Environmental
Geotechnical
Specialists

PHASE 2 ENVIRONMENTAL REPORT

job number C1465/21/E/2362	date 25.03.21

site address
Acorn Way
Grimethorpe

written by I. Sakoor	checked by R.A. Palmer

issued by R.A. Palmer

Rogers Geotechnical Services Ltd

[redacted]

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GEOTECHNICAL ENVIRONMENTAL

Environmental Geotechnical Specialists

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Appendices

Environmental Geotechnical Specialists

Report on a Phase 2 Environmental Investigation

Location:	Acorn Way, Grimethorpe
For:	Holcon Group Ltd
Report No.	C1465/21/E/2362
Report date:	March 2021

For and on behalf of **Rogers Geotechnical Services Ltd**

[redacted]
Imran Sakoor BEng FGS
Geo-environmental Engineer

[redacted]
Senior Geo-environmental Engineer

Report Summary[1]

Item	Comments	Section
Development	Construction of fourteen residential houses with gardens and driveways.	1.
Strata Conditions	Made ground indicated to around 0.3m depth, over sandy clay. Underlain by weathered sandstone.	3.
Contamination	Two hot-spots of PAHs (naphthalene) contamination detected.	5.

[1] This summary should not be relied upon to provide a comprehensive review. All of the information contained in this document should be considered.

1. Introduction

It is understood that the land off Acorn Way, Grimethorpe is to be developed by the construction of a number of residential dwellings with gardens and an access road. The client has undertaken contamination testing at various locations and depths across the site and has commissioned Rogers Geotechnical Services Ltd to complete an environmental assessment for the development. Five trial pits have been excavated by the client in order to obtain environmental samples, the locations of which are shown on a plan provided by the client, which is presented in Appendix 1. The recovered samples were also logged by the client and the logs are presented in Appendix 2. This report assesses the risks from chemical contamination and provides remediation recommendations based on the information provided.

2. Limitations

The recommendations made and opinions expressed in this report have been based solely on the information provided by the client. Whilst opinions may be expressed relating to sub-soil conditions in parts of the site not investigated, for example between trial pit positions, these are for guidance only and no liability can be accepted for their accuracy. Moreover, it should be appreciated that this report has been written without Rogers Geotechnical Services Ltd having undertaken a site visit or any actual observation of the ground conditions. In addition, it should be noted that the contamination assessment within this report only relates to chemical contamination (determinands listed as per Section 4). Other forms of contamination, for instance ground gas, or sulphate attack on concrete, are outside the scope of this report.

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 issue.

3. Strata Conditions

The trial pit logs provided by the client indicate the following ground conditions:

Table 1: Generalised Strata Profile

Depth m below ground level to underside of layer	Strata Type	Positions Encountered	Groundwater Strikes m below ground level
0.05 – 0.3	MADE GROUND (Soil with gravel fragments).	A, B, C, D, E	None
0.7 - +1.0	Sandy CLAY (Weathered sandstone).	A, B, C, D, E	None
0.8 - +1.0	SANDSTONE.	B, C, D, E	None

'+' denotes that the strata extended below the termination depth of the investigated positions, thus the extent of the deposit is only proven to the depths indicated

4. Laboratory Testing - Environmental

A suite of testing was conducted by the client on samples from across the site. The following regime was undertaken.

- Metals – Cd, Cr(total), Cu, Hg, Ni, Pb and Zn.
- Semi and Non-Metals - As, total cyanide and Phenols.
- Polycyclic aromatic hydrocarbons (PAHs).
- Petroleum hydrocarbons (TPHs).

The testing was undertaken by UK Analytical Ltd and the results provided by the client. These are presented in Appendix 3 of this report. It should be appreciated that whilst total chromium has been tested, there is no indication as to what fraction of this forms chromium VI, which is considered to represent one of the more harmful forms of this determinand. In view of this, the recommendations within the environmental discussion below do not extend to chromium.

5. Discussion of Ground Conditions - Environmental

5.1 Discussion of Test Results

It is understood that the site is to be developed by the construction of residential properties with gardens and an access road. Consequently, the site may be classified as residential with plant uptake.

5.1.1 Soil Samples

The results of the chemical testing undertaken on soil samples obtained during this investigation have been compared to the ATRISK soil screening values (SSVs) as compiled by WS Atkins plc. With respect to the results it should be appreciated that the soil organic matter (SOM) content for the samples has not been tested for. However, based on the descriptions of the strata provided by the client, is it anticipated that the organic content will be low. On this basis, it is considered that the screening values associated with 1% SOM should be adopted, which represents the most onerous case. These values have been derived in such a way as to adhere to the principles within the revised CLEA model and include the most current release of the SGVs. A list of subscribers is provided within the website[2] and these include many local authorities. A comparison of the results of the testing, together with the data given above, can be found within Appendix 3. These results indicate the following:

Table 2: Summary of Contaminated Areas

Location	Depth (m)	Contaminants found to be exceeding SSVs (Residential with plant uptake)
A	0.3	PAHs [Naphthalene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(g,h,i)perylene, benzo(g,h,i)perylene].
A	0.9	PAHs [Indeno(1,2,3-cd)pyrene, dibenz(g,h,i)perylene, benzo(g,h,i)perylene].

[2] http://www.atrisksoil.co.uk/pages/general/subscribers.asp

B	0.3	PAHs [Benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene, dibenz(g,h,i)perylene, benzo(g,h,i)perylene].
B	0.9	PAHs [Chrysene, indeno(1,2,3-cd)pyrene, dibenz(g,h,i)perylene, benzo(g,h,i)perylene].
C	0.3	PAHs [Naphthalene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(g,h,i)perylene, benzo(g,h,i)perylene].
C	0.9	PAHs [Indeno(1,2,3-cd)pyrene, benzo(g,h,i)perylene].
D	0.3	PAHs [Benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(g,h,i)perylene, benzo(g,h,i)perylene].
D	0.9	None.
E	0.3	PAHs [Benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(g,h,i)perylene, benzo(g,h,i)perylene].
E	0.9	None.

Concentrations of, total cyanide, mercury, phenols (total) and total petroleum hydrocarbons (aliphatic C5 to C10; aromatic C5 to C16) were below the detection limits for the tests. Detectable levels of all other contaminants were recorded, but these fell below the associated Atrisk Soil Screening Values. In addition, no asbestos was detected within the soils samples tested.

It should be appreciated that the soil screening values for PAHs and TPHs (where appropriate) represents vapour saturation limits. The inhalation of vapour pathway contributes less than 10% of total exposure, which is unlikely to significantly affect the combined assessment criterion[3]. In view of this, the ATRISK soil SSVs notes that the users may wish to consider using a combined assessment criterion if free product is not observed, the values for which are also provided on the summary of contamination analysis. On the basis that the trial pit logs do not record any signs of free product contamination, it is considered that the criteria for no free product should be adopted for the PAHs and TPHs at this site. The results of the contaminants found to exceed these screening values are tabulated below:

Table 3: Summary of Areas Contaminated by PAHs & TPHs

Location	Depth (m)	Contaminants found to be exceeding SSVs (Residential with Plant Uptake)
A	0.3	PAH [Naphthalene].
A	0.9	None.
B	0.3	None.
B	0.9	None.
C	0.3	PAH [Naphthalene].
C	0.9	None.
D	0.3	None.
E	0.3	None.

On the basis of the above information, the results of the investigation have concluded that two 'hot-spots' of contamination are present within the made ground below the site, although it should be

[3] Ref: ATRISK soil, SSVs derived using CLEA v1.071 for 1% SOM, Residential with home grown produce land use, 23.06.17.

noted that elevated levels of PAHs have also been detected within other soil samples, most notably within samples obtained at 0.3m depth. Nonetheless, concentrations of such determinands have generally fallen below the required screening levels, with the exception of naphthalene at location A and C, both at 0.3m.

