT RESIDENTIAL POS (POS1) END-USE – NATURAL STRATA						
Contaminants – Potentially Harmful to Human Health	No. of Samples Tested	Concentration Range (mg/kg)	Tier 1 GAC (mg/kg)	C4SL (mg/kg)	UCL (mg/kg)	Tier 1 GAC Exceeded @ UCL (Yes/No)
Arsenic	12	5-25	79 S4UL	37		No
Cadmium	12	<1-1.0	120 S4UL			No
Chromium III	12	7-21	1500 S4UL	-		No
Lead	12	7-270	630 C4SL	-		No
Nickel	12	7-17	230 S4UL	-		No
Copper	12	6-140	12000 S4UL			No
Zinc	12	22-150	81000 S4UL	-		No
PAHs						
Anthracene	12	<0.1-1.1	74000 S4UL	-		No
Benzo(a)anthracene	12	<0.1-1.0	29 S4UL	-		No
Benzo(a)pyrene	12	<0.1-1.6	5.7 S4UL	5		No
Benzo(b)fluoranthene	12	<0.1-2.7	7.1 S4UL	-		No
Benzo(k)fluoranthene	12	<0.1-0.3	190 S4UL			No
Benzo(ghi)perylene	12	<0.1-0.4	640 S4UL	-		No
Chrysene	12	<0.1-2.0	15 S4UL	-		No
Dibenzo(ah)anthracene	12	<0.1-0.3	0.57 S4UL	-		No
Indeno(123cd)pyrene	12	<0.1-0.5	82 S4UL			No
Fluoranthene	12	<0.1-5.9	3100 S4UL	-		No
Fluorene	12	<0.1-0.2	9900 S4UL	-		No
Naphthalene	12	<0.1-0.2	4900 S4UL	-		No
Phenanthrene	12	<0.1-2.9	3100 S4UL	-		No
Pyrene	12	<0.1-4.5	7400 S4UL	-		No

Key
S4UL – LQM/CIEH S4ULs for Human Health Risk Assessment, 2015. Copyright Land Quality Management Limited reproduced with permission; publication number S4UL3026.
C4SL – Category 4 Screening Level. Detailed within DEFRA SP1010 Policy Companion Document dated December 2014.
**Geometric Mean

All the determinands reviewed were recorded below their respective Tier 1 GAC, or limit of detection of the method of analysis employed. Therefore all determinands tested for in the Natural Strata are considered to be present at acceptable concentrations assuming a residential (POS1) end-use.

6.8 Asbestos

Eleven samples of Made Ground were submitted for asbestos screening, including a sample of possible ACM obtained during our previous works from borehole BH2B. The sample from borehole BH2B identified chrysotile (white asbestos) within the material sampled. A sample obtained during our previous works from borehole WS18 was found to contain both chrysotile (white asbestos) and amosite (brown asbestos) fibres within the Made Ground.

6.9 Waste Acceptance Criteria (WAC) tests

Three samples of Made Ground (obtained during our previous works from boreholes WS3, BH2B and WS17) were submitted to the laboratory for WAC testing. The test results are presented in Appendix VII.

6.10 PCBs

Nine samples of Made Ground were screened for PCB compounds (WHO 12 congeners, with three samples being screened for 7 congeners within WAC samples).

None of the samples screened for PCBs revealed elevated concentrations above the Limit of Detection of the method of test employed.

Therefore we consider that the Made Ground at the site is not contaminated with PCB compounds.

6.11 Volatile Organic Compounds (VOCs) Screening

During the current intrusive works, selected soil samples were analysed on site using a portable MiniRAE 2000 Photo Ionisation Detector (PID).

The MiniRAE 2000 is a robust, portable PID used to investigate the potential presence of Volatile Organic Compounds (VOCs) and volatile hydrocarbon vapours. Whilst the PID does not quantitatively discriminate between discrete VOCs, the gross presence of VOCs is taken to be a reliable indicator of soil impaction. The selected soil samples (small disturbed samples) were agitated and the headspace in each container aspirated into the PID for analysis on site.

Screening revealed a maximum concentration of 38ppm within impacted soils revealed in WS33 at 2.25m begl. A typical background level of 10ppm may be considered as an ambient concentration. Samples from trial pit TP1 also appeared to be impacted with TPH but samples, although not screened were scheduled for TPH analyses.

Semi-Volatile Organic Compound (SVOC) testing has confirmed elevated concentrations of PAH compounds (Benzo(a)pyrene, Benzo(bk)fluoranthene, and Dibenzo(ah)anthracene) in boreholes WS23, WS32 and WS33 above the Tier 1 GAC for a residential (POS end use).

. In addition, concentrations of 2-Methylnaphthalene were detected in boreholes WS23 and WS32 (0.2mg/kg and 0.6 mg/kg respectively) at concentrations slightly in excess of the LOD, which are unlikely to further significantly impact the assessment of the Made Ground.

Concentrations of Dibenzofuran were revealed in boreholes WS23, WS32 and WS33 at concentrations ranging between 0.5 mg/kg to 3.1 mg/kg. There are currently no readily available Tier 1 assessment criteria for Dibenzofuran at this stage.

6.12 Total Petroleum Hydrocarbons (TPH)

Thirty two samples were submitted for speciated fraction banded TPH analysis. The samples were collected during our previous works from adjacent to the UST (now without the current site boundary and located in the adjacent Frost site) and ASTs and from borehole WS2 and WS4 where potential hydrocarbon odours and/or staining were noted (note that the USTs were beneath the Frost section of the site, and boreholes WS2 and WS4 were also located in the Frost site). In addition, samples obtained during the current works from adjacent to USTs, the area of the historical oil storage depot area (WS15, BH3, WS22, WS23 and WS26) and areas of revealed hydrocarbon impaction were screened with a PID and samples selected, in particular from boreholes WS22, WS23, WS30, WS31, WS33 and trial pit TP1 for TPH analysis.

The results of the TPH test data have been tabulated below.

TABLE 6- SUMMARY OF TIER 1 SITE ACCEPTANCE CRITERIA (SAC) TPH DATA ASSESSMENT RESIDENTIAL (POS1) END USE (MADE GROUND/NATURAL STRATA)			
Determinants	Concentration Range (mg/kg)	Tier 1 SAC (mg/kg)	Tier 1 SAC Exceeded? (Yes/No)
Ethylbenzene	0.01-0.46	24000 S4UL	No
Gasoline Range Organics#	<0.1-9.91	2100 S4UL	No
M/P Xylene	<0.01-4.9	41000 S4UL	No
O Xylene	<0.01-3.4	41000 S4UL	No
Toluene	<0.01-0.32	56000 S4UL	No
Aliphatics C6-C8	<1-0.3	600000 S4UL	No
Aliphatics C8-C10	<0.1-10	13000 S4UL	No
Aliphatics C10-C12	<1-200	13000 S4UL	No
Aliphatics C12-C16	<2-820	13000 S4UL	No
Aliphatics C16-C35	<5-1310	250000 S4UL	No
Aliphatics C35-C44	<1-13	250000 S4UL	No
Aromatics C8-C10	0.1-54.5	5000 S4UL	No
Aromatics C10-C12	<1-300	5000 S4UL	No
Aromatics C12-C16	<1-1800	5100 S4UL	No
Aromatics C16-C21	<1-2200	3800 S4UL	No
Aromatics C21-C35	<1-2500	3800 S4UL	No
Aromatics C35-C44	<1-420	3800 S4UL	No
# Total of Aliphatics C5-C6, C6-C7 and C8-C10. Aliphatic Tier 1 SAC of 2100mg/kg adopted.			

The assessment of soil test results has not revealed the presence of any TPH determinants at individual concentrations elevated above their respective Tier 1 SAC assuming a POS residential (POS1) end use.

6.13 Soil Testing Summary

Based on the testing undertaken the Made Ground at the site may be regarded as being contaminated with respect to a residential (POS1) end use with respect to Arsenic, Lead and PAH compounds and potentially localised SVOC impaction.

The Made Ground soils, were noted to be aesthetically undesirable with inclusions of brick, ash, slag, concrete, brick and tar like gravel material.

The Natural Strata at the site may be regarded as uncontaminated assuming a residential (POS1) end use.

6.14 Groundwater Test Results

6.14.1 Introduction

Guidance in England and Wales regarding Water Quality Standards is generally limited to The Water Supply (Water Quality) Regulations (1989 and 2000 Eds.) and The Water Supply (Water Quality) (Amendment) Regulations (2005). The guidance values relate to the quality of potable water, with the point of compliance set at the consumers tap, and are therefore very conservative. However, these values are considered to be applicable for a Tier 1 assessment in the first instance (where available) for water testing determinands.

Where UK Drinking Water Standards are not available for Tier 1 Screening, we have made reference to the Scottish Environmental Protection Agency (SEPA) Position Statement WAT-PS-10-01 '*Assigning groundwater assessment criteria for pollutant inputs*', dated May 2011, which collates determinands from a variety of sources and provides relevant screening criteria (including drinking water standards and WHO guidelines on drinking water quality). Where appropriate, we have also made reference to relevant Environmental Quality Standards (EQS) which are published by the Environment Agency for the protection of freshwater environments (i.e. surface water streams etc).

Please note that screening concentrations have only been adopted for determinands which are present at concentrations in excess of the LOD on at least one occasion and where readily available Site Acceptance Criteria (SAC) are available.
An audit was undertaken during the current works of previous monitoring well installations which reveal intact and serviceable monitoring points within cable percussive boreholes BH1 and BH2B (the pipe in BH3 was blocked), and window sample boreholes WS10, WS15 and WS17.

6.14.2 Water Test Results – Shallow Installations (WS10, WS15 and WS17)

Each well installation was typically bailed for three times the well volume (wherever possible) prior to sampling in accordance with standard best practice.

The assessment of the water test results is summarised in Table 6 below for shallow installations within the Made Ground/superficial deposits (WS10, WS15 and WS17).

TABLE 6 - SUMMARY OF WATER TEST RESULTS (BOREHOLES WS10, WS15 AND WS17)

Determinands	No. of Samples Tested	Concentration Range (µg/l)	Tier 1 SAC (µg/l)	No. of samples Above SAC	Location of Exceedence
Metals					
Arsenic	3	8.2-74	10 DW2005, 50EQS	2 (DWS) and 1 (EQS)	WS10 and WS15), WS15 (EQS)
Cadmium	3	0.15-0.87	5 DW2005	0	
Copper	3	4.5-53	2000 DW2005	0	
Chromium	3	<1-1	50 DW2005	0	
Chromium VI	3	13-14	50 DW2005	0	
Nickel	3	9-21	20 DW2005	1	WS10
Selenium	3	2.7-140	10 DW2005	4	WS10 and WS15
Zinc	3	24-28	5000 DW1989	0	
Primary PAHs					
Total PAH**	3	<0.01-4.07	0.1** DW2005	2	WS10 and WS17
Benzo(a)pyrene	3	<0.01-1.2	0.01 DW2005	2	WS10 and WS17
Fluoranthene	3	<0.01-2.0	0.1 EQS	2	WS10 and WS17
Naphthalene	3	<0.01-0.09	10 EA R&D VALUE	0	
TPH					
Total TPH (C8-C44)	3	ND-470	10 DW1989	2	WS10 and WS17
SVOCs					
Phenol	3	18-21	0.5 DW2005 30 EQS	2 (DW2005) 0 (EQS)	WS10 and WS15

Key
DW1989 – Water Supply (Water Quality) Regulations 1989.
DW2005 – Water Supply (Water Quality) (Amended) Regulations 2005.
WHO – World Health Organisation (WHO) value.
EQS - Environmental Quality Standards value.
SEPA – Resource Value taken from SEPA Position Statement WAT-PS-10-01, June 2011.
** - Tier 1 SAC based on Total PAH. PAH comprises sum of benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and

TABLE 6 - SUMMARY OF WATER TEST RESULTS (BOREHOLES WS10, WS15 AND WS17)
indeno(1,2,3-cd)pyrene concentrations in accordance with Water Supply (Water Quality) Regulations 2000. ~ - EQS Value for Benzo(k)Fluoranthene. Value below the limit of Detection. All Units are μg/l unless otherwise stated.

The water test results from the shallow installations within the Made Ground/superficial deposits reveal an exceedence within two of the samples with respect to Arsenic, Selenium and a slight exceedence with respect to Nickel when compared to the Drinking Water Standards. In addition, exceedences were revealed with respect to total PAH, individual PAH compounds and total TPH within boreholes WS10 and WS17.

All the remaining determinants examined within the shallow water samples were found to be present at UCL values, and individual values, below the appropriate conservatively adopted DWS/EQS Tier 1 SAC.

6.14.3 Water Test Results – Deep Installations (BH1 and BH2B)

Each well installation was typically bailed for three times the well volume (wherever possible) prior to sampling in accordance with standard best practice.

The assessment of the groundwater test results is summarised in Table 7 below for the deeper installations within the Chalk deposits (BH1 and BH2B).

TABLE 7 - SUMMARY OF WATER TEST RESULTS (BOREHOLES BH1 AND BH2B)

Determinands	No. of Samples Tested	Concentration Range (μg/l)	Tier 1 SAC (μg/l)	No. of samples Above SAC	Location of Exceedence
Metals					
Arsenic	2	9-36	10 $_{DW2005,}$ 50$_{EQS}$	1 (DWS)	BH2B
Cadmium	2	0.19-0.30	5 $_{DW2005}$	0	
Copper	2	6-25	2000 $_{DW2005}$	0	
Chromium VI	2	14	50 $_{DW2005}$	0	
Nickel	2	2-7	20 $_{DW2005}$	0	
Selenium	2	16-71	10 $_{DW2005}$	2	BH1 and BH2B
Zinc	2	24	5000 $_{DW1989}$	0	
Primary PAHs					
Total PAH**	2	<0.04	0.1** $_{DW2005}$	0	
Benzo(a)pyrene	2	<0.01	0.01 $_{DW2005}$	0	
Fluoranthene	2	<0.01	0.1 $_{EQS}$	0	
Naphthalene	2	<0.01-0.02	10 $_{EA R\&D VALUE}$	0	
TPH					
Total TPH (C8-C44)	2	ND-0.03	10 $_{DW1989}$	0	
SVOC					
Tetrachloroethene	2	<1-10	10 $_{DW2005}$	0	

Key
DW1989 – Water Supply (Water Quality) Regulations 1989.
DW2005 – Water Supply (Water Quality) (Amended) Regulations 2005.
WHO – World Health Organisation (WHO) value.
EQS - Environmental Quality Standards value.
SEPA – Resource Value taken from SEPA Position Statement WAT-PS-10-01, June 2011.
** - Tier 1 SAC based on Total PAH. PAH comprises sum of benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene and indeno(1,2,3-cd)pyrene concentrations in accordance with Water Supply (Water Quality) Regulations 2000.
~ - EQS Value for Benzo(k)Fluoranthene. Value below the limit of Detection.
All Units are μg/l unless otherwise stated.

The water test results from the deeper installations within the Chalk deposits reveal an exceedence within the samples with respect to Arsenic and Selenium when compared to the Drinking Water Standards.

All the remaining determinants examined within the deeper water samples were found to be present at UCL values, and individual values, below the appropriate conservatively adopted DWS/EQS Tier 1 SAC.

6.15 Groundwater Summary

The results of the water sampling and testing have revealed that the shallow perched water table appears to be contaminated with respect to Arsenic, Nickel and Selenium, Total PAH, individual PAH compounds and Total TPH when compared to conservatively adopted Drinking Water Standards.

The deeper groundwater samples recovered from installations within the deeper Chalk deposits have revealed slight exceedences with respect to Arsenic and Selenium only, with PAH, SVOC and TPH compounds being present below the drinking water standards or less than the LOD..

7.0 CONCEPTUAL SITE MODEL

7.1 General

The DEFRA publication '*Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance*' (dated April 2012) states the following with regards to the production of a Conceptual Site Model (CSM) for a site:

'*The process of risk assessment involves understanding the risks presented by land, and the associated uncertainties. In practice, this understanding is usually developed and communicated in the form of a "conceptual model"*'. The development of a CSM is typically undertaken in an iterative process, reflecting the changes in understanding as more detailed site information becomes available.

In developing a CSM, and specifically in the context of land contamination, consideration needs to be given to three essential elements; which form the basis of any risk present. The statutory guidance sections 3.8 and 3.9 (April 2012) states the following with respect to Part 2A.

'*Under Part 2A, for a relevant risk to exist there needs to be one or more contaminant-pathway-receptor* [CPR] *linkages – "contaminant linkage" – by which a relevant receptor might be affected by the contaminants in question. In other words, for a risk to exist there must be contaminants present in, on or under the land in a form and quantity that poses a hazard, and one or more pathways by which they might significantly harm people, the environment, or property; or significantly pollute controlled waters. For the purposes of this guidance:*

(a) A "contaminant" is a substance which is in, on or under the land and which has the potential to cause significant hard to a relevant receptor, or to cause significant pollution of controlled waters.
(b) A "receptor" is something that could be adversely affected by a contaminant, for example a person, an organism, and ecosystem, property, or controlled waters. The various types of receptors that are relevant under the Part 2A regime are explained in later sections.
(c) A "pathway" is a route by which a receptor is or might be affected by a contaminant.

The term "contaminant linkage" means the relationship between a contaminant, a pathway and a receptor. All three elements of a contaminant linkage must exist in relation to a particular land before the land can be considered potentially to be contaminated land under Part 2A, including evidence of the actual presence of contaminants. The term "significant contaminant linkage", as used in this Guidance, means a contaminant linkage which gives rise to a level of risk sufficient to justify a piece of land being determined as contaminated land. The term "significant contaminant" means the contaminant which forms part of a significant contaminant linkage.'

With respect to the presence of background levels of contaminants, section 3.21 to 3.23 states '*The Part 2A regime was introduced to help identify and deal with land which poses unacceptable levels of risk. It was not intended to apply to land with levels of contaminants in soil that are commonplace and widespread throughout England or parts of it, and for which in the very large majority of cases there is no reason to consider that there is an unacceptable risk.*

Normal levels of contaminants in soil should not be considered to cause land to qualify as contaminated land, unless there is a particular reason to consider otherwise. Therefore, if it is established that land is at or close to normal levels of particular contaminants, it should usually not be considered further in relation to the Part 2A regime...

For the purpose of this Guidance, "normal" levels of contaminants in soil may result from:

(a) The natural presence of contaminants (e.g. caused by soil formation processes and underlying geology) at levels that might reasonably be considered typically in a given area and have not been shown to pose an unacceptable risk to health or the environment.
(b) The presence of contaminants caused by low level diffuse pollution, and common human activity other than specific industrial processes. For example, this would include diffuse pollution caused by historic use of leaded petrol and the presence of benzo(a)pyrene from vehicle exhausts, and the spreading of domestic ash in gardens at levels that might reasonably be considered typical.'

In selecting appropriate generic assessment criteria Section 3.27 of the Guidance states:

'It is common practice in contaminated land risk assessment to use "generic assessment criteria" (GACs) as screening tools in generic quantitative human health risk assessment to help assessors decide when land can be excluded from the need for further inspection and assessment, or when further work would be warranted'.

With respect to assessing contaminated land, section 4.17 of the Guidance states:

'*In deciding whether or not land is contaminated land on grounds of significant possibility of significant harm to human health, the local authority should use the categorisations described in paragraphs 4.19 – 4.30 below. Categories 1 and 2 would encompass land which is capable of being determined as contaminated land on the grounds of significant possibility of harm to human health. Categories 3 and 4 would encompass land which is not capable of being determined on such grounds.'*

In relation to the use of GAC values in the assessment of contaminated land, section 3.29 of the Guidance states:

'GACs relating to human health risk assessment represent cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal risk to health. With regards to such GACs:

(a) They may be used to indicate when land is very unlikely to pose a significant possibility of significant harm to human health. This is on the basis that they are designed to estimate levels of contamination at which risks are likely to be negligible or minimal and far from posing a significant possibility of significant harm to human health.
(b) They should not be used as direct indicators of whether a significant possibility of significant harm to human health may exist. Also, the local authority should not view the degree by which the GACs are exceeded (in itself) as being particularly relevant to this consideration, given that the degree of risk posed by land would normally depend on many factors other than simply the amount of contaminants in soil.
(c) They should not be seen as screening levels which describe the boundary between Categories 3 and 4 in terms of Section 4 (i.e. the two Categories in which land would not be contaminated land on grounds of risk to human health). In the very large majority of cases, these SGVs/GACs describe levels of contamination from which risks should be considered to be comfortably within Category 4.
(d) They should not be viewed as indicators of levels of contamination above which detailed risk assessment would automatically be required under Part 2A.
(e) They should not be used as generic remediation targets under the Part 2A regime. Nor should they be used in this way under the planning system, for example in relation to ensuring that land affected by contaminated does not meet the Part 2A definition of contaminated land after it has been developed.'

In undertaking a risk assessment and deriving a CSM for the purposes of the redevelopment of a site (i.e. planning and development control) reference has been made to both the Model Procedures for the Management of Land Contamination, as well as the National Planning Policy Framework (NPPF, dated March 2012). Reference has also been made to the Contaminated Land Statutory Guidance (referenced above), although this is primarily concerned with Local Government determinations of Statutory '*Contaminated Land*', which is separate to planning framework requirements.

7.2 CPR Considerations

The following CPR assessment has been undertaken based on a residential (POS1) end-use for the proposed development.

7.3 Consideration of Potential Sources of Contamination (C)

Based on the findings of the previous Phase I Desk Study and the exploratory investigation works the potential key sources of contamination at the site are considered to be the following:

- Metals associated with any Made Ground or Natural Metal Enrichment (NME) in Natural Strata.
- Sulphate/acid contaminated soils.
- Polycyclic Aromatic Hydrocarbons (PAHs) derived from any ashy inclusions in the near surface soils.
- Petroleum hydrocarbons (TPH) i.e. fuels, oils etc.
- Asbestos.
- Ground gases (i.e. methane and carbon dioxide) from organic soils and Made Ground beneath the site.

Other potential contaminants which may be locally present but not assessed at the initial stage of works may include:

- Volatile Organic Compounds (VOCs).
- PCBs.
- Detergents.
- Organic solvents/thinners.
- Coal ash.

Visual and olfactory evidence of oils/fuel was revealed during our site work and screening of samples with a MiniRAE PID revealed the localised presence of volatile vapours above background levels. Therefore, laboratory soil testing for oils/fuels and VOCs/SVOCs were undertaken.

7.4 Consideration of Potential Pathways (P)

The potential pathways at the site are primarily:

- Direct ingestion of soil.
- Inhalation of dust and vapours.
- Direct skin contact with the ground.
- Direct contact with construction materials.
- Vertical and lateral migration of contamination.
- Plant uptake.

7.5 Consideration of Potential Receptors (R)

The potential receptors at the site are:

- The construction personnel (i.e. site workers) involved with the redevelopment of the site (typically short term (acute) exposure).
- The final end users (i.e. residential users) of the site (typically long term (chronic) exposure).
- Controlled waters (i.e. principally underlying groundwater).
- Construction materials.
- Building envelope.

7.6 Summary

Our conceptual site model of possible CPR pollutant linkages, applicable to the proposed site usage and updated to include the findings from the supplementary works, is summarised in Table 8.

TABLE 8 - SUMMARY OF CPR ASSESSMENT

Contaminant	Receptor	Pathway	Comments	Plausible Pollutant Linkage	Possible Mitigation	Possible Statutory 'Contaminated Land' following mitigation
Contaminated Soils	*Site Workers*	*Direct Ingestion & Direct Contact*	The Made Ground soils tested at the site may be regarded as being contaminated for the proposed end use. Asbestos has been revealed in the Made Ground. The natural soils may be regarded as uncontaminated.	✔	Site workers to wear appropriate PPE (& RPE if appropriate) and conform to general health and safety requirements.	**X**
Contaminated Soils	*Site Workers*	*Inhalation of Dust & Vapours*	The Made Ground soils tested at the site may be regarded as being contaminated for the proposed end use. Asbestos has been revealed in the Made Ground. The natural soils may be regarded as uncontaminated.	✔	Site workers to wear appropriate PPE (& RPE if appropriate) and conform to general health and safety requirements. Ensure appropriate dampening down equipment is available should dust be generated by the development works. Undertake monitoring for airborne asbestos fibres.	**X**
Contaminated Soils	*End Users – Site Residents*	*Direct Ingestion & Direct Contact*	The Made Ground soils tested at the site may be regarded as being contaminated for the proposed end use. Asbestos has been revealed in the Made Ground. The natural soils may be	✔	Place a suitable remedial capping in all soft landscaping areas. Majority of the site anticipated to be covered by hard surfacing.	**X**

TABLE 8 - SUMMARY OF CPR ASSESSMENT						
Contaminant	Receptor	Pathway	Comments	Plausible Pollutant Linkage	Possible Mitigation	Possible Statutory 'Contaminated Land' following mitigation
			regarded as uncontaminated.			
Contaminated Soils	*End Users – Site Residents*	*Inhalation of Dust & Vapours*	The Made Ground soils tested at the site may be regarded as being contaminated for the proposed end use. Asbestos has been revealed in the Made Ground. The natural soils may be regarded as uncontaminated.	✔	Place a suitable remedial capping in all soft landscaping areas. Undertake monitoring for airborne asbestos fibres. Majority of the site anticipated to be covered by hard surfacing. Significant generation of dust is unlikely after development.	**X**
Contaminated Soils	*End Users – Site Residents*	*Ingestion of Home-Grown Produce*	The Made Ground soils tested at the site may be regarded as being contaminated for the proposed end use. Asbestos has been revealed in the Made Ground. The natural soils may be regarded as uncontaminated.	✔	Place a suitable remedial capping in all soft landscaping areas. Growing of home-grown vegetables not anticipated.	**X**
Contaminated Soils	*Controlled Waters*	*Vertical and Lateral Migration*	The concentrations of determinands detected are considered to be only marginally elevated in relation to conservative drinking water criteria and there is no obvious link between the shallow perched water and the deeper groundwater in the chalk.	**X**	No specific mitigation required in relation to the Controlled Waters at the site.	**X**
Water Soluble Sulphate/Acid Contaminated Soils	*Building Materials*	*Direct Contact*	Design Class DS-2/ACEC Class AC-2. (BRE Spec. Digest 1:2005).	✔	Adopt appropriate concrete mix.	**X**
Contaminated Soils	*Services*	*Direct Contact*	The Made Ground soils tested at the site may be regarded as being contaminated for the proposed end use. Asbestos has been revealed in the Made Ground. The natural soils may be regarded as uncontaminated.	✔	Consult utility companies regarding appropriate utility materials (including water supply pipes).	**X**

TABLE 8 - SUMMARY OF CPR ASSESSMENT						
Contaminant	Receptor	Pathway	Comments	Plausible Pollutant Linkage	Possible Mitigation	Possible Statutory 'Contaminated Land' following mitigation
Radon	*Site Residents & Building Envelope*	*Vertical and Lateral Migration*	The site is located in a lower probability radon area.	**X**	No specific radon precautions are required for proposed dwellings.	**X**
Ground Gases	*Site Residents & Building Envelopes*	*Vertical and Lateral Migration*	The site may be classified as CS2 in accordance with CIRIA report C665.	✔	Adopt appropriate ground gas protection measures.	**X**

KEY

Where text is in ***Bold Italic*** item is potentially present. Where normal text is used item is not present/plausible.

X – Pollutant linkage not plausible

✔ – Pollutant linkage plausible. Mitigation Required

? – Insufficient information, further work necessary

In the foregoing CPR assessment, determinands identified by chemical analysis are only considered to be contaminated with respect to generic guidance where the determinand is present at UCL concentrations above their respective Tier 1 SAC / C4SL.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 Site Summary

Initially, the site area was used for Timber Ponds. Free Wharf was constructed at the southern extent in the 1890s (including timber piled mooring points) which was expanded including warehouse structures into the 1920s. By the 1930s the majority of the site had been developed including warehouses in the eastern and central section of the site. The 1950s map indicates many of the structures present from the 1930s were used as engineering works, a garage, a timber store and possibly a tarmacadam works in the western extent (identified in the 1960s). This area contains a potential large underground concrete structure (conveyor system) and the southern extent had a travelling crane running parallel to the wharf. In the 1960s an oil storage depot is indicated in the southeast of the site in the vicinity of two tank farms (although anecdotally some or all of these tanks may have been used for wine storage). The 1990s map shows the site layout to be broadly similar to that present today with no significant changes evident shown on the most recent map viewed (2012).

The site is underlain by an aquifer designated by the Environment Agency as a Principal Aquifer. The site does not lie within a Source Protection Zone (SPZ).

8.2 Ground Conditions

Beneath the surface materials typically comprising reinforced concrete or localised Macadam and granular sub-grade, Made Ground deposits were encountered comprising the following:

- Soft green sandy gravelly clay.
- Loose and dense brown clayey gravel of brick and flint.
- Loose grey locally clayey gravel of ash, slag, chalk, ceramic and glass. Locally with small timber fragments.
- Loose white clayey gravelly silty Chalk with flints, brick, locally mixed with concrete screed. Also present as soft brown chalky clay or soft putty chalk.

The Made Ground (where penetrated) was encountered to depths ranging between 1.45m to 3.85m begl and may be broadly considered to comprise reclaimed land materials.

Within trial pit TP1 large sections of tree trunk and a root ball was identified (potentially left over from the timber ponds identified in the 1870s) and within Trench C a large concrete block with a mooring chain was identified. Several trenches also revealed large fragments of concrete slab within the Made Ground.

Within borehole WS33 hydrocarbon odours were noted, with free product and staining at 2.20m begl. Hydrocarbon odours and staining were also revealed in TP1 at approximately 2.00m begl, particularly coinciding with the groundwater ingress noted during the excavation of the pit.

Natural Strata

Beneath the Made Ground, Natural Strata was encountered comprising four elements of Head Deposits, Tidal River Deposits, Storm Beach Deposits and Chalk. The Natural Strata units may be described as follows.

- Tidal River Deposits – Present as very soft and soft grey or black and locally brown and green slightly silty CLAY with an organic and hydrogen sulphide odour, and extending to depths ranging between 2.00m to 3.95m begl.

- Storm Beach Deposits – Present as medium dense greyish brown slightly clayey Sand locally and/or medium dense, locally becoming loose brown sandy fine to coarse grained flint and chalk GRAVEL extending to penetrated depths of between 1.90m to 4.90m begl and to depths in excess of 5.00m, but locally not fully penetrated.
- Head Deposits – Broadly encountered across the northern extent of the site comprising locally soft and stiff silty CLAY with chalk and flint gravel which extended to depths to in excess of 4.00m begl.
- Tarrant Chalk Member – Encountered in borehole WS22 only as light brown and white gravelly putty Chalk (gravel comprised chalk fragments) which was proven to a maximum depth of 5.00m begl but not fully penetrated.

  Our previous works included deep cable percussive boreholes which penetrated into the Tarrent Chalk Member, which was identified as comprising:

- *'Initially present as highly weathered very weak off white 'putty' CHALK, recovered as very soft off white and light brown clayey silt with gravel of brittle white chalk and flints, locally with large flint cobbles, which generally extended to 16.00m begl. The highly weathered CHALK then graded into moderately weathered to fresh CHALK which was proven to a maximum depth of 26.00m begl but not fully penetrated'*.

We would comment that the findings of our previous investigation broadly concurred with the BGS borehole data in terms of thicknesses of Natural Strata (with the omission of Tidal River Deposits in the BGS borehole records) and depth to the base of the putty Chalk. Our current works also broadly concur with our previous (external areas) investigation in relation to multiple layers of concrete, obstructions in the Made Ground (including large sections of tree), depth of Made Ground and depth of superficial deposits (Tidal Flat and Storm Beach Deposits). The top of the Chalk was only encountered in one location during the current works (WS22).

Ground Anchors

Trenching works at the Free Wharf has revealed steel ground anchor cables at varying depths ranging between 1.05m to 2.05m begl, the majority being approximately 1.75m to 2.05m begl that tie into approximately square shaped anchor blocks which appear to be up to 2.00m in dimension, and approximately 0.44m wide. The revealed anchor cables were approximately 2.30m and 2.60m apart.

The anchor blocks were encountered at depths ranging between 0.65m and 1.10m begl and were approximately 15.20m to 15.55m distant from the sea wall to the south.

Previous works at the former Tarmac Wharf revealed 4No. ground anchor ties at intervals of 3.45m, 3.10m, 3.20m and 3.15m respectively. A concrete structure was encountered approximately 11.85m from the north elevation of the sea wall, at an approximate depth of 3.20m begl. The steel anchor cable was noted to enter the southern side of the concrete. It was not possible to ascertain the width or base of the structure. This structure was deemed to potentially comprise a ground anchor block. This was in close proximity to the conveyor/hopper structure.

8.3 Foundation Design

Traditional spread foundations i.e. pad foundations, strip or trench fill foundations are considered not to be appropriate for the site. The deep Made Ground and upper layers of the superficial deposits are considered to be unsuitable for bearing loads from shallow foundations.

We consider that the most appropriate foundation solution for the site would be piles, potentially driven piles, founded within the Tarrant Chalk Member.

The specific type, size and depth of pile foundations would be subject to consultation with specialist pile foundation design contractors. Taking account of the EA designation of the Tarrant Chalk Member as a Principal Aquifer, we would recommend that piles are installed with due regard to Environment Agency publication NC/99/73 '*Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention*' (May 2001).

The southern boundary of the site comprised a wharf which was formed by an approximately 7.00m high steel interlocking sheet pile retaining wall. The steel piles appeared to have locking bolts on their outer faces, at approximately 2.00m below the wharf level, and spaced at approximately 1.00m centres. We observed that each alternate bolt was larger, therefore we understand that the smaller bolts may be attached to the sheet pile whaling's only, with the larger bolts securing ground anchors. Larger bolts occur more widely spaced which may represent bolting points for ground anchor cables.

We understand that the locking bolts, which appear to be attached to ground anchors, were installed to increase the stability of the retaining wall. The diameter, length and angle of installation of the potential anchors points were unknown at the time of our initial works. Subsequent works in 2013 and 2015 have revealed potential anchor blocks at Tarmac Wharf approximately 11.85m from the sea wall (and up to 3.50m deep). Anchor blocks (approximately 0.44m wide and 1.20m to 2.00 square, and between 0.65m to 1.10m deep) have been revealed along Free Wharf approximately 15.20m to 15.55m from the sea wall.

Obstructions were encountered during our previous works in boreholes BH2 and BH2A at depths of 2.90m and 1.70m begl, potentially associated with the anchors (these boreholes were visually positioned between the securing bolt spacing centres to attempt to avoid any ground anchors present). Additionally, a variety of underground obstructions were encountered including multiple slabs, concrete blocks, potential timber piles, railway sleepers and sections of tree trunk. Therefore, if a pile foundation option is adopted, the potential presence of obstructions, ground anchors and anchor blocks should be taken into consideration during the site layout planning process.

No additional loads should be imposed on the retaining wall at the southern extent of the site i.e. construction of access roads etc., until a structural assessment of the retaining wall is undertaken to assess its suitability to accept additional loads.

Alternatively, consideration may also be given to the use of ground improvement techniques i.e. vibro-stone or concrete columns, subject to consultation with specialist contractors in terms of ground condition acceptability and proposed column loadings. The columns could be used to support either shallow spread foundations or a raft. The potential presence of ground anchors would also need to be taken into consideration in this instance.

<u>Comment on the Engineering Characteristics of Chalk</u>

The site is indicated to be immediately underlain by the Tarrant Chalk Member which has weathered to a putty Chalk consistency to an approximate depth of 16.00m begl, underlain by less weathered potentially blocky Chalk.

The CIRIA report indicates that *'when selecting foundations in chalk, consideration should always be given to the use of shallow foundations either bearing directly on the chalk itself or on superficial deposits overlying the chalk. In the latter* situation *the principal problem concerns the possible existence of solution features in the chalk…in which case the adoption of piled foundations may be necessary...'*

We would comment that the possibility of the presence of solution features at the site, although possible, may be considered to be unlikely. The potential outcome for piles, where solution features are present, would be an increase in pile length in driving the base of the pile through the relatively softened solution feature infill.

8.4 Floor Slabs

Made Ground deposits were encountered across the site which were revealed to be variable in composition (with both granular and cohesive fill materials present) and strength. The Made Ground was also variable in thickness ranging from 0.65m to 4.80m across the site (taking account both phases of work) and SPT N-Values ranging between 2 and 20 at a depth of 1.00m begl.

Therefore, a suspended ground floor slab is recommended at the site for the residential buildings, and where there is small scale retail use of the ground floor with residential above.

However, we acknowledge that construction of suspended floor slabs on a large scale may be problematic and expensive to construct. Therefore, taking account of the foregoing ground conditions, a suitably reinforced ground bearing floor slab may be considered for larger commercial/industrial floor slabs (if proposed) provided that the Structural Engineer is satisfied that a suitably reinforced floor slab may be designed, depending upon proposed loadings and allowable settlement criteria.

Designs may require structural reinforcement of the formation by proof rolling and possible improvement of soil strength through the use of soil mixing or by employing geotextile reinforcement within the capping layer. Alternatively, the floor slab could be supported by ground improvement using vibro-stone columns or where preferred/necessary, a suspended floor slab may be adopted.

8.5 Ground Gas Precautions

A programme of ground gas monitoring (6No. visits) previously undertaken at the site has revealed that the site falls within Characteristic Situation 2 (CS2) in accordance with CIRIA report C665 by virtue of the presence of methane in excess of 1% and carbon dioxide in excess of 5% and relatively high positive gas flow rates (potentially due to tidal effects).

Therefore, the following ground gas protective measures should be incorporated into the proposed structures.

Residential Buildings

Ventilation of the underside of the floor slab should be provided. Where a ground supported reinforced suspended slab is proposed the ventilation may be achieved by incorporating perforated pipework in a fines free granular layer, linked to periscopic air bricks. Where precast suspended floors are proposed then the sub slab void will provide the ventilation layer, via periscopic air bricks.

A suitable, certificated, ground gas resistant membrane from a suitable manufacturer/supplier should be included in the floor slab design. The membrane should have suitable tensile strength and puncture resistance, may include an aluminium core (as appropriate) and be of a sufficient thickness to allow any welding to take place without damaging the membrane. The membrane must be suitably lapped and taped and should be extended across wall cavities to effectively exclude ground gases from the footprint of the proposed building.

Service penetrations through the membrane should be kept to a minimum and should be suitably sealed to the membrane.

Commercial/Industrial Buildings

Due to the relatively low gas concentrations recorded at the site, for larger commercial/industrial buildings where the internal spaces are typically large and do not contain small rooms, sub slab ventilation is not considered necessary. However, ventilation of any small ground floor rooms (i.e. store cupboards/offices/kitchens etc) would be prudent via trickle vents in windows/walls or open vents in doors.

A suitable, certificated, ground gas resistant membrane from a suitable manufacturer/supplier should be included in the floor slab design. The membrane should have suitable tensile strength and puncture resistance, may include an aluminium core (as appropriate) and be of a sufficient thickness to allow any welding to take place without damaging the membrane. The membrane must be suitably lapped and taped and should be extended across wall cavities to effectively exclude ground gases from the footprint of the proposed building.

Service penetrations through the membrane should be kept to a minimum and should be suitably sealed to the membrane.

General Gas Precaution Comments

The gas protection measures proposed should be designed to comply with the requirements of BS8485 (2007). Where applicable, alternative gas protection measures may be proposed to suit the foundation/floor slab proposals providing that they can be demonstrated to provide adequate protection in accordance with BS8485.

Further guidance on the detailing and construction of protection measures for residential buildings is given in BR414. We would be pleased to assist with the detailed design, upon request.

8.6 Radon

The previously commissioned Landmark Envirocheck report identified that no radon protective measures are necessary in the construction of buildings on the site.

8.7 Building Near Trees

We would recommend that appropriate heave precautions are incorporated into foundations assuming soils of a medium volume change potential for the site (based on the results of the Plasticity Index testing). However, the clay soils were predominantly present at depth and therefore may not influence foundation design.

8.8 Coal Mining

No coal mining issues relate to the site, therefore no coal mining precautions are required in the design of foundations.

8.9 Water

2013 Works

Water was encountered within the exploratory boreholes across the site. Water strikes were encountered within the Made Ground at depths ranging between 1.60m and 4.70m begl, apparently occurring as potentially perched water above clayey layers within the Made Ground, or more usually as water seepages at the base of the Made Ground above the Natural Strata interface.
Water strikes were encountered within the Natural Strata at depths ranging between 3.00m and 4.00m begl, generally within the Gravel strata. We would comment that water was required to be added to the cable percussive boreholes during advancement through the Gravel strata due to local 'blowing' conditions potentially caused by a rising tide. Water strikes within the Chalk deposits were largely obscured due to the necessity to add water to the borehole to assist the drilling process, and due to water strikes within the overlying Gravel stratum.

Water was recorded within the boreholes over the 6No. monitoring visits undertaken ranging between 1.49m and 4.90m begl.

2015 Works

Water was encountered within the majority of the exploratory boreholes across the site at depths ranging between 1.80m and 3.80m begl.

Comments

We would comment that the depth to water beneath the site may be largely dependent upon seasonal and tidal variations.

Based on the foregoing, significant dewatering of shallow excavations (i.e. less than 1.00m depth) is considered unlikely to be necessary based on the site observations undertaken to date, but localised removal of perched water may be required.

Deeper excavations for sewers are likely to encounter significant water ingress, particularly where in excess of 3.00m. Deep excavations into the Gravel stratum could, theoretically encounter base instability due to positive hydrostatic pressure within the gravel deposits during periods of rising tide.

8.10 Excavations and Stability

The sides of the boreholes in the Made Ground became locally unstable during advancement, casing was used to support the upper 1.00m of the window sample boreholes. The cable percussive boreholes previously advanced at the site were cased into the Chalk to maintain stability. The sides of the boreholes in the Natural Strata became locally unstable in the Gravel strata.

Shallow foundations may require sidewall support for both construction and health and safety purposes.

Deeper excavations at the site are potentially liable to encounter obstructions (former foundations potentially including piles, buried multiple concrete slabs, concrete blocks, railway timbers and tree trunk sections) and underground structures (i.e. the conveyor tunnel beneath the western extent of the site), unstable ground and locally shallow groundwater, as detailed above, therefore deep excavations are likely to require trench support and an allowance should be made for breaking out of obstructions.

Consideration may be given to undertaking a clearance programme across the entire site (or targeted to build areas) to remove potential obstructions prior to advancing piled foundations at the site. The site investigation works revealed a variety of underground obstructions including the sheet pile anchor cables and anchor blocks, subsurface structures (conveyor belt system near Tarmac Wharf), multiple slabs, concrete blocks, railway timbers and tree trunks (potentially left after the site was used for timber ponds in the 1870s).

Clearance works of subsurface obstacles should be undertaken on a cost benefit analysis taking account of the potential for prohibitive delays and associated costs to piling activities, and subsequent schedule delays to follow on works.

8.11 Sulphate Classification

Based on the laboratory soil test results, and in accordance with the Building Research Establishment publication Special Digest 1 '*Concrete in Aggressive Ground*' (2005), the site falls into Design Sulfate Class DS-2 and an Aggressive Chemical Environment for Concrete (ACEC) classification of AC-2.

Therefore an appropriate concrete mix should be adopted in accordance with BRE Special Digest 1 for all buried concrete in contact with the ground.

8.12 CBRs and Pavements

Typically, CBR values of less than 2% would be anticipated for near surface Made Ground materials.

