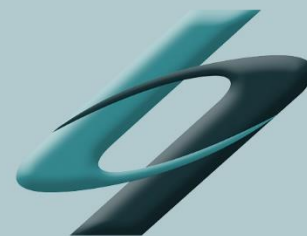
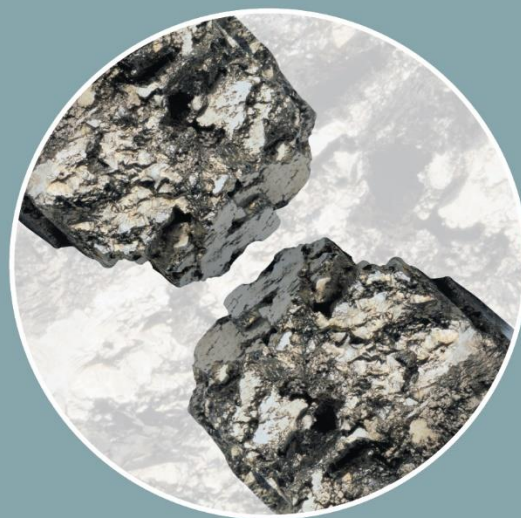


**Document:** Remediation Verification Report  
**Project:** Needham Market Quarry  
**Reference No.:** GN17820\_RV14  
**Date:** September 2019  
**Prepared for:** Hopkins Homes Limited



**harrison**geotechnical  
**ENGINEERING**



## HARRISON GROUP ENVIRONMENTAL LIMITED

**Document:** Remediation Verification Report

**Project:** Needham Market Quarry

**Reference No.:** GN17820\_RV14

**Date:** September 2019

**Prepared For:** Hopkins Homes Limited

**REPORT STATUS:**

Revision	Comments	Prepared By	Approved By	Issued By	Audited By
0	first issue	INIT MR SIGN  COMMENTS DATE 27/09/19	INIT JA SIGN  COMMENTS DATE 27/09/19	INIT MR SIGN  COMMENTS DATE 27/09/19	INIT JA SIGN  COMMENTS DATE 27/09/19
		INIT SIGN  COMMENTS DATE	INIT SIGN  COMMENTS DATE	INIT SIGN  COMMENTS DATE	INIT SIGN  COMMENTS DATE
		INIT SIGN  COMMENTS DATE	INIT SIGN  COMMENTS DATE	INIT SIGN  COMMENTS DATE	INIT SIGN  COMMENTS DATE
		INIT SIGN  COMMENTS DATE	INIT SIGN  COMMENTS DATE	INIT SIGN  COMMENTS DATE	INIT SIGN  COMMENTS DATE

This sheet is to be kept in Report file.

Auditors to insert their comments on the table, to annotate the report itself or provide comments on a separate sheet. (Please state which)

For final reports a hard copy of the signed off form will be kept on the appropriate QA file.

## CONTENTS

### FOREWORD

<b>1</b>	<b>TERMS OF REFERENCE &amp; INTRODUCTION</b>	<b>1</b>
<b>2</b>	<b>BACKGROUND INFORMATION</b>	<b>1</b>
2.1	Verification Report Structure	1
2.2	Site Setting, History and Investigation	1
<b>3</b>	<b>SOIL REMEDIATION</b>	<b>2</b>
3.1	Cover System Material	3
3.1.1	Site Won Subsoil	3
3.1.2	Imported Topsoil	3
3.2	Soil Sampling and Analysis	4
<b>4</b>	<b>CONCLUSION</b>	<b>5</b>

### APPENDICES – Supporting Documentation

Photographic Evidence  
Soil Chemical Analysis Reports  
Trial Pit Logs  
Remediation Plans and Drawings

## FOREWORD

### General Conditions Relating To a Verification Report

This investigation has been devised to generally comply with the relevant principles and requirements of B.S.10175:2011+A2:2017 'Investigation of potentially contaminated sites - Code of practice', science report SC050021/SR3 'Updated Technical Background to the CLEA Model' (Environment Agency, 2008), and DEFRA/Environment Agency (EA), 2019 'land contamination: risk management'. The recommendations made and opinions expressed in this report are based on the information obtained from the sources described using a methodology intended to provide reasonable consistency and robustness.

The opinions expressed in this report are based on the ground conditions revealed by the site works, together with an assessment of the site and of laboratory test results. Whilst opinions may be expressed relating to sub-soil conditions in parts of the site not investigated, for example between exploratory positions, these are only for guidance and no liability can be accepted for their accuracy.

Boring and sampling procedures are undertaken in accordance with B.S.5930:2015 'Code of Practice for Site Investigations'. Likewise, in-situ and laboratory testing complies with B.S.1377:1990 'Methods of Tests for Soils for Civil Engineering Purposes' and B.S.22475:2011, unless stated otherwise in the text. Chemical testing has been undertaken by a UKAS accredited laboratory.

Some items of the investigation have been provided by third parties and whilst Harrison Group have no reason to doubt the accuracy, the items relied on have not been verified. No responsibility can be accepted for errors within third party items presented in this report.

This report is produced for the benefit of the client alone. No responsibility can be accepted for any consequences of this information being passed to a third party who may act upon its contents/recommendations.

**VERIFICATION REPORT**  
**FOR REMEDIAL ACTIVITY**  
**AT**  
**NEEDHAM MARKET QUARRY**

## **1 TERMS OF REFERENCE & INTRODUCTION**

The work covered by this document was undertaken on behalf of Hopkins Homes Ltd, in accordance with an emailed instruction to proceed from Hopkins Homes Ltd dated 3<sup>th</sup> October 2018.