5.2 Site Specific Risk Assessment

5.2.1 Approach

The presence of contamination hazards and the risks associated with them should be assessed in accordance with industry practice and the 'suitable for use' approach. This has been conducted with reference to The Department for Environment, Food and Rural Affairs (DEFRA) and The Environment Agency[4] advice on the assessment of risks arising from the presence of contamination in soils and using the source-pathway-receptor approach.[5] This method dictates that there must be a risk of contaminant produced at a 'source' in sufficient concentration to cause harm and there must be a 'pathway' for the contaminant to reach an identifiable 'receptor' for the linkage to be proved and a contamination hazard to be considered present. Not all substances are contaminants and not all contaminants are considered to be a risk. Indeed DEFRA and The Environment Agency state that 'a contaminant is a substance which has the potential to cause harm, while a risk itself is considered to exist if such a substance is present in sufficient concentration to cause harm and a pathway exists for a receptor to be exposed to the substance.'[6]

5.2.2 Conceptual Ground Model and Risk Assessment

In view of the results of the chemical testing undertaken the conceptual site model is presented accordingly as Table 4. Sources of contamination include the following:

On-site – Made Ground (Naphthalene).

The preliminary risk assessment has been evaluated with reference to the following ratings and definitions:

N/A -	A source-pathway-receptor linkage is not considered to exist and therefore a risk assessment is not required.
Low -	A pollution linkage is unlikely and/or the likelihood of harm occurring is low and of minor consequence.
Moderate -	The linkage exists but the likelihood of harm occurring is not considered to be significant although remedial action may be necessary
High -	The linkage exists and the available data indicates that significant harm may be caused and remedial action could be necessary.

[4] R&D Publication CLR 8, 'Assessment of Risks to Human Health from Land Contamination: An overview of the Development of Soil Guideline Values and Related Research'.
[5] The pollution linkage approach was developed by 'Circular 2/2000 Contaminated Land: Implementation of Part II of The Environmental Protection Act 1990' which provides meanings for the terms contained in The Environmental Protection Act 1990 Part IIA, the primary legislation for addressing the issues of contaminated land.
[6] See 'Circular 2/2000 Contaminated Land: Implementation of Part II of The Environmental Protection Act 1990', appendix A.

Table 4: Conceptual Site Model and Site Specific Risk Assessment [Contamination: PAHs]

Conceptual Site Model			Site Specific Risk Assessment	
Pathways	**Receptor**	**Linkage Present?**	**Risk Rating**	**Notes**
Direct contact/dermal absorption/soil ingestion	Operative	Yes – contamination found to be present at the site and contact with soil likely during works.	High	Some contamination is present in the soils underlying the site within the vicinity of trial pits A and C. Precautionary measures will be required during the construction phase. Remediation will be required to either remove the contamination or break pathways within the contaminated area. However, as the site is anticipated to be secured during the development phase, contamination is not anticipated to be mobile and affect neighbours.
	End User	Yes – contamination found to be present at the site and site to be developed into residential housing with garden areas.		
	Neighbours	Yes – contamination found to be present at the site and a populated residential area surrounds the site. However, on the basis of the trial pit logs, the contamination is not anticipated to be mobile.	Low	
Inhalation of Dust/Vapours	Operative	Yes – dust may be derived from contaminated soils. In addition, naphthalene contamination is also considered to represent a vapour risk.	High (Dust) Moderate (Vapour)	Some contamination is present in the soils underlying the site within the vicinity of trial pits A and C. Precautionary measures will be required during the construction phase. Remediation will be required to either remove the contamination or break pathways within the contaminated area.
	End User			
	Neighbours	Yes – contamination found to be present at the site and residential and properties located within 250m radius of the site and possible inhalation of dust during the works.	High	
Ingestion of fruit/vegetables and/or waters	Operative	Not applicable.	-	Some contamination is present in the soils underlying the site within the vicinity of trial pits A and C. Precautionary measures will be required during the construction phase. Remediation will be required to either remove the contamination or break pathways within the contaminated area. However, the contamination at the site is considered to be of limited mobility, therefore the likelihood of contamination affecting neighbouring gardens is considered low risk.
	End User	Yes – contamination found to be present at the site and site to be developed into residential housing with garden areas.	High	
	Neighbours	Yes – contamination found to be present at the site and a populated residential area surrounds the site. However, on the basis of the trial pit logs, the contamination is not anticipated to be mobile	Low	

Spillage/loss/run off direct to receiving water	Controlled Waters	No – no known controlled waters within 250m.	Low	Some contamination is present underlying the site. However, the contamination at the site is considered to be of limited mobility, therefore the likelihood of contamination affecting controlled waters is considered as low risk.
Migration via permeable unsaturated strata	Controlled Waters	Yes – a secondary A aquifer is present beneath the site. However, contamination by naphthalene is not anticipated to be significantly mobile.	Low	
Run off via drainage/sewers etc	Controlled Waters	Yes – old services may be present on site. However, contamination by naphthalene is not anticipated to be significantly mobile.	Low	
Direct contact with contaminated soils Uptake via root system	Plants	Yes – some contamination present at the site which may affect plants.	Moderate	Some contamination is present in the soils underlying the site within the vicinity of trial pits A and C. Precautionary measures will be required during the construction phase. Remediation will be required to either remove the contamination or break pathways within the contaminated area
Direct contact with contaminated soils Direct contact with contaminated groundwater	Building Materials	Yes – the test results show some levels of contamination which may adversely affect the integrity of plastic services.	Moderate (plastic services)	Please see section 5.3 for information on good building practice.
Exposure to Radon	Operative End User	No – not in a radon affected area.	N/A	Less than 1% of properties are above the action level for radon. No further action required.

5.3 Remediation Strategy

In view of the site specific risk assessment it is considered that remediation will be required at this site. Such a strategy should include the following main elements.

5.3.1 Remediation Objectives

Based on the site specific risk assessment the object of the remediation is likely to be as follows.

- To protect the site operatives during the construction process from the ingestion of soil or dust, dermal contact with the soil and inhalation of dust and vapours.
- To protect the end user from the ingestion of soil or dust, dermal contact with the soil and inhalation of vapours.
- To protect neighbours from the inhalation and ingestion dust during the construction process.
- To protect plants from direct contact with contamination and prevent uptake via root system.
- To protect plastic services from being penetrated by, or degrading due to the presence of, contamination in the soil or groundwater.
- To protect site operatives and the end user from vapours associated with local elevated levels of PAHs within the made ground.

5.3.2 Development Requirements

Whilst the precise nature of this development has not been finalised it is understood that it is to be developed by the construction of residential housing with garden areas and an access road. In view of the above a site specific remediation strategy should be undertaken after the proposed development has been finalised. However, for preliminary design and costing the following remediation proposals are offered.

5.3.3 Outline Strategy

In order to fulfil the objectives defined above it is likely that the following remedial strategy could be utilised. It is recommended that a pragmatic approach be undertaken, with observational techniques being employed at each stage of the work.

Ground-works

During the ground-works phase of the development, protection to the site operatives is required. The risk to site operatives is considered under the Health and Safety at Work Act 1974, together with regulations made under the act, which includes the Control of Substances Hazardous to Health (COSHH) regulations. Therefore, the risks to site personnel must be considered under the Construction Design and Management (CDM) regulations at the planning stage and be included in the contractor's

Health and Safety Plan and site specific Method Statements. These documents should include the following main elements.

- Site operatives at all levels should be made aware of the hazards of working with contaminated soils. They should also be made aware of working within confined spaces where accumulations of hydrocarbon vapour could occur.
- Personal hygiene facilities, including washing and messing, must be provided and site operatives be encouraged to use them.
- Where work is undertaken in dry weather the site should be dampened down to avoid dust. In addition, dust masks must be provided to all site operatives for use in dry weather.
- In order for contaminated soils to be disposed of to an appropriate landfill, it may be necessary to carry out Waste Acceptance Criteria (WAC) testing in accordance with BS EN 12457.
- Any stockpiles of contaminated soil on site should be sheeted over to prevent excessive amounts of airborne dust and cross contamination of imported fill.
- Where vehicles are transferring soil to the landfill site they should be covered to prevent contamination of the surrounding area by dust.
- Where work is undertaken in wet weather, vehicle and wheel washing facilities are required to ensure that the vehicles leaving the site do not transfer contamination to surrounding areas.