All CBR values would be subject to confirmation at sub-base level after services construction and proof rolling of the formation, where an improved CBR value may be achieved. Pavement construction may include geotextile reinforcement to reduce capping thickness and improve ground stability.

8.13 Soakaways

The use of soakaways for the disposal of surface water is unlikely to be feasible across the majority of the site due to the presence of deep Made Ground and water bearing superficial deposits. In addition, the site is underlain by a Principal Aquifer. The EA may place restrictions on the use of soakaways in areas underlain by a Principal Aquifer.

8.14 Contamination Assessment

<u>Soils</u>

The assessment of soil test results has revealed the Made Ground at the site to be contaminated with respect to Arsenic, Lead and total PAH, individual PAH compounds, and locally potentially SVOC compounds assuming a residential (POS1) end use.

Asbestos fibres were revealed in two samples of Made Ground comprising chrysotile (white) asbestos and amosite (brown) asbestos.

Based on the testing undertaken the Natural Strata may be regarded as being uncontaminated for the proposed end use.

Hydrocarbons

Selected boreholes were targeted to areas of potential concern i.e. USTs (undertaken during initial works in 2013 associated with the Frosts site but now without the site boundary), ASTs, the former oil storage yard and tarmacadam works. No visual or olfactory evidence of gross TPH contamination was evident in the vicinity of an AST (WS8) or the oil storage depot (WS15, BH3, WS22, WS23 and WS26). Tarry bitumen fragments were identified in the vicinity of the tarmacadam works (BH1), although no gross contamination was evident i.e. smells or free product.

In addition, whilst visual and olfactory evidence of TPH contamination was revealed in borehole WS10 (located adjacent to the AST south of the former packing shed), no significantly elevated concentrations of TPH were identified in the soil samples tested.

Samples obtained during the current works were screened with a PID and samples selected for laboratory testing, in particular from boreholes WS22, WS23, WS30, WS31, WS33 and trial pit TP1 which were also located adjacent to ASTs (around the packing shed area), the former oil storage area or where gross TPH impaction was revealed. No significantly elevated concentrations of TPH were identified in the soil samples tested.

Perched Water and Ground Water

Testing on water samples recovered from shallow monitoring points within the Made Ground/superficial deposits (WS10, WS15 and WS17) revealed elevated concentrations with respect to Arsenic, Lead and Selenium, total PAH, PAH compounds and total TPH, when compared to conservatively adopted Drinking Water Standards.

The deeper groundwater samples recovered from installations within the deeper Chalk deposits have revealed slight exceedences with respect to Arsenic and Selenium only, with PAH, SVOC and TPH compounds being present below the Drinking Water Standards or less than the LOD.

8.15 Remediation Proposals

Based on the works undertaken at the site and our understanding of the development proposals, the following general protocols are provided for the site.

8.15.1 Proposed Soft Landscaped Areas

The Made Ground beneath the site is contaminated with metals, PAH and SVOC compounds and was noted to be generally aesthetically undesirable containing fragments of brick, concrete, timber, slag and ash. These materials should not be left exposed at the surface and should be covered with a 0.60m thick layer of clean imported topsoil in areas of Public Open Space. Where present beneath hardstanding, no capping would be required other than the hardstanding and geotechnical construction layer themselves.

8.15.2 Asbestos

Asbestos (Chrysotile and Amosite) has been found within the Made Ground at the site. Any Asbestos Containing Material (ACM) excavated during development works may require disposal off-site to a suitably licensed disposal facility, undertaken by suitably qualified Contractors. Alternatively, soils containing asbestos fibres may remain in-situ beneath a suitable remedial cap or beneath hard standing areas, placed in accordance with a suitable site specific risk assessment or a Materials Management Plan (MMP).

The CIRIA C733 document *'Asbestos in soil and made ground: a guide to understanding and managing risks'* (2014) recommends that remediation measures undertaken in sites affected by asbestos should be undertaken to a CAR (Control of Asbestos Regulations 2012) compliant risk assessment in order to protect site staff and members of the public.

The remediation of sites affected by Asbestos may involve licensable work, notified non-licensable work or simply non-licensable work. The CAR risk assessment for the site should be site specific and must cover all aspects of remediation involving ACMs.

The main risk associated with ACMs is the release of airborne fibres resulting from excavation, earth movements and primarily vehicle movements around the site (particularly during dry weather), the severity of which will depend upon the amounts and types of Asbestos present. Good site awareness, site management, Asbestos-specific mitigation measures and training will reduce worker exposure to airborne dust and fibres. In order to avoid subsequent civil liabilities, mitigation measures need to prevent exposure of neighbouring residents and public to levels, which may be deemed significant in the future.

The CAR risk assessment in conjunction with the Client Health and Safety procedures will define the mitigation measures required at the site. Mitigation measures to avoid the spread of Asbestos fibres may include some or all of the following:

- Damping down of surfaces and stockpiles of demolition/crushed materials.
- Management of stockpiles and soil movements.
- Hand picking of visible ACM materials from the site surface or stockpiles.
- Segregated areas
- Potentially wheel washes, road wetting and road cleaning (as appropriate).

Monitoring around the sites perimeter for airborne Asbestos dust particles would ensure and confirm good site management of the Asbestos risk and further protect site workers and members of the public.

8.15.3 General Guidance on Asbestos as a Waste Material (after WM2, 2014)

The following comments may assist in determining the Clients options appraisal in the event that the Made Ground soils containing asbestos fibres are not to be retained on site beneath a suitable remedial cap (or hardstanding), and off-site disposal is being considered.

Comments taken from *'WM2 – Interpretation of the definition and classification of Hazardous Waste'* (2014) indicate.

'…it has become apparent that the many people in the waste industry are still unaware of how soils contaminated with asbestos should be classified for waste disposal purposes. WM2 now provides a specific example about how soil and other construction and demolition waste containing or contaminated with asbestos should be assessed…'.

'…Example 17 on page A59 of WM2 says that: "If the waste contains, in addition to any dispersed fibres, any asbestos in identifiable pieces they must be assessed as set out below. This would also apply to any dispersed fibres produced by deliberately breaking up such identifiable pieces.

Where the waste contains identifiable pieces of asbestos (i.e. any particle of a size that can be identified as potentially being asbestos by a competent person if examined by the naked eye), then the asbestos must be assessed separately. The waste is hazardous if the concentration of asbestos in the pieces alone is 0.1%. The waste is regarded as a mixed waste (see example 1) and classified accordingly. The following codes should be assigned to the asbestos waste as appropriate:

- *17 06 05* Construction material containing asbestos MH*
- *17 06 01* Insulation material containing asbestos MH*
- *17 06 05* would normally be used in preference to 17 06 01* for the asbestos in asbestos contaminated soil and stones."*

Example 1 on page A37 says that: "If more than one separately identifiable waste is present then more than one list of waste code will be required. The general principle is that if 3 items of waste (one each of types A, B and C) are placed in a single container, then that container contains 3 wastes. Each of which must be separately assessed, described and coded."

Example 17 says that if the ***concentration of asbestos in the pieces alone is > 0.1%*** *then the waste is hazardous. All asbestos containing materials likely to be identifiable by the naked eye contain more than 0.1% of asbestos.*

There is no threshold indicated for this so currently a single piece of asbestos would be sufficient to classify several hundred tonnes of soil as hazardous. We [the document Authors] *have queried this with the Environment Agency and had confirmation that this is the correct approach to waste classification. We* [the document Authors] *also queried what size the piece of asbestos would have to be and was told that* ***a piece the size of a 5p*** *would be large enough.*

If there are visible pieces of asbestos then the waste ***must*** *be classed as hazardous on that basis alone.*

The waste would then have two EWC codes, one for the soil, probably 17 05 04 or 17 05 03 depending on any other contaminants in the material and one for the asbestos.

For asbestos from asbestos cement sheets then the code would normally be 17 06 05. I [the document Author] *think it important to note that, even if your laboratory results show less than 0.1% of asbestos in any soil samples, the soil should be classed as hazardous if there are any visible pieces (larger than a 5p) of asbestos containing material.*

In practice it is not practicable to pick over a soil to remove all pieces of asbestos containing material bigger than a 5p piece although based on considerations of occupational exposure it may well be advisable.

Mechanically screening a contaminated soil may deliberately break up such identifiable pieces and WM2 explicitly states that you would still have to classify the soil as hazardous'.

Whilst we would comment that very little or no significant large quantities or fragments of ACM was revealed during our works within the soil, this does not mean that fragments of ACM sheeting, lagging etc are not present within the Made Ground. Therefore, careful consideration will be required including detailed CAR risk assessment and cost benefit analysis before any decision to remove asbestos impacted materials off-site is made.

8.15.4 Above Ground Fuel Storage Tanks and TPH Impaction

A watching brief is recommended during removal of any ASTs for visual or olfactory evidence of gross TPH contamination beneath the tanks. Any revealed grossly impacted soils should be removed from site. The sides and base of the resultant excavation should be sampled and the test results validated against current Tier 1 GACs for a residential (POS1) end use.

Localised excavation and/or pumping of impacted soils and perched water may be required at the site. Although the soils tested contained TPH concentrations below the residential (POS1) Tier 1 GACs, the perched water samples contained marginally elevated concentrations of total TPH. Therefore, taking account of the depth of the revealed impaction (generally at or below 2.00m begl), areas of identified impaction should be assessed in relation to areas of proposed build. Any impacted areas where piles are required to be advanced should be suitably remediated to prevent the introduction of a downward pathway for the hydrocarbon contamination into the Principal Aquifer.

8.15.5 Groundwater

The concentrations of determinands revealed in the soils and water at the site are not considered to represent a significant risk to Controlled Waters i.e. the Aquifer beneath the site and the estuary of the adjacent River Adur.

Water test results have verified metal, PAH and TPH impaction in the shallow water samples, but only metal (Arsenic and Selenium) within the deeper samples recovered from the Chalk aquifer, when assessed against conservatively adopted Drinking Water/EQS standards.

Taking account of the sites long history of industrial usage, and the current setting of the site the levels of contamination within the shallow perched water may be considered to be relatively low, with the levels of contaminants within the deeper Chalk Aquifer to have been demonstrated to be very low with only exceedences with respect to Arsenic and Selenium.

Therefore, at this stage, although localised removal of impacted soils/water around identified TPH impaction may be considered (to enable pile foundation installation), no significant widespread remedial measures are recommended with respect to perched waters and deeper groundwater. This conclusion is further mitigated by the final development proposals with will be predominantly hard surfaced and therefore minimal percolation of storm water into the ground would occur.

8.15.6 Surplus Soils or Off Site Disposal

Where the off-site disposal of soils is being considered, we would recommend that the environmental laboratory test results and WAC test results contained herein, are provided to several landfill operators for consideration and cost provision in the first instance, prior to the material being removed from the site.

8.16 Unforeseen Circumstances

Should any areas of potentially contaminated soil be encountered during site construction works, we would recommend consultation with GeoDyne to ensure that our recommendations continue to apply.

Any potentially contaminated soils should be left in-situ and subjected to further assessment, to potentially include further chemical testing and risk assessment.

The following procedure should be adhered to if any areas of previously unidentified suspected contamination are encountered during the development of the site:

i. Suspected contaminated material will remain in-situ.
ii. GeoDyne to be notified, and will inform the Local Authority Environmental Health Department.
iii. GeoDyne will undertake a visual assessment of the possible contamination, followed by appropriate sampling/testing (as necessary).
iv. If necessary, an appropriate strategy to remove/remediate the contamination will be submitted to the Local Authority.

8.17 Construction Workers

It is recommended that construction personnel involved with direct contact with the soils at the site use appropriate PPE equipment together with welfare facilities in accordance with general health and safety guidelines.

It is likely that gas protection measures, such as ventilated manhole covers etc, will be required at the site. Monitoring of excavations for ground gases should also be undertaken prior to, and during occupation of excavations/chambers by personnel.

8.18 Utilities

We would recommend that this report is supplied to utility companies (including water supply), and that their recommendations relating to appropriate supply pipes are adhered to.

8.19 Licenses, Permits, Registrations and Approvals

The Contractor/Developer is responsible for, and must ensure that, all necessary licenses, permits, plans, registrations and approvals are in place prior to commencing with the development of the site. These will include any Mobile Treatment Licenses (MTLs), Site Waste Management Plans/Materials Management Plans and/or Waste Management Licenses/Exemptions as necessary to enable the completion of the proposed works.

We would be pleased to prepare a Materials Management Plan (MMP) upon request.

8.20 Asbestos in Existing Structures

Potential ACMs on the existing structures was visually identified in the form of roof sheeting and side cladding. An internal examination of the existing structures was not undertaken, this being outside our remit and beyond our field of expertise. Therefore, a pre-demolition asbestos survey should be undertaken in the existing structures to ascertain the presence of ACMs.

Any materials suspected or proven to be ACMs should be removed from site by a suitably qualified Contractor.

8.21 Statutory Consultation

A copy of this report should be sent to the Local Planning Authority in advance of construction to obtain written comments and approval of the contents presented herein.

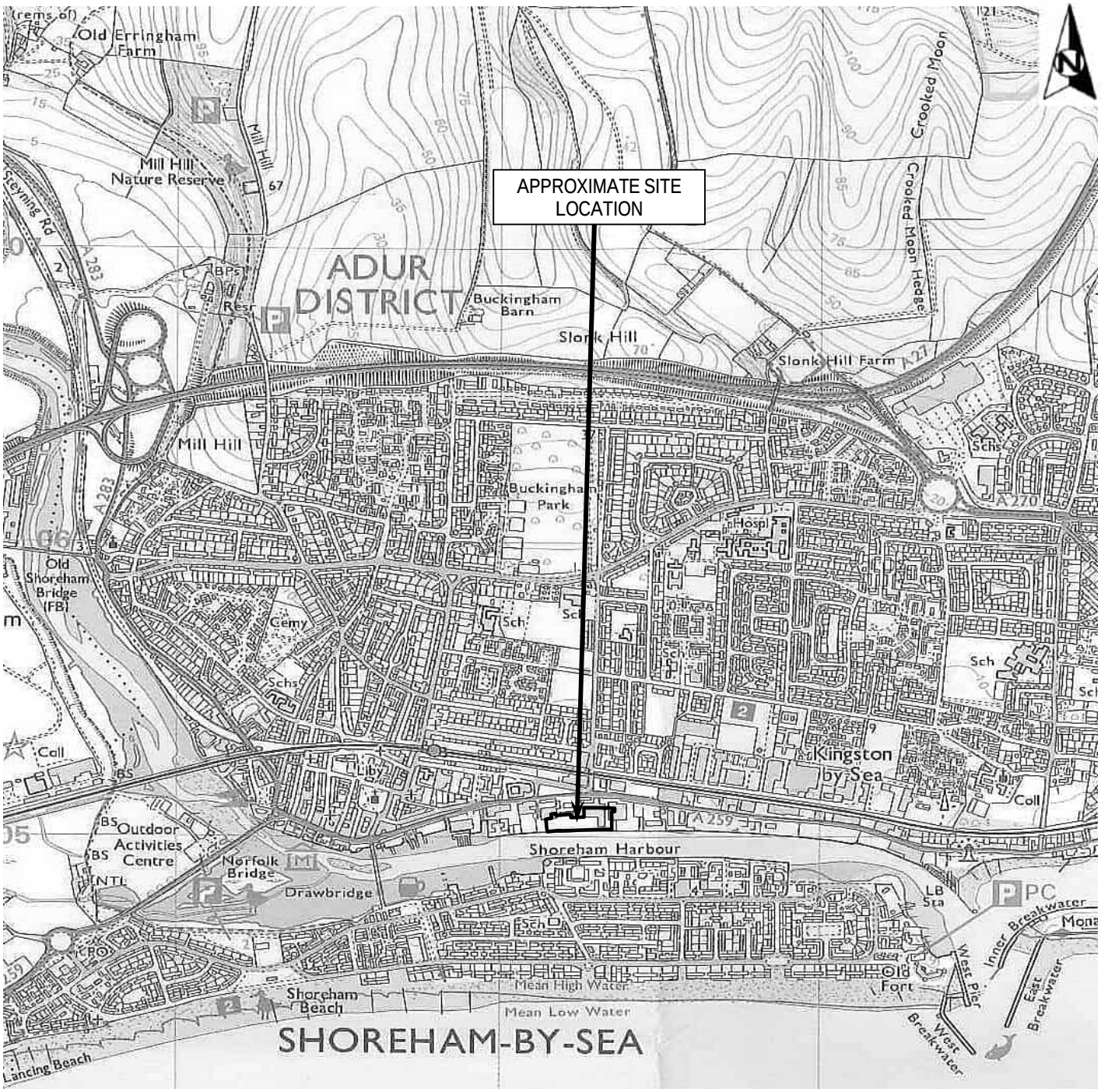
8.22 Further Works

The following phased works are recommended for the site:

- Additional works in the vicinity of borehole WS33 and TP1 (depending on where they lie in relation to the proposed development) to attempt to delineate the extent and degree of the visual/olfactory hydrocarbon impaction.
- A watching brief in the location of above ground storage tanks during their removal for any visual or olfactory evidence of gross TPH contamination which should be removed and validated.
- A pre-demolition asbestos survey of existing buildings.
- Preparation of a Materials Management Plan (if required).
- Upon site clearance of the surface concrete, it may be possible to undertake Ground Penetrating Radar (GPR) works to attempt to further ascertain the presence and depths of ground anchor cables and blocks along the southern boundary of the site. This will assist in detailed foundation design.

APPENDIX I

Site Location Plan



Project No.	31149	Drawn	CJP
Client	Newbridge Group/Southern Housing Group	Checked	RS
Project	Brighton Road, Shoreham	Approved	RS
		Scale	NTS
		Date Drawn	22/06/2015
Title	Site Location Plan	Rev.	
		Figure No.	31149/S01

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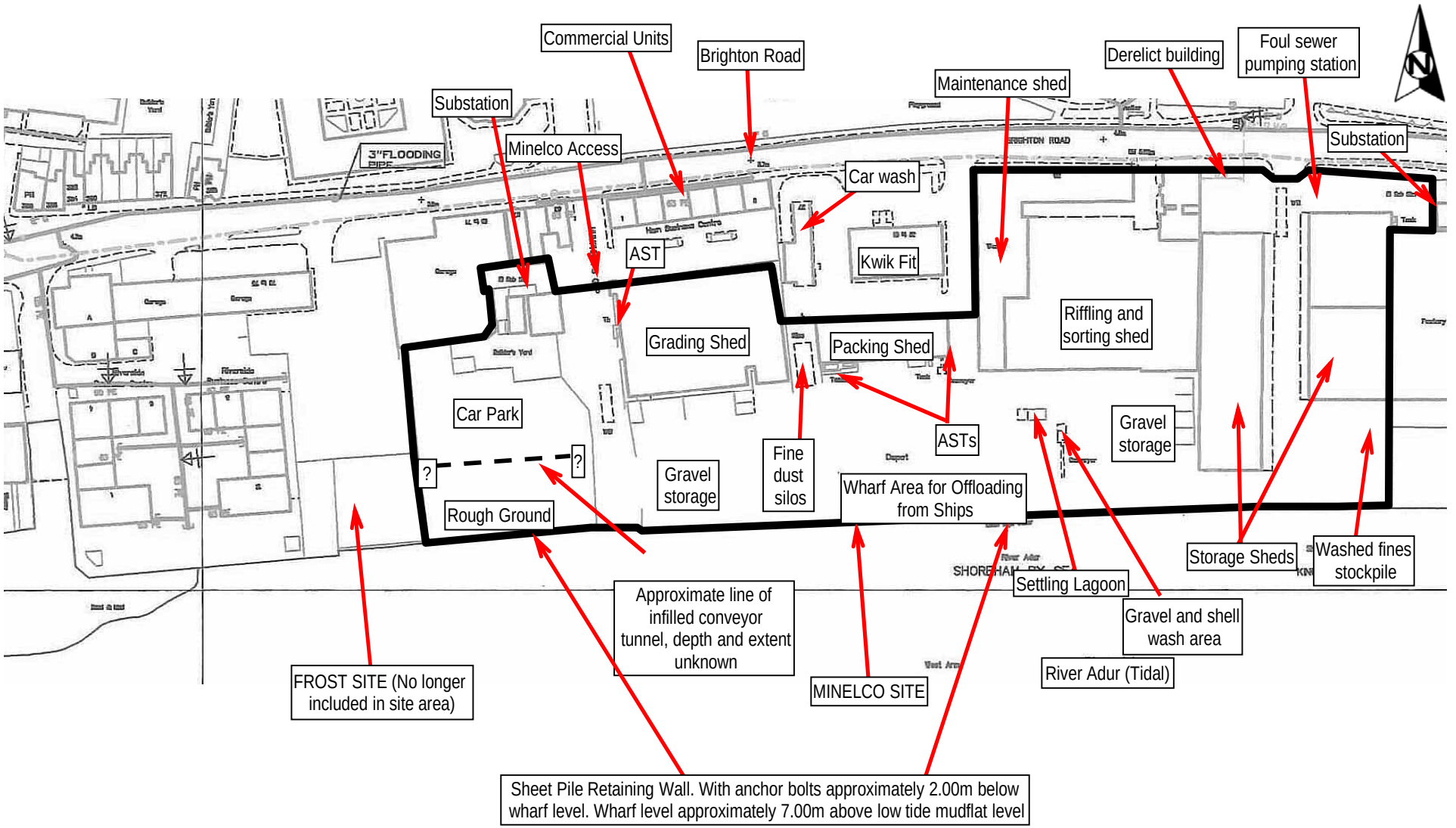
APPENDIX II

Annotated Site Plan and Historical Annotated Plan with Historical Photograph



Project No.	31149	Title	Annotated Site Plan Showing Former Site Activities	Drawn	CJP
Client	Newbribge Group/Southern Housing Group			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	22/06/2015	Approved	RS
		Scale	NTS	Figure No.31149/02	
		Revision			

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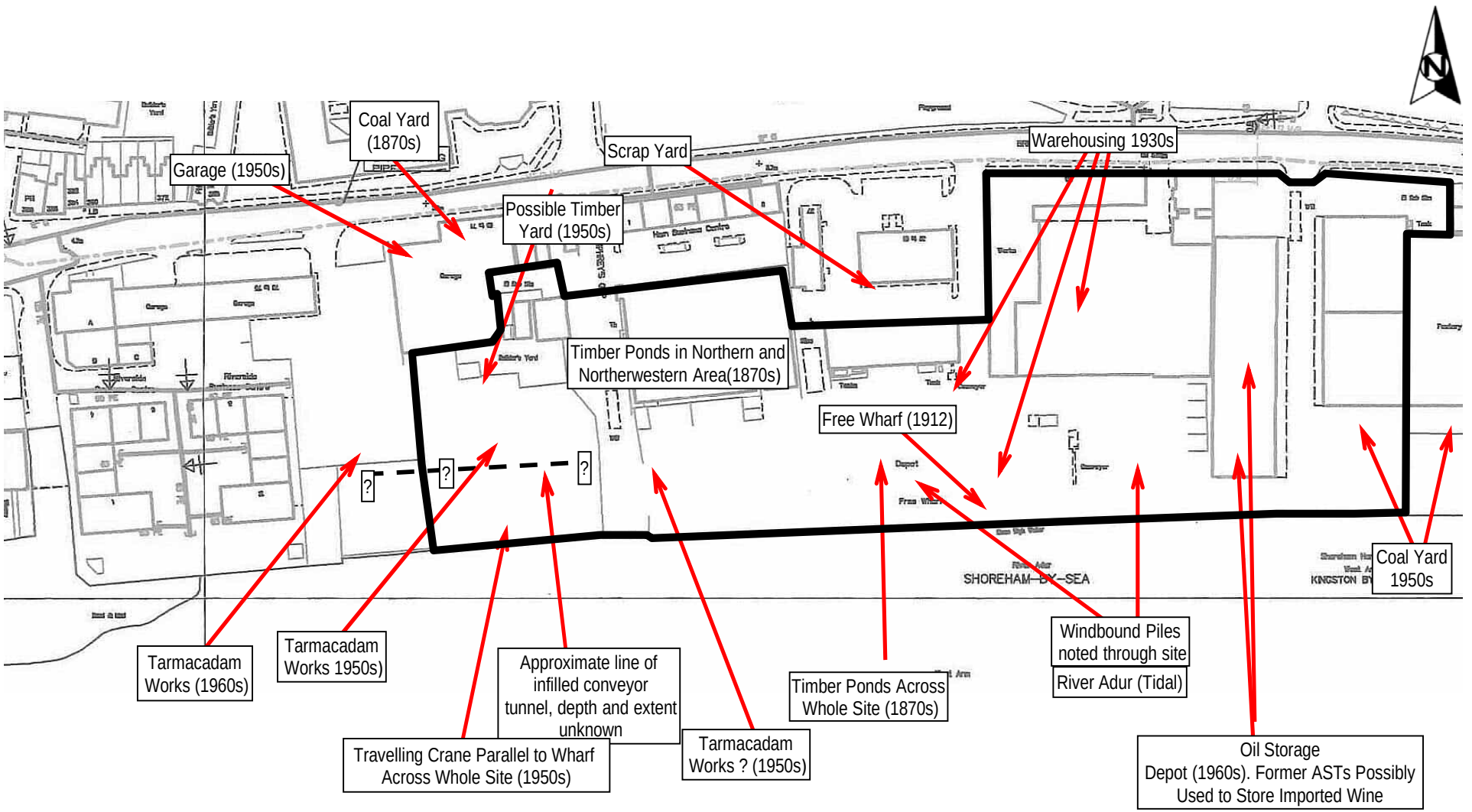
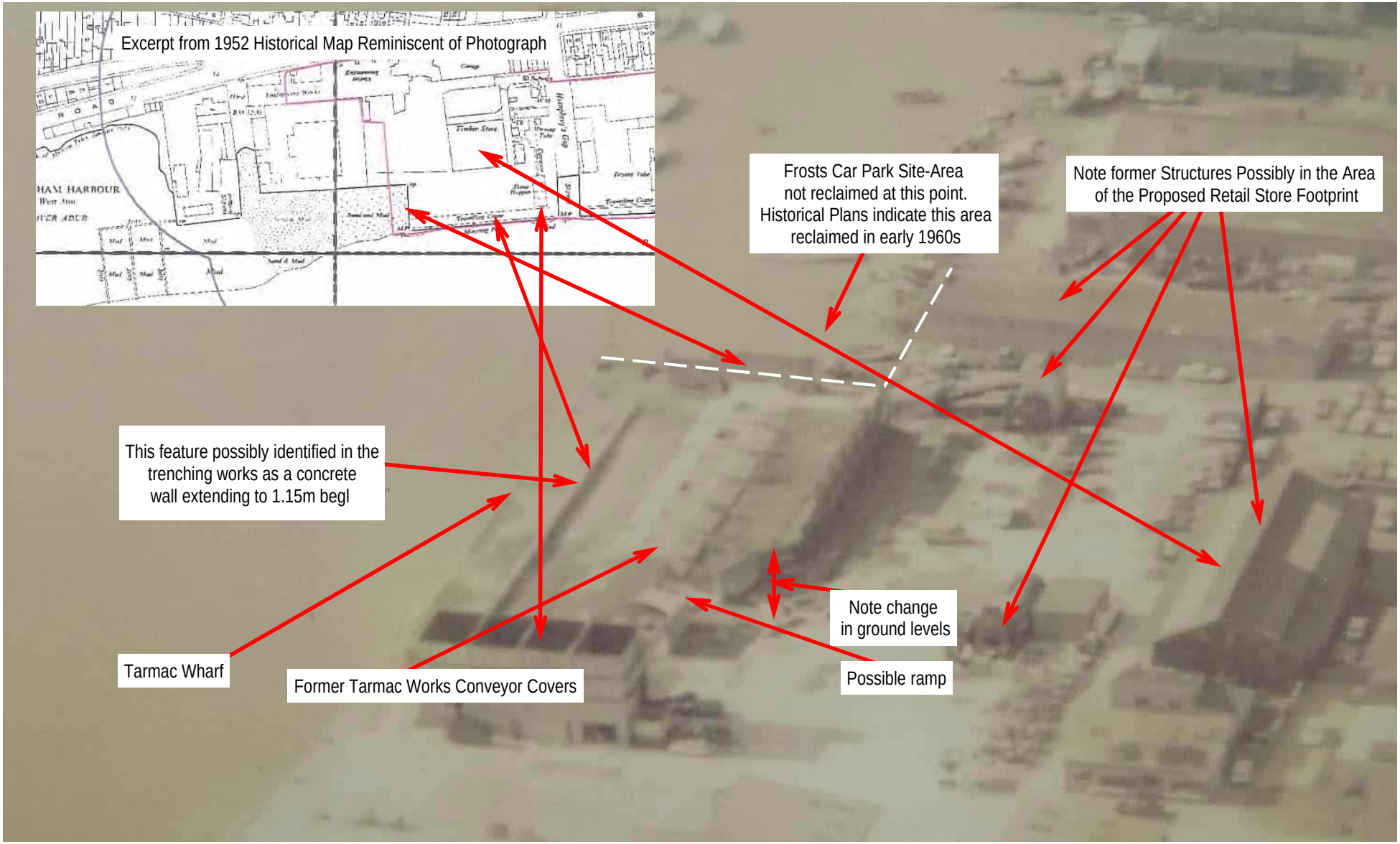


Project No.	31149	Title	Annotated Site Plan Showing the Main Historical Usages On and Around the Site	Drawn	CJP
Client	Newbribge Group/Southern Housing Group			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	22/06/2015	Approved	RS
		Scale	NTS	Figure No.31149/S03	
		Revision			

GeoDyne



Project No.	31149	Title	View of Enlarged Section of Aerial Photograph of the Former Tarmac Works	Drawn	CJP
Client	BSCP Ltd			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	20/06/2013	Approved	RS
		Scale	NTS	Figure No.31149/GA6	
		Revision			

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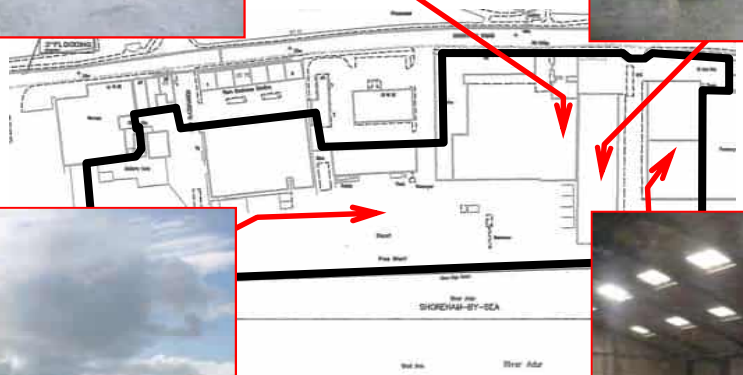
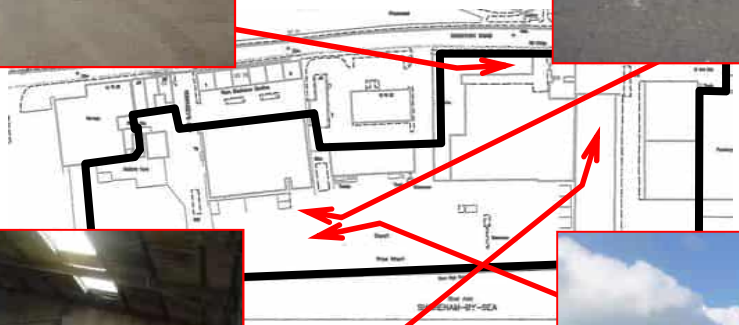
APPENDIX III

Site Plans Showing General Site Views



Project No.	31149	Title	Plan Showing Internal and External Views of the Site	Drawn	CJP
Client	Newbribge Group/Southern Housing Group			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	22/06/2015	Approved	RS
		Scale	NTS	Figure No.31149/S04	
		Revision			

GeoDyne



Project No.	31149	Title	Plan Showing Internal and External Views of the Site	Drawn	CJP
Client	Newbribge Group/Southern Housing Group			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	22/06/2015	Approved	RS
		Scale	NTS	Figure No.31149/S05	
		Revision			

GeoDyne

Project No.	31149	Title	Plan Showing Internal Views of the Site	Drawn	CJP
Client	Newbribge Group/Southern Housing Group			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	22/06/2015	Approved	RS
		Scale	NTS	Figure No.31149/S06	
		Revision			

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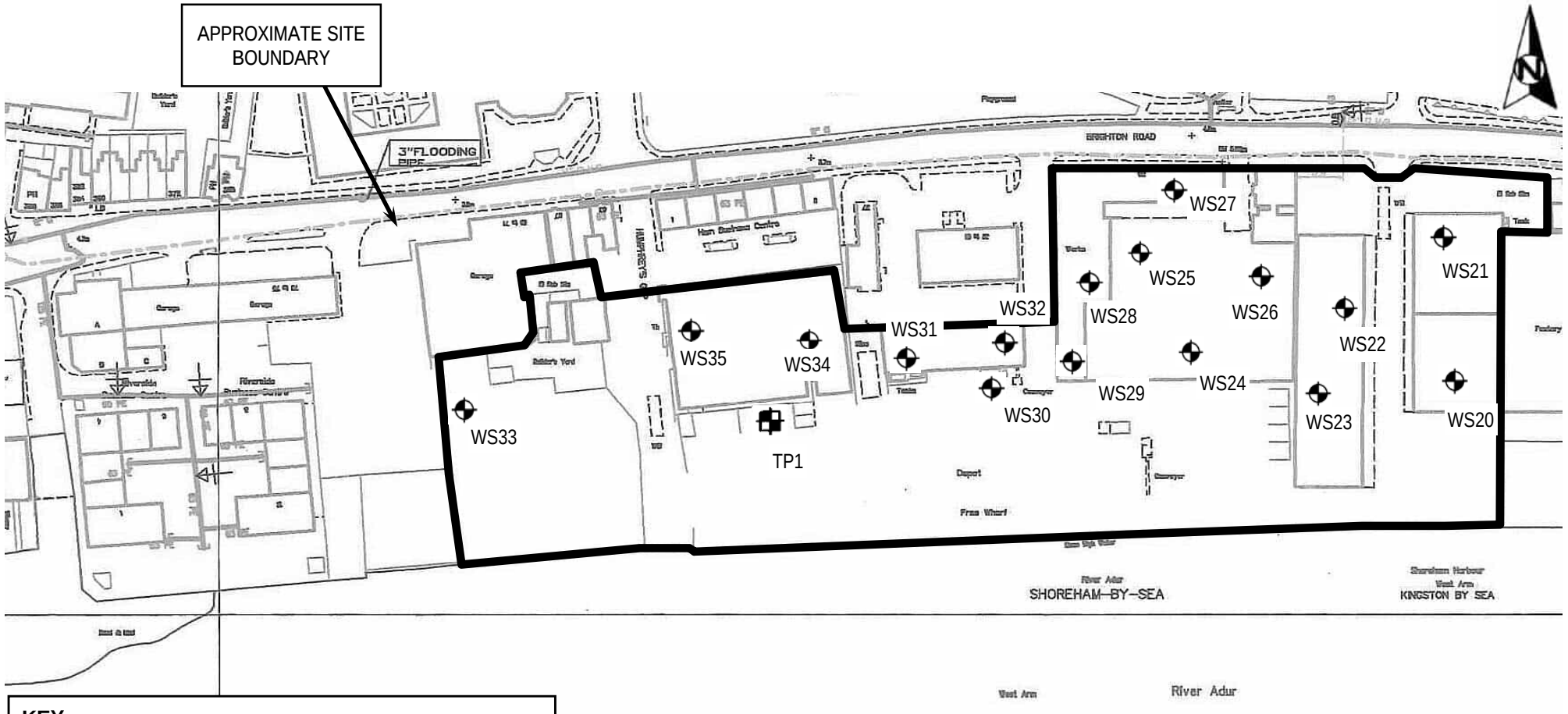
APPENDIX IV

Exploratory Hole/Monitoring Point Location Plans and

Plan Showing Depth to Base of Made Ground



KEY

Window Sampling (WS) Borehole Location

Trial Pit (TP) Location

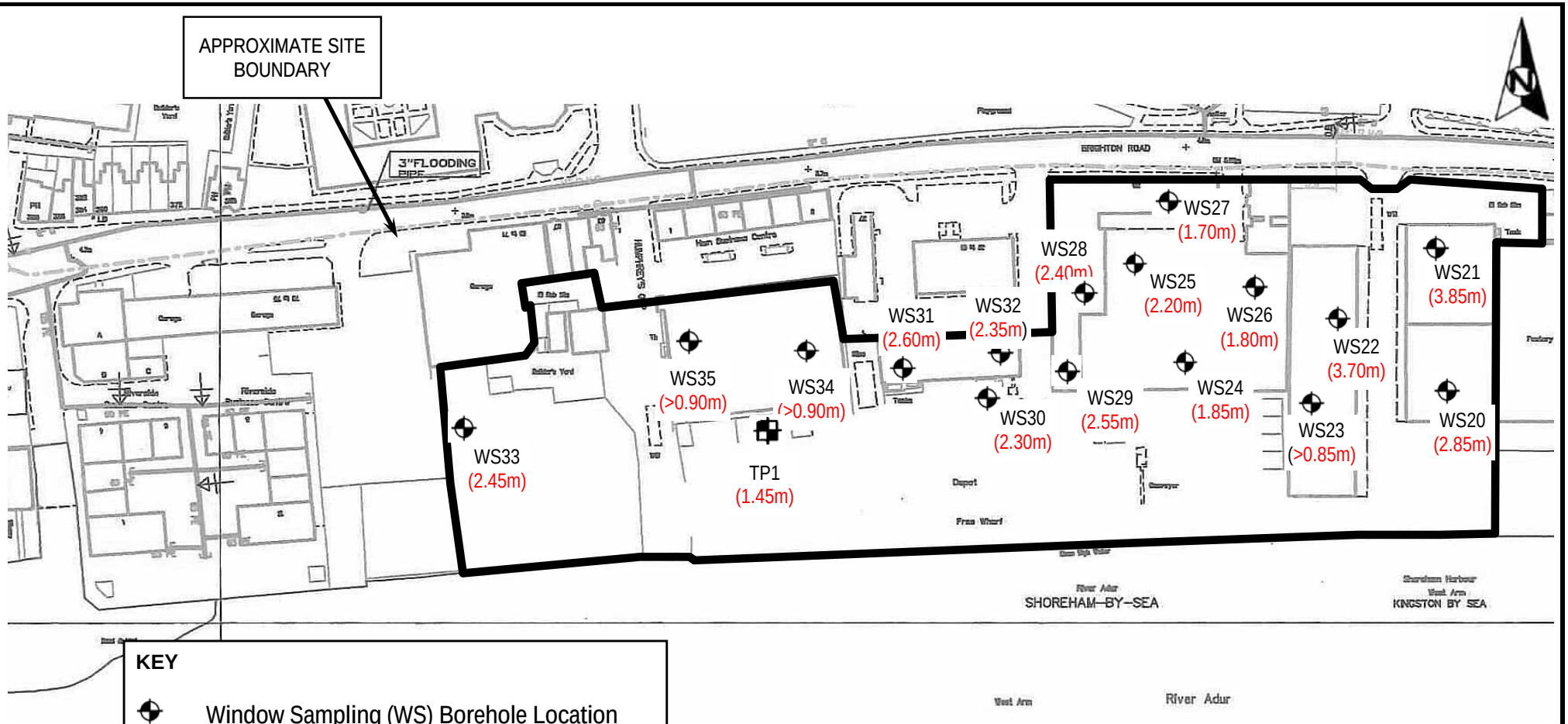
NB: All locations shown are approximate.

Note

Borehole references commence at WS20 for current phase of works, continuing the numbering from previous works at the site in 2012.

Project No.	31149	Title	Exploratory Hole Location Plan	Drawn	CJP
Client	Newbribge Group/Southern Housing Group			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	22/06/2015	Approved	RS
		Scale	NTS	Figure No.31149/S07	
		Revision			

GeoDyne



KEY

Window Sampling (WS) Borehole Location

Trial Pit (TP) Location

1.00m Depth to Base of Made Ground (> denotes

NB: All locations shown are approximate.

Note

Borehole references commence at WS20 for current phase of works, continuing the numbering from previous works at the site in 2012.

Project No.	31149	Title	Plan Showing Depth to Base of Made Ground	Drawn	CJP
Client	Newbribge Group/Southern Housing Group			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	22/06/2015	Approved	RS
		Scale	NTS	Figure No.31149/S08	
		Revision			

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APPENDIX V

Exploratory Hole Logs and BGS Borehole Records

GeoDyne
Unit 2.2 Clarendon House
Clarendon Business Park
Clumber Avenue, Nottingham NG5 1AH
Tel: 0115 962 0001 Fax: 0115 960 9995
email: info@geodyne.co.uk

TP1

Project No: 31149

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-Water
Unreinforced bitumen bound concrete (MADE GROUND)		0.10					
Macadam (MADE GROUND)		0.20					
Loose black slightly ashy sand (MADE GROUND)		0.30					
Medium dense white sandy fine, medium and coarse angular gravel and cobbles of chalk and local fragments of decomposed timber (MADE GROUND)							
...with a large section of timber and smaller black pieces of timber at 1.30m		1.45					
Loose light greenish brown silty fine grained SAND (STORM BEACH DEPOSITS) ...between 1.55m to 1.90m - two large sections of tree trunk and tree root ball. Unable to remove all three pieces. ...becoming stained grey and black and with strong hydrocarbon odour		1.70	T1	D			▽
...rapid water flow, running sand and stained with oil and with a hydrocarbon odour at 1.90m		2.00					
Flint GRAVEL (STORM BEACH DEPOSITS)		2.00	T2	D			
End of Trial Pit at 2.15 m		2.15					

Remarks:

1.Trial pit sides unstable.
2.Water encountered as rapid flow at 1.90m
3.Trial pit terminated due to tree obstruction and rapid water ingress causing slurrying of sand and gravel.
4.Trial pit backfilled with arisings upon completion.

Key: B = Bulk Sample D = Disturbed Sample W = Water Sample SV = Shear Vane (kN/m²) P = Penetrometer (kN/m²)
J = Jar Sample V = Vial Sample T = Tub Sample ▽ = Water Strike (m) ▼ = Steady Water Level (m)

Project:
Brighton Road, Shoreham

Client:
Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing No.
CP	RS	CJP 15/01	JCB 3CX	TP1
Date: 10/06/2015			**Scale:** 1:20	

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WS20

Project No. 31149

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Reinforced concrete, reinforcement bar at 140mm and 190mm (MADE GROUND)		(0.30) 0.30			
				Reinforced concrete, reinforcement bar 360mm (MADE GROUND)		0.45			
0.50	D	T1		Dense gravel of flint and brick (MADE GROUND)		(0.40) 0.85			
1.00-1.45 1.00	C D	T2	8	Loose white clayey gravelly sandy chalk with flint gravel and brick fragments (MADE GROUND)		(2.00) 2.85			
2.00-2.45	C		5						
3.00-3.45 3.00	C D/B	T3/B1	3	Very soft grey slightly silty CLAY (TIDAL RIVER DEPOSITS)		(0.90) 3.75		▽	
4.00-4.45	C		17	Medium dense greyish brown slightly clayey silty fine, medium and coarse grained SAND (STORM BEACH DEPOSITS)		4.00			
				End of Borehole at 4.00 m					

Remarks:
1.Sides generally unstable within Made Ground.
2.Water encountered at 3.00m.