On completion of the ground-works a careful site inspection of the sub-grade would be required. Should visual or olfactory evidence of contamination be revealed then further testing may become necessary.

Construction

During the construction phase of the contract the following items are required to protect the end user from the potential contaminants revealed at this site.

- Beneath buildings, pavements and hard-standings clean inert granular sub-base should be employed.
- Any redundant services revealed at this site should be de-commissioned and piped services sealed. Any existing services that are to be employed in the new development should be carefully inspected to ensure that they are serviceable.
- New plastic services should be constructed in a surround of clean inert material and selected in accordance with the recommendation given in the United Kingdom Water Industry Research (UKWIR) website under Report Ref. No. 10/WM/03/21 - 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites'. The statutory water authority for the area in which site is located may have a risk assessment form to complete which allows these recommendations to be met. However, further determinand specification contamination testing may be necessary.
- Should all localised areas of PAH contamination not be removed, an appropriate vapour barrier will be required beneath the new properties due to potential volatilization of the contamination within the made ground (area of trial pit A and trial pit C).

Soft Landscaped and Garden Areas

It should be appreciated that the results of the testing indicate that potential ‘hot-spots’ of PAH contamination is present in the areas of trial pit A and C. Whilst further targeted investigation could be undertaken within these areas in order to establish the exact extent of the contamination, given the

elevated levels of PAHs at other locations within the near surface soils, it is recommended that remedial measures be applied site wide.

As such, it is recommended that a clean cover system should be installed within garden and soft landscaped areas. This could include the provision of a capping layer of say 500mm of inert material, which will put the contaminated ground out of the end users' dig range. At the base of this layer, a granular capillary break of say 100mm of free draining granular soil should be placed in order to prevent mobile contamination rising upward. This expedient should also provide a suitable root barrier to isolate the plants from the underlying contaminated ground. It should be appreciated that such a system is also deemed suitable to remove the potential vapour risks associated with the elevated levels of naphthalene, as such measures would remove the near surface soils where this determinand was detected in higher concentrations.

Permanent Hard-standing incl. Building Footprints

It is considered that areas of permanent hard-standing will break the pathway between the end user and the source. Therefore, limited remediation is considered to be necessary beneath any permanent hard-standing, which includes building footprints. Given the limited vapour risk associated with the elevated concentrations of PAHs, it is recommended that the top 300mm of ground be removed beneath the building footprints to remove made ground that has been highlighted to contain elevated levels of naphthalene. However, it is understood that the properties shall be constructed utilising a beam and block floor system, therefore, such a system will allow sufficient material to be removed, thus presenting a lower risk to end users.

5.4 Fill Materials

It should also be appreciated that any fill material, either site-won or imported, to be employed at the site should be subjected to the following assessment to determine its suitability.

Fill materials should be initially screened, by a suitably qualified engineer to establish that:

- It is a suitable growing media if it is to be employed as such, including compliance with BS3883 (2007)
- It is free from obvious contamination i.e. visual or olfactory evidence
- It has not come from areas where Japanese Knotweed or other invasive or injurious plants are suspected to be growing
- It is not a statutory nuisance, such as being odorous
- It is free from unsuitable material i.e. whole bricks, brick ties, timber or glass.

It should also be appreciated that any fill should be subjected to validation testing to assess its suitability. The following table has been taken from YALPAG[7] documentation and may be used as a guide. Depending on the origin and nature of the material, not all fill will require the sampling frequency

[7] *YALPAG Technical Guidance for Developers, Landowners and Consultants – Verification Requirements for Cover Systems V3.3* Appendix 1a, October 2016.

and testing indicated, although this should be in agreement with any regulatory bodies (such as the Local Authority).

Table 5: Validation sampling and testing

Fill Type	Frequency	Minimum Determinands
Virgin Quarried Material	1 or 2 depending on the type of stone (to confirm the inert nature of the material)	Standard metals/metalloids (As, Cd, Cr, Cr^{VI}, Cu, Hg, Ni, Pb, Se, Zn)
Crushed Hardcore, Stone, Brick	Minimum 1 per 1000m³	Standard metals/metalloids as above plus PAH (16 USEPA) and Asbestos
Greenfield/ Manufactured Soils	The greater of a minimum of 3 or 1 per 250m³	Standard metals/metalloids as above plus PAH (16 USEPA) and Asbestos
Brownfield/ Screened Soils	The greater of a minimum of 6 or 1 per 100m³	Standard metals/metalloids as above plus PAH (16 USEPA), TPH (CWG banded) and Asbestos Any additional analysis dependant on the history of the donor site.

The screening values for the above regime should also be agreed with any regulatory bodies; however, the following is recommended in the first instance.

Table 6: Fill Screening Values

Contaminant	Screening Value (Residential with Plant Uptake) (mg/kg)		Reference
	1% SOM	6% SOM	
As	37	37	Atrisk^{SOIL} SSVs
Cd	22.1	22.1	Atrisk^{SOIL} SSVs
Cr(VI)	3.62	3.63	Atrisk^{SOIL} SSVs
Cu	4730	4790	Atrisk^{SOIL} SSVs
Hg	8.81	15.8	Atrisk^{SOIL} SSVs
Ni	136	136	Atrisk^{SOIL} SSVs
Pb	200	200	Atrisk^{SOIL} SSVs
V	136	138	Atrisk^{SOIL} SSVs
Zn	20000	20300	Atrisk^{SOIL} SSVs

The above screening values are considered to be appropriate for topsoil (typically 6% SOM). However, for granular fill, the soil organic matter would be different (i.e. 1% SOM), thus different screening values would be required. Testing should comply with UKAS and MCERTS, where applicable, and undertaken by an accredited laboratory.

Where the material has been derived from a commercial company, certificates or other industry quality protocol compliance i.e. WRAP should be obtained. However, it will be necessary to ensure that this documentation specifically related to the material being imported, it is no more than two months old and complies with the screening and frequency requirements given above.

Suitable fill materials should be either placed immediate or sufficiently quarantined to prevent cross-contamination. If it is necessary, the quarantined material should be placed on appropriate sheeting and covered to prevent it becoming mixed with contaminated soils or dust, or penetrated by mobile contaminants.

5.5 Verification Report

In order to demonstrate that the remedial works and provision of clean cover has been sufficiently carried out where applicable, it will be necessary to produce a verification report for submission to any statutory authorities.

It will be necessary for this report to include the following:

- If undertaken, the assessment of the extents of any contamination 'hot-spots' identified including the details of sampling points, such as location and descriptive logs, and the results of any chemical testing. Note, if a clean cover system is applied site wide, this will not be required.
- The extents of any areas where made ground has been wholly removed.
- Characterisation of the suitability of the clean material including the derivation of the material, comments from a visual screen, the tests results of chemical screening, delivery tickets where appropriate and the conditions by which the clean material has been stored and handled on site.
- Photographic and logged evidence the clean material has been handled on site and placed in a sufficient thickness over areas where made ground remains. This may be either at the time of placement or after placement by means of hand excavated trialpits. Photographs should include visual site references or reference boards to prove the location and date taken. A measurement reference should be visible in the photographs to substantiate the thickness of material placed. Please note that it may also be necessary to undertake a topographical survey and the requirement for which should be checked with any statutory authorities.

6. Recommendations for Further Work

- This report should be forwarded to the relevant authorities as soon as practicable to ensure they have sufficient time to review and discuss any issues.
- Discussions with ground work contractors in relation to the requirement for testing of materials to be disposed off-site (Waste Acceptance Criteria) and the suitability of imported materials.
- Discussions with service providers regarding suitable materials for pipe work given the nature of chemical determinands found within the soils on site.
- Produce a validation report to demonstrate that the geo-environmental risks discussed in this report have been mitigated.