Key:
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Brighton Road, Shoreham
Client: Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing Ref:
CP	RS	CJP 15/01	Competitor Rig	WS20
Date: 19/05/2015			**Scale:** 1:25	

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WS21

Project No. 31149

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Reinforced concrete, reinforcement bar at 130mm and 230mm (MADE GROUND)		0.28			
				Concrete (MADE GROUND)		0.50			
				Coarse angular flint gravel (MADE GROUND)		0.70			
				Concrete slab (MADE GROUND)		0.85			
1.00-1.45 1.00	C D	T1	9	Fine, medium and coarse brown clayey flint gravel (MADE GROUND)		(0.85)			
				Firm light brown gravelly clay. Gravel is predominantly chalk with occasional flint and brick (MADE GROUND)		1.70			
2.00-2.45	C		2	...30% recovery between 2.00m to 3.00m		(1.10)			
				Fragmented concrete screed with chalk and sandstone mixed with layers of soft putty chalk (MADE GROUND)		2.80			
3.00-3.45 3.00	C D	T2	4			(1.05)		▽	
				Very soft black organic silty CLAY (TIDAL RIVER DEPOSITS)		3.85			
4.00-4.45 4.00	C D/B	T3/B1	13			(0.60)			
				Medium dense grey and white clayey silty chalk and flint GRAVEL (STORM BEACH DEPOSITS)		4.45			
						(0.55)			
				End of Borehole at 5.00 m					

Remarks:
1.Sides generally unstable within Made Ground.
2.Water encountered at 3.80m.

Key:
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Brighton Road, Shoreham

Client: Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing Ref:
CP	RS	CJP 15/01	Competitor Rig	WS21
Date: 19/05/2015			**Scale:** 1:25	

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WS22

Project No. 31149

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Reinforced concrete, reinforcement bar at 170mm and 270mm (MADE GROUND)		(0.32)			
				Reinforced concrete, reinforcement bar at 510mm (MADE GROUND)		0.32			
0.60	D	T1		Soft brown sandy gravelly clay. Gravel is predominantly chalk with brick and ash (MADE GROUND)		0.58			
1.00-1.45	C		3			(1.12)			
				Very soft white and brown gravelly putty chalk. Gravel is predominantly chalk with localised flint, ash and sandstone (MADE GROUND)		1.70			
2.00-2.45 2.00	C D	T2	5			(1.30)			
3.00-3.45	C		0	Loose black clayey ashy flint gravel (MADE GROUND)		3.00			
						(0.70)		▽	
				Very soft grey becoming green silty CLAY with shell fragments (TIDAL RIVER DEPOSITS)		3.70			
4.00-4.45 4.00	C D/B	T3/B1	5	...becoming sandy with depth		(1.05)			
				Grey and white slighty clayey sandy chalk and flint GRAVEL		4.75			
				Continued on next sheet		4.90			

Remarks:
1.Sides unstable below 3.50m.
2.Water encountered at 3.50m.

Key:
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Brighton Road, Shoreham
Client: Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing Ref:
CP	RS	CJP 15/01	Competitor Rig	WS22
Date: 19/05/2015			Scale: 1:25	

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WS22

Project No. 31149

Sheet 1+ of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
5.00-5.45 5.00	C D	T4	18	4.75m - 4.90m : (STORM BEACH DEPOSITS) 4.90m - 5.00m : Light brown and white slightly gravelly putty CHALK. Gravel is predominantly fine to medium chalk (TARRANT CHALK MEMBER) End of Borehole at 5.00 m		5.00			

Remarks:
1.Sides unstable below 3.50m.
2.Water encountered at 3.50m.

Key:
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Brighton Road, Shoreham
Client: Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing Ref:
CP	RS	CJP 15/01	Competitor Rig	WS22
Date: 19/05/2015			Scale: 1:25	

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WS23

Project No. 31149

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Reinforced concrete, reinforcement bar at 210mm and 240mm (MADE GROUND)		0.28			
				Flint gravel sub-base (MADE GROUND)		0.35			
0.50	D	T1				0.40			
				Thin layer of concrete (MADE GROUND)		(0.45)			
				Soft green sandy gravelly clay with brick fragments (MADE GROUND)		0.85			
				End of Borehole at 0.85 m					

Remarks:
1.Sides stable.
2.No water encountered.
3.Borehole terminated at 0.85m due to possible concrete obstruction.

Key:
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Brighton Road, Shoreham
Client: Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing Ref:
CP	RS	CJP 15/01	Competitor Rig	WS23
Date: 19/05/2015			Scale: 1:25	

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WS24

Project No. 31149

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Unreinforced concrete (MADE GROUND)		0.15			
				Flint sub-base (MADE GROUND)		0.25			
						0.30			
0.50	D	T1		Dark grey concrete (MADE GROUND)		0.40			
				Concrete (MADE GROUND)					
				Loose dark grey sandy gravel of ash, slag and rare chalk (MADE GROUND)					
1.00-1.45	C		2						
1.00	D	T2				(1.45)			
						1.85			
2.00-2.45	C		2	Soft light grey very silty CLAY (TIDAL RIVER DEPOSITS)					
2.00	D/B	T3/B1				(0.55)			
				Loose light brown clayey silty slightly gravelly SAND (TIDAL RIVER DEPOSITS)		2.40			
						(0.50)			
						2.90			
3.00-3.45	C		9	Medium dense light brown sandy fine, medium and coarse GRAVEL of flint and chalk (STORM BEACH DEPOSITS)		3.00			
3.00	D	T4/B1		End of Borehole at 3.00 m					

Remarks:
1.Sides generally unstable within Made Ground.
2.No water encountered.

Key:
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Brighton Road, Shoreham
Client: Newbridge Group/Southern Housing Group

Logged: CP
Date: 19/05/2015
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Field Book Ref: CJP 15/01
Plant: Competitor Rig
Scale: 1:25
Drawing Ref: WS24

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WS25

Project No. 31149

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Concrete (MADE GROUND)		0.13			
				Macadam (MADE GROUND)		0.30			
0.50	D	T1		Soft brown sandy gravelly clay (MADE GROUND)		0.45			
				Dark brown and grey becoming brown and white locally clayey sandy gravel. Gravel is predominantly mortar, brick, flint, ash, slag and rare ceramic and glass (MADE GROUND)					
1.00-1.45 1.00	C D	T2	7			(1.75)			
				...with a layer of soft brown clay between 1.55m to 1.80m					
2.00-2.45	C		7						
2.20	D	T3		Soft light brown silty sandy CLAY (TIDAL RIVER DEPOSITS)		2.20 (0.30)			
				Medium dense light brown very clayey silty very gravelly SAND. Gravel is predominantly fine, medium and coarse chalk (STORM BEACH DEPOSITS)		2.50			
3.00-3.45 3.00	C D	T4	6			(1.10)			
				Stiff light brown very silty gravelly CLAY. Gravel is predominantly chalk (HEAD DEPOSITS)		3.60			
3.75	B	B1				(0.40)			
4.00-4.45 4.00	C D	T5	27	End of Borehole at 4.00 m		4.00			

Remarks:
1.Sides generally unstable within Made Ground.
2.No water encountered.

Key:
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Brighton Road, Shoreham
Client: Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing Ref:
CP	RS	CJP 15/01	Competitor Rig	WS25
Date: 20/05/2015			**Scale:** 1:25	

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WS26

Project No. 31149

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Concrete (MADE GROUND)		0.18			
				Granular sub-base (assummed - no recovery) (MADE GROUND)		0.40			
0.75	D	T1		Very loose gravel and cobbles of angular and subrounded flint gravel, whole brick and lenses of brown clayey sand (MADE GROUND) ...20% recovery between 0.40m to 1.80m					
1.00-1.45	C		0			(1.40)			
						1.80		▽	
1.90	D	T2		Very soft dark grey slightly silty CLAY (TIDAL RIVER DEPOSITS)					
2.00-2.45	C		1			2.00			
				Very loose to medium dense brown slightly sandy fine, medium and coarse subrounded flint GRAVEL (STORM BEACH DEPOSITS)		(0.50)			
				End of Borehole at 2.50 m		2.50			

Remarks:
1.Sides generally unstable within Made Ground.
2.Water encountered at 1.80m.
3.Borehole terminated at 2.50m due to obstruction - possible cobbles.

Key:
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Brighton Road, Shoreham
Client: Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing Ref:
CP	RS	CJP 15/01	Competitor Rig	WS26
Date: 20/05/2015			Scale: 1:25	

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WS27

Project No. 31149

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Concrete (MADE GROUND)		0.27			
				Sub-base of crushed flint gravel and cobbles (MADE GROUND)		0.45			
0.50	D	T1		Very loose dark brown sandy gravel. Gravel is predominantly ash, mortar, flint, sandstone, brick and ceramic (MADE GROUND)		0.70			
1.00-1.45 1.00	C D	T2	2	Firm light brown silty clay. Gravel is predominantly chalk, flint and black ash (MADE GROUND)		(1.00)			
1.75	D	T3		Light brown slightly sandy fine, medium and coarse subangular GRAVEL of flint and occasional chalk (STORM BEACH DEPOSITS)		1.70 1.90			
2.00-2.45	C		7	Firm light brown silty slightly gravelly CLAY. Gravel is predominantly flint and chalk (HEAD DEPOSITS)		2.00			
				End of Borehole at 2.00 m					

Remarks:
1.Sides generally stable.
2.No water encountered.

Key:
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Brighton Road, Shoreham
Client: Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing Ref:
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Date: 20/05/2015			**Scale:** 1:25	

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WS28

Project No. 31149

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Reinforced concrete, reinforcement bar at 130mm (MADE GROUND)		0.19			
0.50	D	T1		Very loose brown and grey slightly sandy gravel and cobbles of flint with brick, sandstone, ash and timber (MADE GROUND)					
1.00-1.45	C		1			(2.21)			
1.75	D	T2		...becoming rusty brown with abundant ash, slag, glass and ceramic					
2.00-2.45	C		3						
						2.40			
2.50	D/B	T3/B1		Soft light brown slightly gravelly CLAY. Gravel is predominantly chalk (HEAD DEPOSITS)		(0.40)			
						2.80			
3.00-3.45	C		30	Stiff light brown and white silty gravelly CLAY. Gravel is predominantly fine, medium and coarse chalk (HEAD DEPOSITS)		3.00			
				End of Borehole at 3.00 m					

Remarks:
1.Sides generally unstable within Made Ground.
2.No water encountered.

Key:
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Brighton Road, Shoreham
Client: Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing Ref:
CP	RS	CJP 15/01	Competitor Rig	WS28
Date: 20/05/2015			Scale: 1:25	

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WS29

Project No. 31149

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Reinforced concrete, reinforcement bar at 140mm (MADE GROUND)		0.26			
0.50	D	T1		Very loose black sandy gravel of ash, slag, shale, brick and flint (MADE GROUND)					
				...bcoming brown clayey with abundant brick and ceramic					
1.00-1.45	C		3			(1.54)			
1.50	D	T2							
				Firm light brown sandy clay with rare inclusions of brick and glass (MADE GROUND)		1.80			
2.00-2.45	C		3						
2.00	D	T3				(0.75)			
				Very soft light brown slightly silty CLAY (TIDAL RIVER DEPOSITS)		2.55			
				Very soft grey silty CLAY (TIDAL RIVER DEPOSITS)		2.80			
2.90	B	B1							
3.00-3.45	C		0						
3.00	D	T4							
				...becoming very sandy with depth		(1.00)			
				Loose grey silty fine to medium grained SAND (STORM BEACH DEPOSITS)		3.80		▽	
4.00-4.45	C		26			3.95			
4.00	D	T5		Medium dense brown slightly sandy GRAVEL. Gravel is predominantly fine, medium and coarse subrounded to angular flint (STORM BEACH DEPOSITS)		4.00			
				End of Borehole at 4.00 m					

Remarks:
1.Sides generally unstable within Made Ground.
2.Water encountered at 3.80m.

Key:
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Brighton Road, Shoreham
Client: Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing Ref:
CP	RS	CJP 15/01	Competitor Rig	WS29
Date: 20/05/2015			Scale: 1:25	

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WS30

Project No. 31149

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Reinforced concrete, reinforcement bar at 110mm (MADE GROUND)		0.18			
0.50	D	T1		Loose brown sandy gravel and cobble of brick, mortar and flint (MADE GROUND)		(0.67)			
						0.85			
1.00-1.45	C		3	Loose grey sandy gravel of ash, slag and brick with rare ceramic and glass (MADE GROUND)					
1.50	D	T2				(1.45)			
2.00-2.45	C		2					▽	
				Very soft grey silty CLAY (TIDAL RIVER DEPOSITS)		2.30			
2.50	D	T3		Soft light brown silty sandy CLAY laminated with light brown silty sand (TIDAL RIVER DEPOSITS)		2.50 (0.30)			
2.80	B	B1				2.80		▽	
3.00-3.45	C		10	Medium dense light grey silty fine grained SAND (STORM BEACH DEPOSITS)		3.00			
				End of Borehole at 3.00 m					

Remarks:
1.Sides generally unstable within Made Ground.
2.Water encountered at 2.00m and 2.80m.

Key:
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Brighton Road, Shoreham
Client: Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing Ref:
CP	RS	CJP 15/01	Competitor Rig	WS30
Date: 20/05/2015			Scale: 1:25	

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WS31

Project No. 31149

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Concrete (MADE GROUND)		0.18			
0.50	D	T1		Loose grey and white sandy gravel of ash, flint, slag, brick and mortar (MADE GROUND)		(1.22)			
1.00-1.45	C		4						
				Soft becoming firm brown sandy gravelly clay. Gravel is predominantly of ash and brick (MADE GROUND)		1.40 (0.35)			
				Brown slightly sandy fine to coarse flint gravel (MADE GROUND)		1.75 (0.85)	2.00		
2.00-2.45	C		13						
2.00	D	T2						▽	
				Soft grey silty CLAY (TIDAL RIVER DEPOSITS)		2.60			
2.75	B	B1							
3.00-3.45	C		0						
3.00	D	T3		...becoming very soft and with a hydrogen sulphide odour below 3.50m		(1.35)			
4.00-4.45	C		22						
4.00	D	T4		Medium dense brown sandy GRAVEL (STORM BEACH DEPOSITS)		3.95 4.00			
				End of Borehole at 4.00 m					

Remarks:
1.Sides generally unstable within Made Ground. Cased to 2.00m.
2.Water encountered at 2.60m.

Key:
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Brighton Road, Shoreham
Client: Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing Ref:
CP	RS	CJP 15/01	Competitor Rig	WS31
Date: 20/05/2015			**Scale:** 1:25	

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email: info@geodyne.co.uk

WS32

Project No. 31149

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Concrete (MADE GROUND)		0.13			
0.50	D	T1		Brown sandy flint gravel (MADE GROUND)		(0.62)			
						0.75			
1.00-1.45	C		4	Brown and grey clayey gravelly sand. Gravel is predominantly of flint and ash (MADE GROUND)		(0.45)			
1.00	D	T2				1.20			
				Firm greenish brown silty gravelly clay (MADE GROUND)		(0.50)			
						1.70			
2.00-2.45	C		0	Very loose grey clayey silty ashy sand with black fibrous roots, lenses of soft brown silty clay (MADE GROUND) ...becoming gravelly		(0.65)			
2.00	D	T3				2.35		▽	
2.50	B	B1		Very soft greenish brown and grey silty CLAY (TIDAL RIVER DEPOSITS)		(1.05)			
3.00-3.45	C		1						
3.00	D	T4		...becoming sandy with depth		3.40			
				Very loose grey clayey silty SAND (STORM BEACH DEPOSITS)		(0.40)			
						3.80			
4.00-4.45	C		10	Medium dense light brown sandy fine, medium and coarse GRAVEL of chalk and flint (STORM BEACH DEPOSITS)		4.00			
4.00	D	T5		End of Borehole at 4.00 m					

Remarks:
1.Sides generally unstable within Made Ground at base.
2.Water encountered at 2.35m.

Key:
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Brighton Road, Shoreham

Client: Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing Ref:
CP	RS	CJP 15/01	Competitor Rig	WS32
Date: 20/05/2015			Scale: 1:25	

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WS33

Project No. 31149

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Concrete (MADE GROUND)		0.15			
				Limestone gravel sub-base (MADE GROUND)		0.35			
				Reinforced concrete, reinforcement bar at 370mm (MADE GROUND)		0.50 0.60			
0.75	D	T1		Limestone and chert gravel sub-base (MADE GROUND)		0.80			
				Dark grey gravelly sand (MADE GROUND)		(0.60)			
				Medium dense dark brown and grey clayey sandy gravel of flint, brick, mortar and rare ceramic (MADE GROUND)		1.40			
				Firm light grey silty clay with rare flint gravel (MADE GROUND)		(0.45)			
				Dark brown and rusty brown clayey gravelly sand. Gravel is predominantly flint, ironstone and ash (MADE GROUND)		1.85 (0.60)		▽	
2.25	D	T2		...stained dark grey with oil and hydrocarbon odour at 2.20m					
2.50	J	J1		Very soft grey organic silty CLAY with a slight hydrocarbon odour (TIDAL RIVER DEPOSITS)		2.45 2.65			
				Medium dense light brown silty fine to medium grained SAND with a very slight hydrocarbon odour (STORM BEACH DEPOSITS)		(0.35) 3.00			
				Medium dense light brown and white sandy flint GRAVEL (STORM BEACH DEPOSITS)		(1.00)			
4.00	D	T4		End of Borehole at 4.00 m		4.00			

Remarks:
1.Sides generally unstable within Made Ground.
2.Water encountered at 2.20m.

Key:
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Brighton Road, Shoreham
Client: Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing Ref:
CP	RS	CJP 15/01	Competitor Rig	WS33
Date: 20/05/2015			Scale: 1:25	

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WS34

Project No. 31149

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
0.20	D	T1		Reinforced concrete, reinforcement bar at 85mm (MADE GROUND)		0.18			
				Black weakly cemented fine grained silt. Probable Pulverised Fuel Ash (PFA) (MADE GROUND)		(0.37)			
				Concrete (MADE GROUND)		0.55			
				Black weakly cemented fine grained silt. Probable Pulverised Fuel Ash (PFA) (MADE GROUND)		0.74			
				End of Borehole at 0.90 m		0.90			

Remarks:
1.Sides generally stable.
2.No water encountered.
3.Borehole terminated at full extent of coring attachment.

Key:
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Brighton Road, Shoreham
Client: Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing Ref:
CP	RS	CJP 15/01	Competitor Rig	WS34
Date: 21/05/2015			Scale: 1:25	

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WS35

Project No. 31149

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
0.20	D	T1		Reinforced concrete, reinforcement bar at 85mm (MADE GROUND)		0.18			
				Black weakly cemented fine grained silt. Probable Pulverised Fuel Ash (PFA) (MADE GROUND)		(0.72)			
				End of Borehole at 0.90 m		0.90			

Remarks:
1.Sides generally stable.
2.No water encountered.
3.Borehole terminated at full extent of coring attachment.

Key:
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Brighton Road, Shoreham
Client: Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing Ref:
CP	RS	CJP 15/01	Competitor Rig	WS35
Date: 21/05/2015			Scale: 1:25	

GROUND EXPLORATIONS LTD.

TQ 20 NW/38

BOREHOLE NO. 9

2213 0515

Contract Name THE HAM, SHOREHAM. Report No. 4746/ET.

Client West Sussex County Council. Site Address The Ham, Shoreham, Sussex.

Address County Hall, Chichester, Sussex.

Standing Water Level 3·66 m. Method of Boring Shell/auger.

Water Struck 3·35m., 7·62m., 9·14m. Diameter 15·24 cm.

Ground Level 4·07m. O.D. Start 14.7.69. Finish 15.7.69.

Remarks

JARS			CORES			BULK		
m.		m.	m.		m.	m.		m.
2437	0·61		2438	1·07		2441	3·66	
2439	2·13		2440	2·59				
2443	4·88		2442	4·12				
2444	6·10							
2445	7·62							
2446	9·14							
2447	10·67							
2448	12·19							
2449	13·72							
2450	15·24							
2451	water							

Description	Thickness	Depth
	m.	m.
Made ground (topsoil and stones)	0·46	0·46
Stiff brown silty clay with patches of organic matter	2·89	3·35
Brown chalky flinty clay	0·61	3·96
Very stiff brown clay with pieces of rock chalk	0·92	4·88
Medium hard white matrix of putty chalk with pieces of rock chalk and flints	7·31	12·19
Hard white matrix of putty chalk with pieces of rock chalk	3·43	15·62
TOTALS	15·62	15·62

Notes 1. Descriptions are in accordance with B.S. Code of Practice C.P. 2001
Clients are requested to compare with samples submitted.
2. Core samples are nominally 10cms. diameter and 45cms. long.
Depths shown are to top of sample.

GROUND EXPLORATIONS LTD.

TQ 20 NW/35
2209 0514

BOREHOLE NO. 6

Contract Name THE HAM, SHOREHAM. Report No. 4746/PT.

Client West Sussex County Hall, Site Address

Address County Hall, The Ham,

Chichester, Shoreham,

Sussex. Sussex.

Standing Water Level 3·96 m. Method of Boring Shell/auger.

Water Struck 4·57m., 6·10m., 9·14m. Diameter 15·24 cm.

Ground Level 3·23m. O.D. Start 5.7.69. Finish 9.7.69.

Remarks

JARS			CORES		BULK	
m.	m.	m.	m.	m.	m.	m.
2407 0·61	2420 15·24		2408 1·07		2409 1·82	
2421 2·13	2422 Water		2412 4·12			
2410 2·44						
2411 3·35						
2413 4·88						
2414 6·10						
2415 7·62						
2416 9·14						
2417 10·67						
2418 12·19						
2419 13·72						

Description	Thickness	Depth
Made ground (tarmacadam)	0·08	0·08
Made ground (hardcore)	0·23	0·31
Stiff brown friable silty clay with occasional gravel	1·21	1·52
Brown chalky clay with occasional gravel	0·92	2·44
Brown/white matrix of putty chalk with pieces of rock chalk and occasional flints) Weak to Medium Hard	6·86	9·30
) Hard	4·42	13·72
Hard white matrix of putty chalk with pieces of rock chalk	1·75	15·47
TOTALS	15·47	15·47

Notes 1. Descriptions are in accordance with B.S. Code of Practice C.P. 2001
Clients are requested to compare with samples submitted.
2. Core samples are nominally 4 ins. diameter and 18 ins. long.
Depths shown are to top of sample.

GROUND EXPLORATIONS LTD.

TQ 20 NW/39

BOREHOLE NO. 10 2043 0512

Contract Name THE HAM, SHOREHAM. Report No. 4746/PT.

Client West Sussex County Council, Site Address

Address The County Hall, The Ham,

Chichester, Shoreham,

Sussex. Sussex.

Standing Water Level 4·12 m. Method of Boring Shell/auger.

Water Struck 8·53m. Diameter 15·24 cm.

Ground Level 5·75m. O.D. Start 13.8.69. Finish 15.8.69.

Remarks

JARS			CORES		BULK	
m.	m.	m.	m.	m.	m.	m.
6644 0·61	6659 water		6645 1·07		6648 3·66	
6646 2·31			6647 2·59			
6649 4·42			6650 5·18			
6651 6·10						
6652 7·62						
6653 9·14						
6654 10·67						
6655 12·19						
6656 13·72						
6657 15·24						
6658 16·76						

Description	Thickness	Depth
Made ground (topsoil)	0·31	0·31
Made ground (chalk, flints and topsoil)	0·60	0·91
Stiff brown silty clay with occasional flints and organic matter	2·14	3·05
Firm brown clay with chalk nodules and flints	3·66	6·71
White matrix of putty chalk with pieces of)Medium hard	3·96	10·67
rock chalk) Hard	6·33	17·00
TOTALS	17·00	17·00

Notes 1. Descriptions are in accordance with B.S. Code of Practice C.P. 2001
Clients are requested to compare with samples submitted.
2. Core samples are nominally 10cms. diameter and 45cms. long.

GROUND EXPLORATIONS LTD.

TQ 20 NW/34
2202 0508

BOREHOLE NO. 5

Contract Name THE HAM, SHOREHAM. Report No. 4746/PT.

Client West Sussex County Council. Site Address

Address County Hall, The Ham,

Chichester, Shoreham,

Sussex. Sussex.

Standing Water Level 2·59 m. Method of Boring Shell/auger.

Water Struck 3·66m., 9·14m., 15·24m. Diameter 15·24 cm.

Ground Level 3·57 m. O.D. Start 27.7.69. Finish 31.7.69.

Remarks Standing water levels measured at high and low tides were similar.

JARS			CORES		BULK	
m.	m.	m.	m.	m.	m.	m.
2485 0·91			2487 2·74 m.		2486 1·82	
2489 4·72					2488 3·96	
2491 6·10						
2492 7·62						
2493 9·14						
2494 10·67						
2495 12·19						
2496 13·72						
2497 15·24						
2498 16·76						
6001 18·29						
6002 water						

Description	Thickness	Depth
	m.	m.
Made ground (clay, stones and rubble)	1·52	1·52
Made ground (dark brown silty clay with organic patches, brick and gravel)	0·92	2·44
Very soft grey sandy/silty clay	1·22	3·66
Gravel	1·83	5·49
White maxtrix of putty chalk, with pieces of rock chalk) Medium hard	3·65	9·14
) Hard	9·45	18·59
TOTALS	18·59	18·59

Notes 1. Descriptions are in accordance with B.S. Code of Practice C.P. 2001
Clients are requested to compare with samples submitted.
2. Core samples are nominally 4 ins. diameter and 18 ins. long.
Depths shown are to top of sample.

1" : 318 TQ 20 NW | 81-82 ✳

(3.05m)

(4.57m)

(a) Drift) Ucl) Mck) Lck) ? UGS)	..	...	1300	1300 (396.24m)
G	...	...	15	1315 (400.81m)

(a) TQ 20 NW | 81 N.G.R. 2272. 0507

Drift) Ucl) Mck) Lck) ? UGS) 1300	Chalk and flints	98	98	(29.87m)
	Chalk	37	135	(41.15m)
	Hard grey chalk (seams of soft and hard chalk at 341ft)	273	408	(124.36m)
	Chalk and flints (plastic chalk at 460ft)	77	485	(147.82m)
	Hard chalk with flints (slight infiltration of water at 622ft)	175	660	(201.17m)
	Hard chalk	640	1300	(396.24m)
G 15	Gauge	15	1315	(400.81m)

(b) TQ 20 NW | 82 N.G.R. 2272. 0510

Drift 22	Gravel and clay	7	7	(2.13m)
	Clay and flints	15	22	(6.71m)
	Marl and flint	26	48	(14.63m)
	Chalk and flint	96	144	(43.89m)
Ucl 228	Hard chalk and flint (Strata at 169ft)	25	169	(51.51m)
	Soft chalk (water cut at 236ft)	71	240	(73.15m)
	Very hard chalk	10	250	(76.20m)

A - TQ 2272 0507

B - TQ 2273 0510

GeoDyne

APPENDIX VI

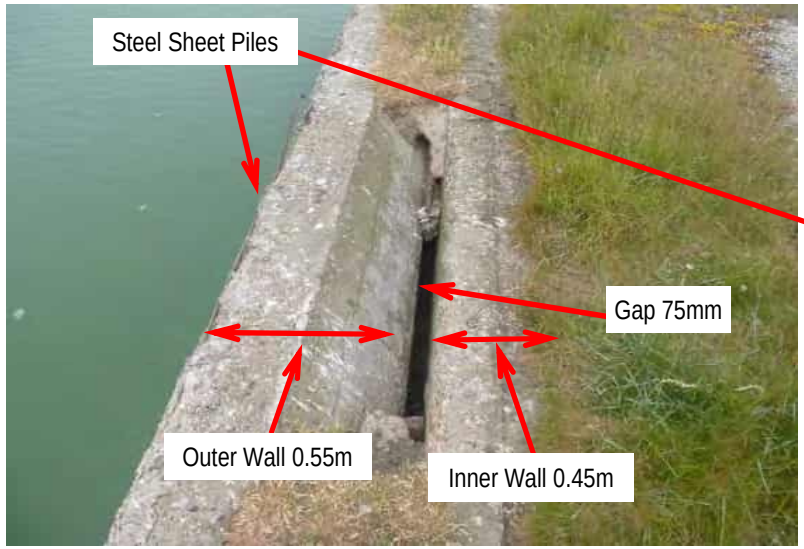
Logs, Drawings and Sketches of 2013 and 2015 Ground Anchor Trenches

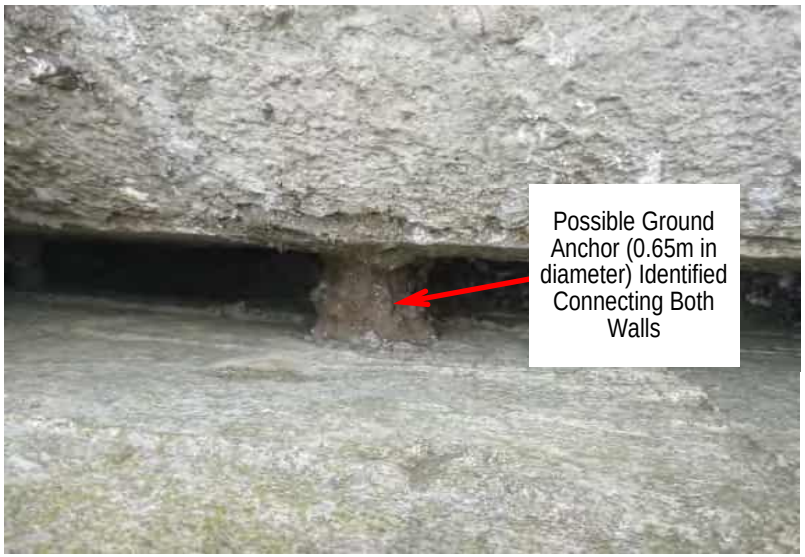
GeoDyne

2013 Works

Project No.	31149	Title	Views of the Area under Investigation on the Tarmac Wharf (Minelco Site) in June 2013	Drawn	CJP
Client	BSCP Ltd			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	20/06/2013	Approved	RS
		Scale	NTS	Figure No.31149/GA3	
		Revision			

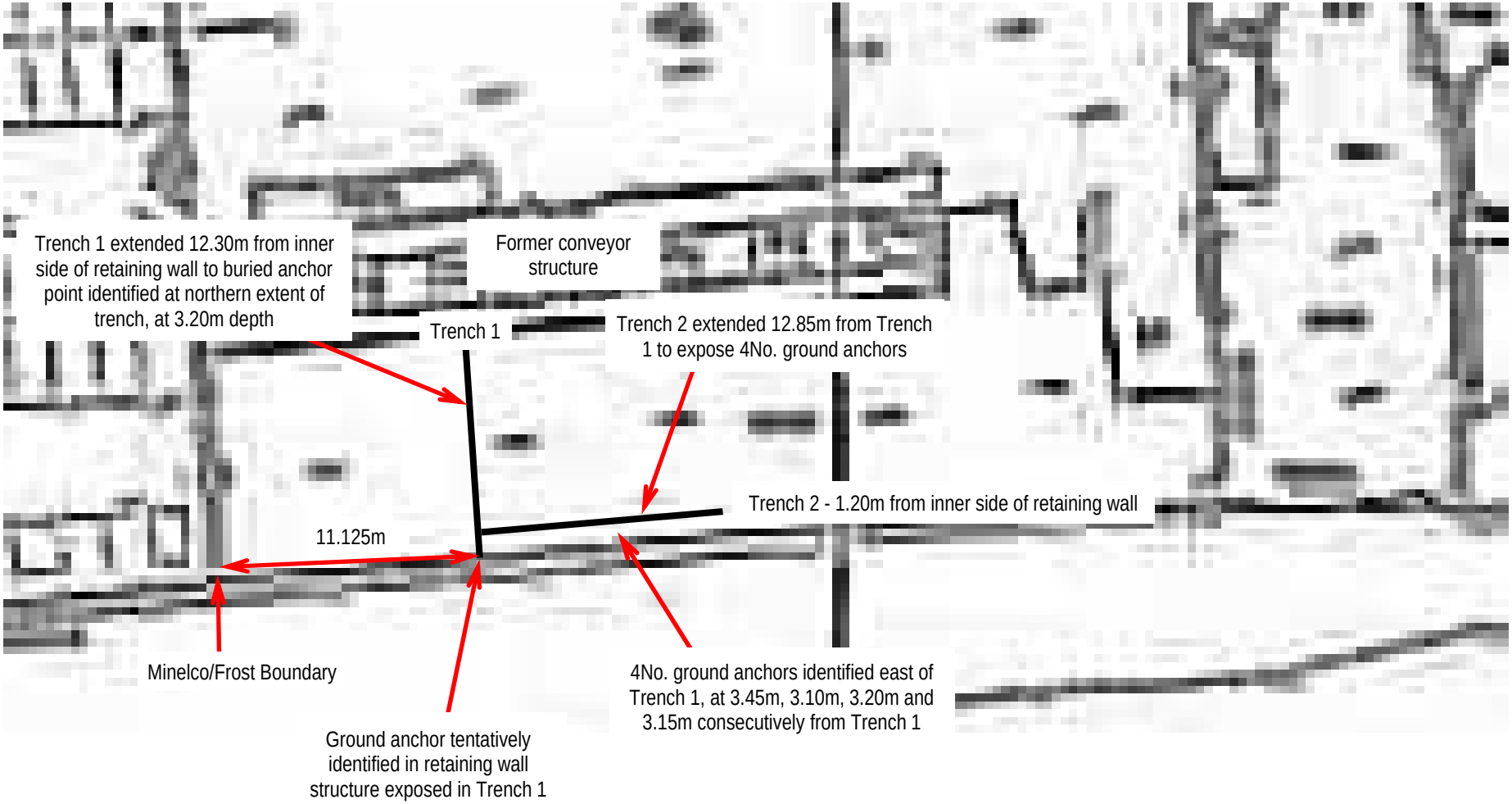
GeoDyne





Project No.	31149	Title	Views of the Corroded Steel Interlocking Sheet Piled Wall at Tarmac Wharf, Concrete Walls and Anchor	Drawn	CJP
Client	BSCP Ltd			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	20/06/2013	Approved	RS
		Scale	NTS	Figure No.31149/GA7	
		Revision			

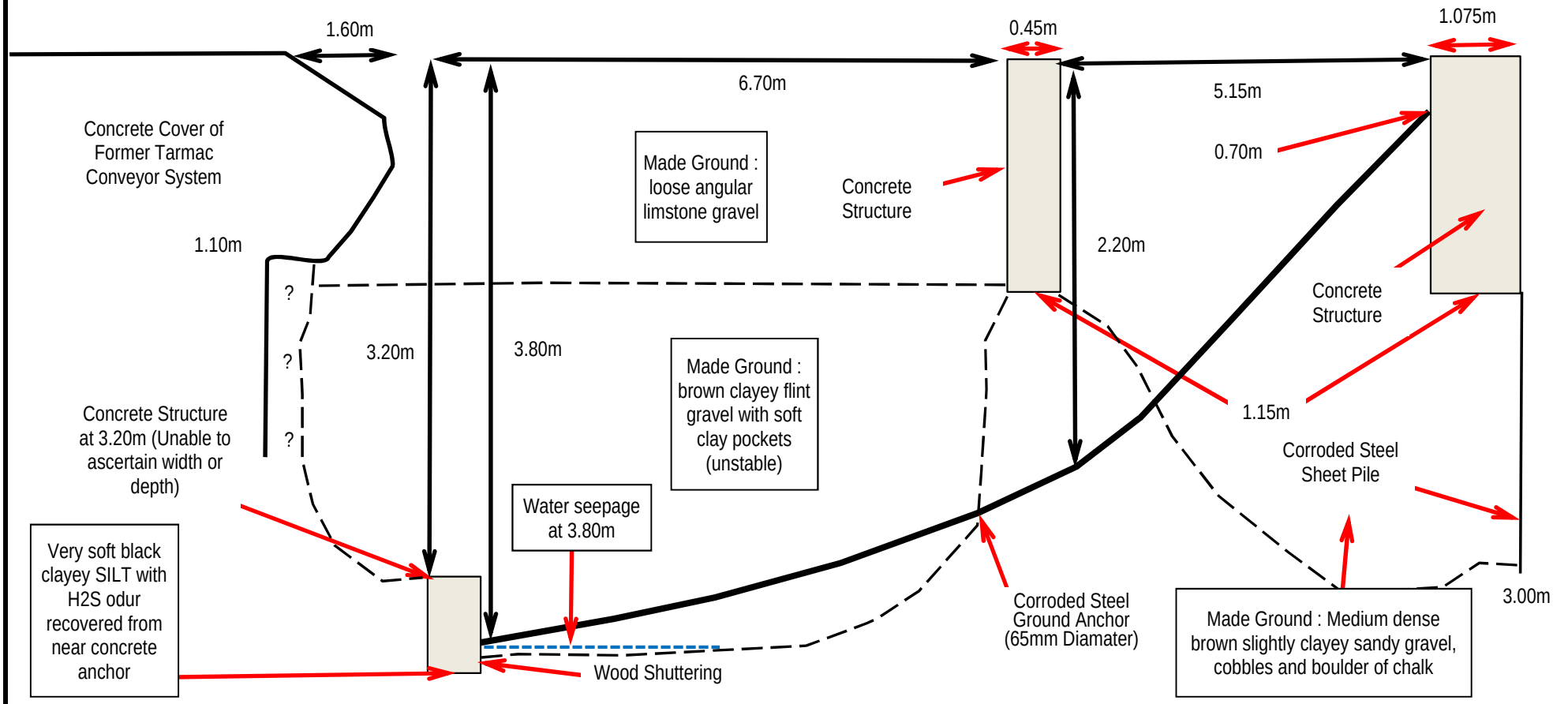
GeoDyne



Project No.	31149	Title	Plan Showing Approximate Locations of Trenches at Tarmac Wharf	Drawn	CJP
Client	Optimisation Developments Ltd			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	20/06/2013	Approved	RS
		Scale	NTS	Figure No.31149/GA9	
		Revision			

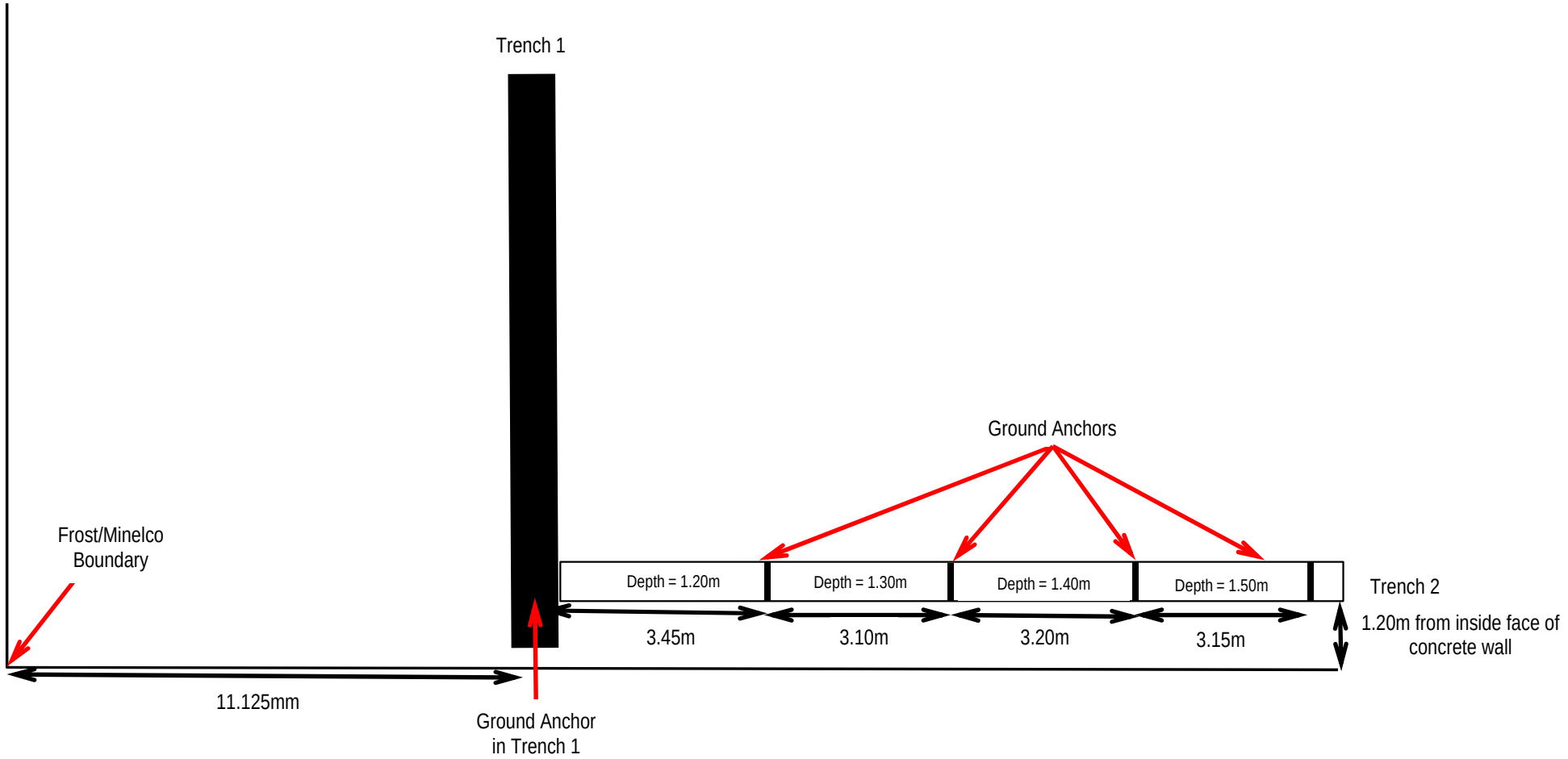
GeoDyne

SKETCH CROSS-SECTION OF TRENCH 1



Project No.	31149	Title	Sketch Cross-Section of Trench 1 Which Exposed Ground Anchor	Drawn	CJP
Client	BSCP Ltd			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	20/06/2013	Approved	RS
		Scale	NTS	Figure No.31149/GA10	
		Revision			

GeoDyne



Project No.	31149	Title	Sketch Plan of Trench 2 Showing Revealed Spacing Centres of Ground Anchors Along Tarmac Wharf	Drawn	CJP
Client	BSCP Ltd			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	20/06/2013	Approved	RS
		Scale	NTS	Figure No.31149/GA11	
		Revision			

GeoDyne

Project No.	31149	Drawn	CJP
Client	BSCP Ltd	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	21/06/2013
Title	Views of the Ground Anchor Cable at the Retaining Wall	Rev.	
		Plate GA1	

GeoDyne

Project No.	31149	Drawn	CJP
Client	BSCP Ltd	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	21/06/2013
Title	Views of the Revealed Concrete Wall Depth	Rev.	
		Plate GA2	

GeoDyne

Project No.	31149	Drawn	CJP
Client	BSCP Ltd	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	21/06/2013
Title	Views of Corroded Steel Sheet Pile Wall and Corrosion Layer from Ground Anchor	Rev.	
		Plate GA3	

GeoDyne

Project No.	31149	Drawn	CJP
Client	BSCP Ltd	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	21/06/2013
Title	Views of the Ground Anchor Cable	Rev.	
		Plate GA4	

GeoDyne

Project No.	31149	Drawn	CJP
Client	BSCP Ltd	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	21/06/2013
Title	View of the Ground Anchor Cable Toward the North	Rev.	
		Plate GA5	