Clearly Rogers Geotechnical Services Ltd would be happy to offer advice with respect to the above and assist where necessary.

7. References

- British Geological Survey (NERC) (2021), BGS, Keyworth.
  - Geology of Britain Viewer: (*http://maps.bgs.ac.uk/geologyviewer_google/googleviewer.html)*
  - Lexicon of Named Rock Units:
  - (*http://www.bgs.ac.uk/lexicon/)*

- British Standards Institution (2015 +A1: 2020) BS 5930: *Code of practice for ground investigations,* B.S.I., London.

- British Standards Institution (2011), BS 10175: *Investigation of potentially contaminated sites – Code of Practice,* British Standards Institute.

- British Standards Institution (2004) BS EN ISO 14688: *Geotechnical investigation and testing – Identification and classification of soil*, *incorporating corrigendum no.1 (2007)*, B.S.I., London.

- Building Research Establishment (BRE) Special Digest 1 (2005), Third Edition: Concrete in aggressive ground, BRE Press, Garston.
  - Part C: *Assessing the aggressive chemical environment.*
  - Part D: *Specifying concrete for general cast-in-situ use.*

- Department for Environment, Food and Rural Affairs and the Environment Agency (2009) DEFRA Science Report – Final SC050021/SR2, *Human Health toxicological assessment of contaminants in soil*. Environment Agency, Bristol.

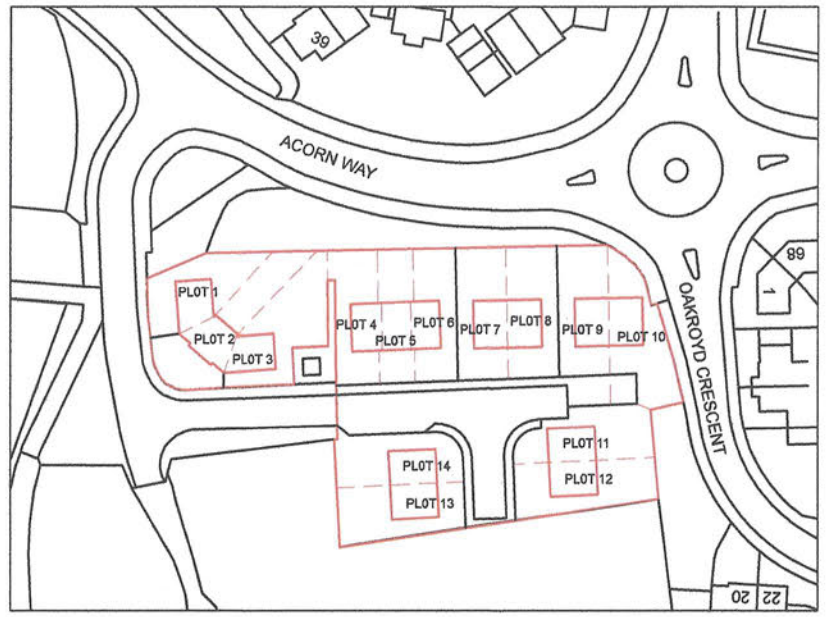
- Department for Environment, Food and Rural Affairs and the Environment Agency (2009) DEFRA Science Report – SC050021/SR3, *Updated technical background to the CLEA model*. Environment Agency, Bristol.

- Department for Environment, Food and Rural Affairs (2014) SP1010: *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document*.

Appendix 1

Site Plan

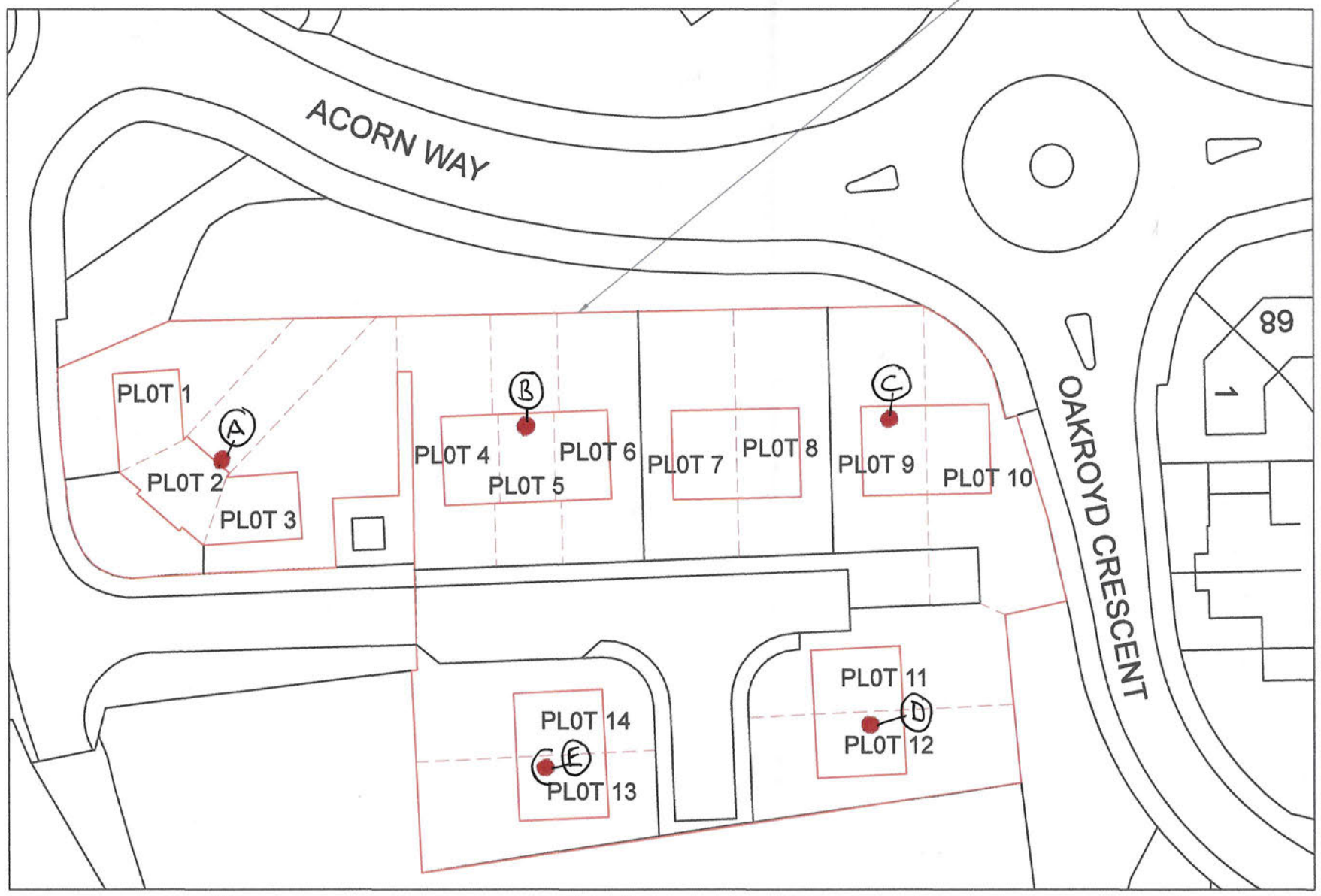
Drawing No.	Rev No.
MRH001 -001	



SITE PLAN
SCALE 1:1250 AT A3

INDICATIVE ONLY

SITE AREA 3159m²



LOACATION PLAN
SCALE 1:500 AT A3

DO NOT SCALE: Contractor to check all dimensions and report any omissions or errors

NOTES

* TWO SAMPLES AT EACH PIT. 300mm BELOW ARS 900 mm BELOW SURFACE

● TRIAL PITS. A-E.

Rev	Description	By	Chk	App	Date

JRB DESIGNS Ltd
1 Saville Road
Cudworth
Barnsley
S72 8LT
Tel: 01226 383542
Fax: 01226 380078
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Client
HOLCON GROUP

Drawing Title
SITE PLANS

Address
LAND OFF ACORN WAY
GRIMETHORPE
BARNSLEY

Project Title:
PROPOSED NEW HOUSING DEVELOPMENT

Purpose of Issue:
PLANNING

Drawing Status
FIRST ISSUE

Scale at A3	Drawn By	Date	
AS SHOWN	JRB	08/11/2020	
Checked By	Date	Approved By	Date
	08/11/2020		08/11/2020
Project No.	Drawing No.		Revision
MRH001	001		-

APPROVAL ☒ INFORMATION ☐ TENDER ☐ CONTRACT ☐ CONSTRUCTION ☐

Appendix 2

Trialpit Records

HOLCON GROUP. TRIAL HOLE

Sheet 1 of 1

Project Name: ACORN WAY.	Project No.: AW-21.	Co-ords: · PIT. No:- A 1+2	Hole Type: TRIAL HOLE
Location: GRIMETHORPE		Level:	Scale: N/A.
Client: HOLCON.		Dates: 5/2/20.	Logged By: RH.

Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
No	0-0.5						Made ground (Brown - Black) Soil Well rounded to fine with small imparted fragments.
	0.5-1.0						Medium Dense to Dense Banded Sandy Clay surrounded by medium grained sandstone (Destructed Sandstone and weathered
		Type	Results				

Remarks: Infill on top of weathered sandstone.

HOLCON GROUP. TRIAL HOLE

Sheet 1 of 1

Project Name: ACORN WAY.	Project No.: AW-21.	Co-ords: · PIT. No:- B 1+12	Hole Type: TRIAL HOLE
Location: GRIMETHORPE		Level:	Scale: N/A.
Client: HOLCON.		Dates: 5/2/20.	Logged By: RH.

Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
	0-0.4						Brown Black Soil leading to silty sandy clay with mixed lithology.
No	0.4-8.0						clay bands / small siltstones / lenses of clay / sandstones.
	<1.0m						leading to course grained lensed sandstone. - hard.

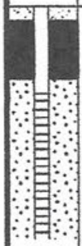
Type	Results

Remarks:

HOLCON GROUP. TRIAL HOLE

Sheet 1 of 1

Project Name: ACORN WAY.	Project No. AW-21.	Co-ords: PIT. No:- C 1+2	Hole Type: TRIAL HOLE
Location: GRIMETHORPE		Level:	Scale: N/A.
Client: HOLCON.		Dates: 5/2/20.	Logged By: RH.



Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
	0-0.3						Brown Black Soil plenty of tree roots / organics / medium closed rootlets.
No	0.3-0.8						Banded yellow clay Thickening with sandstones lenses to solid sandstone
	0.8-1.0						Medium dense to very dense Thickly laminated sandstones.

Depth scale: 1, 2, 3, 4, 5, 6, 7, 8, 9

Remarks:

HOLCON GROUP. TRIAL HOLE

Sheet 1 of 1

Project Name: ACORN WAY.	Project No.: AW-21.	Co-ords: · PIT. No:- D172	Hole Type: TRIAL HOLE
Location: GRIMETHORPE		Level:	Scale: N/A.
Client: HOLCON.		Dates: 5/2/20.	Logged By: RH.

Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
No	0-0.3						Made ground. very loose soil with many rootlets.
	0.3-0.7						Soft ground becoming firm with clay intrusions banding to siltstone.
	0.7-1.0						Siltstones with banded clay turning to coarse grained sandstone. Hard. lenses but weathered.
	>1.00						
		Type	Results				

Remarks:

HOLCON GROUP. TRIAL HOLE

Sheet 1 of 1

Project Name: ACORN WAY.	Project No.: AW-21.	Co-ords: · PIT. No:- E1+2.	Hole Type: TRIAL HOLE
Location: GRIMETHORPE.		Level:	Scale: N/A.
Client: HOLCON.		Dates: 5/2/20.	Logged By: RH.

Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
	0-0.35						Made ground brown/ black with many rootlets with fine to coarse gravel of mixed lithology
	0.35-0.6						Made ground soft to firm yellow brown silty sandy clay with fine to coarse medium grained sandstone
	0.6-1.0m.						Banded clay / Sandstone lenses turning to coarse grained sandstone to hard sandstone at bottom of trial hole.
		Type	Results				

Remarks:

Good solid ground in sandstone at >1m.

Appendix 3

Laboratory Testing - Environmental

UK Analytical Ltd
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Mr Holiday
Holcon Group Ltd
93 High Street
Clayton West
Huddersfield HD8 9NS

09th March 2021

Dear Mr Holiday

Please find enclosed the results on the samples as received 19/01/2021.

Please contact me if you have any queries.

Yours faithfully

[redacted]

RW Brown
Director

Enc.

UK Analytical Ltd
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TEST CERTIFICATE FOR CONTAMINANT ANALYSIS OF SOIL

LABORATORY REFERENCE :	21/22302/1
CLIENT :	Holcon Group Ltd
ADDRESS :	93 High Street, Clayton West Huddersfield HD8 9NS
REPORT DATE :	09/03/21
DATE RECEIVED :	19/01/21
IDENTIFICATION :	Soil Samples 1. A1 300mm Depth 2. A2 900mm Depth 3. B1 300mm Depth
TEST METHOD :	UKA method nos 40, 41, 44, 46, 47, 48 based on, BS, MEWAM & APHA-AWWA-WPCF standard methods and approved subcontractor

RESULTS :

Sample Reference	1	2	3
Asbestos	NAD	NAD	NAD
pH	6.8	6.9	7.0
Total Cyanide mg/kg	<10	<10	<10
Total Sulphate as SO_4 mg/kg	2064	635	675
Sulphide mg/kg	<10	<10	<10
Sulphur (Free) mg/kg	215	14	<10
Arsenic total mg/kg	36	12	18
W/S Boron mg/kg	2.7	1.3	1.1
Cadmium total mg/kg	1.2	0.2	0.7
Chromium total mg/kg	117	70	99
Copper total mg/kg	88	19	53
Lead total mg/kg	145	28	133
Mercury total mg/kg	<0.5	<0.5	<0.5
Nickel total mg/kg	44	24	39
Zinc total mg/kg	421	102	220
Total Phenols (Monohydric) mg/kg	<0.5	<0.5	<0.5
EPH (C10-C40) mg/kg	448	24	321

[redacted]

RW Brown Director

Samples are kept for a period of one month from the report date.

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TEST CERTIFICATE FOR CONTAMINANT ANALYSIS OF SOILS

LABORATORY REFERENCE :	21/22302/2
CLIENT :	Holcon Group Ltd
ADDRESS :	93 High Street, Clayton West Huddersfield HD8 9NS
REPORT DATE :	09/03/21
DATE RECEIVED :	19/01/21
IDENTIFICATION :	Soil Samples 1. A1 300mm Depth 2. A2 900mm Depth 3. B1 300mm Depth
TEST METHOD :	UKA approved sub-contracted USEPA priority pollutant standard methods.