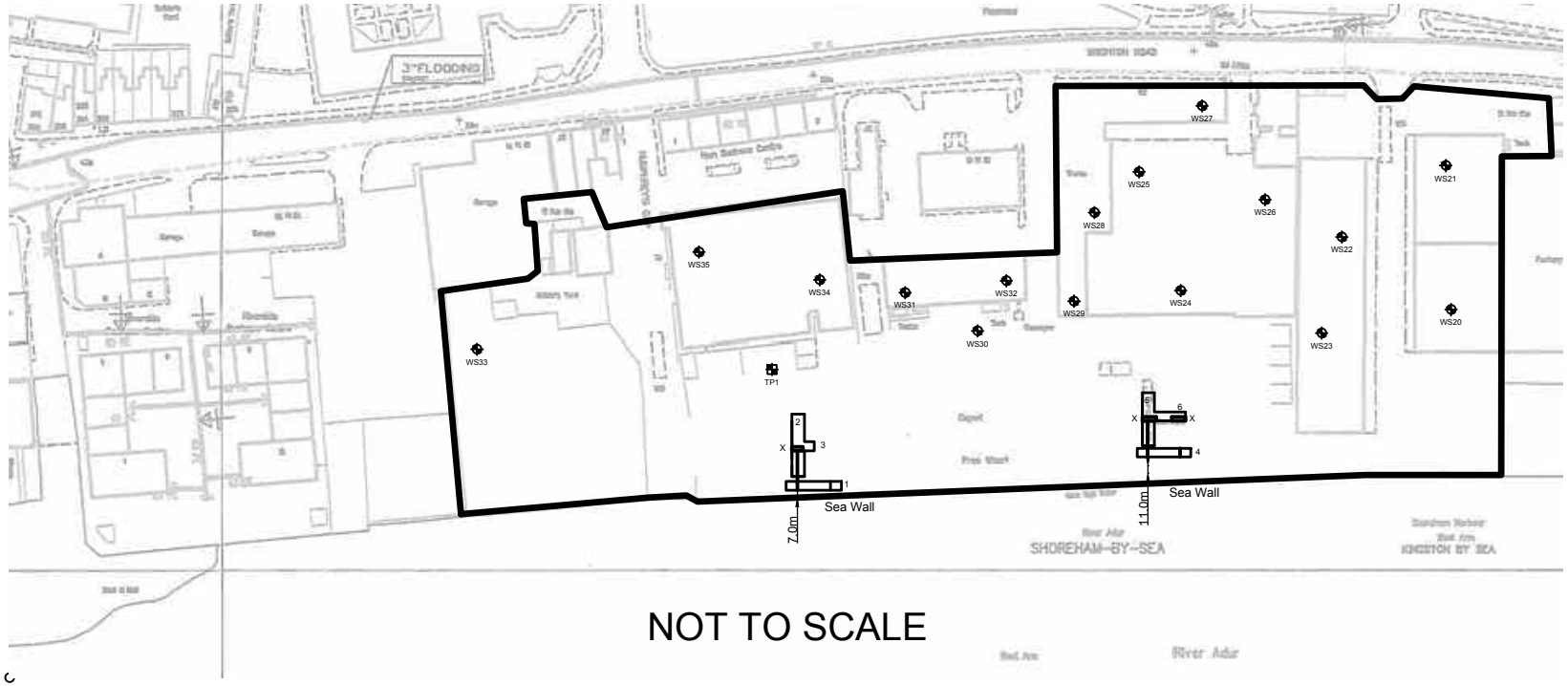
GeoDyne

Project No.	31149	Drawn	CJP
Client	BSCP Ltd	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	21/06/2013
Title	Views of Trench 2	Rev.	
		Plate GA6	

GeoDyne

GeoDyne

2015 Works



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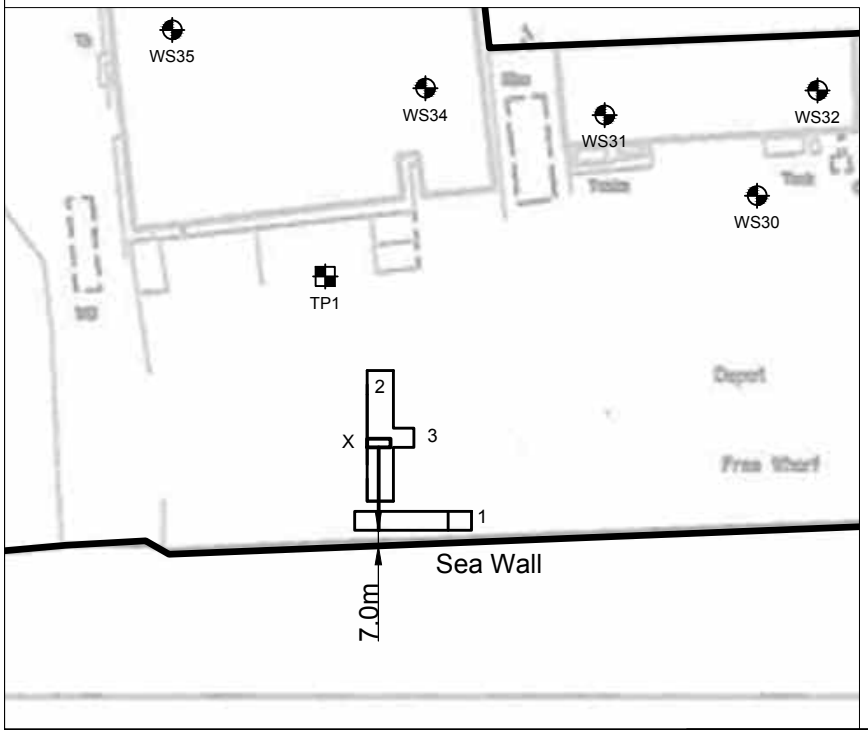
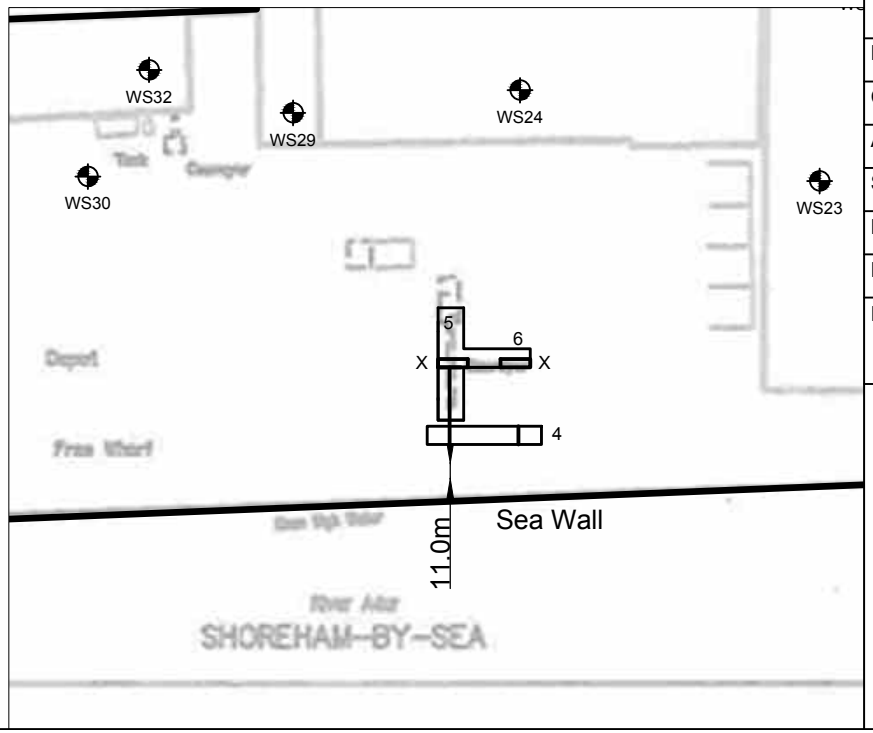




Key

1 - Trench A
2 - Trench B/B1
3 - Trench B2
4 - Trench C
5 - Trench D
6 - Trench E
X - Anchor Block

Project No.	31149
Client	Newbridge Group & Southern Housing Group
Project	Brighton Road, Shorham
Title	Site Investigation and Trench Layout
Drawn By	HW
Checked By	RS
Approved By	RS
Scale	NTS
Date Drawn	23/06/2015
Revision	
Figure No.	31149/GA12

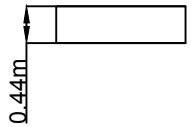
GeoDyne

Unit 2.2, Clarendon House, Clarendon Business Park, Clumber Avenue, Nottingham, NG5 1AH
Tel: 0115 962 0001

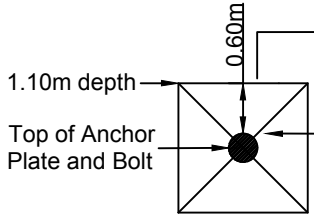
9 Brunel Parkway, Pride Park, Derby DE24 8HR
Tel: 01332 290 798

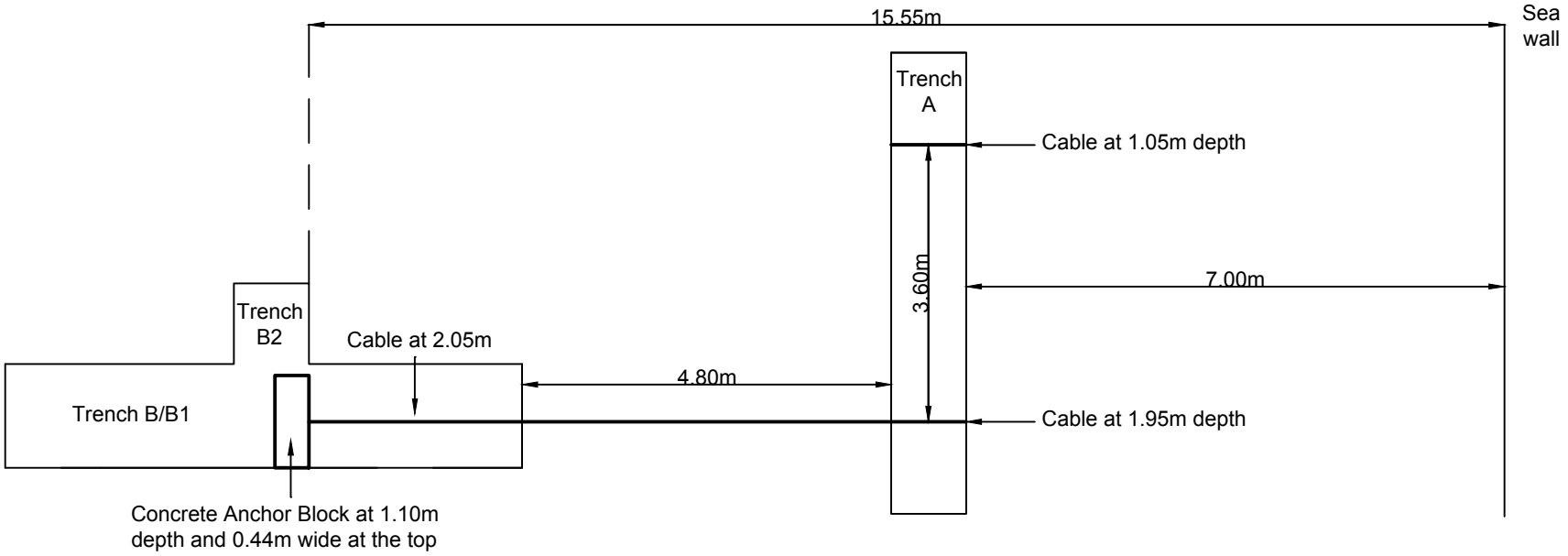
Block revealed in Trench B2

Top View



Northern Elevation





Project No.	31149
Client	Newbridge Group & Southern Housing Group
Project	Brighton Road, Shorham
Title	Trench A, B, B1 & B2 Layout
Drawn By	HW
Checked By	RS
Approved By	RS
Scale	NTS
Date Drawn	22/06/2015
Revision	
Figure No.	31149/GA13

GeoDyne

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email: info@geodyne.co.uk

TRENCHA

Project No: 31149

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-Water
Reinforced concrete (MADE GROUND)		0.27					
Layer of railway timbers (MADE GROUND)		0.45					
Reinforced concrete (MADE GROUND)		0.70					
Soft brown sandy clay locally mixed with chalk and flint (MADE GROUND)		0.85					
Loose brown very sandy fine, medium and coarse subrounded to rounded flint gravel and cobbles (MADE GROUND) ...60mm diameter steel anchor cable at 1.05m. Trial pit extended to the west and deepened to 2.30m. Second steel cable anchor located at 1.95m approximately 3.60m from the first cable							
End of Trial Pit at 2.30 m		2.30					

Remarks:
1.Trial pit sides unstable.
2.No water encountered.
3.Trial pit backfilled with arisings upon completion.

Key: B = Bulk Sample D = Disturbed Sample W = Water Sample SV = Shear Vane (kN/m^2) P = Penetrometer (kN/m^2)
J = Jar Sample V = Vial Sample T = Tub Sample ▽ = Water Strike (m) ▼ = Steady Water Level (m)

Project:
Brighton Road, Shoreham

Client:
Newbridge Group/Southern Housing Group

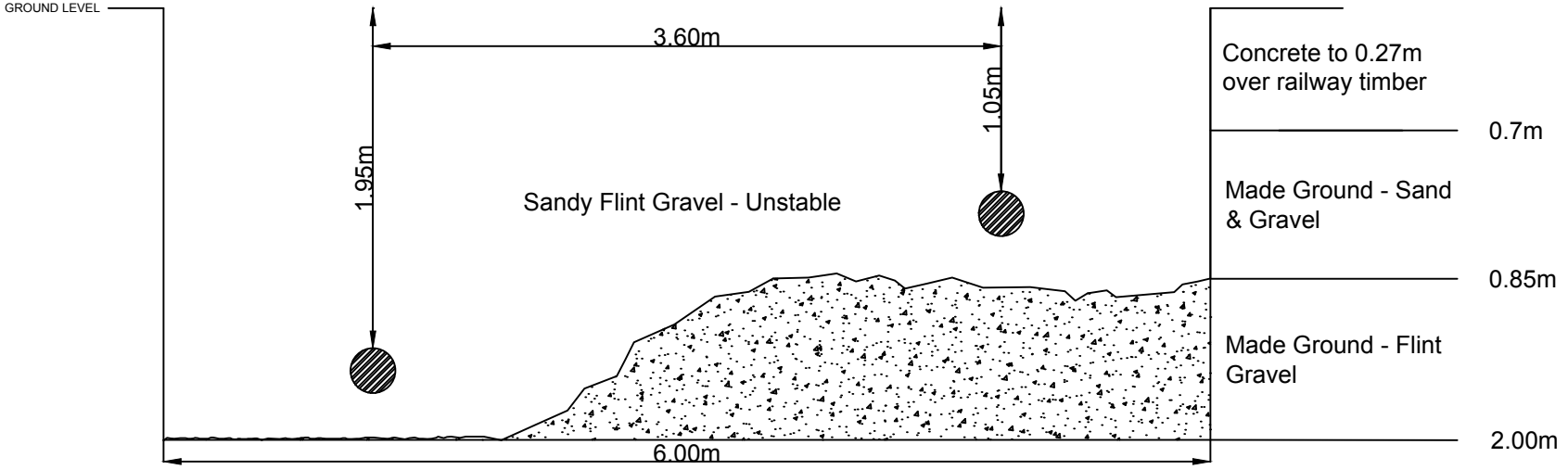
Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing No.
CP	RS	CJP 15/01	JCB 3CX	TRENCHA
Date: 10/06/2015			**Scale:** 1:20	

KEY

Steel Cable

WEST

EAST



Project No.	31149
Client	Newbridge Group & Southern Housing Group
Project	Brighton Road, Shorham
Title	Trench A
Drawn By	HW
Checked By	RS
Approved By	RS
Scale	NTS
Date Drawn	22/06/2015
Revision	
Figure No.	31149/GA14

GeoDyne

Unit 2.2, Clarendon House, Clarendon Business Park, Clumber Avenue, Nottingham, NG5 1AH
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GeoDyne
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email: info@geodyne.co.uk

TRENCHB

Project No: 31149

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-Water
Reinforced concrete (MADE GROUND)							
		0.27					
Medium dense brown slightly silty gravelly sand. Gravel is predominantly fine, medium and coarse flint, sandstone, rare brick and with some large sandstone cobbles (MADE GROUND) ...with pocket of grey sand with a very slight hydrocarbon odour at 0.40m							
...steel anchor cable encountered at 2.05m (approximately 100mm diameter) running south-north attaching into a concrete block located approximately 15.55m from the sea wall		2.10					
End of Trial Pit at 2.10 m							

Remarks:
1.Trial pit sides stable.
2.No water encountered.
3.Trial pit backfilled with arisings upon completion.
4.This log is a representation of Trench B and Trench B1 (which was extended north as Trench B1).

Key: B = Bulk Sample D = Disturbed Sample W = Water Sample SV = Shear Vane (kN/m^2) P = Penetrometer (kN/m^2)
J = Jar Sample V = Vial Sample T = Tub Sample ▽ = Water Strike (m) ▼ = Steady Water Level (m)

Project:
Brighton Road, Shoreham

Client:
Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing No.
CP	RS	CJP 15/01	JCB 3CX	TRENCHB
Date: 10/06/2015			**Scale:** 1:20	

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email: info@geodyne.co.uk

TRENCHB2

Project No: 31149

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-Water
Reinforced concrete (MADE GROUND)							
		0.27					
Medium dense brown slightly silty gravelly sand. Gravel is predominantly fine, medium and coarse flint, sandstone, rare brick and with some large sandstone cobbles and a large block of concrete slab (MADE GROUND)							
...top of concrete anchor block encountered at 1.10m. Block was 0.44m wide with a steel lifting hook attached. Anchor block has pyramidal shape on northern face with central anchor plate and bolt. Anchor block not fully exposed. Depth to top of anchor bolt was 1.70m, block height possibly 1.20m (unable to determine)							
		2.30					
End of Trial Pit at 2.30 m							

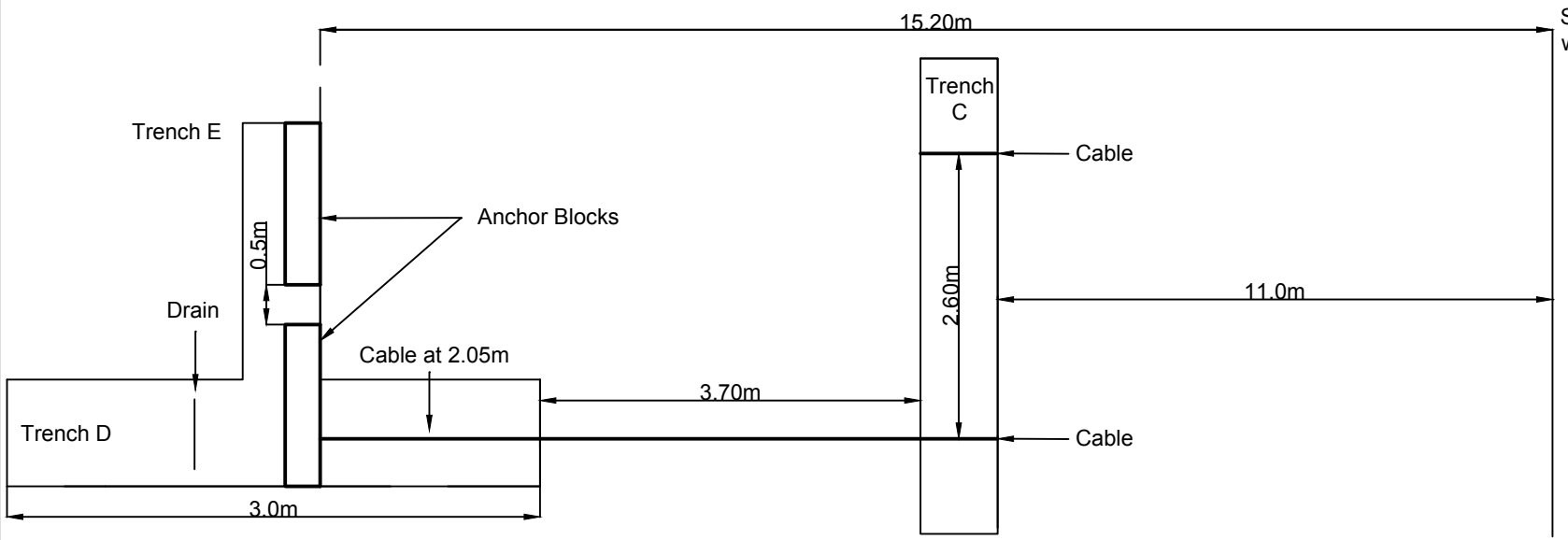
Remarks:
1.Trial pit sides stable.
2.No water encountered.
3.Trial pit backfilled with arisings upon completion.

Key: B = Bulk Sample D = Disturbed Sample W = Water Sample SV = Shear Vane (kN/m²) P = Penetrometer (kN/m²)
J = Jar Sample V = Vial Sample T = Tub Sample ▽ = Water Strike (m) ▼ = Steady Water Level (m)

Project:
Brighton Road, Shoreham

Client:
Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing No.
CP	RS	CJP 15/01	JCB 3CX	TRENCHB2
Date: 10/06/2015			**Scale:** 1:20	



Project No.	31149
Client	Newbridge Group & Southern Housing Group
Project	Brighton Road, Shorham
Title	Trench C, D & E Layout
Drawn By	HW
Checked By	RS
Approved By	RS
Scale	NTS
Date Drawn	22/06/2015
Revision	
Figure No.	31149/GA15

GeoDyne

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TRENCHC

Project No: 31149

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-Water
Reinforced concrete (MADE GROUND)							
		0.27					
Dense brown sandy fine, medium and coarse gravel of flint, sandstone, brick and chalk with occasional large pieces of concrete slab and whole bricks (MADE GROUND) ...blue plastic water pipe broken (not live) encountered at 0.45m ...two layers of reinforced concrete in the northern half of trench between 0.50m to 0.95m ...becoming ashy and with abundant chalk at 0.95m ...with an old steel chain tied into a concrete block in southern side of trench at 1.00m							
		1.30					
Loose brown and grey slightly sandy fine, medium and coarse flint gravel (MADE GROUND) ...with a large slab of concrete and a railway timber running north to south through trench at 1.30m ...steel anchor cable at 1.75m. Trial pit excavated east and second anchor cable located at 1.80m begl, approximately 2.30m apart							
		2.00					
End of Trial Pit at 2.00 m							

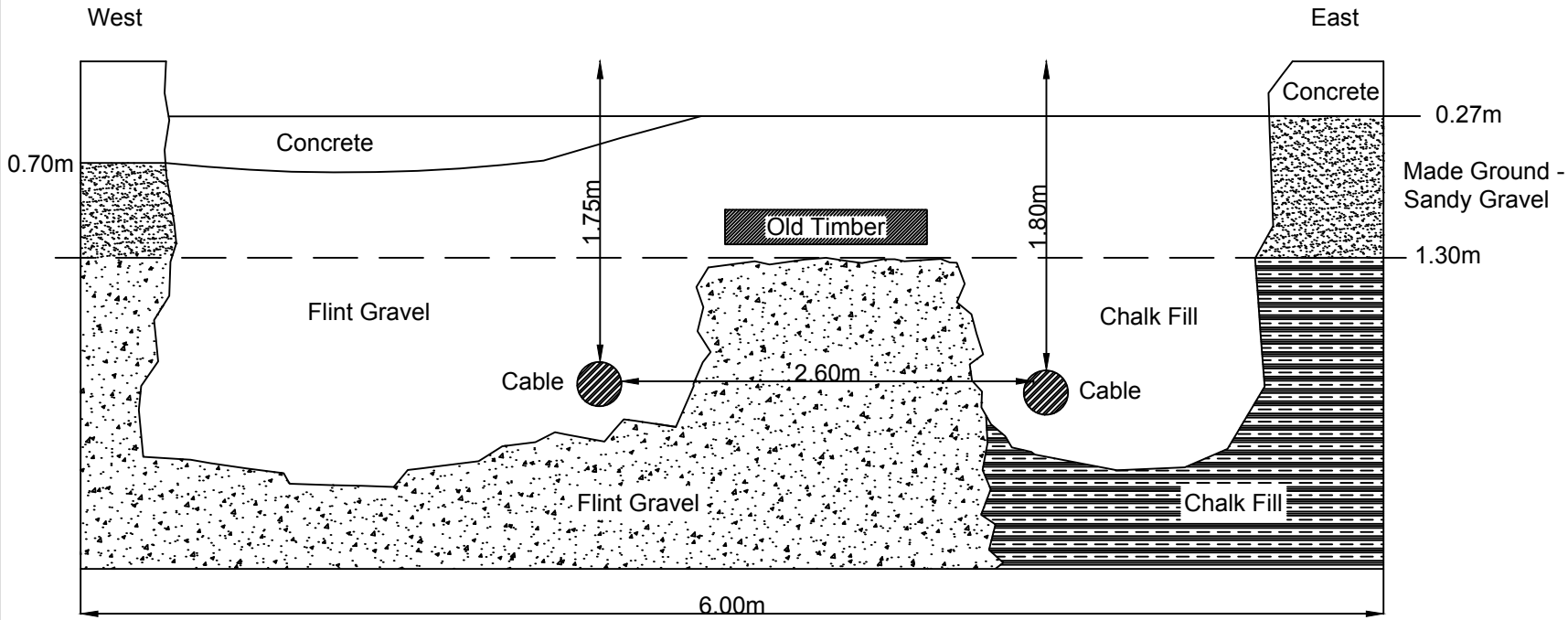
Remarks:
1. Trial pit sides slightly unstable.
2. No water encountered.
3. Trial pit backfilled with arisings upon completion.

Key: B = Bulk Sample D = Disturbed Sample W = Water Sample SV = Shear Vane (kN/m^2) P = Penetrometer (kN/m^2)
J = Jar Sample V = Vial Sample T = Tub Sample ▽ = Water Strike (m) ▼ = Steady Water Level (m)

Project:
Brighton Road, Shoreham

Client:
Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing No.
CP	RS	CJP 15/01	JCB 3CX	TRENCHC
Date: 10/06/2015			**Scale:** 1:20	



KEY

Steel Cable

Project No.	31149
Client	Newbridge Group & Southern Housing Group
Project	Brighton Road, Shorham
Title	Trench C
Drawn By	HW
Checked By	RS
Approved By	RS
Scale	NTS
Date Drawn	22/06/2015
Revision	
Figure No.	31149/GA16

GeoDyne

Unit 2.2, Clarendon House, Clarendon Business Park, Clumber Avenue, Nottingham, NG5 1AH
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email: info@geodyne.co.uk

TRENCHD

Project No: 31149

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-Water
Reinforced concrete (MADE GROUND)							
		0.28					
Dense brown sandy flint gravel (MADE GROUND)		0.40					
Dense light brown clayey very sandy gravel of flint and chalk with brick and sandstone (MADE GROUND)							
...with concrete block with steel lifting ring (0.44m wide) encountered at 0.65m							
...anchor plate and securing bolt at 1.60m							
		1.80					
End of Trial Pit at 1.80 m							

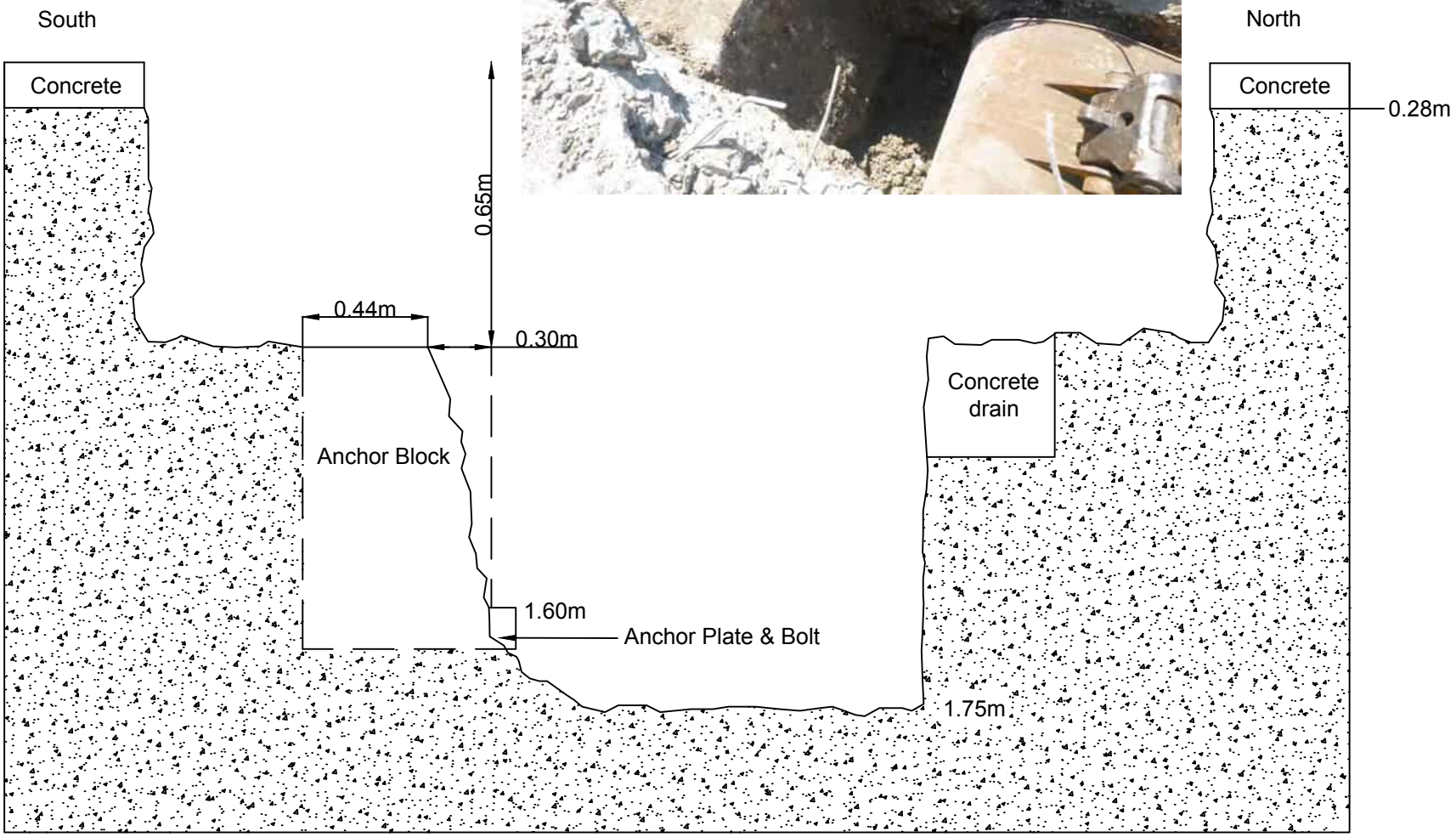
Remarks:
1.Trial pit sides stable.
2.No water encountered.
3.Trial pit backfilled with arisings upon completion.

Key: B = Bulk Sample D = Disturbed Sample W = Water Sample SV = Shear Vane (kN/m^2) P = Penetrometer (kN/m^2)
J = Jar Sample V = Vial Sample T = Tub Sample ▽ = Water Strike (m) ▼ = Steady Water Level (m)

Project:
Brighton Road, Shoreham

Client:
Newbridge Group/Southern Housing Group

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing No.
CP	RS	CJP 15/01	JCB 3CX	TRENCHD
Date: 10/06/2015			**Scale:** 1:20	



Project No.	31149
Client	Newbridge Group & Southern Housing Group
Project	Brighton Road, Shorham
Title	Trench D
Drawn By	HW
Checked By	RS
Approved By	RS
Scale	NTS
Date Drawn	22/06/2015
Revision	
Figure No.	31149/GA17

GeoDyne

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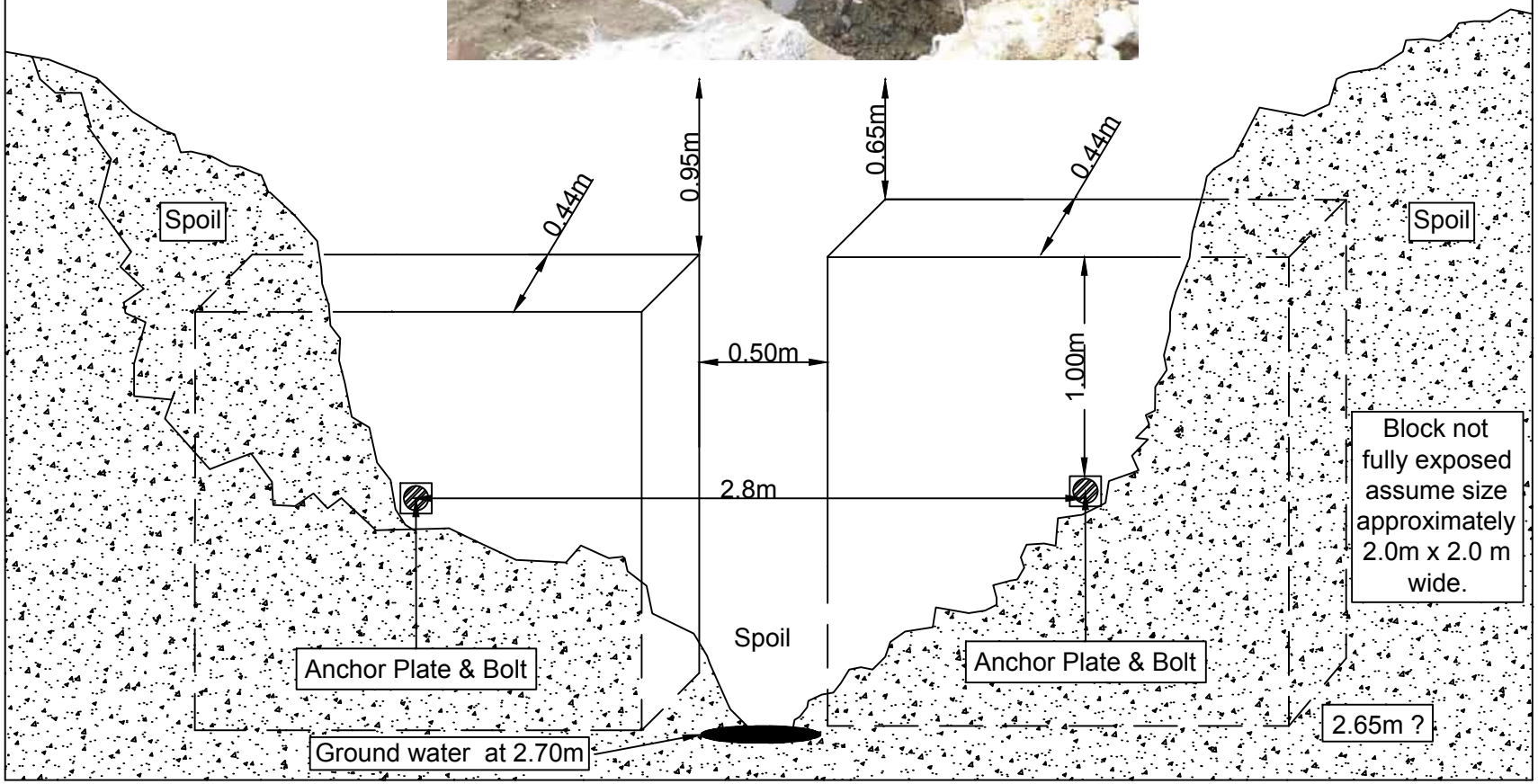
Tel: 01332 290 798



Project No.	31149
Client	Newbridge Group & Southern Housing Group
Project	Brighton Road, Shorham
Title	Trench E
Drawn By	HW
Checked By	RS
Approved By	RS
Scale	NTS
Date Drawn	22/06/2015
Revision	
Figure No.	31149/GA18

GeoDyne

Unit 2.2, Clarendon House, Clarendon Business Park, Clumber Avenue, Nottingham, NG5 1AH
Tel: 0115 962 0001

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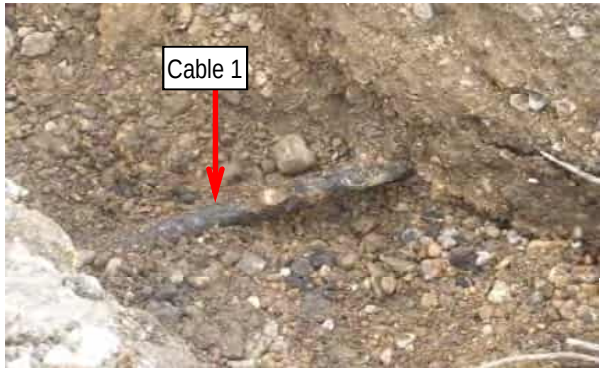
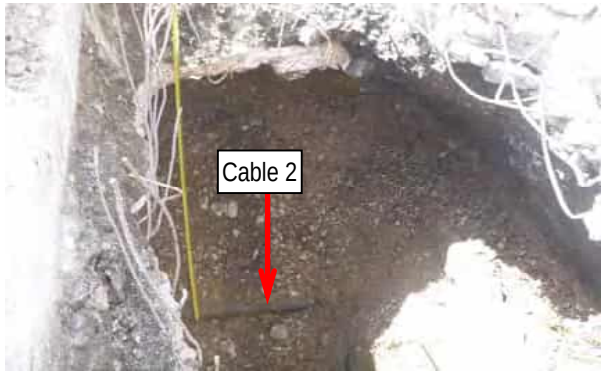
Tel: 01332 290 798



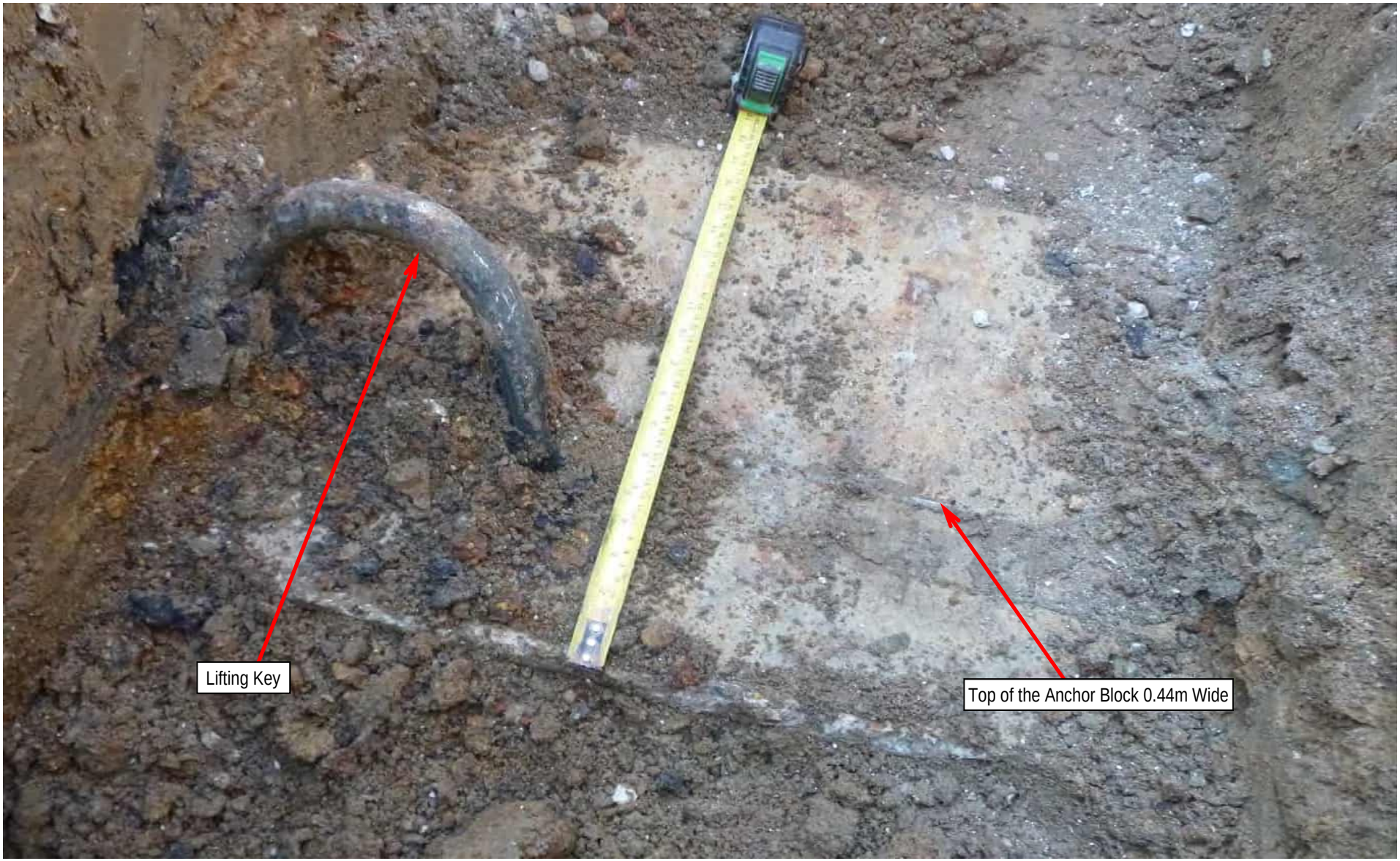


Project No.	31149	Title	View of Trench A Showing Cables 1 & 2 and Railway Timber	Drawn	CJP
Client	The Newbribge Group/Southern Housing Group			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	23/06/2015	Approved	RS
		Scale	NTS	Plate GA7	
		Revision			

GeoDyne

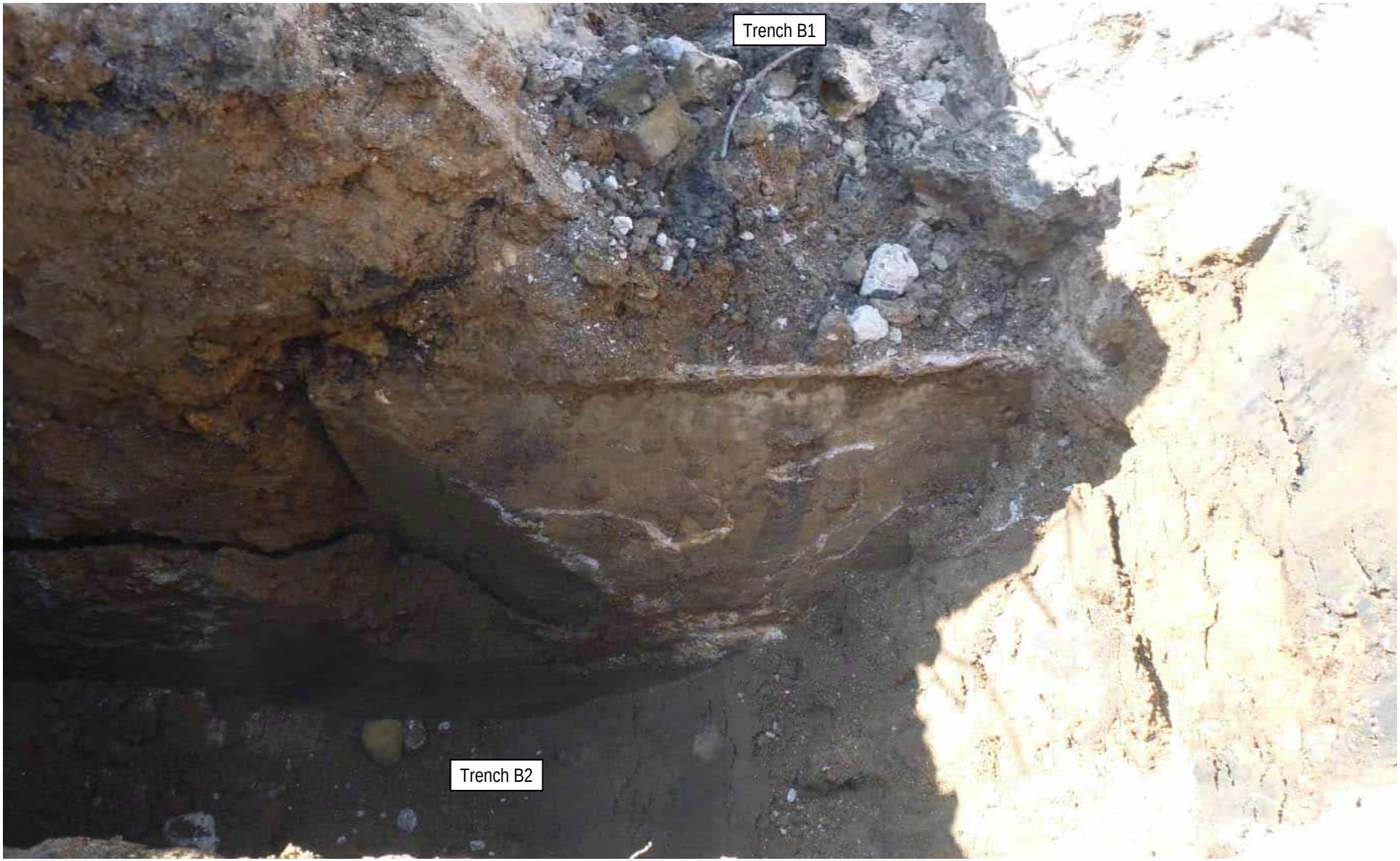
Project No.	31149	Title	Trench B with view of Cable and South Side of the Anchor Block	Drawn	CJP
Client	The Newbribge Group/Southern Housing Group			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	23/06/2015	Approved	RS
		Scale	NTS	Plate GA8	
		Revision			

GeoDyne



Project No.	31149	Title	Trench B1 Showing the top of the Anchor Block and Lifting Key	Drawn	CJP
Client	The Newbribge Group/Southern Housing Group			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	23/06/2015	Approved	RS
		Scale	NTS	Plate GA9	
		Revision			

GeoDyne



Project No.	31149	Title	Trench B2 with view of Northern Face of the Anchor Block	Drawn	CJP
Client	The Newbribge Group/Southern Housing Group			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	23/06/2015	Approved	RS
		Scale	NTS	Plate GA10	
		Revision			

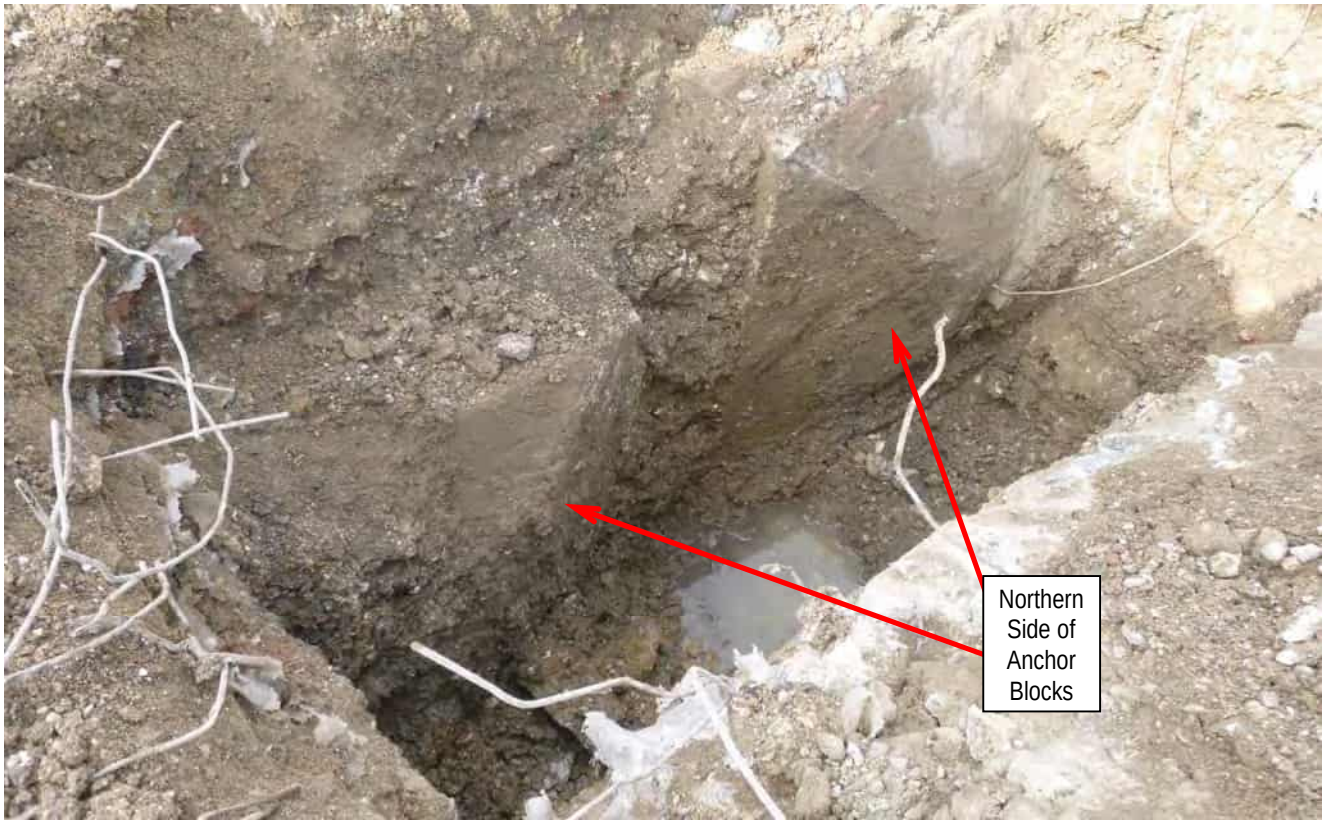
GeoDyne

Project No.	31149	Drawn	CJP
Client	The Newbridge Group/Southern Housing Group	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	23/06/2015
Title	Trench C showing both Cables	Rev.	
		Plate GA12	

GeoDyne

Project No.	31149	Drawn	CJP
Client	The Newbridge Group/Southern Housing Group	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	23/06/2015
Title	Trench D showing the Northern Face of the Anchor Block	Rev.	
		Plate GA13	

GeoDyne



Project No.	31149	Drawn	CJP
Client	The Newbridge Group/Southern Housing Group	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	23/06/2015
Title	Trench E Showing the Northern Side of Both Anchor Blocks	Rev.	
		Plate GA14	

GeoDyne

Project No.	31149	Title	Trench E Back Fill and Water at 2.70m	Drawn	CJP
Client	The Newbribge Group/Southern Housing Group			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	23/06/2015	Approved	RS
		Scale	NTS	Plate GA15	
		Revision			

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Appendix VII

Laboratory Test Results

GeoDyne

2012 Soil Test Results

PSL
Professional Soils Laboratory

LABORATORY REPORT

UKAS TESTING
4043

Contract Number: PSL12/2589

Client's Reference: Report Date: 08 August 2012

Client Name: Geodyne
The Granery
Church Lane
Thrumpton
Nottingham
NG11 0AX

For the attention of: Phil Anelay

Contract Title: Shoreham

Date Received: 1-Aug-12
Date Commenced: 1-Aug-12
Date Completed: 8-Aug-12

Notes: **Observations and Interpretations are outside the UKAS Accreditation**

Checked and Approved Signatories:

R Gunson	A Watkins	M Beastall
(Director)	(Director)	(Laboratory Manager)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Depth m	Description of Sample
BH1	2	B	12.00	Off white structureless CHALK.
BH2	2	B	2.50	Brown slightly gravelly sandy silty CLAY.
BH3	1	B	3.80	Grey gravelly slightly clayey silty SAND.
WS2	1	B	1.50	Brown slightly gravelly sandy silty CLAY.
WS6	2	B	3.00	Grey slightly gravelly slightly sandy silty CLAY.
WS10	1	B	2.80	Dark brown slightly gravelly sandy silty CLAY.
WS17	1	B	2.75	Grey slightly gravelly silty CLAY.

PSL
Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	07/08/12		08/08/12		08/08/12
SHOREHAM.				Contract No:	PSL12/2589
				Client Ref:	31149

SUMMARY OF SOIL CLASSIFICATION TESTS

(B.S. 1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Depth m	Moisture Content % Clause 3.2	Bulk Density Mg/m^3 Clause 7.2	Dry Density Mg/m^3 Clause 7.2	Particle Density Mg/m^3 Clause 8.	Liquid Limit % Clause 4.3/4.4	Plastic Limit % Clause 5.	Plasticity Index % Clause 6.	% Passing .425mm	Remarks
BH1	2	B	12.00	28				32	19	13	80	Low plasticity CL.
BH2	2	B	2.50	25				36	18	18	94	Intermediate plasticity CI.
BH3	1	B	3.80	27					NP			
WS2	1	B	1.50	22				36	17	19	91	Intermediate plasticity CI.
WS6	2	B	3.00	39				51	25	26	93	High plasticity CH.
WS10	1	B	2.80	33				39	23	16	94	Intermediate plasticity CI.
WS17	1	B	2.75	34				59	28	31	97	High plasticity CH.

SYMBOLS : NP : Non Plastic *** : Liquid Limit and Plastic Limit Wet Sieved.**

PSL
Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	07/08/12		08/08/12		08/08/12

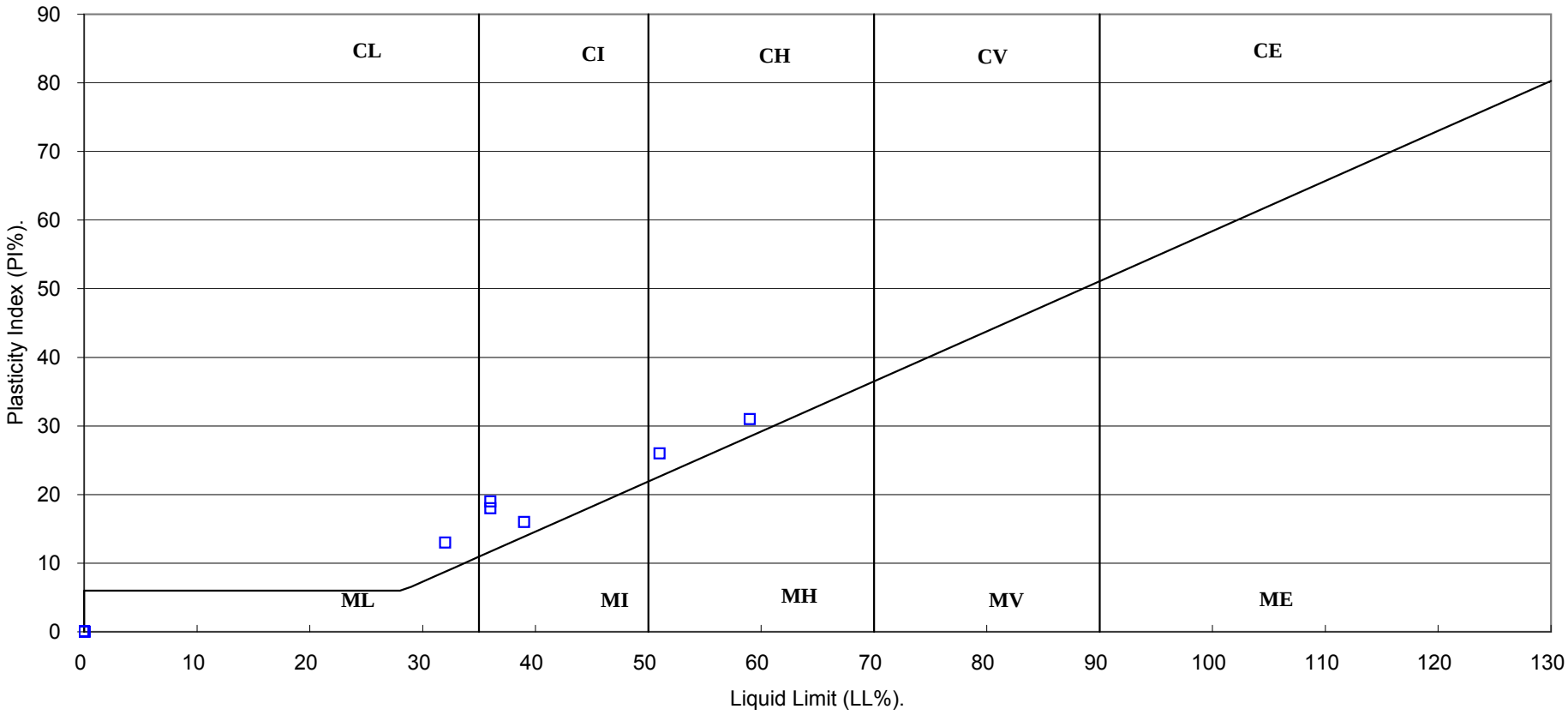
SHOREHAM.

Contract No: **PSL12/2589**

Client Ref: **31149**

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(B.S.5930 : 1999)



Compiled by	Date	Checked by	Date	Approved by	Date
	07/08/12		08/08/12		08/08/12
SHOREHAM.				**Contract No:**	**PSL12/2589**
				Client Ref:	**31149**

PSL
Professional Soils Laboratory

Scientific Analysis Laboratories is a limited company registered in England and Wales (No 2514788) whose address is at Hadfield House, Hadfield Street, Manchester M16 9FE

Scientific Analysis Laboratories Ltd

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 289459-1

Date of Report: 08-Aug-2012

Customer: Geodyne Ltd
The Granary
Church Lane
Thrumpton
Nottinghamshire
NG11 0AX

Customer Contact: Mr Chris Paling

Customer Job Reference: 31149
Customer Site Reference: Shoreham
Date Job Received at SAL: 31-Jul-2012
Date Analysis Started: 02-Aug-2012
Date Analysis Completed: 08-Aug-2012

The results reported relate to samples received in the laboratory
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

Tests covered by this certificate were conducted in accordance with SAL SOPs

UKAS TESTING
1549

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Report checked and authorised by :
Caroline Haworth
Assistant Customer Service Manager

Issued by :
Mr Ross Walker
Customer Services Manager (Land)

SAL Reference: 289459
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
MCERTS Preparation

				SAL Reference	**289459 001**	**289459 002**	**289459 003**	**289459 007**	**289459 009**	**289459 010**	**289459 011**	**289459 014**
				Customer Sample Reference	**WS1 T1(W) 0.50-1.00**	**WS1 2.0-2.5**	**WS1 2.65-3.0**	**WS2 3.00**	**WS2 4.50**	**WS3 0.50**	**WS3 2.75**	**WS4 1.50**
				Bottom Depth	**1.00**	**2.5**	**3.0**	**3.00**	**4.50**	**0.50**	**2.75**	**1.50**
				Date Sampled	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**
				Top Depth	**0.50**	**2.0**	**2.65**					
				Type	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Clay**	**Clay**	**Clay**	**Clay**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**								
Moisture	T277	AR	0.1	%	**5.0**	**29**	**18**	**13**	**11**	**12**	**30**	**11**
Moisture @ 105 C	T162	AR	0.1	%	**8.9**	**32**	**18**	**14**	**12**	**16**	**27**	**15**

SAL Reference: 289459
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
MCERTS Preparation

				SAL Reference	**289459 015**	**289459 017**	**289459 024**	**289459 025**	**289459 026**	**289459 028**	**289459 029**	**289459 030**
				Customer Sample Reference	**WS4 3.00**	**WS4 4.50**	**WS7 1.50**	**WS7 3.00**	**WS8 0.75**	**WS8 2.00**	**WS8 3.00**	**WS8 3.75**
				Bottom Depth	**3.00**	**4.50**	**1.50**	**3.00**	**0.75**	**2.00**	**3.00**	**3.75**
				Date Sampled	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**
				Top Depth								
				Type	**Sandy Soil**	**Fill**	**Clay**	**Clay**	**Sandy Soil**	**Sandy Soil**	**Clay**	**Fill**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**								
Moisture	T277	AR	0.1	%	**13**	**6.8**	**16**	**11**	**11**	**23**	**27**	**10**
Moisture @ 105 C	T162	AR	0.1	%	**18**	**6.4**	**13**	**13**	**15**	**21**	**28**	**11**

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Soil Analysed as Soil
MCERTS Preparation

				SAL Reference	**289459 032**	**289459 034**	**289459 036**	**289459 039**	**289459 042**	**289459 043**	**289459 045**	**289459 049**
				Customer Sample Reference	**WS10 0.30**	**WS10 2.70**	**WS11 1.50**	**WS15 0.50-1.00**	**WS15 5.00**	**WS17 0.50-1.50**	**WS17 2.75**	**WS19 0.90**
				Bottom Depth	**0.30**	**2.70**	**1.50**	**1.00**	**5.00**	**5.00**	**2.75**	**0.90**
				Date Sampled	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**
				Top Depth				**0.50**				
				Type	**Fill**	**Sandy Soil**	**Fill**	**Clay**	**Clay**	**Sandy Soil**	**Clay**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**								
Moisture	T277	AR	0.1	%	**6.7**	**20**	**3.3**	**16**	**22**	**22**	**37**	**13**
Moisture @ 105 C	T162	AR	0.1	%	**7.3**	**21**	**2.6**	**21**	**26**	**27**	**40**	**15**

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Soil Analysed as Soil
MCERTS Preparation

SAL Reference					**289459 051**	**289459 054**	**289459 057**	**289459 072**	**289459 077**	**289459 084**	**289459 087**	**289459 088**
Customer Sample Reference					**WS19 2.00**	**BH1 1.10**	**BH1 3.00**	**BH2B 0.90**	**BH2B 3.00**	**BH3 1.30**	**BH3 2.50**	**BH3 3.10**
Bottom Depth					**2.00**	**1.10**	**3.00**	**0.90**	**3.00**	**1.30**	**2.50**	**3.10**
Date Sampled					**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**
Top Depth												
Type					**Clay**	**Fill**	**Fill**	**Fill**	**Clay**	**Fill**	**Clay**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**								
Moisture	T277	AR	0.1	%	**21**	**12**	**6.9**	**5.4**	**19**	**5.5**	**20**	**24**
Moisture @ 105 C	T162	AR	0.1	%	**21**	**12**	**6.3**	**5.3**	**21**	**2.4**	**17**	**25**

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Soil Analysed as Soil
Geodyne Suite 1

SAL Reference					**289459 001**	**289459 010**	**289459 011**	**289459 014**	**289459 024**	**289459 025**	**289459 026**	**289459 029**
Customer Sample Reference					**WS1 T1(W) 0.50-1.00**	**WS3 0.50**	**WS3 2.75**	**WS4 1.50**	**WS7 1.50**	**WS7 3.00**	**WS8 0.75**	**WS8 3.00**
Bottom Depth					**1.00**	**0.50**	**2.75**	**1.50**	**1.50**	**3.00**	**0.75**	**3.00**
Date Sampled					**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**
Top Depth					**0.50**							
Type					**Sandy Soil**	**Clay**	**Clay**	**Clay**	**Clay**	**Clay**	**Sandy Soil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**								
pH	T7	AR			**7.7**	**8.2**	**7.8**	**8.5**	**8.2**	**8.3**	**8.5**	**7.8**
Arsenic	T6	M40	2	mg/kg	**13**	**23**	**13**	**10**	**12**	**5**	**10**	**11**
Cadmium	T6	M40	1	mg/kg	<1	**1**	<1	<1	<1	<1	<1	<1
Chromium	T6	M40	1	mg/kg	**54**	**34**	**18**	**14**	**22**	**9**	**14**	**14**
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1
Copper	T6	M40	1	mg/kg	**39**	**250**	**40**	**44**	**29**	**7**	**14**	**15**
Lead	T6	M40	1	mg/kg	**88**	**360**	**160**	**200**	**32**	**7**	**46**	**17**
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	**10**	**33**	**12**	**13**	**23**	**9**	**12**	**13**
Selenium	T6	M40	3	mg/kg	**3**	<3	<3	<3	<3	<3	<3	<3
Zinc	T6	M40	1	mg/kg	**160**	**860**	**150**	**160**	**64**	**34**	**58**	**32**
Total Organic Carbon	T21	M40	0.1	%	**4.3**	**2.5**	**1.7**	**1.7**	**0.9**	<0.1	**1.2**	**1.5**

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Soil Analysed as Soil
Geodyne Suite 1

				SAL Reference	**289459 036**	**289459 039**	**289459 042**	**289459 043**	**289459 045**	**289459 049**	**289459 051**	**289459 072**
				Customer Sample Reference	**WS11 1.50**	**WS15 0.50-1.00**	**WS15 5.00**	**WS17 0.50-1.50**	**WS17 2.75**	**WS19 0.90**	**WS19 2.00**	**BH2B 0.90**
				Bottom Depth	**1.50**	**1.00**	**5.00**	**5.00**	**2.75**	**0.90**	**2.00**	**0.90**
				Date Sampled	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**
				Top Depth		**0.50**						
				Type	**Fill**	**Clay**	**Clay**	**Sandy Soil**	**Clay**	**Clay**	**Clay**	**Fill**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**								
pH	T7	AR			**8.3**	**8.3**	**8.2**	**7.8**	**7.5**	**7.8**	**8.6**	**7.9**
Arsenic	T6	M40	2	mg/kg	**12**	**10**	**8**	**110**	**25**	**10**	**14**	**16**
Cadmium	T6	M40	1	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	T6	M40	1	mg/kg	**7.1**	**17**	**14**	**35**	**19**	**17**	**14**	**32**
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1
Copper	T6	M40	1	mg/kg	**9.4**	**14**	**31**	**240**	**27**	**22**	**11**	**29**
Lead	T6	M40	1	mg/kg	**29**	**69**	**48**	**1700**	**100**	**91**	**32**	**45**
Mercury	T6	M40	1	mg/kg	<1	<1	<1	**2**	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	**6.3**	**19**	**14**	**100**	**17**	**17**	**9**	**10**
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3	<3	<3	<3
Zinc	T6	M40	1	mg/kg	**31**	**51**	**60**	**680**	**120**	**54**	**39**	**60**
Total Organic Carbon	T21	M40	0.1	%	**0.6**	**0.8**	**1.7**	**17**	**2.7**	**1.1**	**0.6**	**4.1**

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Soil Analysed as Soil
Geodyne Suite 1

				SAL Reference	**289459 077**	**289459 084**
				Customer Sample Reference	**BH2B 3.00**	**BH3 1.30**
				Bottom Depth	**3.00**	**1.30**
				Date Sampled	**26-JUL-2012**	**26-JUL-2012**
				Top Depth		
				Type	**Clay**	**Fill**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
pH	T7	AR			**7.8**	**8.2**
Arsenic	T6	M40	2	mg/kg	**12**	**7.3**
Cadmium	T6	M40	1	mg/kg	<1	<1
Chromium	T6	M40	1	mg/kg	**12**	**5.4**
Chromium VI	T6	AR	1	mg/kg	<1	<1
Copper	T6	M40	1	mg/kg	**12**	**4.2**
Lead	T6	M40	1	mg/kg	**35**	**30**
Mercury	T6	M40	1	mg/kg	<1	<1
Nickel	T6	M40	1	mg/kg	**7**	**5.9**
Selenium	T6	M40	3	mg/kg	<3	<3
Zinc	T6	M40	1	mg/kg	**38**	**18**
Total Organic Carbon	T21	M40	0.1	%	**0.4**	**0.1**

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Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
Miscellaneous

SAL Reference	289459 006	289459 008	289459 013	289459 014	289459 027	289459 029	289459 033	289459 036
Customer Sample Reference	WS2 1.50	WS2 4.00	WS4 0.50	WS4 1.50	WS8 1.50	WS8 3.00	WS10 0.70	WS11 1.50
Bottom Depth	1.50	4.00	0.50	1.50	1.50	3.00	0.70	1.50
Date Sampled	26-JUL-2012	26-JUL-2012	26-JUL-2012	26-JUL-2012	26-JUL-2012	26-JUL-2012	26-JUL-2012	26-JUL-2012
Type				Clay		Clay		Fill

Determinand	Method	Test Sample	LOD	Units								
Asbestos ID	T27	AR			-	-	N.D.	-	-	-	N.D.	-
SO4(2:1)	T6	AR	0.1	g/l	<0.1	<0.1	-	**0.1**	<0.1	**0.4**	-	<0.1
pH	T7	AR			-	**8.2**	-	-	**8.1**	-	-	-

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Soil Analysed as Soil
Miscellaneous

SAL Reference	289459 046	289459 075	289459 077	289459 081	289459 086	289459 089
Customer Sample Reference	WS18 0.75	BH2B 2.20	BH2B 3.00	BH2B 11.50	BH3 2.10	BH3 6.70
Bottom Depth	0.75	2.20	3.00	11.50	2.10	6.70
Date Sampled	26-JUL-2012	26-JUL-2012	26-JUL-2012	26-JUL-2012	26-JUL-2012	26-JUL-2012
Type			Clay			

Determinand	Method	Test Sample	LOD	Units						
Asbestos ID	T27	AR			Amosite Detected - Chrysotile Detected -	Chrysotile Detected -	-	-	-	-
SO4(2:1)	T6	AR	0.1	g/l	-	-	**0.4**	<0.1	**1.2**	<0.1
pH	T7	AR			-	-	-	**8.2**	**7.5**	-

SAL Reference: 289459
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Soil Analysed as Soil
BTEX GRO MTBE

SAL Reference	289459 002	289459 003	289459 007	289459 009	289459 015	289459 017	289459 028	289459 030
Customer Sample Reference	WS1 2.0-2.5	WS1 2.65-3.0	WS2 3.00	WS2 4.50	WS4 3.00	WS4 4.50	WS8 2.00	WS8 3.75
Bottom Depth	2.5	3.0	3.00	4.50	3.00	4.50	2.00	3.75
Date Sampled	26-JUL-2012	26-JUL-2012	26-JUL-2012	26-JUL-2012	26-JUL-2012	26-JUL-2012	26-JUL-2012	26-JUL-2012
Top Depth	2.0	2.65						
Type	Sandy Soil	Sandy Soil	Clay	Clay	Sandy Soil	Fill	Sandy Soil	Fill

Determinand	Method	Test Sample	LOD	Units								
Benzene	T209	M105	10	µg/kg	(9,195) <100	(195,9) <100	<10	<10	<10	<10	<10	<10
EthylBenzene	T209	M105	10	µg/kg	**(195) 460**	**(195) 200**	<10	<10	<10	<10	<10	<10
Gasoline Range Organics	T54	M105	100	µg/kg	**(195) 81000**	**(195) 31000**	<100	<100	<100	<100	<100	<100
M/P Xylene	T209	M105	10	µg/kg	**(195) 4900**	**(195) 1100**	<10	<10	<10	<10	<10	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	(195,9) <100	(195,9) <100	<10	<10	<10	<10	<10	<10
O Xylene	T209	M105	10	µg/kg	**(195) 3400**	**(195) 860**	<10	<10	<10	<10	<10	<10
Toluene	T209	M105	10	µg/kg	**(195) 320**	(9,195) <100	<10	<10	<10	<10	<10	<10

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Soil Analysed as Soil
BTEX GRO MTBE

SAL Reference			**289459 032**	**289459 034**	**289459 054**	**289459 057**	**289459 087**	**289459 088**
Customer Sample Reference			**WS10 0.30**	**WS10 2.70**	**BH1 1.10**	**BH1 3.00**	**BH3 2.50**	**BH3 3.10**
Bottom Depth			**0.30**	**2.70**	**1.10**	**3.00**	**2.50**	**3.10**
Date Sampled			**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**
Top Depth								
Type			**Fill**	**Sandy Soil**	**Fill**	**Fill**	**Clay**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**						
Benzene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10	<10
EthylBenzene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10	<10
Gasoline Range Organics	T54	M105	100	µg/kg	**200**	<100	<100	<100	**1000**	<100
M/P Xylene	T209	M105	10	µg/kg	**18**	<10	<10	<10	<10	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	<10	<10	<10	<10	<10
O Xylene	T209	M105	10	µg/kg	**13**	<10	<10	<10	<10	<10
Toluene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10	<10

SAL Reference: 289459
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
Geodyne TPH (CWG)

SAL Reference			**289459 002**	**289459 003**	**289459 007**	**289459 009**	**289459 015**	**289459 017**	**289459 028**	**289459 030**
Customer Sample Reference			**WS1 2.0-2.5**	**WS1 2.65-3.0**	**WS2 3.00**	**WS2 4.50**	**WS4 3.00**	**WS4 4.50**	**WS8 2.00**	**WS8 3.75**
Bottom Depth			**2.5**	**3.0**	**3.00**	**4.50**	**3.00**	**4.50**	**2.00**	**3.75**
Date Sampled			**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**
Top Depth			**2.0**	**2.65**						
Type			**Sandy Soil**	**Sandy Soil**	**Clay**	**Clay**	**Sandy Soil**	**Fill**	**Sandy Soil**	**Fill**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**								
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	(195,9) <1.00	(9,195) <1.00	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	(9,195) <1.0	(195,9) <1.0	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.100	mg/kg	**(195) 25.1**	**(195) 9.91**	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
TPH (C10-C12 aliphatic)	T206	M105	1	mg/kg	**200**	**75**	<1	<1	(9) <10	<1	<1	(4) <2
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	**820**	**200**	<2	<2	(9) <10	<2	<2	(4) <2
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	**790**	**170**	<1	<1	<10	**2**	<1	(4) <2
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	**520**	**57**	<4	<4	(9) <10	**5**	<4	(4) <4
TPH (C35-C44 aliphatic)	T8	M105	1	mg/kg	(9) <10	<1	<1	<1	(9) <10	<1	<1	(4) <2
TPH (C6-C7 aromatic)	T209	M105	0.100	mg/kg	(195,9) <1.00	(9,195) <1.00	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
TPH (C7-C8 aromatic)	T209	M105	0.100	mg/kg	(195,9) <1.00	(195,9) <1.00	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
TPH (C8-C10 aromatic)	T209	M105	0.100	mg/kg	**(195) 54.5**	**(195) 21.2**	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	**300**	**150**	<1	<1	(9) <10	<1	<1	(4) <2
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	**1800**	**560**	<1	<1	(9) <10	<1	<1	(4) <2
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	**2200**	**580**	<1	<1	**42**	**4**	**5**	(4) <2
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	**960**	**210**	<1	<1	**91**	**10**	**9**	(4) <2
TPH (C35-C44 aromatic)	T8	M105	1	mg/kg	(9) <10	**1**	<1	<1	(9) <10	<1	<1	(4) <2
TPH (Aliphatic) total	T85	M105		mg/kg	**2400**	**510**	N.D.	N.D.	N.D.	**7.0**	N.D.	N.D.
TPH (Aromatic) total	T85	M105		mg/kg	**5300**	**1500**	N.D.	N.D.	**130**	**14**	**14**	N.D.
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	**7700**	**2000**	N.D.	N.D.	**130**	**21**	**14**	N.D.

SAL Reference: 289459
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
Geodyne TPH (CWG)

				SAL Reference	**289459 032**	**289459 034**	**289459 054**	**289459 057**	**289459 087**	**289459 088**
				Customer Sample Reference	**WS10 0.30**	**WS10 2.70**	**BH1 1.10**	**BH1 3.00**	**BH3 2.50**	**BH3 3.10**
				Bottom Depth	**0.30**	**2.70**	**1.10**	**3.00**	**2.50**	**3.10**
				Date Sampled	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**
				Top Depth						
				Type	**Fill**	**Sandy Soil**	**Fill**	**Fill**	**Clay**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**						
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	**0.30**	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.100	mg/kg	<0.100	<0.100	<0.100	<0.100	**0.686**	<0.100
TPH (C10-C12 aliphatic)	T206	M105	1	mg/kg	**9**	<1	(9) <10	<1	<1	<1
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	**5**	<2	**48**	<2	<2	<2
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	**6**	<1	**81**	<1	<1	<1
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	**41**	<4	**240**	<4	<4	<4
TPH (C35-C44 aliphatic)	T8	M105	1	mg/kg	**3**	<1	**31**	<1	<1	<1
TPH (C6-C7 aromatic)	T209	M105	0.100	mg/kg	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
TPH (C7-C8 aromatic)	T209	M105	0.100	mg/kg	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
TPH (C8-C10 aromatic)	T209	M105	0.100	mg/kg	**0.195**	<0.100	<0.100	<0.100	<0.100	<0.100
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	<1	<1	(9) <10	<1	<1	<1
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	**5**	<1	**49**	<1	<1	<1
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	**85**	<1	**530**	**2**	<1	**3**
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	**210**	<1	**1100**	**5**	**2**	**9**
TPH (C35-C44 aromatic)	T8	M105	1	mg/kg	**15**	<1	**83**	<1	<1	<1
TPH (Aliphatic) total	T85	M105		mg/kg	**64**	N.D.	**400**	N.D.	**0.99**	N.D.
TPH (Aromatic) total	T85	M105		mg/kg	**320**	N.D.	**1800**	**7.0**	**2.0**	**12**
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	**380**	N.D.	**2200**	**7.0**	**3.0**	**12**

SAL Reference: 289459
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
Total and Speciated USEPA16 PAH

				SAL Reference	**289459 001**	**289459 010**	**289459 011**	**289459 014**	**289459 024**	**289459 025**	**289459 026**	**289459 029**
				Customer Sample Reference	**WS1 T1(W) 0.50-1.00**	**WS3 0.50**	**WS3 2.75**	**WS4 1.50**	**WS7 1.50**	**WS7 3.00**	**WS8 0.75**	**WS8 3.00**
				Bottom Depth	**1.00**	**0.50**	**2.75**	**1.50**	**1.50**	**3.00**	**0.75**	**3.00**
				Date Sampled	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**
				Top Depth	**0.50**							
				Type	**Sandy Soil**	**Clay**	**Clay**	**Clay**	**Clay**	**Clay**	**Sandy Soil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**								
Naphthalene	T207	M105	0.1	mg/kg	**0.6**	<0.1	<0.1	**0.1**	<0.1	<0.1	**0.2**	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	**0.3**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.2**	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	**2.8**	**1.4**	**0.7**	**1.2**	<0.1	<0.1	**8.6**	<0.1
Anthracene	T207	M105	0.1	mg/kg	**0.5**	**0.4**	<0.1	**0.2**	<0.1	<0.1	**2.1**	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	**11**	**4.6**	**2.0**	**6.1**	<0.1	<0.1	**22**	<0.1
Pyrene	T207	M105	0.1	mg/kg	**11**	**3.8**	**1.8**	**5.4**	<0.1	<0.1	**18**	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	**4.1**	**0.8**	**0.4**	**1.0**	<0.1	<0.1	**5.1**	<0.1
Chrysene	T207	M105	0.1	mg/kg	**5.2**	**1.3**	**0.5**	**1.3**	<0.1	<0.1	**5.2**	<0.1
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	**11**	**2.5**	**0.8**	**2.5**	<0.1	<0.1	**9.0**	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	**6.2**	**1.3**	**0.5**	**1.4**	<0.1	<0.1	**4.8**	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	**3.6**	**0.6**	**0.2**	**0.8**	<0.1	<0.1	**2.3**	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	**1.5**	**0.2**	<0.1	**0.2**	<0.1	<0.1	**1.0**	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	**4.2**	**0.7**	**0.2**	**0.8**	<0.1	<0.1	**2.3**	<0.1
PAH(total)	T207	M105	0.1	mg/kg	**62**	**18**	**7.1**	**21**	<0.1	<0.1	**81**	<0.1

SAL Reference: 289459
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
Total and Speciated USEPA16 PAH

SAL Reference	**289459 036**	**289459 039**	**289459 042**	**289459 043**	**289459 045**	**289459 049**	**289459 051**	**289459 072**
Customer Sample Reference	**WS11 1.50**	**WS15 0.50-1.00**	**WS15 5.00**	**WS17 0.50-1.50**	**WS17 2.75**	**WS19 0.90**	**WS19 2.00**	**BH2B 0.90**
Bottom Depth	**1.50**	**1.00**	**5.00**	**5.00**	**2.75**	**0.90**	**2.00**	**0.90**
Date Sampled	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**	**26-JUL-2012**
Top Depth		**0.50**						
Type	**Fill**	**Clay**	**Clay**	**Sandy Soil**	**Clay**	**Clay**	**Clay**	**Fill**

Determinand	Method	Test Sample	LOD	Units								
Naphthalene	T207	M105	0.1	mg/kg	<0.1	**0.1**	<0.1	**1.7**	**0.2**	<0.1	<0.1	**0.2**
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	**1.1**	<0.1	<0.1	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.4**
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	**0.8**	<0.1	<0.1	**0.2**	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	**1.3**	**0.2**	**1.0**	**13**	**1.6**	**0.2**	**2.9**	**5.1**
Anthracene	T207	M105	0.1	mg/kg	**0.4**	<0.1	**0.2**	**3.1**	**0.9**	<0.1	**1.1**	**1.0**
Fluoranthene	T207	M105	0.1	mg/kg	**2.6**	**0.5**	**1.0**	**56**	**5.9**	**0.6**	**4.9**	**9.6**
Pyrene	T207	M105	0.1	mg/kg	**2.3**	**0.4**	**0.8**	**48**	**4.5**	**0.4**	**3.7**	**8.5**
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	**0.7**	**0.1**	**0.2**	**19**	**2.0**	**0.2**	**1.0**	**2.7**
Chrysene	T207	M105	0.1	mg/kg	**0.7**	**0.1**	**0.2**	**21**	**2.0**	**0.2**	**1.0**	**2.9**
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	**1.1**	**0.3**	**0.3**	**37**	**2.7**	**0.3**	**1.6**	**6.3**
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	**0.6**	**0.1**	**0.2**	**22**	**1.6**	**0.1**	**0.9**	**3.2**
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	**0.3**	<0.1	<0.1	**7.7**	**0.5**	<0.1	**0.3**	**1.2**
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	**0.1**	<0.1	<0.1	**3.5**	**0.3**	<0.1	**0.1**	**0.4**
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	**0.2**	<0.1	<0.1	**6.5**	**0.4**	<0.1	**0.3**	**1.3**
PAH(total)	T207	M105	0.1	mg/kg	**10**	**1.8**	**3.9**	**240**	**23**	**2.0**	**18**	**44**

SAL Reference: 289459
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
Total and Speciated USEPA16 PAH

SAL Reference	**289459 077**	**289459 084**
Customer Sample Reference	**BH2B 3.00**	**BH3 1.30**
Bottom Depth	**3.00**	**1.30**
Date Sampled	**26-JUL-2012**	**26-JUL-2012**
Top Depth		
Type	**Clay**	**Fill**

Determinand	Method	Test Sample	LOD	Units		
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	**0.2**	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	**0.5**	<0.1
Pyrene	T207	M105	0.1	mg/kg	**0.3**	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	**0.1**	<0.1
Chrysene	T207	M105	0.1	mg/kg	**0.1**	<0.1
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	**0.3**	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	**0.1**	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	<0.1
PAH(total)	T207	M105	0.1	mg/kg	**1.6**	<0.1

Index to symbols used in 289459-1

Value	Description
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
AR	As Received

M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
N.D.	Not Detected
4	LOD Raised due to insufficient Sample
9	LOD raised due to dilution of sample
195	Due to levels found in the sample that are outside of the normal calibration range of the instrument, analysis was conducted on a diluted sample
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos in sample 75 was detected in cement
"Fill" samples are outside the scope of our MCERTS accreditation. Results are UKAS only

Method Index

Value	Description
T162	Grav (1 Dec) (105 C)
T277	Grav (1 Dec) (40 C)
T85	Calc
T54	GC/MS (Headspace)
T27	PLM
T206	GC/FID (MCERTS)
T8	GC/FID
T6	ICP/OES
T7	Probe
T21	OX/IR
T209	GC/MS(Head Space)(MCERTS)
T207	GC/MS(MCERTS)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Naphthalene	T207	M105	0.1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Naphthalene	T207	M105	0.1	mg/kg	U	036,072,084
Acenaphthylene	T207	M105	0.1	mg/kg	U	001,010-011,014,024-026,029,036,039,042-043,045,049,051,072,077,084
Acenaphthene	T207	M105	0.1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Acenaphthene	T207	M105	0.1	mg/kg	U	036,072,084
Fluorene	T207	M105	0.1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Fluorene	T207	M105	0.1	mg/kg	U	036,072,084
Phenanthrene	T207	M105	0.1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Phenanthrene	T207	M105	0.1	mg/kg	U	036,072,084
Anthracene	T207	M105	0.1	mg/kg	U	001,010-011,014,024-026,029,036,039,042-043,045,049,051,072,077,084
Fluoranthene	T207	M105	0.1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Fluoranthene	T207	M105	0.1	mg/kg	U	036,072,084
Pyrene	T207	M105	0.1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Pyrene	T207	M105	0.1	mg/kg	U	036,072,084
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	U	036,072,084
Chrysene	T207	M105	0.1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Chrysene	T207	M105	0.1	mg/kg	U	036,072,084
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	U	036,072,084
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	U	036,072,084
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	U	036,072,084
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	U	036,072,084
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	U	036,072,084
PAH(total)	T207	M105	0.1	mg/kg	U	001,010-011,014,024-026,029,036,039,042-043,045,049,051,072,077,084
pH	T7	AR			M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Arsenic	T6	M40	2	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Arsenic	T6	M40	2.0	mg/kg	U	036,072,084
Cadmium	T6	M40	1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Cadmium	T6	M40	1.0	mg/kg	U	036,072,084