RESULTS :

Sample Reference	1	2	3
Naphthalene mg/kg	0.87	0.08	0.29
Acenaphthylene mg/kg	0.23	<0.02	0.06
Acenaphthene mg/kg	0.10	<0.02	0.07
Fluorene mg/kg	0.17	<0.02	0.08
Phenanthrene mg/kg	2.75	0.13	1.46
Anthracene mg/kg	0.69	0.03	0.31
Fluoranthene mg/kg	5.97	0.29	3.00
Pyrene mg/kg	5.20	0.27	2.61
Benzo (a) anthracene mg/kg	2.61	0.12	1.28
Chrysene mg/kg	2.99	0.16	1.45
Benzo (b) fluoranthene mg/kg	3.42	0.16	1.57
Benzo (k) fluoranthene	1.33	0.06	0.68
Benzo (a) pyrene	2.48	0.12	1.08
Indeno (1,2,3-cd) pyrene	2.22	0.12	1.10
Dibenz (a,h) anthracene	0.38	0.02	0.19
Benzo (g,h,i) perylene	1.81	0.10	0.90
Total EPA-16 PAH's mg/kg	33.2	1.64	16.1

[redacted]

R W Brown Director

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TEST CERTIFICATE FOR CONTAMINANT ANALYSIS OF SOILS

LABORATORY REFERENCE :	21/22302/3
CLIENT :	Holcon Group Ltd
ADDRESS :	93 High Street, Clayton West Huddersfield HD8 9NS
REPORT DATE :	09/03/21
DATE RECEIVED :	19/01/21
IDENTIFICATION :	Soil Samples 1. A1 300mm Depth 2. A2 900mm Depth 3. B1 300mm Depth
TEST METHOD :	UKA approved sub-contracted

RESULTS :

Sample Reference	1	2	3
Aliphatic >C5 – C6 mg/kg	<0.1	<0.1	<0.1
Aliphatic >C6 – C8 mg/kg	<0.1	<0.1	<0.1
Aliphatic >C8 – C10 mg/kg	<0.1	<0.1	<0.1
Aliphatic >C10 – C12 mg/kg	<4	<4	<4
Aliphatic >C12 – C16 mg/kg	9	<4	<4
Aliphatic >C16 – C35 mg/kg	197	9	88
Aliphatic >C35 – C44 mg/kg	124	<10	33
Aromatic >C5 – C7 mg/kg	<0.01	<0.01	<0.01
Aromatic >C7 – C8 mg/kg	<0.01	<0.01	<0.01
Aromatic >C8 – C10 mg/kg	<0.01	<0.01	<0.01
Aromatic >C10 – C12 mg/kg	<1	<1	<1
Aromatic >C12 – C16 mg/kg	<1	<1	<1
Aromatic >C16 – C21 mg/kg	16	1	8
Aromatic >C21 – C35 mg/kg	16	1	8
Aromatic >C55 – C44 mg/kg	3	<1	<1

[redacted]

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TEST CERTIFICATE FOR CONTAMINANT ANALYSIS OF SOIL

LABORATORY REFERENCE :	21/22302/4
CLIENT :	Holcon Group Ltd
ADDRESS :	93 High Street, Clayton West Huddersfield HD8 9NS
REPORT DATE :	09/03/21
DATE RECEIVED :	19/01/21
IDENTIFICATION :	Soil Samples 4. B2 900mm Depth 5. C1 300mm Depth 6. C2 900mm Depth
TEST METHOD :	UKA method nos 40, 41, 44, 46, 47, 48 based on, BS, MEWAM & APHA-AWWA-WPCF standard methods and approved subcontractor

RESULTS :

Sample Reference	4	5	6
Asbestos	NAD	NAD	NAD
pH	7.3	6.9	7.2
Total Cyanide mg/kg	<10	<10	<10
Total Sulphate as SO_4 mg/kg	138	1231	164
Sulphide mg/kg	<10	<10	<10
Sulphur (Free) mg/kg	<10	12	<10
Arsenic total mg/kg	16	33	15
W/S Boron mg/kg	1.3	1.7	1.2
Cadmium total mg/kg	0.6	0.9	<0.2
Chromium total mg/kg	62	64	61
Copper total mg/kg	29	75	19
Lead total mg/kg	50	133	32
Mercury total mg/kg	<0.5	<0.5	<0.5
Nickel total mg/kg	22	33	20
Zinc total mg/kg	202	442	89
Total Phenols (Monohydric) mg/kg	<0.5	<0.5	<0.5
EPH (C10-C40) mg/kg	115	319	28

[redacted]

RW Brown Director

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TEST CERTIFICATE FOR CONTAMINANT ANALYSIS OF SOILS

LABORATORY REFERENCE :	21/22302/5
CLIENT :	Holcon Group Ltd
ADDRESS :	93 High Street, Clayton West Huddersfield HD8 9NS
REPORT DATE :	09/03/21
DATE RECEIVED :	19/01/21
IDENTIFICATION :	Soil Samples 4. B2 900mm Depth 5. C1 300mm Depth 6. C2 900mm Depth
TEST METHOD :	UKA approved sub-contracted USEPA priority pollutant standard methods.

RESULTS :

Sample Reference	4	5	6
Naphthalene mg/kg	0.19	0.87	0.16
Acenaphthylene mg/kg	0.05	0.22	<0.02
Acenaphthene mg/kg	<0.02	0.09	<0.02
Fluorene mg/kg	0.05	0.18	<0.02
Phenanthrene mg/kg	0.67	2.92	0.10
Anthracene mg/kg	0.15	0.62	<0.02
Fluoranthene mg/kg	1.24	5.07	0.07
Pyrene mg/kg	1.06	4.25	0.06
Benzo (a) anthracene mg/kg	0.52	1.92	0.03
Chrysene mg/kg	0.62	2.38	0.05
Benzo (b) fluoranthene mg/kg	0.67	2.50	0.05
Benzo (k) fluoranthene	0.23	1.05	<0.03
Benzo (a) pyrene	0.43	1.71	0.02
Indeno (1,2,3-cd) pyrene	0.44	1.63	0.04
Dibenz (a,h) anthracene	0.07	0.30	<0.02
Benzo (g,h,i) perylene	0.37	1.35	0.2
Total EPA-16 PAH's mg/kg	6.77	27.1	0.59

[redacted]

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TEST CERTIFICATE FOR CONTAMINANT ANALYSIS OF SOILS

LABORATORY REFERENCE :	21/22302/6
CLIENT :	Holcon Group Ltd
ADDRESS :	93 High Street, Clayton West Huddersfield HD8 9NS
REPORT DATE :	09/03/21
DATE RECEIVED :	19/01/21
IDENTIFICATION :	Soil Samples 4. B2 900mm Depth 5. C1 300mm Depth 6. C2 900mm Depth
TEST METHOD :	UKA approved sub-contracted

RESULTS :

Sample Reference	4	5	6
Aliphatic >C5 – C6 mg/kg	<0.1	<0.1	<0.1
Aliphatic >C6 – C8 mg/kg	<0.1	<0.1	<0.1
Aliphatic >C8 – C10 mg/kg	<0.1	<0.1	<0.1
Aliphatic >C10 – C12 mg/kg	<4	<4	5
Aliphatic >C12 – C16 mg/kg	<4	16	7
Aliphatic >C16 – C35 mg/kg	41	238	24
Aliphatic >C35 – C44 mg/kg	<10	72	<10
Aromatic >C5 – C7 mg/kg	<0.01	<0.01	<0.01
Aromatic >C7 – C8 mg/kg	<0.01	<0.01	<0.01
Aromatic >C8 – C10 mg/kg	<0.01	<0.01	<0.01
Aromatic >C10 – C12 mg/kg	<1	<1	<1
Aromatic >C12 – C16 mg/kg	<1	<1	<1
Aromatic >C16 – C21 mg/kg	4	14	<1
Aromatic >C21 – C35 mg/kg	4	12	<1
Aromatic >C55 – C44 mg/kg	<1	2	<1

[redacted]

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TEST CERTIFICATE FOR CONTAMINANT ANALYSIS OF SOIL

LABORATORY REFERENCE :	21/22302/7
CLIENT :	Holcon Group Ltd
ADDRESS :	93 High Street, Clayton West Huddersfield HD8 9NS
REPORT DATE :	09/03/21
DATE RECEIVED :	19/01/21
IDENTIFICATION :	Soil Samples 7. D1 300mm Depth 8. D2 900mm Depth 9. E1 300mm Depth
TEST METHOD :	UKA method nos 40, 41, 44, 46, 47, 48 based on, BS, MEWAM & APHA-AWWA-WPCF standard methods and approved subcontractor

RESULTS :

Sample Reference	7	8	9
Asbestos	NAD	NAD	NAD
pH	6.9	7.3	7.1
Total Cyanide mg/kg	<10	<10	<10
Total Sulphate as SO_4 mg/kg	170	<100	174
Sulphide mg/kg	<10	<10	<10
Sulphur (Free) mg/kg	<10	<10	<10
Arsenic total mg/kg	21	12	20
W/S Boron mg/kg	2.1	0.8	1.9
Cadmium total mg/kg	0.8	0.2	0.8
Chromium total mg/kg	46	62	90
Copper total mg/kg	43	22	53
Lead total mg/kg	94	38	142
Mercury total mg/kg	<0.5	<0.5	<0.5
Nickel total mg/kg	23	24	40
Zinc total mg/kg	420	149	333
Total Phenols (Monohydric) mg/kg	0.8	<0.5	<0.5
EPH (C10-C40) mg/kg	267	<10	267

[redacted]

RW Brown Director

Samples are kept for a period of one month from the report date.