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Chromium	T6	M40	1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Chromium	T6	M40	1.0	mg/kg	U	036,072,084
Chromium VI	T6	AR	1	mg/kg	N	001,010-011,014,024-026,029,036,039,042-043,045,049,051,072,077,084
Copper	T6	M40	1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Copper	T6	M40	1.0	mg/kg	U	036,072,084
Lead	T6	M40	1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Lead	T6	M40	1.0	mg/kg	U	036,072,084
Mercury	T6	M40	1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Mercury	T6	M40	1.0	mg/kg	U	036,072,084
Nickel	T6	M40	1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Nickel	T6	M40	1.0	mg/kg	U	036,072,084
Selenium	T6	M40	3	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Selenium	T6	M40	3.0	mg/kg	U	036,072,084
Zinc	T6	M40	1	mg/kg	M	001,010-011,014,024-026,029,039,042-043,045,049,051,077
Zinc	T6	M40	1.0	mg/kg	U	036,072,084
Total Organic Carbon	T21	M40	0.1	%	N	001,010-011,014,024-026,029,036,039,042-043,045,049,051,072,077,084
Asbestos ID	T27	AR			SU	013,033,046,075
SO4(2:1)	T6	AR	0.1	g/l	N	006,008,014,027,029,036,077,081,086,089
pH	T7	AR			U	008,027,036,072,081,084,086
Benzene	T209	M105	10	µg/kg	M	002-003,007,009,015,028,034,087-088
Benzene	T209	M105	10	µg/kg	U	017,030,032,054,057
EthylBenzene	T209	M105	10	µg/kg	M	002-003,007,009,015,028,034,087-088
EthylBenzene	T209	M105	10	µg/kg	U	017,030,032,054,057
Gasoline Range Organics	T54	M105	100	µg/kg	N	002-003,007,009,015,017,028,030,032,034,054,057,087-088
M/P Xylene	T209	M105	10	µg/kg	M	002-003,007,009,015,028,034,087-088
M/P Xylene	T209	M105	10	µg/kg	U	017,030,032,054,057
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	M	002-003,007,009,015,028,034,087-088
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	U	017,030,032,054,057
O Xylene	T209	M105	10	µg/kg	M	002-003,007,009,015,028,034,087-088
O Xylene	T209	M105	10	µg/kg	U	017,030,032,054,057
Toluene	T209	M105	10	µg/kg	M	002-003,007,009,015,028,034,087-088
Toluene	T209	M105	10	µg/kg	U	017,030,032,054,057
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	N	002-003,007,009,015,017,028,030,032,034,054,057,087-088
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	N	002-003,007,009,015,017,028,030,032,034,054,057,087-088
TPH (C8-C10 aliphatic)	T209	M105	0.100	mg/kg	N	002-003,007,009,015,017,028,030,032,034,054,057,087-088
TPH (C10-C12 aliphatic)	T206	M105	1	mg/kg	N	002-003,007,009,015,017,028,030,032,034,054,057,087-088
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	N	002-003,007,009,015,017,028,030,032,034,054,057,087-088
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	M	002-003,007,009,015,028,034,087-088
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	U	017,030,032,054,057
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	M	002-003,007,009,015,028,034,087-088
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	U	017,030,032,054,057
TPH (C35-C44 aliphatic)	T8	M105	1	mg/kg	N	002-003,007,009,015,017,028,030,032,034,054,057,087-088
TPH (C6-C7 aromatic)	T209	M105	0.100	mg/kg	N	002-003,007,009,015,017,028,030,032,034,054,057,087-088
TPH (C7-C8 aromatic)	T209	M105	0.100	mg/kg	N	002-003,007,009,015,017,028,030,032,034,054,057,087-088
TPH (C8-C10 aromatic)	T209	M105	0.100	mg/kg	N	002-003,007,009,015,017,028,030,032,034,054,057,087-088
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	N	002-003,007,009,015,017,028,030,032,034,054,057,087-088
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	N	002-003,007,009,015,017,028,030,032,034,054,057,087-088
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	M	002-003,007,009,015,028,034,087-088
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	U	017,030,032,054,057
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	M	002-003,007,009,015,028,034,087-088
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	U	017,030,032,054,057
TPH (C35-C44 aromatic)	T8	M105	1	mg/kg	N	002-003,007,009,015,017,028,030,032,034,054,057,087-088
TPH (Aliphatic) total	T85	M105		mg/kg	N	002-003,007,009,015,017,028,030,032,034,054,057,087-088
TPH (Aromatic) total	T85	M105		mg/kg	N	002-003,007,009,015,017,028,030,032,034,054,057,087-088
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	N	002-003,007,009,015,017,028,030,032,034,054,057,087-088
Moisture	T277	AR	0.1	%	N	001-003,007,009-011,014-015,017,024-026,028-030,032,034,036,039,042-043,045,049,051,054,057,072,077,084,087-088
Moisture @ 105 C	T162	AR	0.1	%	N	001-003,007,009-011,014-015,017,024-026,028-030,032,034,036,039,042-043,045,049,051,054,057,072,077,084,087-088

GeoDyne

2012 WAC Test Results

Scientific Analysis Laboratories is a limited company registered in England and Wales (No 2514788) whose address is at Hadfield House, Hadfield Street, Manchester M16 9FE

Scientific Analysis Laboratories Ltd

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 289509-1

Date of Report: 17-Aug-2012

Customer: Geodyne Ltd
The Granary
Church Lane
Thrumpton
Nottinghamshire
NG11 0AX

Customer Contact: Mr Chris Paling

Customer Job Reference: 31149
Customer Site Reference: Shoreham
Date Job Received at SAL: 31-Jul-2012
Date Analysis Started: 01-Aug-2012
Date Analysis Completed: 17-Aug-2012

The results reported relate to samples received in the laboratory
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation

Tests covered by this certificate were conducted in accordance with SAL SOPs

UKAS TESTING
1549

Report checked and authorised by :
Caroline Haworth
Assistant Customer Service Manager

Issued by :
Caroline Haworth
Assistant Customer Service Manager

Waste Acceptance Criteria

Customer Sample Reference : WS3 0.50
SAL Sample Reference : 289509 001
SAL Reference : 289509
Project Site : Shoreham
Customer Reference : 31149
Date Sampled : 20-JUL-2012
Test Portion Mass (g) : 175

Soil Summary					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Acid Neutralising Capacity (pH 7)	Titration	2.0	Mol/kg	N	<2.0			
PCB EC7 (Sum)	Calc	0.00035	mg/kg	U	0.049	1.0		
BTEX (Sum)	Calc	0.0040	mg/kg	U	(2) <0.0080	6.0		
Loss on Ignition	Grav	0.1	%	N	6.5			10.0
pH	Probe	0.0		U	8.2		>6.0	
Total Organic Carbon	OX/IR	0.1	%	N	2.3	3.0	5.0	6.0
TPH C10-C40 (sum)	Calc	1	mg/kg	N	480	500.0		
PAH (Sum)	Calc	1.6	mg/kg	N	14	100.0		

10:1 Leachate					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.055	0.06	0.7	5.0
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	N	0.11	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.37	20.0	100.0	300.0
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.00020	mg/kg	N	0.00062	0.04	1.0	5.0
Chloride	Calc / Discrete Analyser	5.0	mg/kg	N	33	800.0	15000.0	25000.0
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.044	0.5	10.0	70.0
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.072	2.0	50.0	100.0
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	76	500.0	800.0	1000.0
Fluoride	Calc / Discrete Analyser	0.50	mg/kg	N	7.7	10.0	150.0	500.0
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	N	0.018	0.5	10.0	50.0
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.00050	mg/kg	N	0.0012	0.01	0.2	2.0
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	0.15	0.5	10.0	30.0
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	N	<0.010	0.4	10.0	40.0
Phenols(Mono)	Calc / Colorimetry	1.0	mg/kg	N	<1.0	1.0		
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	N	0.019	0.1	0.5	7.0
Sulphate	Calc / Discrete Analyser	1.0	mg/kg	N	140	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc / Grav	1000	mg/kg	N	<1000	4000.0	60000.0	100000.0
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	N	0.072	4.0	50.0	200.0

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as ammended)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

SAL Reference: 289509
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
BTEX

SAL Reference	**289509 001**
Customer Sample Reference	**WS3 0.50**
Test Sample	**AR**
Date Sampled	**20-JUL-2012**

Determinand	Method	LOD	Units	Symbol	
Benzene	GC/MS (Headspace)	1	µg/kg	U	(2,13) <2
EthylBenzene	GC/MS (Headspace)	1	µg/kg	U	(2) <2
Toluene	GC/MS (Headspace)	1	µg/kg	U	(2) <2
Xylene (Total)	GC/MS (Headspace)	1	µg/kg	U	(2) <2

SAL Reference: 289509
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
TPH

SAL Reference	**289509 001**
Customer Sample Reference	**WS3 0.50**
Test Sample	**AR**
Date Sampled	**20-JUL-2012**

Determinand	Method	LOD	Units	Symbol	
Total Petroleum Hydrocarbons	GC/FID	1	mg/kg	U	**280**
Total Petroleum Hydrocarbons (C35-C40)	GC/FID	1	mg/kg	N	**200**

SAL Reference: 289509
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
PAH EPA 16, Coronene

SAL Reference	**289509 001**
Customer Sample Reference	**WS3 0.50**
Test Sample	**AR**
Date Sampled	**20-JUL-2012**

Determinand	Method	LOD	Units	Symbol	
Naphthalene	GC/MS	0.1	mg/kg	U	<0.1
Acenaphthylene	GC/MS	0.1	mg/kg	U	<0.1
Acenaphthene	GC/MS	0.1	mg/kg	U	<0.1
Fluorene	GC/MS	0.1	mg/kg	U	<0.1
Phenanthrene	GC/MS	0.1	mg/kg	U	**0.5**
Anthracene	GC/MS	0.1	mg/kg	U	**0.2**
Fluoranthene	GC/MS	0.1	mg/kg	U	**2.9**
Pyrene	GC/MS	0.1	mg/kg	U	**2.7**
Benzo(a)Anthracene	GC/MS	0.1	mg/kg	U	**0.9**
Chrysene	GC/MS	0.1	mg/kg	U	**1.0**
Benzo(b/k)Fluoranthene	GC/MS	0.1	mg/kg	U	**2.1**
Benzo(a)Pyrene	GC/MS	0.1	mg/kg	U	**1.0**
Indeno(123-cd)Pyrene	GC/MS	0.1	mg/kg	U	**0.8**
Dibenzo(ah)Anthracene	GC/MS	0.1	mg/kg	U	**0.2**
Benzo(ghi)Perylene	GC/MS	0.1	mg/kg	U	**0.9**
Coronene	GC/MS	0.1	mg/kg	N	**0.5**

SAL Reference: 289509
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
PCB EC7 and Total

SAL Reference	**289509 001**
Customer Sample Reference	**WS3 0.50**
Test Sample	**AR**
Date Sampled	**20-JUL-2012**

Determinand	Method	LOD	Units	Symbol	
Polychlorinated biphenyl BZ#28	GC/MS (HR)	0.05	µg/kg	U	(9) <0.50
Polychlorinated biphenyl BZ#52	GC/MS (HR)	0.05	µg/kg	U	**1.1**
Polychlorinated biphenyl BZ#101	GC/MS (HR)	0.05	µg/kg	U	**6.9**
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.05	µg/kg	U	**1.8**
Polychlorinated biphenyl BZ#153	GC/MS (HR)	0.05	µg/kg	U	**13**
Polychlorinated biphenyl BZ#138	GC/MS (HR)	0.05	µg/kg	U	**14**
Polychlorinated biphenyl BZ#180	GC/MS (HR)	0.05	µg/kg	U	**12**

Index to symbols used in 289509-1

Value	Description
AR	As Received
8:1	Leachate to BS EN 12457-3 (8:1)
2:1	Leachate to BS EN 12457-3 (2:1)
13	Results have been blank corrected.
2	LOD Raised Due to Matrix Interference
9	LOD raised due to dilution of sample
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Scientific Analysis Laboratories is a limited company registered in England and Wales (No 2514788) whose address is at Hadfield House, Hadfield Street, Manchester M16 9FE

Scientific Analysis Laboratories Ltd

Certificate of Analysis

Hadfield House
Hadfield Street
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M16 9FE
Tel : 0161 874 2400
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Report Number: 289744-1

Date of Report: 21-Aug-2012

Customer: Geodyne Ltd
The Granary
Church Lane
Thrumpton
Nottinghamshire
NG11 0AX

Customer Contact: Mr Chris Paling

Customer Job Reference: 31149
Customer Site Reference: Shoreham
Date Job Received at SAL: 31-Jul-2012
Date Analysis Started: 02-Aug-2012
Date Analysis Completed: 21-Aug-2012

The results reported relate to samples received in the laboratory
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
Tests covered by this certificate were conducted in accordance with SAL SOPs

UKAS TESTING
1549

Report checked and authorised by :
Caroline Haworth
Assistant Customer Service Manager

Issued by :
Caroline Haworth
Assistant Customer Service Manager

Waste Acceptance Criteria

Customer Sample Reference : WS17 0.50-1.50
SAL Sample Reference : 289744 001
SAL Reference : 289744
Project Site : Shoreham
Customer Reference : 31149
Date Sampled : 20-JUL-2012
Test Portion Mass (g) : 175

Soil Summary					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Acid Neutralising Capacity (pH 7)	Titration	2.0	Mol/kg	N	<2.0			
PCB EC7 (Sum)	Calc	0.00035	mg/kg	U	(9) <0.0035	1.0		
BTEX (Sum)	Calc	0.0040	mg/kg	U	<0.0040	6.0		
Loss on Ignition	Grav	0.1	%	N	8.1			10.0
pH	Probe	0.0		U	7.7		>6.0	
Total Organic Carbon	OX/IR	0.1	%	N	3.1	**3.0**	5.0	6.0
TPH C10-C40 (sum)	Calc	1	mg/kg	N	650	**500.0**		
PAH (Sum)	Calc	1.6	mg/kg	N	190	**100.0**		

10:1 Leachate					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	WN	0.13	**0.06**	0.7	5.0
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	WN	0.043	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	WN	0.91	20.0	100.0	300.0
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.00020	mg/kg	WN	0.00093	0.04	1.0	5.0
Chloride	Calc / Discrete Analyser	5.0	mg/kg	N	100	800.0	15000.0	25000.0
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	WN	0.025	0.5	10.0	70.0
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	WN	0.052	2.0	50.0	100.0
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	77	500.0	800.0	1000.0
Fluoride	Calc / Discrete Analyser	0.50	mg/kg	N	6.0	10.0	150.0	500.0
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	WN	0.018	0.5	10.0	50.0
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.00050	mg/kg	WN	<0.00050	0.01	0.2	2.0
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	WN	0.25	0.5	10.0	30.0
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	WN	0.024	0.4	10.0	40.0
Phenols(Mono)	Calc / Colorimetry	1.0	mg/kg	N	<1.0	1.0		
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	WN	0.025	0.1	0.5	7.0
Sulphate	Calc / Discrete Analyser	1.0	mg/kg	N	250	1000.0	20000.0	50000.0
Total Dissolved Solids	Calc / Grav	1000	mg/kg	N	1800	4000.0	60000.0	100000.0
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	WN	0.15	4.0	50.0	200.0

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as ammended)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

Waste Acceptance Criteria

Customer Sample Reference : BH2B 1.20
SAL Sample Reference : 289744 002
SAL Reference : 289744
Project Site : Shoreham
Customer Reference : 31149
Test Portion Mass (g) : 175
Date Sampled : 20-JUL-2012

Soil Summary					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Acid Neutralising Capacity (pH 7)	Titration	2.0	Mol/kg	N	<2.0			
PCB EC7 (Sum)	Calc	0.00035	mg/kg	U	(9) <0.0035	1.0		
BTEX (Sum)	Calc	0.0040	mg/kg	U	(2) <0.012	6.0		
Loss on Ignition	Grav	0.1	%	N	17			**10.0**
pH	Probe	0.0		U	8.7		>6.0	
Total Organic Carbon	OX/IR	0.1	%	N	13	3.0	5.0	**6.0**
TPH C10-C40 (sum)	Calc	1	mg/kg	N	430	500.0		
PAH (Sum)	Calc	1.6	mg/kg	N	4.4	100.0		

10:1 Leachate					Result	Inert Waste Landfill	Stable non reactive	Hazardous Waste Landfill
Determinand	**Technique**	**LOD**	**Units**	**Symbol**				
Antimony (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	WN	0.016	0.06	0.7	5.0
Arsenic (Dissolved)	Calc / ICP/MS (Filtered)	0.0020	mg/kg	WN	0.047	0.5	2.0	25.0
Barium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	WN	0.46	20.0	100.0	300.0
Cadmium (Dissolved)	Calc / ICP/MS (Filtered)	0.00020	mg/kg	WN	0.00027	0.04	1.0	5.0
Chloride	Calc / Discrete Analyser	5.0	mg/kg	N	870	**800.0**	15000.0	25000.0
Chromium (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	WN	0.014	0.5	10.0	70.0
Copper (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	WN	0.031	2.0	50.0	100.0
Dissolved Organic Carbon	Calc / OX/IR	10	mg/kg	N	59	500.0	800.0	1000.0
Fluoride	Calc / Discrete Analyser	0.50	mg/kg	N	11	**10.0**	150.0	500.0
Lead (Dissolved)	Calc / ICP/MS (Filtered)	0.0030	mg/kg	WN	<0.0030	0.5	10.0	50.0
Mercury (Dissolved)	Calc / ICP/MS (Filtered)	0.00050	mg/kg	WN	0.00055	0.01	0.2	2.0
Molybdenum (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	WN	0.047	0.5	10.0	30.0
Nickel (Dissolved)	Calc / ICP/MS (Filtered)	0.010	mg/kg	WN	0.024	0.4	10.0	40.0
Phenols(Mono)	Calc / Colorimetry	1.0	mg/kg	N	<1.0	1.0		
Selenium (Dissolved)	Calc / ICP/MS (Filtered)	0.0050	mg/kg	WN	0.065	0.1	0.5	7.0
Sulphate	Calc / Discrete Analyser	1.0	mg/kg	N	1800	**1000.0**	20000.0	50000.0
Total Dissolved Solids	Calc / Grav	1000	mg/kg	N	4700	**4000.0**	60000.0	100000.0
Zinc (Dissolved)	Calc / ICP/MS (Filtered)	0.020	mg/kg	WN	0.056	4.0	50.0	200.0

From: EC Directive 99/31/EC and Landfill Regulations 2002 (as ammended)

Notes:- Cumulative release at L/S=10 (mg/kg of dry matter) in accordance with BS EN 12457. Soil leaching procedure is not covered by our UKAS accreditation

SAL Reference: 289744
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
BTEX

				SAL Reference	**289744 001**	**289744 002**
				Customer Sample Reference	**WS17 0.50-1.50**	**BH2B 1.20**
				Test Sample	**AR**	**AR**
				Date Sampled	**20-JUL-2012**	**20-JUL-2012**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Benzene	GC/MS (Headspace)	1	µg/kg	U	(13) <1	(2,13) <3
EthylBenzene	GC/MS (Headspace)	1	µg/kg	U	<1	(2) <3
Toluene	GC/MS (Headspace)	1	µg/kg	U	<1	(2) <3
Xylene (Total)	GC/MS (Headspace)	1	µg/kg	U	<1	(2) <3

SAL Reference: 289744
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
TPH

				SAL Reference	**289744 001**	**289744 002**
				Customer Sample Reference	**WS17 0.50-1.50**	**BH2B 1.20**
				Test Sample	**AR**	**AR**
				Date Sampled	**20-JUL-2012**	**20-JUL-2012**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Total Petroleum Hydrocarbons	GC/FID	1	mg/kg	U	**580**	**220**
Total Petroleum Hydrocarbons (C35-C40)	GC/FID	1	mg/kg	N	**73**	**210**

SAL Reference: 289744
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
PAH EPA 16, Coronene

				SAL Reference	**289744 001**	**289744 002**
				Customer Sample Reference	**WS17 0.50-1.50**	**BH2B 1.20**
				Test Sample	**AR**	**AR**
				Date Sampled	**20-JUL-2012**	**20-JUL-2012**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Naphthalene	GC/MS	0.1	mg/kg	U	**1.7**	<0.1
Acenaphthylene	GC/MS	0.1	mg/kg	U	**2.7**	**0.3**
Acenaphthene	GC/MS	0.1	mg/kg	U	**0.2**	<0.1
Fluorene	GC/MS	0.1	mg/kg	U	**0.6**	<0.1
Phenanthrene	GC/MS	0.1	mg/kg	U	**8.9**	**0.3**
Anthracene	GC/MS	0.1	mg/kg	U	**3.3**	**0.1**
Fluoranthene	GC/MS	0.1	mg/kg	U	**32**	**0.5**
Pyrene	GC/MS	0.1	mg/kg	U	**27**	**0.8**
Benzo(a)Anthracene	GC/MS	0.1	mg/kg	U	**18**	**0.2**
Chrysene	GC/MS	0.1	mg/kg	U	**19**	**0.2**
Benzo(b/k)Fluoranthene	GC/MS	0.1	mg/kg	U	**31**	**0.6**
Benzo(a)Pyrene	GC/MS	0.1	mg/kg	U	**17**	**0.3**
Indeno(123-cd)Pyrene	GC/MS	0.1	mg/kg	U	**12**	**0.4**
Dibenzo(ah)Anthracene	GC/MS	0.1	mg/kg	U	**2.7**	<0.1
Benzo(ghi)Perylene	GC/MS	0.1	mg/kg	U	**8.2**	**0.5**
Coronene	GC/MS	0.1	mg/kg	N	**2.1**	**0.2**

SAL Reference: 289744
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
PCB EC7

				SAL Reference	**289744 001**	**289744 002**
				Customer Sample Reference	**WS17 0.50-1.50**	**BH2B 1.20**
				Test Sample	**AR**	**AR**
				Date Sampled	**20-JUL-2012**	**20-JUL-2012**
Determinand	**Method**	**LOD**	**Units**	**Symbol**		
Polychlorinated biphenyl BZ#28	GC/MS (HR)	0.05	µg/kg	U	(9) <0.50	(9) <0.50
Polychlorinated biphenyl BZ#52	GC/MS (HR)	0.05	µg/kg	U	(9) <0.50	(9) <0.50
Polychlorinated biphenyl BZ#101	GC/MS (HR)	0.05	µg/kg	U	(9) <0.50	(9) <0.50
Polychlorinated biphenyl BZ#118	GC/MS (HR)	0.05	µg/kg	U	(9) <0.50	(9) <0.50
Polychlorinated biphenyl BZ#153	GC/MS (HR)	0.05	µg/kg	U	(9) <0.50	(9) <0.50
Polychlorinated biphenyl BZ#138	GC/MS (HR)	0.05	µg/kg	U	(9) <0.50	(9) <0.50
Polychlorinated biphenyl BZ#180	GC/MS (HR)	0.05	µg/kg	U	(9) <0.50	(9) <0.50

Index to symbols used in 289744-1

Value	Description
AR	As Received
2:1	Leachate to BS EN 12457-3 (2:1)
8:1	Leachate to BS EN 12457-3 (8:1)
9	LOD raised due to dilution of sample
13	Results have been blank corrected.
2	LOD Raised Due to Matrix Interference
W	Analysis was performed at another SAL laboratory
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

GeoDyne

2015 Soil Test Results

PSL
Professional Soils Laboratory

LABORATORY REPORT

UKAS TESTING
4043

Contract Number: PSL15/2612

Client's Reference: Report Date: 03 June 2015

Client Name: GeoDyne
The Granary
Church Lane
Thrumpton
Notts
NG11 0AX

For the attention of: Chris Paling

Contract Title: Shoreham

Date Received: 28/5/2015
Date Commenced: 28/5/2015
Date Completed: 3/6/2015

Notes: Opinions and Interpretations are outside the UKAS Accreditation

Checked and Approved Signatories:

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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Depth m	Description of Sample
WS21	1	B	4.00	Dark grey gravelly sandy CLAY.
WS24	1	B	2.00	Brown mottled grey very silty SAND.
WS25	1	B	3.75	Brown gravelly very sandy CLAY.
WS29	1	B	2.90	Dark brown slightly sandy CLAY.
WS31	1	B	2.75	Brown mottled grey slightly sandy CLAY.

PSL
Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	03/06/15		03/06/15		03/06/15
SHOREHAM.				Contract No:	PSL15/2612
				Client Ref:	31149

SUMMARY OF SOIL CLASSIFICATION TESTS

(B.S. 1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Depth m	Moisture Content % Clause 3.2	Bulk Density Mg/m^3 Clause 7.2	Dry Density Mg/m^3 Clause 7.2	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4.4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	% Passing .425mm	Remarks
WS21	1	B	4.00	46				54	27	27	95	High plasticity CH.
WS24	1	B	2.00	30					NP			
WS25	1	B	3.75	16				27	15	12	90	Low plasticity CL.
WS29	1	B	2.90	42				51	26	25	100	High plasticity CH.
WS31	1	B	2.75	49				64	27	37	100	High plasticity CH.

SYMBOLS : NP : Non Plastic *** : Liquid Limit and Plastic Limit Wet Sieved.**

PSL
Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	03/06/15		03/06/15		03/06/15

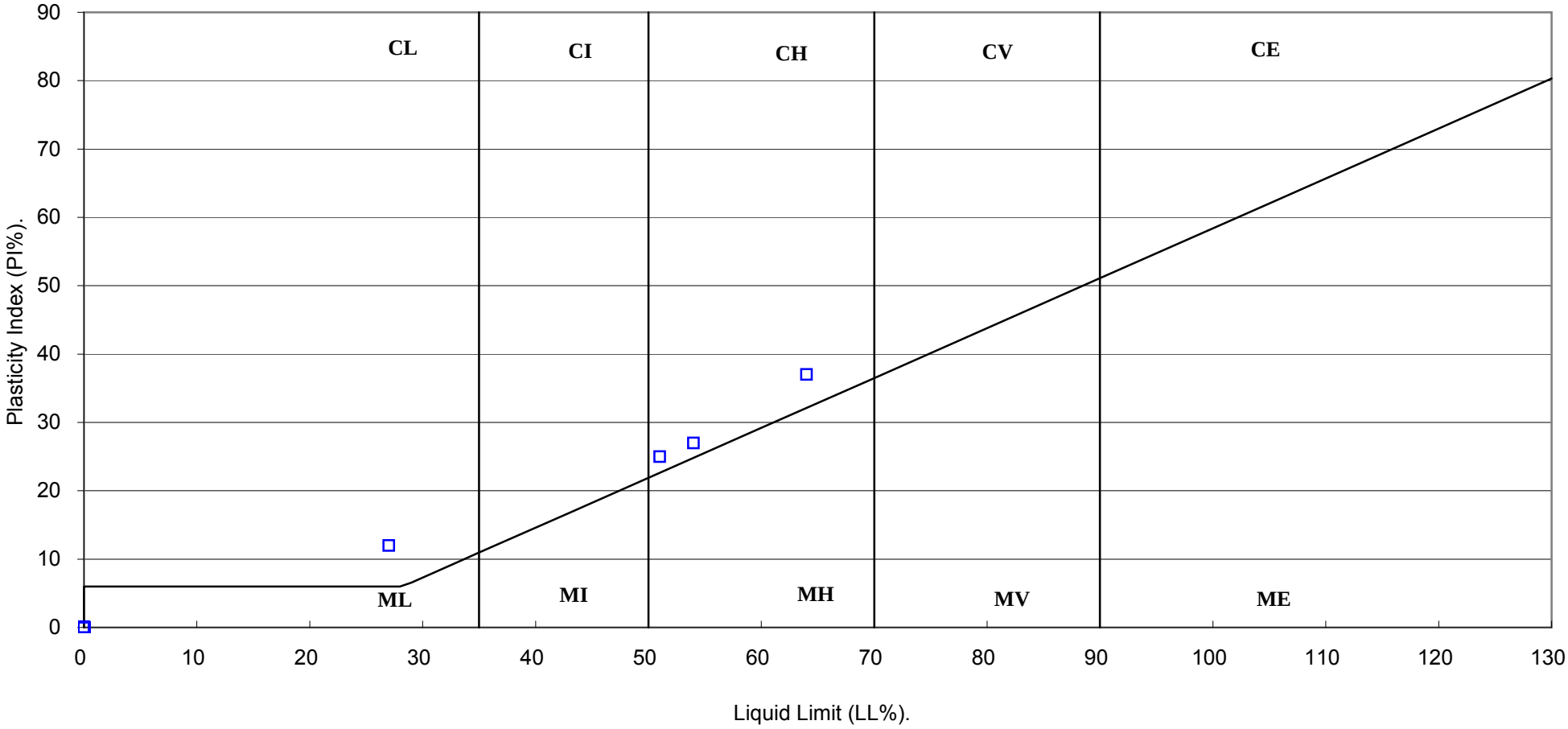
SHOREHAM.

Contract No: PSL15/2612

Client Ref: 31149

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(B.S.5930 : 1999)



PSL Professional Soils Laboratory	Compiled by	Date	Checked by	Date	Approved by	Date
		03/06/15		03/06/15		03/06/15
	SHOREHAM.				Contract No:	PSL15/2612
					Client Ref:	31149

Hadfield House
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Scientific Analysis Laboratories Ltd

Certificate of Analysis

Report Number: 481128-1

Date of Report: 05-Jun-2015

Customer: Geodyne Ltd
The Granary
Church Lane
Thrumpton
Nottinghamshire
NG11 0AX

Customer Contact: Mr Chris Paling

Customer Job Reference: 31149
Customer Site Reference: Shoreham
Date Job Received at SAL: 22-May-2015
Date Analysis Started: 29-May-2015
Date Analysis Completed: 05-Jun-2015

The results reported relate to samples received in the laboratory
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
Tests covered by this certificate were conducted in accordance with SAL SOPs
All results have been reviewed in accordance with Section 25 of the SAL Quality Manual

UKAS TESTING
1549

Report checked and authorised by :
Ross Walker
Sales Support Manager

Issued by :
Ross Walker
Sales Support Manager

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
Geodyne Suite 1

SAL Reference					**481128 002**	**481128 003**	**481128 004**	**481128 008**	**481128 012**	**481128 013**	**481128 025**	**481128 026**	**481128 027**	**481128 029**
Customer Sample Reference					**WS20 T2**	**WS20 T3**	**WS21 T1**	**WS22 T1**	**WS23 T1**	**WS24 T1**	**WS27 T2**	**WS27 T3**	**WS28 T1**	**WS28 T3**
Depth					**1.00**	**3.00**	**1.00**	**0.60**	**0.50**	**0.50**	**1.00**	**1.75**	**0.50**	**2.50**
Date Sampled					**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**
Type					**Sandy Soil**	**Clay**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Clay**	**Sandy Soil**	**Clay**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**										
Arsenic	T6	M40	2	mg/kg	**11**	**13**	**10**	**20**	**16**	**110**	**16**	**9**	**62**	**16**
Cadmium	T6	M40	1	mg/kg	**1**	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chromium	T6	M40	1	mg/kg	**6**	**12**	**18**	**21**	**17**	**73**	**24**	**7**	**22**	**21**
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Copper	T6	M40	1	mg/kg	**8**	**6**	**23**	**36**	**70**	**470**	**64**	**11**	**130**	**29**
Lead	T6	M40	1	mg/kg	**61**	**7**	**58**	**62**	**390**	**3500**	**420**	**54**	**230**	**270**
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	**7**	**12**	**17**	**28**	**19**	**100**	**23**	**7**	**53**	**17**
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Zinc	T6	M40	1	mg/kg	**100**	**27**	**73**	**110**	**270**	**1100**	**120**	**37**	**160**	**88**
pH	T7	AR			**8.8**	**8.7**	**8.3**	**8.2**	**10.2**	**7.7**	**7.6**	**8.3**	**7.2**	**7.7**
Total Organic Carbon	T21	M40	0.1	%	**0.3**	**0.7**	**1.2**	**2.3**	**4.2**	**14**	**1.6**	**0.5**	**44**	**1.4**

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
Geodyne Suite 1

SAL Reference					**481128 042**	**481128 046**	**481128 047**	**481128 050**	**481128 052**
Customer Sample Reference					**WS32 T1**	**WS32 T5**	**WS33 T1**	**WS33 T4**	**WS34 T1**
Depth					**0.50**	**4.00**	**0.75**	**3.00**	**0.20**
Date Sampled					**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**
Type					**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Fill**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Arsenic	T6	M40	2	mg/kg	**13**	**12**	**70**	**13**	**44**
Cadmium	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Chromium	T6	M40	1	mg/kg	**13**	**9**	**130**	**11**	**35**
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1	<1
Copper	T6	M40	1	mg/kg	**20**	**10**	**8500**	**7**	**470**
Lead	T6	M40	1	mg/kg	**68**	**25**	**6300**	**7**	**280**
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	**10**	**9**	**130**	**9**	**63**
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3
Zinc	T6	M40	1	mg/kg	**36**	**25**	**2800**	**22**	**180**
pH	T7	AR			**8.5**	**8.3**	**8.0**	**8.3**	**11.0**
Total Organic Carbon	T21	M40	0.1	%	**0.6**	**1.2**	**15**	**0.3**	**11**

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
Miscellaneous

SAL Reference	481128 002	481128 003	481128 004	481128 014	481128 017	481128 022	481128 027	481128 038	481128 047	481128 048
Customer Sample Reference	WS20 T2	WS20 T3	WS21 T1	WS24 T2	WS25 T1	WS26 T1	WS28 T1	WS31 T1	WS33 T1	WS33 T2
Depth	1.00	3.00	1.00	1.00	0.50	0.75	0.50	0.50	0.75	2.25
Date Sampled	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015
Type	Sandy Soil	Clay	Sandy Soil				Clay		Sandy Soil	Sandy Soil

Determinand	Method	Test Sample	LOD	Units										
Asbestos ID	T27	AR			-	-	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	-
(Water Soluble) SO4 expressed as SO4	T242	AR	0.01	g/l	**0.11**	**0.15**	-	-	-	-	-	-	-	**0.07**

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
Miscellaneous

SAL Reference	481128 050	481128 053
Customer Sample Reference	WS33 T4	WS35 T1
Depth	3.00	0.20
Date Sampled	19-MAY-2015	19-MAY-2015
Type	Sandy Soil	

Determinand	Method	Test Sample	LOD	Units		
Asbestos ID	T27	AR			-	N.D.
(Water Soluble) SO4 expressed as SO4	T242	AR	0.01	g/l	<0.01	-

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
GeoDyne USEPA16 PAHs

SAL Reference	481128 002	481128 003	481128 004	481128 008	481128 012	481128 013	481128 025	481128 026	481128 027	481128 029
Customer Sample Reference	WS20 T2	WS20 T3	WS21 T1	WS22 T1	WS23 T1	WS24 T1	WS27 T2	WS27 T3	WS28 T1	WS28 T3
Depth	1.00	3.00	1.00	0.60	0.50	0.50	1.00	1.75	0.50	2.50
Date Sampled	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015
Type	Sandy Soil	Clay	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Clay	Sandy Soil	Clay	Clay

Determinand	Method	Test Sample	LOD	Units										
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	**0.2**	<0.1	**0.3**	**0.2**	<0.1	<0.1	(9) <10	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	**0.3**	<0.1	**0.5**	**0.3**	<0.1	<0.1	(9) <10	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1	**0.2**	<0.1	**1.9**	<0.1	<0.1	<0.1	**18**	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1	**0.3**	<0.1	**2.2**	<0.1	<0.1	<0.1	**22**	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	<0.1	<0.1	**6.4**	**0.1**	**17**	**1.0**	**0.1**	**0.3**	**360**	**0.8**
Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	**1.5**	<0.1	**5.9**	**0.2**	<0.1	<0.1	**88**	**0.2**
Fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	**11**	**0.2**	**14**	**2.7**	**0.3**	**1.1**	**370**	**1.2**
Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	**9.4**	**0.2**	**12**	**2.1**	**0.2**	**0.8**	**310**	**1.0**
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1	**4.3**	<0.1	**9.2**	**1.3**	<0.1	**0.6**	**230**	**0.6**
Chrysene	T207	M105	0.1	mg/kg	<0.1	<0.1	**4.1**	<0.1	**5.4**	**1.6**	<0.1	**0.5**	**190**	**0.5**
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	**4.5**	<0.1	**6.7**	**2.3**	<0.1	**0.6**	**170**	**0.4**
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	<0.1	<0.1	**2.0**	<0.1	**3.8**	**0.8**	<0.1	**0.3**	**110**	**0.3**
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	**3.7**	<0.1	**5.8**	**1.6**	<0.1	**0.4**	**160**	**0.4**
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	<0.1	<0.1	**2.1**	<0.1	**3.1**	**1.1**	<0.1	**0.2**	**76**	**0.2**
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	<0.1	<0.1	**2.5**	<0.1	**3.1**	**1.3**	<0.1	**0.3**	**90**	**0.2**
PAH(total)	T207	M105	0.1	mg/kg	<0.1	<0.1	**53**	**0.5**	**92**	**17**	**0.6**	**5.1**	**2200**	**5.8**
Dibenzo(ah)Anthracene	T99	M105	0.10	mg/kg	<0.10	<0.10	**0.48**	<0.10	**1.10**	**0.23**	<0.10	<0.10	**23.0**	<0.10

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
GeoDyne USEPA16 PAHs

	SAL Reference	481128 042	481128 046	481128 047	481128 050	481128 052
	Customer Sample Reference	WS32 T1	WS32 T5	WS33 T1	WS33 T4	WS34 T1
	Depth	0.50	4.00	0.75	3.00	0.20
	Date Sampled	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015
	Type	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Fill
Determinand	Method / Test Sample / LOD / Units					
Naphthalene	T207 / M105 / 0.1 / mg/kg	<0.1	<0.1	**0.9**	<0.1	<0.1
Acenaphthylene	T207 / M105 / 0.1 / mg/kg	<0.1	<0.1	**1.4**	<0.1	<0.1
Acenaphthene	T207 / M105 / 0.1 / mg/kg	<0.1	<0.1	**0.2**	<0.1	<0.1
Fluorene	T207 / M105 / 0.1 / mg/kg	**0.1**	<0.1	**0.3**	<0.1	<0.1
Phenanthrene	T207 / M105 / 0.1 / mg/kg	**0.9**	<0.1	**5.3**	<0.1	<0.1
Anthracene	T207 / M105 / 0.1 / mg/kg	**0.4**	<0.1	**1.8**	<0.1	<0.1
Fluoranthene	T207 / M105 / 0.1 / mg/kg	**1.8**	<0.1	**14**	<0.1	<0.1
Pyrene	T207 / M105 / 0.1 / mg/kg	**1.5**	<0.1	**13**	<0.1	<0.1
Benzo(a)Anthracene	T207 / M105 / 0.1 / mg/kg	**0.9**	<0.1	**7.4**	<0.1	<0.1
Chrysene	T207 / M105 / 0.1 / mg/kg	**0.8**	<0.1	**7.8**	<0.1	<0.1
Benzo(b)fluoranthene	T207 / M105 / 0.1 / mg/kg	**0.8**	<0.1	**8.5**	<0.1	<0.1
Benzo(k)fluoranthene	T207 / M105 / 0.1 / mg/kg	**0.5**	<0.1	**4.2**	<0.1	<0.1
Benzo(a)Pyrene	T207 / M105 / 0.1 / mg/kg	**0.7**	<0.1	**6.9**	<0.1	<0.1
Indeno(123-cd)Pyrene	T207 / M105 / 0.1 / mg/kg	**0.4**	<0.1	**6.9**	<0.1	<0.1
Benzo(ghi)Perylene	T207 / M105 / 0.1 / mg/kg	**0.4**	<0.1	**9.3**	<0.1	<0.1
PAH(total)	T207 / M105 / 0.1 / mg/kg	**9.3**	<0.1	**89**	<0.1	<0.1
Dibenzo(ah)Anthracene	T99 / M105 / 0.10 / mg/kg	**0.12**	<0.10	**1.31**	<0.10	-
Dibenzo(ah)Anthracene	T99 / AR / 0.10 / mg/kg	-	-	-	-	<0.10

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
BTEX GRO MTBE

	SAL Reference	481128 002	481128 009	481128 011	481128 012	481128 013	481128 027	481128 029	481128 030	481128 034	481128 035
	Customer Sample Reference	WS20 T2	WS22 T2	WS22 T4	WS23 T1	WS24 T1	WS28 T1	WS28 T3	WS29 T1	WS29 T5	WS30 T1
	Depth	1.00	2.00	5.00	0.50	0.50	0.50	2.50	0.50	4.00	0.50
	Date Sampled	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015
	Type	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Clay	Clay	Sandy Soil	Sandy Soil	Clay
Determinand	Method / Test Sample / LOD / Units										
Benzene	T209 / M105 / 10 / µg/kg	(13) <10	(13) <10	(13) <10	(13) <10	(13) <10	(13) <10	(13) <10	(13) <10	(13) <10	(13) <10
Toluene	T209 / M105 / 10 / µg/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
EthylBenzene	T209 / M105 / 10 / µg/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
M/P Xylene	T209 / M105 / 10 / µg/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
O Xylene	T209 / M105 / 10 / µg/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methyl tert-Butyl Ether	T209 / M105 / 10 / µg/kg	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Gasoline Range Organics	T54 / M105 / 100 / µg/kg	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
BTEX GRO MTBE

SAL Reference					481128 037	481128 043	481128 046	481128 048	481128 050	481128 052
Customer Sample Reference					WS30 T3	WS32 T2	WS32 T5	WS33 T2	WS33 T4	WS34 T1
Depth					2.50	1.00	4.00	2.25	3.00	0.20
Date Sampled					19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015
Type					Clay	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Fill
Determinand	**Method**	**Test Sample**	**LOD**	**Units**						
Benzene	T209	M105	10	µg/kg	(13) <10	(13) <10	(13) <10	(13) <10	(13) <10	(13) <10
Toluene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10	<10
EthylBenzene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10	<10
M/P Xylene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10	<10
O Xylene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	<10	<10	<10	<10	<10
Gasoline Range Organics	T54	M105	100	µg/kg	<100	<100	<100	**670**	<100	<100

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
Geodyne TPH (CWG)

SAL Reference					481128 002	481128 009	481128 011	481128 012	481128 013	481128 027	481128 029	481128 030	481128 034	481128 035
Customer Sample Reference					WS20 T2	WS22 T2	WS22 T4	WS23 T1	WS24 T1	WS28 T1	WS28 T3	WS29 T1	WS29 T5	WS30 T1
Depth					1.00	2.00	5.00	0.50	0.50	0.50	2.50	0.50	4.00	0.50
Date Sampled					19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015
Type					Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Sandy Soil	Clay	Clay	Sandy Soil	Sandy Soil	Clay
Determinand	**Method**	**Test Sample**	**LOD**	**Units**										
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C10-C12 aliphatic)	T206	M105	1	mg/kg	<1	<1	<1	(9) <10	<1	(9) <10	<1	<1	<1	<1
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	<2	<2	<2	**14**	<2	(9) <10	<2	**6**	<2	<2
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	<1	<1	<1	**45**	<1	(9) <10	<1	**16**	<1	<1
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	<4	<4	<4	**24**	<4	(9) <10	<4	**7**	<4	<4
TPH (C35-C44 aliphatic)	T8	M105	1	mg/kg	<1	<1	<1	**13**	<1	(9) <10	<1	<1	<1	<1
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	<1	<1	<1	(9) <10	<1	(9) <10	<1	**1**	<1	<1
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	<1	<1	<1	(9) <10	<1	**66**	**3**	**17**	<1	<1
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	<1	<1	<1	**33**	**2**	**1300**	**28**	**200**	**3**	**12**
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	<1	<1	<1	**230**	**13**	**2500**	**73**	**340**	**4**	**21**
TPH (C35-C44 aromatic)	T8	M105	1	mg/kg	<1	<1	<1	**170**	**6**	**420**	**29**	**58**	<1	**4**
TPH (Aliphatic) total	T85	M105		mg/kg	<4.0	<4.0	<4.0	**96**	<4.0	<10	<4.0	**29**	<4.0	<4.0
TPH (Aromatic) total	T85	M105		mg/kg	<1.0	<1.0	<1.0	**430**	**21**	**4300**	**130**	**620**	**7.1**	**37**
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	<4.0	<4.0	<4.0	**530**	**21**	**4300**	**130**	**650**	**7.1**	**37**

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
Geodyne TPH (CWG)

				SAL Reference	**481128 037**	**481128 043**	**481128 046**	**481128 048**	**481128 050**	**481128 052**
				Customer Sample Reference	**WS30 T3**	**WS32 T2**	**WS32 T5**	**WS33 T2**	**WS33 T4**	**WS34 T1**
				Depth	**2.50**	**1.00**	**4.00**	**2.25**	**3.00**	**0.20**
				Date Sampled	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**
				Type	**Clay**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Fill**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**						
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	**0.57**	<0.10	<0.10
TPH (C10-C12 aliphatic)	T206	M105	1	mg/kg	**9**	<1	<1	**4**	<1	<1
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	**90**	**3**	<2	**48**	<2	<2
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	**100**	**6**	<1	**58**	<1	<1
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	**23**	**5**	<4	**11**	<4	<4
TPH (C35-C44 aliphatic)	T8	M105	1	mg/kg	<1	<1	<1	<1	<1	<1
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10	<0.10	**0.10**	<0.10	<0.10
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	**5**	**3**	<1	<1	<1	<1
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	**100**	**42**	<1	**33**	<1	<1
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	**190**	**130**	<1	**77**	<1	<1
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	**130**	**190**	<1	**59**	<1	<1
TPH (C35-C44 aromatic)	T8	M105	1	mg/kg	**23**	**39**	<1	**7**	<1	<1
TPH (Aliphatic) total	T85	M105		mg/kg	**230**	**13**	<4.0	**120**	<4.0	<4.0
TPH (Aromatic) total	T85	M105		mg/kg	**450**	**410**	<1.0	**180**	<1.0	<1.0
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	**670**	**420**	<4.0	**300**	<4.0	<4.0

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
Poly-Chlorinated Biphenyls (WHO 12)

				SAL Reference	**481128 002**	**481128 004**	**481128 008**	**481128 013**	**481128 024**	**481128 042**	**481128 043**	**481128 047**	**481128 052**
				Customer Sample Reference	**WS20 T2**	**WS21 T1**	**WS22 T1**	**WS24 T1**	**WS27 T1**	**WS32 T1**	**WS32 T2**	**WS33 T1**	**WS34 T1**
				Depth	**1.00**	**1.00**	**0.60**	**0.50**	**0.50**	**0.50**	**1.00**	**0.75**	**0.20**
				Date Sampled	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**
				Type	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**		**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Fill**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**									
PCB BZ#105	T1	AR	0.05	µg/kg	<0.05	(9) <0.50	<0.05	<0.05	<0.05	<0.05	<0.05	(9) <0.50	<0.05
PCB BZ#114	T1	AR	0.05	µg/kg	<0.05	(9) <0.50	<0.05	<0.05	<0.05	<0.05	<0.05	(9) <0.50	<0.05
PCB BZ#118	T1	AR	0.05	µg/kg	<0.05	(9) <0.50	<0.05	<0.05	<0.05	<0.05	<0.05	(9) <0.50	<0.05
PCB BZ#123	T1	AR	0.05	µg/kg	<0.05	(9) <0.50	<0.05	<0.05	<0.05	<0.05	<0.05	(9) <0.50	<0.05
PCB BZ#126	T1	AR	0.05	µg/kg	<0.05	(9) <0.50	<0.05	<0.05	<0.05	<0.05	<0.05	(9) <0.50	<0.05
PCB BZ#156	T1	AR	0.05	µg/kg	<0.05	(9) <0.50	<0.05	<0.05	<0.05	<0.05	<0.05	(9) <0.50	<0.05
PCB BZ#157	T1	AR	0.05	µg/kg	<0.05	(9) <0.50	<0.05	<0.05	<0.05	<0.05	<0.05	(9) <0.50	<0.05
PCB BZ#167	T1	AR	0.05	µg/kg	<0.05	(9) <0.50	<0.05	<0.05	<0.05	<0.05	<0.05	(9) <0.50	<0.05
PCB BZ#169	T1	AR	0.05	µg/kg	<0.05	(9) <0.50	<0.05	<0.05	<0.05	<0.05	<0.05	(9) <0.50	<0.05
PCB BZ#189	T1	AR	0.05	µg/kg	<0.05	(9) <0.50	<0.05	<0.05	<0.05	<0.05	<0.05	(9) <0.50	<0.05
PCB BZ#77	T1	AR	0.05	µg/kg	<0.05	(9) <0.50	<0.05	<0.05	<0.05	<0.05	<0.05	(9) <0.50	<0.05
PCB BZ#81	T1	AR	0.05	µg/kg	<0.05	(9) <0.50	<0.05	<0.05	<0.05	<0.05	<0.05	(9) <0.50	<0.05

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625)

				SAL Reference	**481128 009**	**481128 012**	**481128 043**	**481128 046**	**481128 048**	**481128 050**
				Customer Sample Reference	**WS22 T2**	**WS23 T1**	**WS32 T2**	**WS32 T5**	**WS33 T2**	**WS33 T4**
				Depth	**2.00**	**0.50**	**1.00**	**4.00**	**2.25**	**3.00**
				Date Sampled	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**
				Type	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**						
1,2,4-Trichlorobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,2-Dichlorobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,3-Dichlorobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
1,4-Dichlorobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,5-Trichlorophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4,6-Trichlorophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dichlorophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dimethylphenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dinitrophenol	T207	M105	0.1	mg/kg	(36) <0.5	(36) <0.5	(36) <0.5	(36) <0.5	(36) <0.5	(36) <0.5
2,4-Dinitrotoluene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,6-Dinitrotoluene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chloronaphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chlorophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-methyl phenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylnaphthalene	T207	M105	0.1	mg/kg	<0.1	**0.2**	**0.6**	<0.1	<0.1	<0.1
2-Nitroaniline	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Nitrophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	(36) <0.5
3-Nitroaniline	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
3/4-Methylphenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Bromophenyl phenylether	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloro-3-methylphenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloroaniline	T207	M105	0.1	mg/kg	(36) <0.5	(36) <0.5	(36) <0.5	(36) <0.5	(36) <0.5	(36) <0.5
4-Chlorophenyl phenylether	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitroaniline	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Nitrophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	(36) <0.5
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	**1.9**	**2.7**	<0.1	**0.8**	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	**0.5**	**1.7**	<0.1	**0.3**	<0.1
Anthracene	T207	M105	0.1	mg/kg	<0.1	**5.9**	**5.2**	<0.1	**1.2**	<0.1
Azobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	**1.0**	**9.2**	**9.9**	<0.1	**2.4**	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	**0.6**	**5.8**	**6.5**	<0.1	**1.4**	<0.1
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	**1.1**	**10**	**11**	<0.1	**2.6**	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	**0.3**	**3.1**	**3.0**	<0.1	**0.6**	<0.1
Bis (2-chloroethoxy) methane	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-chloroethyl) ether	T207	M105	0.1	mg/kg	(36) <0.5	(36) <0.5	(36) <0.5	(36) <0.5	(36) <0.5	<0.1
Bis (2-chloroisopropyl) ether	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Bis (2-ethylhexyl)phthalate	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Butyl benzylphthalate	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Carbazole	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	T207	M105	0.1	mg/kg	**0.7**	**5.4**	**5.7**	<0.1	**1.6**	<0.1
Di-n-butylphthalate	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Di-n-octylphthalate	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	**1.1**	**1.0**	<0.1	**0.2**	<0.1
Dibenzofuran	T207	M105	0.1	mg/kg	<0.1	**1.7**	**3.1**	<0.1	**0.5**	<0.1
Diethyl phthalate	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dimethyl phthalate	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	**1.8**	**14**	**13**	<0.1	**5.4**	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	**2.2**	**5.0**	<0.1	**0.9**	<0.1
Hexachlorobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorobutadiene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Hexachlorocyclopentadiene	T207	M105	0.1	mg/kg	(36) <0.5	(36) <0.5	(36) <0.5	(36) <0.5	(36) <0.5	(36) <0.5
Hexachloroethane	T207	M105	0.1	mg/kg	(36) <0.5	(36) <0.5	(36) <0.5	(36) <0.5	(36) <0.5	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	**0.3**	**3.1**	**3.0**	<0.1	**0.6**	<0.1
Isophorone	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Naphthalene	T207	M105	0.1	mg/kg	<0.1	**0.3**	**1.4**	<0.1	**0.6**	<0.1
Nitrobenzene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil

Semi-Volatile Organic Compounds (USEPA 625)

				SAL Reference	**481128 009**	**481128 012**	**481128 043**	**481128 046**	**481128 048**	**481128 050**
				Customer Sample Reference	**WS22 T2**	**WS23 T1**	**WS32 T2**	**WS32 T5**	**WS33 T2**	**WS33 T4**
				Depth	**2.00**	**0.50**	**1.00**	**4.00**	**2.25**	**3.00**
				Date Sampled	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**
				Type	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**						
Pentachlorophenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	**0.5**	**17**	**14**	<0.1	**4.1**	<0.1
Phenol	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	T207	M105	0.1	mg/kg	**1.4**	**12**	**11**	<0.1	**4.3**	<0.1

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil

Volatile Organic Compounds (USEPA 624) (MCERTS)

				SAL Reference	**481128 009**	**481128 012**	**481128 043**	**481128 046**	**481128 048**	**481128 050**
				Customer Sample Reference	**WS22 T2**	**WS23 T1**	**WS32 T2**	**WS32 T5**	**WS33 T2**	**WS33 T4**
				Depth	**2.00**	**0.50**	**1.00**	**4.00**	**2.25**	**3.00**
				Date Sampled	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**
				Type	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**						
1,1,1,2-Tetrachloroethane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
1,1,1-Trichloroethane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
1,1,2,2-Tetrachloroethane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
1,1,2-Trichloroethane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
1,1-Dichloroethane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
1,1-Dichloroethylene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
1,1-Dichloropropene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
1,2,3-Trichloropropane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
1,2,4-Trimethylbenzene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
1,2-dibromoethane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
1,2-Dichlorobenzene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
1,2-Dichloroethane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
1,2-Dichloropropane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
1,3,5-Trimethylbenzene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
1,3-Dichlorobenzene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
1,3-Dichloropropane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
1,4-Dichlorobenzene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
2,2-Dichloropropane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
2-Chlorotoluene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
4-Chlorotoluene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Benzene	T209	M105	10	µg/kg	(13) <10	(13) <10	(13) <10	(13) <10	(13) <10	(13) <10
Bromobenzene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Bromochloromethane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Bromodichloromethane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Bromoform	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Bromomethane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Carbon tetrachloride	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Chlorobenzene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Chlorodibromomethane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Chloroethane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Chloroform	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Chloromethane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Cis-1,2-Dichloroethylene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Cis-1,3-Dichloropropene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Dibromomethane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Dichlorodifluoromethane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Dichloromethane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
EthylBenzene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10	<10
Isopropyl benzene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
M/P Xylene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10	<10
n-Propylbenzene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
O Xylene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10	<10
p-Isopropyltoluene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
S-Butylbenzene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Styrene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
T-Butylbenzene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Tetrachloroethene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Toluene	T209	M105	10	µg/kg	<10	<10	<10	<10	<10	<10
Trans-1,2-Dichloroethene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Trans-1,3-Dichloropropene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Trichloroethene	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Trichlorofluoromethane	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50
Vinyl chloride	T209	M105	50	µg/kg	<50	<50	<50	<50	<50	<50

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
MCERTS Preparation

				SAL Reference	**481128 002**	**481128 003**	**481128 004**	**481128 008**	**481128 009**
				Customer Sample Reference	**WS20 T2**	**WS20 T3**	**WS21 T1**	**WS22 T1**	**WS22 T2**
				Depth	**1.00**	**3.00**	**1.00**	**0.60**	**2.00**
				Date Sampled	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**
				Type	**Sandy Soil**	**Clay**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Moisture @ 105 C	T162	AR	0.1	%	**13**	**21**	**14**	**21**	**38**
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1	<0.1	-

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
MCERTS Preparation

				SAL Reference	**481128 011**	**481128 012**	**481128 013**	**481128 025**	**481128 026**
				Customer Sample Reference	**WS22 T4**	**WS23 T1**	**WS24 T1**	**WS27 T2**	**WS27 T3**
				Depth	**5.00**	**0.50**	**0.50**	**1.00**	**1.75**
				Date Sampled	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**
				Type	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Clay**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Moisture @ 105 C	T162	AR	0.1	%	**16**	**13**	**28**	**17**	**14**
Retained on 10mm sieve	T2	M40	0.1	%	-	<0.1	<0.1	<0.1	<0.1

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
MCERTS Preparation

				SAL Reference	**481128 027**	**481128 029**	**481128 030**	**481128 034**	**481128 035**
				Customer Sample Reference	**WS28 T1**	**WS28 T3**	**WS29 T1**	**WS29 T5**	**WS30 T1**
				Depth	**0.50**	**2.50**	**0.50**	**4.00**	**0.50**
				Date Sampled	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**
				Type	**Clay**	**Clay**	**Sandy Soil**	**Sandy Soil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Moisture @ 105 C	T162	AR	0.1	%	**11**	**23**	**6.4**	**17**	**10**
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	-	-	-

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
MCERTS Preparation

				SAL Reference	**481128 037**	**481128 042**	**481128 043**	**481128 046**	**481128 047**
				Customer Sample Reference	**WS30 T3**	**WS32 T1**	**WS32 T2**	**WS32 T5**	**WS33 T1**
				Depth	**2.50**	**0.50**	**1.00**	**4.00**	**0.75**
				Date Sampled	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**
				Type	**Clay**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Moisture @ 105 C	T162	AR	0.1	%	**19**	**3.0**	**20**	**6.6**	**20**
Retained on 10mm sieve	T2	M40	0.1	%	-	<0.1	-	<0.1	<0.1

SAL Reference: 481128
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
MCERTS Preparation

SAL Reference	**481128 048**	**481128 050**	**481128 052**
Customer Sample Reference	**WS33 T2**	**WS33 T4**	**WS34 T1**
Depth	**2.25**	**3.00**	**0.20**
Date Sampled	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**
Type	**Sandy Soil**	**Sandy Soil**	**Fill**

Determinand	Method	Test Sample	LOD	Units			
Moisture @ 105 C	T162	AR	0.1	%	**13**	**20**	**33**
Retained on 10mm sieve	T2	M40	0.1	%	-	<0.1	<0.1

Index to symbols used in 481128-1

Value	Description
AR	As Received
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
N.D.	Not Detected
9	LOD raised due to dilution of sample
13	Results have been blank corrected.
36	LOD Raised due to low Matrix spike recovery
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos was subcontracted to REC Asbestos
"Fill" samples are outside the scope of our MCERTS accreditation. Results are UKAS only

Method Index

Value	Description
T2	Grav
T7	Probe
T85	Calc
T162	Grav (1 Dec) (105 C)
T206	GC/FID (MCERTS)
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T27	PLM
T54	GC/MS (Headspace)
T99	GC/MS (LV)
T6	ICP/OES
T8	GC/FID
T207	GC/MS (MCERTS)
T21	OX/IR
T1	GC/MS (HR)
T209	GC/MS(Head Space)(MCERTS)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Arsenic	T6	M40	2	mg/kg	M	002-004,008,012-013,025-027,029,042,046-047,050
Arsenic	T6	M40	2.0	mg/kg	U	052
Cadmium	T6	M40	1	mg/kg	M	002-004,008,012-013,025-027,029,042,046-047,050
Cadmium	T6	M40	1	mg/kg	U	052
Chromium	T6	M40	1	mg/kg	M	002-004,008,012-013,025-027,029,042,046-047,050

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Chromium	T6	M40	1	mg/kg	U	052
Chromium VI	T6	AR	1	mg/kg	N	002-004,008,012-013,025-027,029,042,046-047,050,052
Copper	T6	M40	1	mg/kg	M	002-004,008,012-013,025-027,029,042,046-047,050
Copper	T6	M40	1	mg/kg	U	052
Lead	T6	M40	1	mg/kg	M	002-004,008,012-013,025-027,029,042,046-047,050
Lead	T6	M40	1	mg/kg	U	052
Mercury	T6	M40	1	mg/kg	M	002-004,008,012-013,025-027,029,042,046-047,050
Mercury	T6	M40	1	mg/kg	U	052
Nickel	T6	M40	1	mg/kg	M	002-004,008,012-013,025-027,029,042,046-047,050
Nickel	T6	M40	1	mg/kg	U	052
Selenium	T6	M40	3	mg/kg	M	002-004,008,012-013,025-027,029,042,046-047,050
Selenium	T6	M40	3	mg/kg	U	052
Zinc	T6	M40	1	mg/kg	M	002-004,008,012-013,025-027,029,042,046-047,050
Zinc	T6	M40	1	mg/kg	U	052
pH	T7	AR			M	002-004,008,012-013,025-027,029,042,046-047,050
pH	T7	AR			U	052
Total Organic Carbon	T21	M40	0.1	%	N	002-004,008,012-013,025-027,029,042,046-047,050,052
Asbestos ID	T27	AR			SU	004,014,017,022,027,038,047,053
(Water Soluble) SO4 expressed as SO4	T242	AR	0.01	g/l	N	002-003,048,050
Naphthalene	T207	M105	0.1	mg/kg	M	002-004,008-009,012-013,025-027,029,042-043,046-048,050
Naphthalene	T207	M105	0.1	mg/kg	U	052
Acenaphthylene	T207	M105	0.1	mg/kg	U	002-004,008-009,012-013,025-027,029,042-043,046-048,050,052
Acenaphthene	T207	M105	0.1	mg/kg	M	002-004,008-009,012-013,025-027,029,042-043,046-048,050
Acenaphthene	T207	M105	0.1	mg/kg	U	052
Fluorene	T207	M105	0.1	mg/kg	M	002-004,008-009,012-013,025-027,029,042-043,046-048,050
Fluorene	T207	M105	0.1	mg/kg	U	052
Phenanthrene	T207	M105	0.1	mg/kg	M	002-004,008-009,012-013,025-027,029,042-043,046-048,050
Phenanthrene	T207	M105	0.1	mg/kg	U	052
Anthracene	T207	M105	0.1	mg/kg	U	002-004,008-009,012-013,025-027,029,042-043,046-048,050,052
Fluoranthene	T207	M105	0.1	mg/kg	M	002-004,008-009,012-013,025-027,029,042-043,046-048,050
Fluoranthene	T207	M105	0.1	mg/kg	U	052
Pyrene	T207	M105	0.1	mg/kg	M	002-004,008-009,012-013,025-027,029,042-043,046-048,050
Pyrene	T207	M105	0.1	mg/kg	U	052
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	002-004,008-009,012-013,025-027,029,042-043,046-048,050
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	U	052
Chrysene	T207	M105	0.1	mg/kg	M	002-004,008-009,012-013,025-027,029,042-043,046-048,050
Chrysene	T207	M105	0.1	mg/kg	U	052
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	002-004,008,012-013,025-027,029,042,046-047,050
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	U	052
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	002-004,008,012-013,025-027,029,042,046-047,050
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	U	052
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	002-004,008-009,012-013,025-027,029,042-043,046-048,050
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	U	052
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	002-004,008-009,012-013,025-027,029,042-043,046-048,050
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	U	052
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	002-004,008-009,012-013,025-027,029,042-043,046-048,050
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	U	052
PAH(total)	T207	M105	0.1	mg/kg	U	002-004,008,012-013,025-027,029,042,046-047,050,052
Dibenzo(ah)Anthracene	T99	M105	0.10	mg/kg	M	002-004,008,012-013,025-027,029,042,046-047,050
Dibenzo(ah)Anthracene	T99	AR	0.10	mg/kg	U	052
Benzene	T209	M105	10	µg/kg	M	002,009,011-013,027,029-030,034-035,037,043,046,048,050
Benzene	T209	M105	10	µg/kg	U	052
Toluene	T209	M105	10	µg/kg	M	002,009,011-013,027,029-030,034-035,037,043,046,048,050
Toluene	T209	M105	10	µg/kg	U	052
EthylBenzene	T209	M105	10	µg/kg	M	002,009,011-013,027,029-030,034-035,037,043,046,048,050
EthylBenzene	T209	M105	10	µg/kg	U	052
M/P Xylene	T209	M105	10	µg/kg	M	002,009,011-013,027,029-030,034-035,037,043,046,048,050
M/P Xylene	T209	M105	10	µg/kg	U	052
O Xylene	T209	M105	10	µg/kg	M	002,009,011-013,027,029-030,034-035,037,043,046,048,050
O Xylene	T209	M105	10	µg/kg	U	052
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	M	002,009,011-013,027,029-030,034-035,037,043,046,048,050
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	U	052
Gasoline Range Organics	T54	M105	100	µg/kg	N	002,009,011-013,027,029-030,034-035,037,043,046,048,050,052
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	N	002,009,011-013,027,029-030,034-035,037,043,046,048,050,052
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	N	002,009,011-013,027,029-030,034-035,037,043,046,048,050,052
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	N	002,009,011-013,027,029-030,034-035,037,043,046,048,050,052
TPH (C10-C12 aliphatic)	T206	M105	1	mg/kg	N	002,009,011-013,027,029-030,034-035,037,043,046,048,050,052
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	M	002,009,011-013,027,029-030,034-035,037,043,046,048,050
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	U	052
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	M	002,009,011-013,027,029-030,034-035,037,043,046,048,050

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	U	052
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	M	002,009,011-013,027,029-030,034-035,037,043,046,048,050
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	U	052
TPH (C35-C44 aliphatic)	T8	M105	1	mg/kg	N	002,009,011-013,027,029-030,034-035,037,043,046,048,050,052
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	N	002,009,011-013,027,029-030,034-035,037,043,046,048,050,052
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	N	002,009,011-013,027,029-030,034-035,037,043,046,048,050,052
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	N	002,009,011-013,027,029-030,034-035,037,043,046,048,050,052
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	M	002,009,011-013,027,029-030,034-035,037,043,046,048,050
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	U	052
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	M	002,009,011-013,027,029-030,034-035,037,043,046,048,050
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	U	052
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	M	002,009,011-013,027,029-030,034-035,037,043,046,048,050
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	U	052
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	M	002,009,011-013,027,029-030,034-035,037,043,046,048,050
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	U	052
TPH (C35-C44 aromatic)	T8	M105	1	mg/kg	N	002,009,011-013,027,029-030,034-035,037,043,046,048,050,052
TPH (Aliphatic) total	T85	M105		mg/kg	N	002,009,011-013,027,029-030,034-035,037,043,046,048,050,052
TPH (Aromatic) total	T85	M105		mg/kg	N	002,009,011-013,027,029-030,034-035,037,043,046,048,050,052
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	N	002,009,011-013,027,029-030,034-035,037,043,046,048,050,052
PCB BZ#105	T1	AR	0.05	µg/kg	U	002,004,008,013,024,042-043,047,052
PCB BZ#114	T1	AR	0.05	µg/kg	U	002,004,008,013,024,042-043,047,052
PCB BZ#118	T1	AR	0.05	µg/kg	U	002,004,008,013,024,042-043,047,052
PCB BZ#123	T1	AR	0.05	µg/kg	U	002,004,008,013,024,042-043,047,052
PCB BZ#126	T1	AR	0.05	µg/kg	U	002,004,008,013,024,042-043,047,052
PCB BZ#156	T1	AR	0.05	µg/kg	U	002,004,008,013,024,042-043,047,052
PCB BZ#157	T1	AR	0.05	µg/kg	U	002,004,008,013,024,042-043,047,052
PCB BZ#167	T1	AR	0.05	µg/kg	U	002,004,008,013,024,042-043,047,052
PCB BZ#169	T1	AR	0.05	µg/kg	U	002,004,008,013,024,042-043,047,052
PCB BZ#189	T1	AR	0.05	µg/kg	U	002,004,008,013,024,042-043,047,052
PCB BZ#77	T1	AR	0.05	µg/kg	U	002,004,008,013,024,042-043,047,052
PCB BZ#81	T1	AR	0.05	µg/kg	U	002,004,008,013,024,042-043,047,052
1,2,4-Trichlorobenzene	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
1,2-Dichlorobenzene	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
1,3-Dichlorobenzene	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
1,4-Dichlorobenzene	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
2,4,5-Trichlorophenol	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050
2,4,6-Trichlorophenol	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050
2,4-Dichlorophenol	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050
2,4-Dimethylphenol	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050
2,4-Dinitrophenol	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050
2,4-Dinitrotoluene	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
2,6-Dinitrotoluene	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050
2-Chloronaphthalene	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
2-Chlorophenol	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
2-methyl phenol	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
2-Methylnaphthalene	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
2-Nitroaniline	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
2-Nitrophenol	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050
3-Nitroaniline	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050
3/4-Methylphenol	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
4-Bromophenyl phenylether	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
4-Chloro-3-methylphenol	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
4-Chloroaniline	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050
4-Chlorophenyl phenylether	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
4-Nitroaniline	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050
4-Nitrophenol	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050
Azobenzene	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
Bis (2-chloroethoxy) methane	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
Bis (2-chloroethyl) ether	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
Bis (2-chloroisopropyl) ether	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
Bis (2-ethylhexyl)phthalate	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
Butyl benzylphthalate	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050
Carbazole	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050
Di-n-butylphthalate	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
Di-n-octylphthalate	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
Dibenzofuran	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
Diethyl phthalate	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050
Dimethyl phthalate	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Hexachlorobenzene	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
Hexachlorobutadiene	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
Hexachlorocyclopentadiene	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050
Hexachloroethane	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050
Isophorone	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050
Nitrobenzene	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
Pentachlorophenol	T207	M105	0.1	mg/kg	U	009,012,043,046,048,050
Phenol	T207	M105	0.1	mg/kg	M	009,012,043,046,048,050
1,1,1,2-Tetrachloroethane	T209	M105	50	µg/kg	M	009,012,043,046,048,050
1,1,1-Trichloroethane	T209	M105	50	µg/kg	M	009,012,043,046,048,050
1,1,2,2-Tetrachloroethane	T209	M105	50	µg/kg	U	009,012,043,046,048,050
1,1,2-Trichloroethane	T209	M105	50	µg/kg	M	009,012,043,046,048,050
1,1-Dichloroethane	T209	M105	50	µg/kg	M	009,012,043,046,048,050
1,1-Dichloroethylene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
1,1-Dichloropropene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
1,2,3-Trichloropropane	T209	M105	50	µg/kg	U	009,012,043,046,048,050
1,2,4-Trimethylbenzene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
1,2-dibromoethane	T209	M105	50	µg/kg	M	009,012,043,046,048,050
1,2-Dichlorobenzene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
1,2-Dichloroethane	T209	M105	50	µg/kg	M	009,012,043,046,048,050
1,2-Dichloropropane	T209	M105	50	µg/kg	M	009,012,043,046,048,050
1,3,5-Trimethylbenzene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
1,3-Dichlorobenzene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
1,3-Dichloropropane	T209	M105	50	µg/kg	M	009,012,043,046,048,050
1,4-Dichlorobenzene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
2,2-Dichloropropane	T209	M105	50	µg/kg	U	009,012,043,046,048,050
2-Chlorotoluene	T209	M105	50	µg/kg	U	009,012,043,046,048,050
4-Chlorotoluene	T209	M105	50	µg/kg	U	009,012,043,046,048,050
Bromobenzene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Bromochloromethane	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Bromodichloromethane	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Bromoform	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Bromomethane	T209	M105	50	µg/kg	U	009,012,043,046,048,050
Carbon tetrachloride	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Chlorobenzene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Chlorodibromomethane	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Chloroethane	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Chloroform	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Chloromethane	T209	M105	50	µg/kg	U	009,012,043,046,048,050
Cis-1,2-Dichloroethylene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Cis-1,3-Dichloropropene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Dibromomethane	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Dichlorodifluoromethane	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Dichloromethane	T209	M105	50	µg/kg	U	009,012,043,046,048,050
Isopropyl benzene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
n-Propylbenzene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
p-Isopropyltoluene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
S-Butylbenzene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Styrene	T209	M105	50	µg/kg	U	009,012,043,046,048,050
T-Butylbenzene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Tetrachloroethene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Trans-1,2-Dichloroethene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Trans-1,3-Dichloropropene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Trichloroethene	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Trichlorofluoromethane	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Vinyl chloride	T209	M105	50	µg/kg	M	009,012,043,046,048,050
Moisture @ 105 C	T162	AR	0.1	%	N	002-004,008-009,011-013,025-027,029-030,034-035,037,042-043,046-048,050,052
Retained on 10mm sieve	T2	M40	0.1	%	N	002-004,008,012-013,025-027,029,042,046-047,050,052

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Manchester
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Scientific Analysis Laboratories Ltd

Certificate of Analysis

Report Number: 486260-1

Date of Report: 19-Jun-2015

Customer: Geodyne Ltd
Unit 2.2
Clarendon House
Clarendon Business Park
Nottingham
Nottinghamshire
NG5 1AH

Customer Contact: Mr Chris Paling

Customer Job Reference: 31149
Customer Site Reference: Shoreham
Date Job Received at SAL: 16-Jun-2015
Date Analysis Started: 17-Jun-2015
Date Analysis Completed: 19-Jun-2015

The results reported relate to samples received in the laboratory
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
Tests covered by this certificate were conducted in accordance with SAL SOPs
All results have been reviewed in accordance with Section 25 of the SAL Quality Manual

1549

Report checked and authorised by :
Mr Richard Wong
Project Manager

Issued by :
Mr Richard Wong
Project Manager

SAL Reference: 486260
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
MCERTS Preparation

SAL Reference	**486260 001**	**486260 002**
Customer Sample Reference	**TP1 T1**	**TP1 T2**
Depth	**1.70**	**2.00**
Date Sampled	**12-JUN-2015**	**12-JUN-2015**
Type	**Clay**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
Moisture @ 105 C	T162	AR	0.1	%	**15**	**35**

SAL Reference: 486260
Project Site: Shoreham
Customer Reference: 31149

Soil Analysed as Soil
Geodyne TPH (CWG)

SAL Reference	**486260 001**	**486260 002**
Customer Sample Reference	**TP1 T1**	**TP1 T2**
Depth	**1.70**	**2.00**
Date Sampled	**12-JUN-2015**	**12-JUN-2015**
Type	**Clay**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
Benzene	T209	M105	10	µg/kg	(13) <10	(13,100) <20
Toluene	T209	M105	10	µg/kg	<10	(100) <20
EthylBenzene	T209	M105	10	µg/kg	<10	(100) <20
M/P Xylene	T209	M105	10	µg/kg	<10	(100) <20
O Xylene	T209	M105	10	µg/kg	<10	(100) <20
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	(100) <20
Gasoline Range Organics	T54	M105	100	µg/kg	<100	**11000**
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100	(100) <0.200
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10	(100) <0.20
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	<0.10	**10**
TPH (C10-C12 aliphatic)	T206	M105	1	mg/kg	**6**	**69**
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	**130**	**560**
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	**150**	**490**
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	**36**	**150**
TPH (C35-C44 aliphatic)	T8	M105	1	mg/kg	<1	**6**
TPH (Aliphatic) total	T85	M105		mg/kg	**320**	**1300**
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	<0.10	(100) <0.20
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	<0.10	(100) <0.20
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	<0.10	(100) <0.20
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	<1	**8**
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	**32**	**250**
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	**74**	**420**
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	**20**	**150**
TPH (C35-C44 aromatic)	T8	M105	1	mg/kg	<1	**8**
TPH (Aromatic) total	T85	M105		mg/kg	**130**	**840**
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	**450**	**2100**

Index to symbols used in 486260-1

Value	Description
AR	As Received
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
100	LOD determined by sample aliquot used for analysis
13	Results have been blank corrected.
M	Analysis is MCERTS accredited
N	Analysis is not UKAS accredited

Method Index

Value	Description
T85	Calc
T209	GC/MS(Head Space)(MCERTS)
T8	GC/FID
T54	GC/MS (Headspace)
T162	Grav (1 Dec) (105 C)
T206	GC/FID (MCERTS)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Benzene	T209	M105	10	µg/kg	M	001-002
Toluene	T209	M105	10	µg/kg	M	001-002
EthylBenzene	T209	M105	10	µg/kg	M	001-002
M/P Xylene	T209	M105	10	µg/kg	M	001-002
O Xylene	T209	M105	10	µg/kg	M	001-002
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	M	001-002
Gasoline Range Organics	T54	M105	100	µg/kg	N	001-002
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	N	001-002
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	N	001-002
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	N	001-002
TPH (C10-C12 aliphatic)	T206	M105	1	mg/kg	N	001-002
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	M	001-002
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	M	001-002
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	M	001-002
TPH (C35-C44 aliphatic)	T8	M105	1	mg/kg	N	001-002
TPH (Aliphatic) total	T85	M105		mg/kg	N	001-002
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	N	001-002
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	N	001-002
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	N	001-002
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	M	001-002
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	M	001-002
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	M	001-002
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	M	001-002
TPH (C35-C44 aromatic)	T8	M105	1	mg/kg	N	001-002
TPH (Aromatic) total	T85	M105		mg/kg	N	001-002
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	N	001-002
Moisture @ 105 C	T162	AR	0.1	%	N	001-002

GeoDyne

2015 Water Test Results

Hadfield House
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Scientific Analysis Laboratories Ltd

Certificate of Analysis

Report Number: 481137-1

Date of Report: 03-Jun-2015

Customer: Geodyne Ltd
The Granary
Church Lane
Thrumpton
Nottinghamshire
NG11 0AX

Customer Contact: Mr Chris Paling

Customer Job Reference: 31149
Customer Site Reference: Shoreham
Date Job Received at SAL: 22-May-2015
Date Analysis Started: 29-May-2015
Date Analysis Completed: 03-Jun-2015

The results reported relate to samples received in the laboratory
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
Tests covered by this certificate were conducted in accordance with SAL SOPs
All results have been reviewed in accordance with Section 25 of the SAL Quality Manual

UKAS TESTING
1549

Report checked
and authorised by :
Ross Walker
Sales Support Manager

Issued by :
Ross Walker
Sales Support Manager

SAL Reference: 481137
Project Site: Shoreham
Customer Reference: 31149

Water Analysed as Water
Geodyne Suite 2

				SAL Reference	**481137 001**	**481137 002**	**481137 003**	**481137 004**	**481137 005**
				Customer Sample Reference	**WS10**	**WS15**	**WS17**	**BH1**	**BH2B**
				Date Sampled	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
As (Dissolved)	T281	AR	0.2	µg/l	**35**	**74**	**8.2**	**9.0**	**36**
Cd (Dissolved)	T281	AR	0.02	µg/l	**0.87**	**0.37**	**0.15**	**0.19**	**0.30**
Cr (Dissolved)	T281	AR	1	µg/l	**1**	**1**	<1	<1	<1
Chromium VI	T686	AR	3	µg/l	**14**	**13**	**14**	**14**	**14**
Cu (Dissolved)	T281	AR	0.5	µg/l	**21**	**53**	**4.5**	**6.0**	**25**
Pb (Dissolved)	T281	AR	0.3	µg/l	<0.3	<0.3	<0.3	<0.3	<0.3
Hg (Dissolved)	T281	AR	0.05	µg/l	<0.05	<0.05	<0.05	<0.05	<0.05
Ni (Dissolved)	T281	AR	1	µg/l	**21**	**12**	**9**	**2**	**7**
Se (Dissolved)	T281	AR	0.5	µg/l	**72**	**140**	**2.7**	**16**	**71**
Zn (Dissolved)	T281	AR	2	µg/l	**28**	**26**	**24**	**24**	**24**
pH	T7	AR			**6.9**	**7.8**	**6.9**	**7.3**	**7.2**
Total Organic Carbon	T21	AR	1	mg/l	**70**	**5**	**35**	**1**	**1**

SAL Reference: 481137
Project Site: Shoreham
Customer Reference: 31149

Water Analysed as Water
PAH US EPA 16 (B and K split)

				SAL Reference	**481137 001**	**481137 002**	**481137 003**	**481137 004**	**481137 005**
				Customer Sample Reference	**WS10**	**WS15**	**WS17**	**BH1**	**BH2B**
				Date Sampled	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
Naphthalene	T149	AR	0.01	µg/l	**0.09**	<0.01	**0.09**	<0.01	**0.02**
Acenaphthylene	T149	AR	0.01	µg/l	**0.13**	<0.01	**0.13**	<0.01	<0.01
Acenaphthene	T149	AR	0.01	µg/l	**0.05**	<0.01	**0.20**	<0.01	**0.02**
Fluorene	T149	AR	0.01	µg/l	**0.09**	<0.01	**0.08**	<0.01	**0.03**
Phenanthrene	T149	AR	0.01	µg/l	**0.58**	<0.01	**0.22**	<0.01	**0.07**
Anthracene	T149	AR	0.01	µg/l	**0.29**	<0.01	**0.15**	<0.01	**0.01**
Fluoranthene	T149	AR	0.01	µg/l	**2.0**	<0.01	**1.3**	<0.01	<0.01
Pyrene	T149	AR	0.01	µg/l	**1.7**	<0.01	**1.1**	<0.01	<0.01
Benzo(a)Anthracene	T149	AR	0.01	µg/l	**0.99**	<0.01	**0.55**	<0.01	<0.01
Chrysene	T149	AR	0.01	µg/l	**0.99**	<0.01	**0.60**	<0.01	<0.01
Benzo(b)fluoranthene	T149	AR	0.01	µg/l	**1.8**	<0.01	**1.1**	<0.01	<0.01
Benzo(k)fluoranthene	T149	AR	0.01	µg/l	**0.59**	<0.01	**0.37**	<0.01	<0.01
Benzo(a)Pyrene	T149	AR	0.01	µg/l	**1.2**	<0.01	**0.65**	<0.01	<0.01
Indeno(123-cd)Pyrene	T149	AR	0.01	µg/l	**0.79**	<0.01	**0.51**	<0.01	<0.01
Dibenzo(ah)Anthracene	T149	AR	0.01	µg/l	**0.21**	<0.01	**0.13**	<0.01	<0.01
Benzo(ghi)Perylene	T149	AR	0.01	µg/l	**0.89**	<0.01	**0.56**	<0.01	<0.01
PAH(total)	T149	AR	0.01	µg/l	**12**	<0.01	**7.7**	<0.01	**0.14**

SAL Reference: 481137
Project Site: Shoreham
Customer Reference: 31149

Water Analysed as Water
BTEX GRO MTBE

	SAL Reference	481137 001	481137 002	481137 003	481137 004	481137 005
	Customer Sample Reference	WS10	WS15	WS17	BH1	BH2B
	Date Sampled	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015
Determinand	**Method** / **Test Sample** / **LOD** / **Units**					
Benzene	T54 / AR / 1 / µg/l	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1
EthylBenzene	T54 / AR / 1 / µg/l	<1	<1	<1	<1	<1
M/P Xylene	T54 / AR / 1 / µg/l	<1	<1	<1	<1	<1
Methyl tert-Butyl Ether	T54 / AR / 1 / µg/l	<1	<1	<1	<1	<1
O Xylene	T54 / AR / 1 / µg/l	<1	<1	<1	<1	<1
Toluene	T54 / AR / 1 / µg/l	<1	<1	<1	<1	<1
TPH (C6-C10)	T215 / AR / 10 / µg/l	<10	<10	<10	<10	<10

SAL Reference: 481137
Project Site: Shoreham
Customer Reference: 31149

Water Analysed as Water
Total Petroleum Hydrocarbons (C6-C35 aliphatic/aromatic)

	SAL Reference	481137 001	481137 002	481137 003	481137 004	481137 005
	Customer Sample Reference	WS10	WS15	WS17	BH1	BH2B
	Date Sampled	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015
Determinand	**Method** / **Test Sample** / **LOD** / **Units**					
TPH (C5-C6 aliphatic)	T215 / AR / 10 / µg/l	<10	<10	<10	<10	<10
TPH (C6-C8 aliphatic)	T215 / AR / 0.010 / mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C8-C10 aliphatic)	T215 / AR / 0.010 / mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
TPH DW(C10-C12 aliphatic)	T81 / AR / 0.01 / mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
TPH DW(C12-C16 aliphatic)	T81 / AR / 0.01 / mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
TPH DW(C16-C21 aliphatic)	T81 / AR / 0.01 / mg/l	<0.01	<0.01	**0.05**	**0.01**	<0.01
TPH DW(C21-C35 aliphatic)	T81 / AR / 0.01 / mg/l	**0.03**	<0.01	**0.18**	**0.02**	<0.01
TPH (C35-C44 aliphatic)	T81 / AR / 0.01 / mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
TPH (Aliphatic) total	T85 / AR / / mg/l	**0.03**	N.D.	**0.23**	**0.03**	N.D.
TPH (C6-C7 aromatic)	T215 / AR / 0.010 / mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C7-C8 aromatic)	T215 / AR / 0.010 / mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
TPH (C8-C10 aromatic)	T215 / AR / 0.010 / mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
TPH DW(C10-C12 aromatic)	T81 / AR / 0.01 / mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
TPH DW(C12-C16 aromatic)	T81 / AR / 0.01 / mg/l	**0.01**	<0.01	**0.03**	<0.01	<0.01
TPH DW(C16-C21 aromatic)	T81 / AR / 0.01 / mg/l	**0.11**	<0.01	**0.03**	<0.01	<0.01
TPH DW(C21-C35 aromatic)	T81 / AR / 0.01 / mg/l	**0.32**	<0.01	**0.06**	<0.01	<0.01
TPH (C35-C44 aromatic)	T81 / AR / 0.01 / mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
TPH (Aromatic) total	T85 / AR / / mg/l	**0.44**	N.D.	**0.12**	N.D.	N.D.
TPH (Aliphatic+Aromatic) (sum)	T85 / AR / / mg/l	**0.47**	N.D.	**0.35**	**0.03**	N.D.