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TEST CERTIFICATE FOR CONTAMINANT ANALYSIS OF SOILS

LABORATORY REFERENCE : 21/22302/8
CLIENT : Holcon Group Ltd
ADDRESS : 93 High Street, Clayton West
Huddersfield HD8 9NS

REPORT DATE : 09/03/21
DATE RECEIVED : 19/01/21
IDENTIFICATION : Soil Samples
7. D1 300mm Depth
8. D2 900mm Depth
9. E1 300mm Depth

TEST METHOD : UKA approved sub-contracted USEPA priority pollutant standard methods.

RESULTS :

Sample Reference	7	8	9
Naphthalene mg/kg	0.52	<0.02	0.48
Acenaphthylene mg/kg	0.38	<0.02	0.18
Acenaphthene mg/kg	0.13	<0.02	0.12
Fluorene mg/kg	0.51	<0.02	0.17
Phenanthrene mg/kg	5.26	<0.02	2.56
Anthracene mg/kg	1.82	<0.02	0.55
Fluoranthene mg/kg	8.21	0.03	4.62
Pyrene mg/kg	6.67	0.03	4.02
Benzo (a) anthracene mg/kg	2.99	<0.02	1.83
Chrysene mg/kg	3.31	<0.03	2.21
Benzo (b) fluoranthene mg/kg	3.18	<0.02	2.30
Benzo (k) fluoranthene	1.32	<0.03	0.99
Benzo (a) pyrene	2.48	<0.02	1.80
Indeno (1,2,3-cd) pyrene	2.11	<0.02	1.61
Dibenz (a,h) anthracene	0.37	<0.02	0.24
Benzo (g,h,i) perylene	1.74	<0.02	1.30
Total EPA-16 PAH's mg/kg	40.8	<0.34	25.0

[redacted]

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TEST CERTIFICATE FOR CONTAMINANT ANALYSIS OF SOILS

LABORATORY REFERENCE :	21/22302/9
CLIENT :	Holcon Group Ltd
ADDRESS :	93 High Street, Clayton West Huddersfield HD8 9NS
REPORT DATE :	09/03/21
DATE RECEIVED :	19/01/21
IDENTIFICATION :	Soil Samples 7. D1 300mm Depth 8. D2 900mm Depth 9. E1 300mm Depth
TEST METHOD :	UKA approved sub-contracted

RESULTS :

Sample Reference	7	8	9
Aliphatic >C5 – C6 mg/kg	<0.1	<0.1	<0.1
Aliphatic >C6 – C8 mg/kg	<0.1	<0.1	<0.1
Aliphatic >C8 – C10 mg/kg	<0.1	<0.1	<0.1
Aliphatic >C10 – C12 mg/kg	<4	<4	<4
Aliphatic >C12 – C16 mg/kg	<4	<4	4
Aliphatic >C16 – C35 mg/kg	89	<4	90
Aliphatic >C35 – C44 mg/kg	21	<10	15
Aromatic >C5 – C7 mg/kg	<0.01	<0.01	<0.01
Aromatic >C7 – C8 mg/kg	<0.01	<0.01	<0.01
Aromatic >C8 – C10 mg/kg	<0.01	<0.01	<0.01
Aromatic >C10 – C12 mg/kg	<1	<1	<1
Aromatic >C12 – C16 mg/kg	<1	<1	<1
Aromatic >C16 – C21 mg/kg	23	<1	13
Aromatic >C21 – C35 mg/kg	17	<1	12
Aromatic >C55 – C44 mg/kg	3	<1	2

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TEST CERTIFICATE FOR CONTAMINANT ANALYSIS OF SOIL

LABORATORY REFERENCE :	21/22302/10
CLIENT :	Holcon Group Ltd
ADDRESS :	93 High Street, Clayton West Huddersfield HD8 9NS
REPORT DATE :	09/03/21
DATE RECEIVED :	19/01/21
IDENTIFICATION :	Soil Samples 10. E2 900mm Depth
TEST METHOD :	UKA method nos 40, 41, 44, 46, 47, 48 based on, BS, MEWAM & APHA-AWWA-WPCF standard methods and approved subcontractor

RESULTS :

Sample Reference	10
Asbestos	NAD
pH	6.9
Total Cyanide mg/kg	<10
Total Sulphate as SO_4 mg/kg	158
Sulphide mg/kg	<10
Sulphur (Free) mg/kg	<10
Arsenic total mg/kg	13
W/S Boron mg/kg	0.7
Cadmium total mg/kg	<0.2
Chromium total mg/kg	63
Copper total mg/kg	30
Lead total mg/kg	21
Mercury total mg/kg	<0.5
Nickel total mg/kg	28
Zinc total mg/kg	64
Total Phenols (Monohydric) mg/kg	<0.5
EPH (C10-C40) mg/kg	<10

[redacted]

RW Brown Director

Samples are kept for a period of one month from the report date.

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TEST CERTIFICATE FOR CONTAMINANT ANALYSIS OF SOILS

LABORATORY REFERENCE :	21/22302/11
CLIENT :	Holcon Group Ltd
ADDRESS :	93 High Street, Clayton West Huddersfield HD8 9NS
REPORT DATE :	09/03/21
DATE RECEIVED :	19/01/21
IDENTIFICATION :	Soil Samples 10. E2 900mm Depth
TEST METHOD :	UKA approved sub-contracted USEPA priority pollutant standard methods.

RESULTS :

Sample Reference	10
Naphthalene mg/kg	<0.02
Acenaphthylene mg/kg	<0.02
Acenaphthene mg/kg	<0.02
Fluorene mg/kg	<0.02
Phenanthrene mg/kg	<0.02
Anthracene mg/kg	<0.02
Fluoranthene mg/kg	0.04
Pyrene mg/kg	0.03
Benzo (a) anthracene mg/kg	<0.02
Chrysene mg/kg	<0.03
Benzo (b) fluoranthene mg/kg	0.02
Benzo (k) fluoranthene	<0.03
Benzo (a) pyrene	<0.02
Indeno (1,2,3-cd) pyrene	<0.02
Dibenz (a,h) anthracene	<0.02
Benzo (g,h,i) perylene	<0.34
Total EPA-16 PAH's mg/kg	33.2

[redacted]

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TEST CERTIFICATE FOR CONTAMINANT ANALYSIS OF SOILS

LABORATORY REFERENCE :	21/22302/12
CLIENT :	Holcon Group Ltd
ADDRESS :	93 High Street, Clayton West Huddersfield HD8 9NS
REPORT DATE :	09/03/21
DATE RECEIVED :	19/01/21
IDENTIFICATION :	Soil Samples 10. E2 900mm Depth

TEST METHOD : UKA approved sub-contracted

RESULTS :