SAL Reference: 481137
Project Site: Shoreham
Customer Reference: 31149

Water Analysed as Water
Semi-Volatile Organic Compounds (USEPA 625)

					SAL Reference	481137 001	481137 002	481137 003	481137 004	481137 005
					Customer Sample Reference	WS10	WS15	WS17	BH1	BH2B
					Date Sampled	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015	19-MAY-2015
Determinand	**Method**	**Test Sample**	**LOD**	**Units**						
1,2,4-Trichlorobenzene	T16	AR	10	µg/l		(36) <50	(36) <50	(36) <50	(36) <50	(36) <50
1,2-Dichlorobenzene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
1,3-Dichlorobenzene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
1,4-Dichlorobenzene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2,4,5-Trichlorophenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2,4,6-Trichlorophenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2,4-Dichlorophenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2,4-Dimethylphenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2,4-Dinitrophenol	T16	AR	10	µg/l		(36) <50	(36) <50	(36) <50	(36) <50	(36) <50
2,4-Dinitrotoluene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2,6-Dinitrotoluene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2-Chloronaphthalene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2-Chlorophenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2-methyl phenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2-Methylnaphthalene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2-Nitroaniline	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2-Nitrophenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
3-Nitroaniline	T16	AR	10	µg/l		<10	<10	<10	<10	<10
3/4-Methylphenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
4-Bromophenyl phenylether	T16	AR	10	µg/l		<10	<10	<10	<10	<10
4-Chloro-3-methylphenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
4-Chloroaniline	T16	AR	10	µg/l		<10	<10	<10	<10	<10
4-Chlorophenyl phenylether	T16	AR	10	µg/l		<10	<10	<10	<10	<10
4-Nitroaniline	T16	AR	10	µg/l		<10	<10	<10	<10	<10
4-Nitrophenol	T16	AR	10	µg/l		(36) <50	(36) <50	(36) <50	(36) <50	(36) <50
Acenaphthene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Acenaphthylene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Anthracene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Azobenzene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Benzo(a)Anthracene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Benzo(a)Pyrene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Benzo(b/k)Fluoranthene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Benzo(ghi)Perylene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Bis (2-chloroethoxy) methane	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Bis (2-chloroethyl) ether	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Bis (2-chloroisopropyl) ether	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Bis (2-ethylhexyl)phthalate	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Butyl benzylphthalate	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Carbazole	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Chrysene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Di-n-butylphthalate	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Di-n-octylphthalate	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Dibenzo(ah)Anthracene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Dibenzofuran	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Diethyl phthalate	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Dimethyl phthalate	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Fluoranthene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Fluorene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Hexachlorobenzene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Hexachlorobutadiene	T16	AR	10	µg/l		(36) <50	(36) <50	(36) <50	(36) <50	(36) <50
Hexachlorocyclopentadiene	T16	AR	10	µg/l		(36) <50	(36) <50	(36) <50	(36) <50	(36) <50
Hexachloroethane	T16	AR	10	µg/l		(36) <50	(36) <50	(36) <50	(36) <50	(36) <50
Indeno(123-cd)Pyrene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Isophorone	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Naphthalene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Nitrobenzene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Pentachlorophenol	T16	AR	10	µg/l		(36) <50	(36) <50	(36) <50	(36) <50	(36) <50
Phenanthrene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Phenol	T16	AR	10	µg/l		**21**	**18**	<10	<10	<10
Pyrene	T16	AR	10	µg/l		<10	<10	<10	<10	<10

SAL Reference: 481137
Project Site: Shoreham
Customer Reference: 31149

Water Analysed as Water
Volatile Organic Compounds (USEPA 624)

				SAL Reference	**481137 001**	**481137 002**	**481137 003**	**481137 004**	**481137 005**
				Customer Sample Reference	**WS10**	**WS15**	**WS17**	**BH1**	**BH2B**
				Date Sampled	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**	**19-MAY-2015**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**					
1,1,1,2-Tetrachloroethane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
1,1,2-Trichloroethane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
1,1,2-Trichloroethylene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
1,1-Dichloroethane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
1,1-Dichloroethylene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
1,1-Dichloropropene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
1,2,3-Trichloropropane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
1,2-dibromoethane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
1,2-Dichloroethane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
1,2-Dichloropropane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
1,3-Dichlorobenzene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
1,3-Dichloropropane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
2,2-Dichloropropane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
2-Chlorotoluene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
4-Chlorotoluene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Benzene	T54	AR	1	µg/l	(13) <1	(13) <1	(13) <1	(13) <1	(13) <1
Bromobenzene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Bromochloromethane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Bromodichloromethane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Bromoform	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Bromomethane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Carbon tetrachloride	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Chlorobenzene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Chlorodibromomethane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Chloroethane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Chloroform	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Chloromethane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Cis-1,2-Dichloroethylene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Cis-1,3-Dichloropropene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Dibromomethane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Dichlorodifluoromethane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Dichloromethane	T54	AR	50	µg/l	<50	<50	<50	<50	<50
EthylBenzene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Isopropyl benzene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
M/P Xylene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
n-Propylbenzene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
O Xylene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
p-Isopropyltoluene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
S-Butylbenzene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Styrene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
T-Butylbenzene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Tetrachloroethene	T54	AR	1	µg/l	<1	<1	<1	**10**	<1
Toluene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Trans-1,2-Dichloroethene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Trans-1,3-Dichloropropene	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Trichlorofluoromethane	T54	AR	1	µg/l	<1	<1	<1	<1	<1
Vinyl chloride	T54	AR	1	µg/l	<1	<1	<1	<1	<1

Index to symbols used in 481137-1

Value	Description
AR	As Received
N.D.	Not Detected
13	Results have been blank corrected.
36	LOD Raised due to low Matrix spike recovery
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Method Index

Value	Description
T21	OX/IR
T149	GC/MS (SIR)
T81	GC/FID (LV)
T85	Calc
T215	GC/MS (Headspace)(LV)
T281	ICP/MS (Filtered)
T16	GC/MS
T686	Discrete Analyser
T54	GC/MS (Headspace)
T7	Probe

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
As (Dissolved)	T281	AR	0.2	µg/l	U	001-005
Cd (Dissolved)	T281	AR	0.02	µg/l	U	001-005
Cr (Dissolved)	T281	AR	1	µg/l	U	001-005
Chromium VI	T686	AR	3	µg/l	U	001-005
Cu (Dissolved)	T281	AR	0.5	µg/l	U	001-005
Pb (Dissolved)	T281	AR	0.3	µg/l	U	001-005
Hg (Dissolved)	T281	AR	0.05	µg/l	U	001-005
Ni (Dissolved)	T281	AR	1	µg/l	U	001-005
Se (Dissolved)	T281	AR	0.5	µg/l	U	001-005
Zn (Dissolved)	T281	AR	2	µg/l	U	001-005
pH	T7	AR			U	001-005
Total Organic Carbon	T21	AR	1	mg/l	U	001-005
Naphthalene	T149	AR	0.01	µg/l	U	001-005
Acenaphthylene	T149	AR	0.01	µg/l	U	001-005
Acenaphthene	T149	AR	0.01	µg/l	U	001-005
Fluorene	T149	AR	0.01	µg/l	U	001-005
Phenanthrene	T149	AR	0.01	µg/l	U	001-005
Anthracene	T149	AR	0.01	µg/l	U	001-005
Fluoranthene	T149	AR	0.01	µg/l	U	001-005
Pyrene	T149	AR	0.01	µg/l	U	001-005
Benzo(a)Anthracene	T149	AR	0.01	µg/l	U	001-005
Chrysene	T149	AR	0.01	µg/l	U	001-005
Benzo(b)fluoranthene	T149	AR	0.01	µg/l	U	001-005
Benzo(k)fluoranthene	T149	AR	0.01	µg/l	U	001-005
Benzo(a)Pyrene	T149	AR	0.01	µg/l	U	001-005
Indeno(123-cd)Pyrene	T149	AR	0.01	µg/l	U	001-005
Dibenzo(ah)Anthracene	T149	AR	0.01	µg/l	U	001-005
Benzo(ghi)Perylene	T149	AR	0.01	µg/l	U	001-005
PAH(total)	T149	AR	0.01	µg/l	U	001-005
Benzene	T54	AR	1	µg/l	U	001-005
M/P Xylene	T54	AR	1	µg/l	U	001-005
Methyl tert-Butyl Ether	T54	AR	1	µg/l	U	001-005
TPH (C6-C10)	T215	AR	10	µg/l	N	001-005
TPH (C5-C6 aliphatic)	T215	AR	10	µg/l	N	001-005
TPH (C6-C8 aliphatic)	T215	AR	0.010	mg/l	N	001-005
TPH (C8-C10 aliphatic)	T215	AR	0.010	mg/l	N	001-005
TPH DW(C10-C12 aliphatic)	T81	AR	0.01	mg/l	N	001-005
TPH DW(C12-C16 aliphatic)	T81	AR	0.01	mg/l	N	001-005
TPH DW(C16-C21 aliphatic)	T81	AR	0.01	mg/l	N	001-005
TPH DW(C21-C35 aliphatic)	T81	AR	0.01	mg/l	N	001-005
TPH (C35-C44 aliphatic)	T81	AR	0.01	mg/l	N	001-005
TPH (Aliphatic) total	T85	AR		mg/l	N	001-005
TPH (C6-C7 aromatic)	T215	AR	0.010	mg/l	N	001-005
TPH (C7-C8 aromatic)	T215	AR	0.010	mg/l	N	001-005

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
TPH (C8-C10 aromatic)	T215	AR	0.010	mg/l	N	001-005
TPH DW(C10-C12 aromatic)	T81	AR	0.01	mg/l	N	001-005
TPH DW(C12-C16 aromatic)	T81	AR	0.01	mg/l	N	001-005
TPH DW(C16-C21 aromatic)	T81	AR	0.01	mg/l	N	001-005
TPH DW(C21-C35 aromatic)	T81	AR	0.01	mg/l	N	001-005
TPH (C35-C44 aromatic)	T81	AR	0.01	mg/l	N	001-005
TPH (Aromatic) total	T85	AR		mg/l	N	001-005
TPH (Aliphatic+Aromatic) (sum)	T85	AR		mg/l	N	001-005
1,2,4-Trichlorobenzene	T16	AR	10	µg/l	U	001-005
1,2-Dichlorobenzene	T16	AR	10	µg/l	U	001-005
1,3-Dichlorobenzene	T16	AR	10	µg/l	U	001-005
1,4-Dichlorobenzene	T16	AR	10	µg/l	U	001-005
2,4,5-Trichlorophenol	T16	AR	10	µg/l	U	001-005
2,4,6-Trichlorophenol	T16	AR	10	µg/l	U	001-005
2,4-Dichlorophenol	T16	AR	10	µg/l	U	001-005
2,4-Dimethylphenol	T16	AR	10	µg/l	U	001-005
2,4-Dinitrophenol	T16	AR	10	µg/l	U	001-005
2,4-Dinitrotoluene	T16	AR	10	µg/l	U	001-005
2,6-Dinitrotoluene	T16	AR	10	µg/l	U	001-005
2-Chloronaphthalene	T16	AR	10	µg/l	U	001-005
2-Chlorophenol	T16	AR	10	µg/l	U	001-005
2-methyl phenol	T16	AR	10	µg/l	U	001-005
2-Methylnaphthalene	T16	AR	10	µg/l	U	001-005
2-Nitroaniline	T16	AR	10	µg/l	U	001-005
2-Nitrophenol	T16	AR	10	µg/l	U	001-005
3-Nitroaniline	T16	AR	10	µg/l	U	001-005
3/4-Methylphenol	T16	AR	10	µg/l	U	001-005
4-Bromophenyl phenylether	T16	AR	10	µg/l	U	001-005
4-Chloro-3-methylphenol	T16	AR	10	µg/l	U	001-005
4-Chloroaniline	T16	AR	10	µg/l	U	001-005
4-Chlorophenyl phenylether	T16	AR	10	µg/l	U	001-005
4-Nitroaniline	T16	AR	10	µg/l	U	001-005
4-Nitrophenol	T16	AR	10	µg/l	U	001-005
Acenaphthene	T16	AR	10	µg/l	U	001-005
Acenaphthylene	T16	AR	10	µg/l	U	001-005
Anthracene	T16	AR	10	µg/l	U	001-005
Azobenzene	T16	AR	10	µg/l	U	001-005
Benzo(a)Anthracene	T16	AR	10	µg/l	U	001-005
Benzo(a)Pyrene	T16	AR	10	µg/l	U	001-005
Benzo(b/k)Fluoranthene	T16	AR	10	µg/l	U	001-005
Benzo(ghi)Perylene	T16	AR	10	µg/l	U	001-005
Bis (2-chloroethoxy) methane	T16	AR	10	µg/l	U	001-005
Bis (2-chloroethyl) ether	T16	AR	10	µg/l	U	001-005
Bis (2-chloroisopropyl) ether	T16	AR	10	µg/l	U	001-005
Bis (2-ethylhexyl)phthalate	T16	AR	10	µg/l	U	001-005
Butyl benzylphthalate	T16	AR	10	µg/l	U	001-005
Carbazole	T16	AR	10	µg/l	U	001-005
Chrysene	T16	AR	10	µg/l	U	001-005
Di-n-butylphthalate	T16	AR	10	µg/l	U	001-005
Di-n-octylphthalate	T16	AR	10	µg/l	U	001-005
Dibenzo(ah)Anthracene	T16	AR	10	µg/l	U	001-005
Dibenzofuran	T16	AR	10	µg/l	U	001-005
Diethyl phthalate	T16	AR	10	µg/l	U	001-005
Dimethyl phthalate	T16	AR	10	µg/l	U	001-005
Fluoranthene	T16	AR	10	µg/l	U	001-005
Fluorene	T16	AR	10	µg/l	U	001-005
Hexachlorobenzene	T16	AR	10	µg/l	U	001-005
Hexachlorobutadiene	T16	AR	10	µg/l	U	001-005
Hexachlorocyclopentadiene	T16	AR	10	µg/l	U	001-005
Hexachloroethane	T16	AR	10	µg/l	U	001-005
Indeno(123-cd)Pyrene	T16	AR	10	µg/l	U	001-005
Isophorone	T16	AR	10	µg/l	U	001-005
Naphthalene	T16	AR	10	µg/l	U	001-005
Nitrobenzene	T16	AR	10	µg/l	U	001-005
Pentachlorophenol	T16	AR	10	µg/l	U	001-005
Phenanthrene	T16	AR	10	µg/l	U	001-005
Phenol	T16	AR	10	µg/l	U	001-005
Pyrene	T16	AR	10	µg/l	U	001-005
1,1,1,2-Tetrachloroethane	T54	AR	1	µg/l	U	001-005
1,1,1-Trichloroethane	T54	AR	1	µg/l	U	001-005

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
1,1,2,2-Tetrachloroethane	T54	AR	1	µg/l	U	001-005
1,1,2-Trichloroethane	T54	AR	1	µg/l	U	001-005
1,1,2-Trichloroethylene	T54	AR	1	µg/l	U	001-005
1,1-Dichloroethane	T54	AR	1	µg/l	U	001-005
1,1-Dichloroethylene	T54	AR	1	µg/l	U	001-005
1,1-Dichloropropene	T54	AR	1	µg/l	U	001-005
1,2,3-Trichloropropane	T54	AR	1	µg/l	U	001-005
1,2,4-Trimethylbenzene	T54	AR	1	µg/l	U	001-005
1,2-dibromoethane	T54	AR	1	µg/l	U	001-005
1,2-Dichlorobenzene	T54	AR	1	µg/l	U	001-005
1,2-Dichloroethane	T54	AR	1	µg/l	U	001-005
1,2-Dichloropropane	T54	AR	1	µg/l	U	001-005
1,3,5-Trimethylbenzene	T54	AR	1	µg/l	U	001-005
1,3-Dichlorobenzene	T54	AR	1	µg/l	U	001-005
1,3-Dichloropropane	T54	AR	1	µg/l	U	001-005
1,4-Dichlorobenzene	T54	AR	1	µg/l	U	001-005
2,2-Dichloropropane	T54	AR	1	µg/l	U	001-005
2-Chlorotoluene	T54	AR	1	µg/l	U	001-005
4-Chlorotoluene	T54	AR	1	µg/l	U	001-005
Bromobenzene	T54	AR	1	µg/l	U	001-005
Bromochloromethane	T54	AR	1	µg/l	U	001-005
Bromodichloromethane	T54	AR	1	µg/l	U	001-005
Bromoform	T54	AR	1	µg/l	U	001-005
Bromomethane	T54	AR	1	µg/l	U	001-005
Carbon tetrachloride	T54	AR	1	µg/l	U	001-005
Chlorobenzene	T54	AR	1	µg/l	U	001-005
Chlorodibromomethane	T54	AR	1	µg/l	U	001-005
Chloroethane	T54	AR	1	µg/l	U	001-005
Chloroform	T54	AR	1	µg/l	U	001-005
Chloromethane	T54	AR	1	µg/l	U	001-005
Cis-1,2-Dichloroethylene	T54	AR	1	µg/l	U	001-005
Cis-1,3-Dichloropropene	T54	AR	1	µg/l	U	001-005
Dibromomethane	T54	AR	1	µg/l	U	001-005
Dichlorodifluoromethane	T54	AR	1	µg/l	U	001-005
Dichloromethane	T54	AR	50	µg/l	N	001-005
EthylBenzene	T54	AR	1	µg/l	U	001-005
Isopropyl benzene	T54	AR	1	µg/l	U	001-005
n-Propylbenzene	T54	AR	1	µg/l	U	001-005
O Xylene	T54	AR	1	µg/l	U	001-005
p-Isopropyltoluene	T54	AR	1	µg/l	U	001-005
S-Butylbenzene	T54	AR	1	µg/l	U	001-005
Styrene	T54	AR	1	µg/l	U	001-005
T-Butylbenzene	T54	AR	1	µg/l	U	001-005
Tetrachloroethene	T54	AR	1	µg/l	U	001-005
Toluene	T54	AR	1	µg/l	U	001-005
Trans-1,2-Dichloroethene	T54	AR	1	µg/l	U	001-005
Trans-1,3-Dichloropropene	T54	AR	1	µg/l	U	001-005
Trichlorofluoromethane	T54	AR	1	µg/l	U	001-005
Vinyl chloride	T54	AR	1	µg/l	U	001-005

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APPENDIX VIII

Plates

GeoDyne

Site Views and Views of Obstructions Encountered

Project No.	31149	Title	Trench E showing concrete obstruction	Drawn	CJP
Client	The Newbridge Group/Southern Housing Group			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	23/06/2015	Approved	RS
		Scale	NTS	Plate SO1	
		Revision			

GeoDyne

Project No.	31149	Drawn	CJP
Client	The Newbridge Group/Southern Housing Group	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	23/06/2015
Title	Trench C with view of buried slabs and mooring block obstruction	Rev.	
		Plate S02	

GeoDyne

Project No.	31149	Drawn	CJP
Client	The Newbridge Group/Southern Housing Group	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	23/06/2015
Title	UST adjacent to the former packing shed (note abcence of staining below the UST supports)	Rev.	
		Plate S03	

GeoDyne

Project No.	31149	Title	UST at the western extent of the packing shed.	Drawn	CJP
Client	The Newbribge Group/Southern Housing Group			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	23/06/2015	Approved	RS
		Scale	NTS	Plate S04	
		Revision			

GeoDyne

Project No.	31149	Drawn	CJP
Client	The Newbridge Group/Southern Housing Group	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	23/06/2015
Title	Location of former UST's south of the packing shed.	Rev.	
		Plate S05	

GeoDyne

Project No.	31149	Drawn	CJP
Client	The Newbridge Group/Southern Housing Group	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	23/06/2015
Title	Views of ACM's on and within the packing shed.	Rev.	
		Plate S06	

GeoDyne

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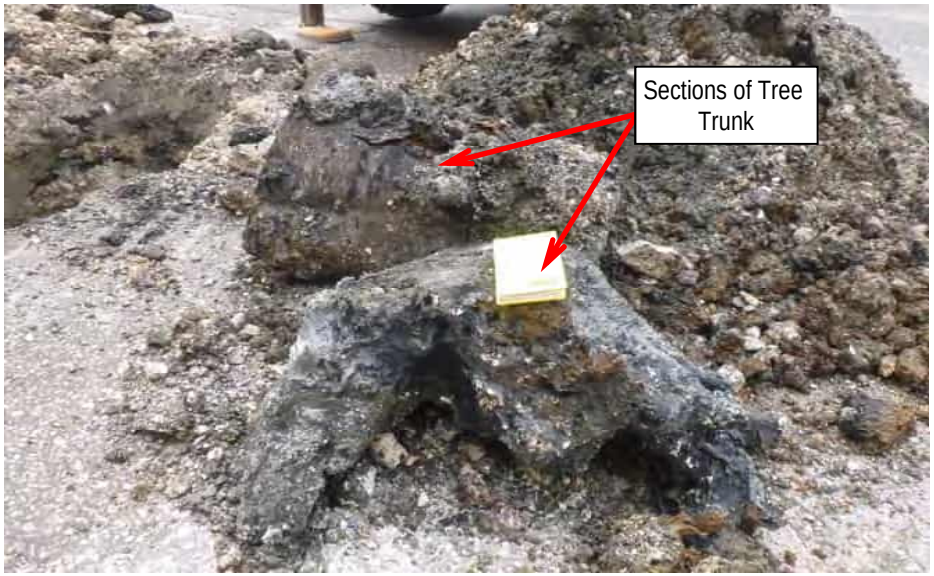
Exploratory Works

Oil



Project No.	31149	Title	Views of Trial Pit 1 Showing Hydrocarbon Impaction and Tree Trunks Removed from Excavation	Drawn	CJP
Client	The Newbribge Group/Southern Housing Group			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	23/06/2015	Approved	RS
		Scale	NTS	Plate S07	
		Revision			

GeoDyne

Project No.	31149	Drawn	CJP
Client	The Newbridge Group/Southern Housing Group	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	23/06/2015
Title	Views of Borehole WS21	Rev.	
		Plate S08	

GeoDyne

Project No.	31149	Drawn	CJP
Client	The Newbridge Group/Southern Housing Group	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	23/06/2015
Title	Views of Borehole WS22	Rev.	
		Plate S09	

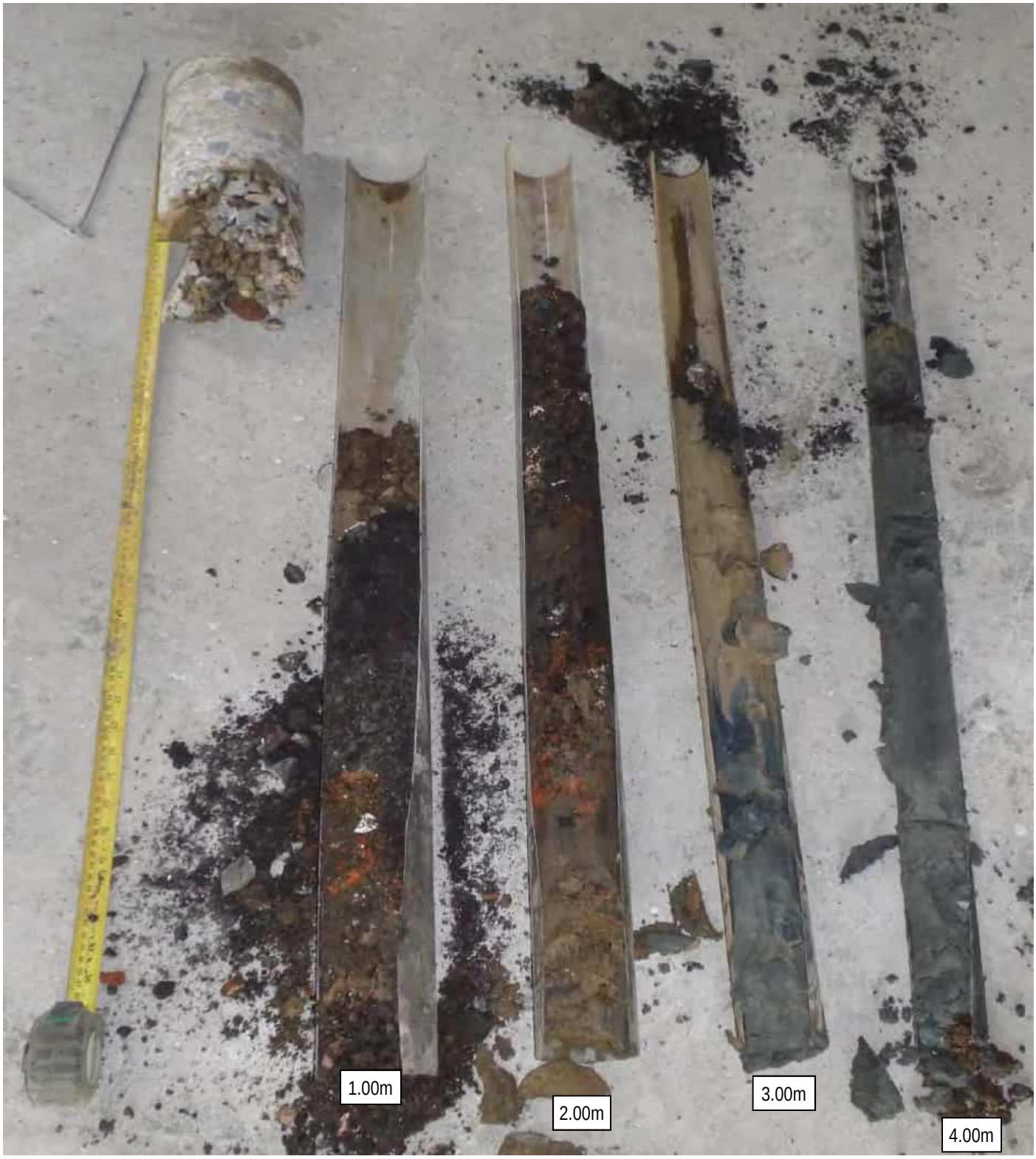
GeoDyne

Project No.	31149	Drawn	CJP
Client	The Newbridge Group/Southern Housing Group	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	23/06/2015
Title	Views of Borehole WS24 and WS25	Rev.	
		Plate S10	

GeoDyne

Project No.	31149	Drawn	CJP
Client	The Newbridge Group/Southern Housing Group	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	23/06/2015
Title	Views of Borehole WS27	Rev.	
		Plate S11	

GeoDyne

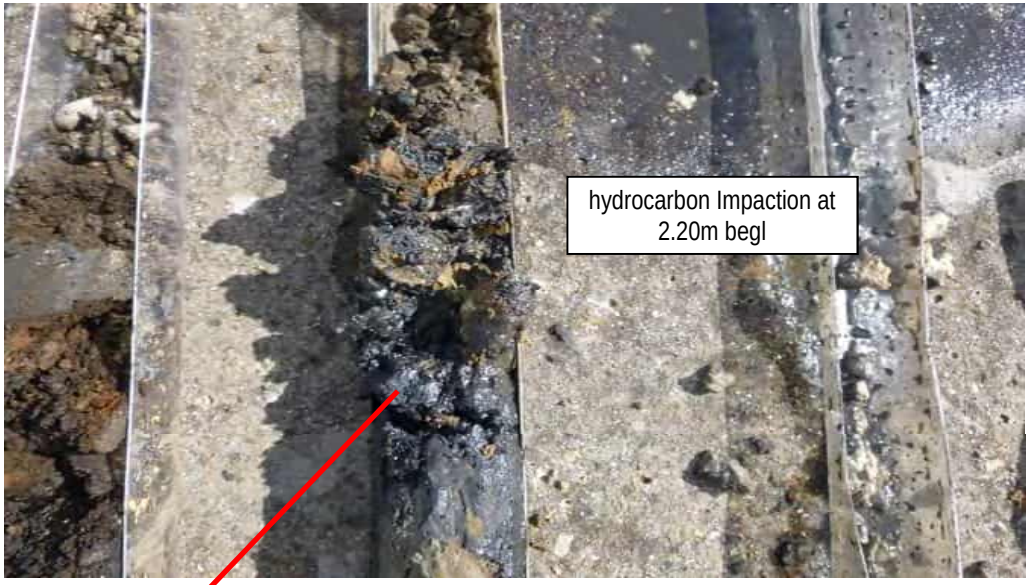


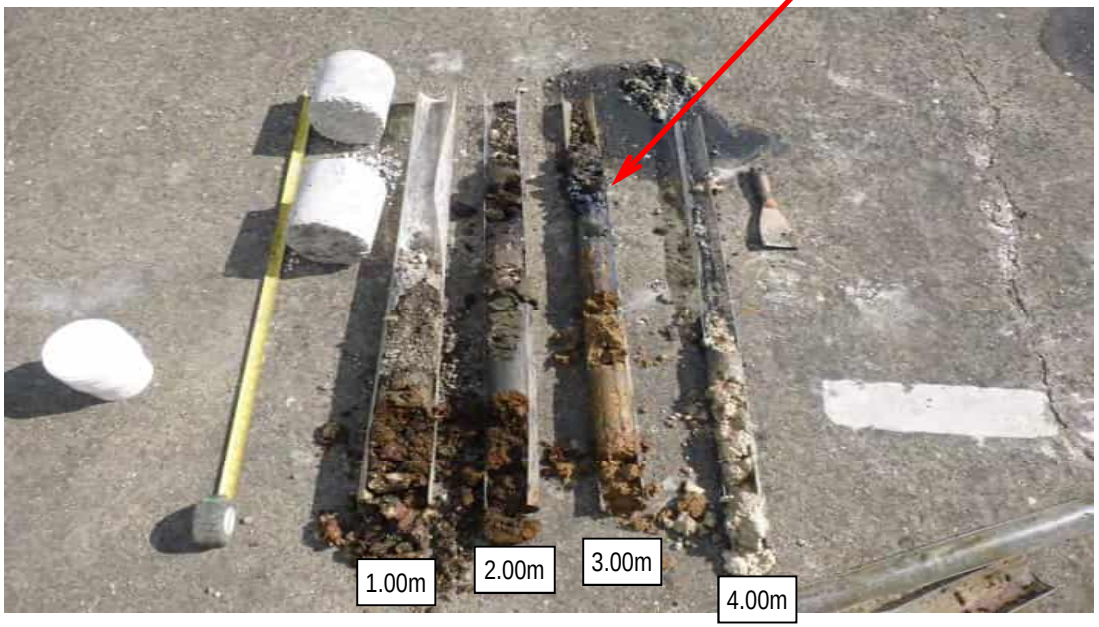
Project No.	31149	Drawn	CJP
Client	The Newbridge Group/Southern Housing Group	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	23/06/2015
Title	View of Borehole WS29	Rev.	
		Plate S12	

GeoDyne

Project No.	31149	Title	View of Borehole WS31	Drawn	CJP
Client	The Newbribge Group/Southern Housing Group			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	23/06/2015	Approved	RS
		Scale	NTS	Plate S13	
		Revision			

GeoDyne





Project No.	31149	Title	Views of Borehole WS33	Drawn	CJP
Client	The Newbribge Group/Southern Housing Group			Checked	RS
Project	Brighton Road, Shoreham	Date Drawn	23/06/2015	Approved	RS
		Scale	NTS	Plate S14	
		Revision			

GeoDyne

Project No.	31149	Drawn	CJP
Client	The Newbridge Group/Southern Housing Group	Checked	RS
		Approved	RS
Project	Brighton Road, Shoreham	Scale	NTS
		Date Drawn	23/06/2015
Title	Views of Borehole WS34	Rev.	
		Plate S15	

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APPENDIX IX

Conditions & Limitations

Conditions & Limitations

Phase I Desk Studies

1. Works undertaken to provide the basis of the Phase I Desk Study report comprise a review of information available from a number of sources/parties (potentially also including the Client) together with a walk over of the site (where applicable and included within the quotation). The opinions given in the Phase I Desk Study are based on the information available from third parties/sources that has been obtained within the available timeframe. GeoDyne Limited assumes all third party information to be true and correct and therefore cannot accept liability for the accuracy of such information supplied.

2. Should additional information become available that may affect the comments and opinions made within the Phase I Desk Study, GeoDyne Limited reserves the right to review such information and make modifications to comments/opinions as appropriate.

3. It should be borne in mind that a Phase I Desk Study collates available information to generate a conceptual model of the site. The actual geotechnical and environmental considerations can only be fully quantified by intrusive investigation works to confirm the accuracy of the conceptual site model.

Phase II Intrusive Investigations

1. Our quotation assumes that access to the site will be arranged by others at no cost to ourselves.

2. We have assumed that free access is available throughout to the entire site and that works can be undertaken during a single mobilisation. Where restricted access is encountered, or where additional unscheduled mobilisations are required, additional costs may be incurred to the client.

3. We have assumed that all available information relating to buried services will be supplied by the Client at no cost to ourselves. No responsibility will be accepted for damage to underground services that have not been brought to our prior attention by the Client.

4. All excavations/boreholes will be backfilled with compacted arisings upon completion, with any excess arisings left proud of ground levels. Excess arisings will not be removed from the site unless specifically requested by the Client. Where we are requested to remove excess arisings, all associated costs will be passed to the Client.

5. We will attempt to leave the site in a clean and tidy state, however, it must be understood that some disturbance of the site is unavoidable during intrusive works.

6. Exploratory holes are positioned approximately on site by GeoDyne Limited. Should the client require precise locations of all exploratory points, additional fees will be incurred. It must be borne in mind that backfilled trial pits can create ‘soft spots’, therefore, should the Client wish to designate ‘no dig’ zones, for example under the footprint of proposed structures, these must be brought to our attention prior to commencement of works.

7. Groundwater observations relate to conditions encountered at the time of investigation. It must be understood that groundwater levels may vary as a result of recent climatic conditions or seasonal variation.

8. Trial pits and boreholes examine only a small proportion of the total site area. No liability can be accepted for conditions not revealed in exploratory holes, particularly between positions. All extrapolations of available data are given in good faith.

Payment

1 Payment terms are strictly 28 days from the invoice date.

2 Prior to commencement of works, we require receipt of formal written instruction from the party accepting full financial responsibility for the work. In the absence of such an instruction, we would expect the instructing Consulting Engineers/Architects to accept full financial responsibility for the works.

3 Receipt of instruction to commence work shall be taken as acceptance and compliance of the foregoing conditions.

Liability

1. GeoDyne Limited offer £5,000,000.00 Professional Indemnity Insurance (in aggregate over the year). This shall be the limit of our liability for works undertaken. No individual liability shall be implied to, or accepted by, any employee for works undertaken for and on the behalf of GeoDyne Limited.

NOTE

A WATCHING BRIEF IS RECOMMENDED DURING DEMOLITION AND EARTHWORKS FOR VISUAL OR OLFACTORY EVIDENCE OF GROSS TPH CONTAMINATION ESPECIALLY BENEATH LOCATIONS WHERE EXISTING TANKS HAVE BEEN REMOVED ANY REVEALED GROSSLY IMPACTED SOILS SHOULD BE REMOVED FROM SITE. THE SIDES AND BASE OF THE RESULTANT EXCAVATION SHOULD BE SAMPLED AND THE TEST RESULTS VALIDATED AGAINST CURRENT TIER 1 GAC's FOR A RESIDENTIAL (POS1) END USE

LOCALISED EXCAVATION OF IMPACTED SOILS PERCHED WATER SAMPLES LOCALLY CONTAINED ELEVATED CONCENTRATIONS OF TOTAL TPH. THEREFORE, ANY IMPACTED AREAS WHERE PILES ARE REQUIRED TO BE ADVANCED SHOULD BE SUITABLY REMEDIATED TO PREVENT THE INTRODUCTION OF A DOWNWARD PATHWAY FOR THE HYDROCARBON CONTAMINATION INTO THE AQUAFER

SHOULD ANY AREAS OF POTENTIALLY CONTAMINATED SOIL BE ENCOUNTERED DURING SITE CONSTRUCTION WORKS, FURTHER CONSULTATION SHOULD BE SORT TO ENSURE ANY POTENTIALLY CONTAMINATED SOILS SHOULD BE LEFT IN-SITU AND SUBJECTED TO FURTHER ASSESSMENT TO POTENTIALLY INCLUDE FURTHER CHEMICAL TESTING AND RISK ASSESSMENT

N

INDICATIVE ONLY

EASTERN AVENUE

Civic Centre

Skatepark

The Ham

WS1
A – 0.5–1.0
BENZO(A)PYRENE
BENZO(B)FLUORANTHENE
DIBENZO(AH)ANTHRACENE
B – 2.0–2.5
B – 2.65–3.0

WS33
A – 0.75
LEAD
BENZO(A)PYRENE
BENZO(B)FLUORANTHENE
DIBENZO(AH)ANTHRACENE
A – 3.0
B – 2.25
B – 3.0
C – 0.75
D – 2.25
BENZO(A)PYRENE
BENZO(BK)FLUORANTHENE
DIBENZO(AH)ANTHRACENE
DIBENZOFURAN
D – 3.0
E – 0.75
HYDROCARBON ODOURS, FREE PRODUCT AND STAINING

WS6

BH1
B – 1.1
B – 3.0
TARRY BITUMEN FRAGMENTS IDENTIFIED

WS7
A – 1.5
A – 3.0

WS5

WS35
C – 0.2

WS8
A – 0.75
BENZO(B)FLUORANTHENE
DIBENZO(AH)ANTHRACENE
A – 3.0
B – 2.0
B – 3.75

HISTORIC ABOVE GROUND STORAGE TANK

WS34
A – 0.2
B – 0.2
E – 0.2

WS31
C – 0.5

HISTORIC ABOVE GROUND STORAGE TANK

TP1
HYDROCARBON ODOURS, FREE PRODUCT AND STAINING

WS32
A – 0.5
DIBENZO(AH)ANTHRACENE
A – 4.0
B – 1.0
B – 4.0
D – 1.0
BENZO(A)PYRENE
BENZO(BK)FLUORANTHENE
DIBENZO(AH)ANTHRACENE
2-METHYLNAPHTHALENE
DIBENZOFURAN
D – 4.0
E – 0.5
E– 1.0

WS10
B – 0.3
B – 2.7
C – 0.7
VISUAL AND OLFACTORY EVIDENCE OF TPH CONTAMINATION, HOWEVER NO SIGNIFICANTLY ELEVATED CONCENTRATIONS OF TPH IDENTIFIED IN SOIL SAMPLES

BH2B
A – 0.9
A – 3.0
C – 2.2
CHRYSOTILE (WHITE ASBESTOS)

BH2
BH2A

WS9

WS30
B – 0.5
B – 2.5

WS28
A – 0.5
BENZO(A)ANTHRACENE
BENZO(A)PYRENE
BENZO(B)FLUORANTHENE
CHRYSENE
DIBENZO(AH)ANTHRACENE
A – 2.5
B – 0.5
B – 2.5
C – 0.5

WS29
B – 0.5
B – 4.0

HISTORIC ABOVE GROUND STORAGE TANK

WS11
A – 1.5

WS27
A – 1.0
A – 1.75
E – 0.5

WS25
C – 0.5

WS26
C – 0.75

WS24
A – 0.5
ARSENIC
LEAD
B – 0.5
C – 1.0
E – 0.5

HISTORIC ABOVE GROUND STORAGE TANK

WS19
A – 0.9
A – 2.0

WS17
A – 0.5–1.5
ARSENIC
LEAD
BENZO(A)PYRENE
BENZO(B)FLUORANTHENE
CHRYSENE
DIBENZO(AH)ANTHRACENE
A – 2.75

ABOVE GROUND STORAGE TANK

WS21
A – 1.0
C – 1.0
E – 1.0

WS18
C – 0.75
CHRYSOTILE (WHITE ASBESTOS)
AMOSITE (BROWN ASBESTOS)

WS22
A – 0.6
B – 2.0
B – 5.0
D – 2.0
E – 0.6

WS14

OIL STORAGE DEPOT IDENTIFIED ON HISTORIC MAPS 1961–1969

BH3
A – 1.3
B – 2.5
B – 3.1

WS20
A – 1.0
A – 3.0
B – 1.0
C – 1.0

WS12

WS23
A – 0.5
BENZO(A)PYRENE
DIBENZO(AH)ANTHRACENE
B – 0.5
D – 0.5
BENZO(A)PYRENE
BENZO(BK)FLUORANTHENE
DIBENZO(AH)ANTHRACENE
2-METHYLNAPHTHALENE
DIBENZOFURAN

WS16

WS15
A – 0.5–1.0
A – 5.0

WS13

CONTAMINATION SUMMARY

(1:500)

1:20 0 0.2m 0.4m 0.6m 0.8m 1m

1:50 0 0.5m 1m 1.5m 2m 2.5m

1:100 0 1m 2m 3m 4m 5m

Project/Task No. 14576 Scale: AS SHOWN ORIGINAL DRAWING SIZE A1

1. GENERAL

(i) This drawing is not to be scaled, work to figured dimensions only, confirmed on site.

(ii) This drawing is to be read in conjunction with all relevant architectural drawings, detailed specifications where applicable and all associated drawings in this series.

(iii) Any discrepancy on this drawing is to be reported immediately to the partnership for clarification.

(iv) The contractor is responsible for all temporary works and for the stability of the works in progress.

2. REFER TO DRAWING 14576-HOP-EN-XX-DR-S-6003 FOR ADDITIONAL NOTES

LEGEND

———	DENOTES SITE BOUNDARY
XXX	HATCH DENOTES POTENTIAL CONTAMINATION SOURCES CURRENTLY IDENTIFIED ON SITE
XXX	HATCH DENOTES POTENTIAL CONTAMINATION SOURCES IDENTIFIED FROM HISTORIC MAPS
A – XX	DENOTES STANDARD CONTAMINATION SUITES AT DEPTH BELOW GROUND LEVEL
B – XX	DENOTES SPECIATED FRACTION BANDED TOTAL PETROLEUM HYDROCARBON (TPH) TESTS AT DEPTH BELOW GROUND LEVEL
C – XX	DENOTES ASBESTOS IDENTIFICATION SCREENS
D – XX	DENOTES VOLATILE ORGANIC COMPOUNDS AND SEMI-VOLATILE ORGANIC COMPOUND (VOC / SVOC) SCREENS
E – XX	DENOTES POLYCHLORINATED BIPHENYL (PCB) SCREENS

CONTAMINATION

NATURAL STRATA CONSIDERED UNCONTAMINATED ASSUMING RESIDENTIAL (POS1) END USE

MADE GROUND CONTAMINATED WITH RESPECT TO A RESIDENTIAL (POS1) END USE WITH RESPECT TO ARSENIC, LEAD AND PAH COMPOUNDS AND POTENTIALLY LOCALISED SVOC IMPACTION.

CONTAMINATES IN THE MADE GROUND RECORDED AS EXCEEDING RESIDENTIAL (POS1) END USE TIER 1 SAC ARE LISTED AGAINST EACH BOREHOLE SAMPLED.

GROUND GAS

RETURN GAS MONITORING VISITS HAVE REVEALED THE SITE FALLS WITHIN CHARACTERISTIC SITUATION 2 (CS2) BY VIRTUE OF THE PRESENCE OF METHANE IN EXCESS OF 1% AND CARBON DIOXIDE IN EXCESS OF 5% WITH RELATIVELY HIGH POSITIVE GAS FLOW RATES POTENTIALLY DUE TO TIDAL EFFECTS.

SULPHATE CLASSIFICATION

THE SITE IS INDICATED TO FALL INTO DESIGN SULPHATE CLASS DS-2 AND AN AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) CLASSIFICATION OF AC-2

SITE INVESTIGATION

REFER TO SITE INVESTIGATION REPORTS LISTED BELOW BY GEODYNE FOR FULL DETAILS.

COMBINED PHASE I DESK STUDY AND INITIAL PHASE II EXPLORATORY INVESTIGATION FOR OPTIMISATION DEVELOPMENTS LTD DATED 28/09/2012

COMBINED GROUND INVESTIGATION AND GEOPHYSICAL SURVEY REPORT FOR BSCP LTD AND WM MORRISONS DATED 09/07/2013

REVIEW OF PREVIOUS REPORTS AND SUPPLEMENTARY PHASE II EXPLORATORY INVESTIGATION FOR THE NEWBRIDGE GROUP / SOUTHERN HOUSING GROUP DATED 30/06/2015

⚠ EXISTING SERVICES

EXISTING SERVICES SHOWN INDICATIVELY ONLY. FOR FURTHER DETAILS REFER TO UTILITIES SURVEY BY TECHNICS GEOSPATIAL CONSULTANT SURVEYORS, REFERENCE SP16059 DATED FEB 2016 – POSSIBILITY OF FURTHER UNKNOWN SERVICES

Description	By	Aprvd.	Date	Rev.
ISSUED FOR TENDER	P.M	J.S	02.07.18	P1

TENDER DRAWING

NOT FOR CONSTRUCTION

Title: CONTAMINATION SUMMARY

Project: FREE WHARF – ENABLING WORKS SHOREHAM-BY-SEA

Client: SOUTHERN HOUSING GROUP

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Drawing No. 14576-HOP-EN-XX-DR-S-0103 Status D2 Rev. P1

Geo-Environmental

INTERIM MMP VERIFICATION REPORT

for the Land at

FREE WHARF, BRIGHTON ROAD,

SHOREHAM-BY-SEA, BN43 6SA

on behalf of

WATES CONSTRUCTION LTD

Report:	**INTERIM MMP VERIFICATION REPORT**
Site:	**FREE WHARF, BRIGHTON ROAD, SHOREHAM-BY-SEA, BN43 6SA**
Client:	**WATES CONSTRUCTION LTD**
Date:	**16TH MARCH 2021**
Reference:	**GE18319/INTMMPVR1.2/MAR21**
Version:	**1.1**
Prepared by:	[redacted]
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Authorised by:	[redacted]
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AMENDMENT RECORD

Revision ref.	Date	Reasons for amendment	Author's initials	Reviewer's initials	Authoriser's initials
1.0	19/02/2021	First issue	WH	KB	LL
1.1	10/03/2021	Changes requested by Mark Wellbelove including addition of a drawing.	WH	KB	LL
1.2	16/03/2021	Change requested by John Rivett (Wates)	WH	KB	LL