Sample Reference	10
Aliphatic >C5 – C6 mg/kg	<0.1
Aliphatic >C6 – C8 mg/kg	<0.1
Aliphatic >C8 – C10 mg/kg	<0.1
Aliphatic >C10 – C12 mg/kg	<4
Aliphatic >C12 – C16 mg/kg	<4
Aliphatic >C16 – C35 mg/kg	<4
Aliphatic >C35 – C44 mg/kg	<10
Aromatic >C5 – C7 mg/kg	<0.01
Aromatic >C7 – C8 mg/kg	<0.01
Aromatic >C8 – C10 mg/kg	<0.01
Aromatic >C10 – C12 mg/kg	<1
Aromatic >C12 – C16 mg/kg	<1
Aromatic >C16 – C21 mg/kg	<1
Aromatic >C21 – C35 mg/kg	<1
Aromatic >C55 – C44 mg/kg	<1

[redacted]

R W Brown Director

Rogers Geotechnical Services: Soil Screening Values Comparison Sheet

The Ground Investigation Specialists

Rogers Geotechnical Services Ltd		Soil Screening Value (SSV) Comparison Sheet										
Job Number	C1465/21/E/2362	A = WS Atkins PLC, Atrisk Soil Screening Values. A+ = Values updated June 2017. A* = Atrisk's SSV is lower than Chemtest's detectable limit for this compound. B = health criterion values, which are available from toxicological reviews published in the C4SL project methodology report. C = Category 4 Screening Levels (C4SLs) based on 6% soil organic matter. D = Value provided is based on Methyl Mercury. Should elemental mercury be observed or a source be known then a										*Results tested as total.
Job Name	Acorn Way, Grimethorpe											
Date	18/03/21											
Client	Holcon Group Ltd											

KEY

- Exceeds SSV
- Exceeds 2017, Below 2015
- Below limit of detection (LOD)

Determinand	Units	Ref	LOD	Residential With Plant Uptake 1%		Sample Location	A1	A2	B1	B2	C1	C2	D1	D2	E1	E2
				Atrisk 2015 (No Free Product	Atrisk 2017	Depth Top	0.3	0.9	0.3	0.9	0.3	0.9	0.3	0.9	0.3	0.9
						Depth Base										
ACM Type			N/A													
Asbestos Identification	%		0.001				None	None	None	None	None	None	None	None	None	None
ACM Detection Stage			N/A													
Moisture	%		0.020													
Soil Colour			N/A													
Other Material			N/A													
Soil Texture			N/A													
pH			N/A				6.8	6.9	7	7.3	6.9	7.2	6.9	7.3	7.1	6.9
Sulphate (2:1 Water Soluble) as SO4	g/l		0.010													
Cyanide (Free)*	mg/kg	A	0.50		34		<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Sulphate (Total)	%		0.010													
Arsenic	mg/kg	C	1.0		37		36	12	18	16	33	15	21	12	20	13
Cadmium	mg/kg	C	0.10		22.1		1.2	0.2	0.7	0.6	0.9	<0.2	0.8	0.2	0.8	<0.2
Copper	mg/kg	A+	0.50		4730		88	19	53	29	75	19	43	22	53	30
Mercury	mg/kg	A/D	0.10		8.81		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel	mg/kg	A+	0.50		136		44	24	39	22	33	20	23	24	40	28
Lead	mg/kg	C	0.50		200		145	28	133	50	133	32	94	38	142	21
Selenium	mg/kg	A	0.20		375											
Vanadium	mg/kg	A+	5.0		136											
Zinc	mg/kg	A+	0.50		20000		421	102	220	202	442	89	420	149	333	64
Chromium (Hexavalent)*	mg/kg	B/C	0.5	20.5	3.62											
Organic Matter	%		0.40													
Aliphatic TPH >C5-C6	mg/kg	A+	1.0		42.7		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatic TPH >C6-C8	mg/kg	A+	1.0		99.3		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.4	<0.1
Aliphatic TPH >C8-C10	mg/kg	A+	1.0		13.9		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.4	<0.1
Aliphatic TPH >C10-C12	mg/kg	A+	1.0	81.7	49.9		<4	<4	<4	<4	<4	5	<4	<4	<4	<4
Aliphatic TPH >C12-C16	mg/kg	A+	1.0	385	20.9		9	<4	<4	<4	16	7	<4	<4	4	<4
Aliphatic TPH >C16-C21	mg/kg	A+	1.0		210000											
Aliphatic TPH >C21-C35	mg/kg	A+	1.0		210000											
Aliphatic TPH >C35-C44	mg/kg		1.0													
Total Aliphatic Hydrocarbons	mg/kg		5.0													
Aromatic TPH >C5-C7	mg/kg	A+	1.0		0.137		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatic TPH >C7-C8	mg/kg	A+	1.0		113		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatic TPH >C8-C10	mg/kg	A+	1.0		20.5		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aromatic TPH >C10-C12	mg/kg	A+	1.0		70		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Aromatic TPH >C12-C16	mg/kg	A+	1.0	165	155		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Aromatic TPH >C16-C21	mg/kg	A+	1.0		319		16	1	8	4	14	<1	23	<1	13	<1
Aromatic TPH >C21-C35	mg/kg	A+	1.0		1120		16	1	8	4	12	<1	17	<1	12	<1
Aromatic TPH >C35-C44	mg/kg		1.0				3	<1	<1	<1	2	<1	3	<1	2	<1
Total Aromatic Hydrocarbons	mg/kg		5.0													
Total Petroleum Hydrocarbons	mg/kg		10.0													
Naphthalene	mg/kg	A+	0.10		0.829		0.87	0.08	0.29	0.19	0.87	0.16	0.52	<0.02	0.48	<0.02
Acenaphthylene	mg/kg		0.10													
Acenaphthene	mg/kg	A+	0.10	608	157		0.1	<0.02	0.07	<0.02	0.09	<0.02	0.13	<0.02	0.12	<0.02
Fluorene	mg/kg	A+	0.10		735		0.17	<0.02	0.08	0.05	0.18	<0.02	0.51	<0.02	0.17	<0.02
Phenanthrene	mg/kg		0.10													
Anthracene	mg/kg	A+	0.10		10200		0.69	0.03	0.31	0.15	0.62	<0.02	1.82	<0.02	0.55	<0.02
Fluoranthene	mg/kg	A+	0.10		983		5.97	0.29	3	1.24	5.07	0.07	8.21	0.03	4.62	0.04
Pyrene	mg/kg	A+	0.10		668		5.2	0.27	2.61	1.06	4.25	0.06	6.67	0.03	4.02	0.03
Benzo[a]anthracene	mg/kg	A	0.10	4.52	1.71		2.61	0.12	1.28	0.52	1.92	0.03	2.99	<0.02	1.83	<0.02
Chrysene	mg/kg	A	0.10	585	0.44		2.99	0.16	1.45	0.62	2.38	0.05	3.31	<0.03	2.21	<0.03
Benzo[b]fluoranthene	mg/kg	A	0.10	7.72	1.22		3.42	0.16	1.57	0.67	2.5	0.05	3.18	<0.02	2.3	0.02
Benzo[k]fluoranthene	mg/kg	A	0.10	84.4	0.686		1.33	0.06	0.68	0.23	1.63	0.04	1.32	<0.03	0.99	<0.02
Benzo[a]pyrene	mg/kg	B/C	0.10	4.95	1.51		2.48	0.12	1.08	0.43	1.71	0.02	2.48	<0.02	1.8	<0.02

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Rogers Geotechnical Services: Soil Screening Values Comparison Sheet

Indeno(1,2,3-c,d)Pyrene	mg/kg	A*	0.10	7.31	0.0614	2.22	0.12	1.1	0.44	1.63	0.04	2.11	<0.02	1.61	<0.02
Dibenz(a,h)Anthracene	mg/kg	A	0.10	0.838	0.00393	0.38	0.02	0.19	0.07	0.3	<0.02	0.37	<0.02	0.24	<0.02
Benzo[g,h,i]perylene	mg/kg	A	0.10	96.2	0.0187	1.81	0.1	0.9	0.37	1.35	0.2	1.74	<0.02	1.3	<0.34
Total Of 16 PAH's	mg/kg		2.0												
Total Phenols	mg/kg	A	0.30		267	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	<0.5	<0.5

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