The work described in this report represents validation and verification of remediation comprising a suitable soil cover system (600mm of combined subsoil and topsoil, with a minimum thickness of topsoil to be 150mm) to the back and front gardens of plot 167 and 168. A remediation method statement (RMS) for the site was compiled and provided for the client to submit to the regulatory authorities in December 2017. The RMS (reference GN17820\_RMS1) detailed the method of remediation to be undertaken, based on the ground investigations and assessment previously completed. We believe that the RMS was issued to Mid Suffolk District Council and the NHBC for their review and comment on the planned remediation.

The plots which require validation of the suitability of the soils in gardens and soft landscaping can be identified in drawing GN17820\_DR402 (appended to this VR), which highlights the development phasing plan (phases 1A, 1B, 2 and 3). Specifically, plots which require confirmation of the suitability of the near-surface soils, and the need for a soil cover, includes plot numbers 1-136, 161-170, 184-193, 197-211, 218-266 and soft landscaping areas in these development phases.

Subsequent remediation verification reports are in production for additional affected plots/areas, as each area is remediated.

## **2 BACKGROUND INFORMATION**

### **2.1 Verification Report Structure**

This document has been set out as follows:

- A brief background of the site, the findings of previous investigations and nature of the remediation planned.
- A description of the activities undertaken.
- Details of soil sampling undertaken to date.
- Concluding with an assessment of the suitability for reuse.

Appended to this document is supporting evidence as follows:

- Photographs taken during the verification of the suitability of the cover system material.
- Chemical analysis of the material used within the cover system (topsoil and subsoil).

### **2.2 Site Setting, History and Investigation**

Harrison Group Environmental Limited (HGE) provided ground investigation for Hopkins Homes (HH) under the direction of Coffey Geotechnics Limited (CG) as part of their interpretative report on contamination and geotechnical aspects of the former chalk quarry, which was completed to provide HH with information for their development prior to acquiring the site. Reference should be made to CG report (reference 02095AA\_R\_003A-InterpReport v6, dated 23<sup>rd</sup> May 2014). Part of CG recommendations were for ground improvement in parts of the site, where deep fill material was placed as part of quarrying activity, and for two zones to require ground gas protection measures.

HGE were contacted by HH in 2017 to assess the ground gas regime during and after earthworks, and to assess the exposure of made ground soils by their earthworks contractor (Breheny Civil Engineering) when they removed approximately 2m thickness of surcharge toward the conclusion of ground improvement. We were also asked to consider the suitability of topsoil and subsoil stockpiled by Breheny Civil Engineering (BCE) as part of earthworks for reuse within the development.

The HGE report on the ground gas regime (reference GN17820\_SI\_GGrev1, dated November 2017) should be referred to for the details. In summary, the concentrations of ground gases were not found to significantly differ during or after earthworks. The two zones requiring protection measures to CS2 in accordance with BS8485 were refined to specifically include plots 109-111, 116 and 121-126 in zone 1 and plots 1, 230, 234-239, 240-249, 251-256, 265 and 266 in zone 2. Drawing GN17820\_DR104 (appended to the RMS document) identifies the two zones referred to and the plots affected.

HGE report on the suitability of identified soil for use within the residential development (GN17820\_SI\_Soilrev1, also dated November 2017) should be referred to for details. Based on the available ground investigation information the quarry backfill material was generally found to comprise reworked glacial drift and structureless chalk but was also noted to include some organic soils with low levels of PAH compounds in some soil samples analysed. It was considered likely that where the darker organic/ashy material was encountered it may potentially be unsuitable to remain where exposed in the near surface of domestic gardens. These areas approximately correspond to development phases 1B and 2, but may extend to areas within phase 3. It was recommended that where unsuitable material is exposed or is present within the near surface of domestic gardens and soft landscaping areas, that a suitable soil cover system is implemented. In order to determine the affected gardens and soft landscaping areas, it was proposed that HGE undertake shallow trial pit excavations.

A stockpile of topsoil (S02) was imported from Hopkins Homes' Bramford site during the summer of 2018. The topsoil was considered physically suitable for reuse in gardens with chemical analysis of this material confirming its chemical suitability. There was a minimal amount of anthropogenic content to the stockpiled topsoil, which was inert and does not present a significant risk to end users, but may be physically undesirable. It was recommended that this material is removed from topsoil planned for use in gardens and areas of public open space, where observed during moving and placing the topsoil.

A remediation method statement (RMS) for the site was compiled following completion of the site investigation works and submitted to the regulatory authorities in December 2017 (reference GN17820\_RMS1). The method for ensuring soil suitability is detailed in sections 4, 5 and 6 of the RMS. Section 3 within the RMS document details the need for gas protection measures. HH have confirmed that gas protection measures are being installed where required (which includes plot 239) and verification of these works is being undertaken by others.

The plots which require validation of the suitability of the soils in gardens and soft landscaping can be identified in drawing GN17820\_DR402 (appended to this VR), which highlights the development phasing plan (phases 1A, 1B, 2 and 3). Specifically, plots which require investigation before the suitability of the near-surface soils (and the need for a soil cover) can be confirmed includes plot numbers 1-136, 161-170, 184-193, 197-211, 218-266 and soft landscaping areas in these development phases.

### **3 SOIL REMEDIATION**

As described above, the verification process was to comprise confirmation that there is sufficient thickness of suitable cover soil within the garden areas of plots 1-136, 161-170, 184-193, 197-211, 218-266 and soft landscaping areas in these development phases, as indicated on drawing GN17820\_DR402 within the appendix. The work described in this report represents validation and verification of remediation comprising a suitable soil cover system (subsoil and topsoil) to the back and front gardens of plots 167 and 168.

An engineer from HGE visited site on 02/09/19 to undertake hand dug trial pits within the front and rear gardens of plots 167 and 168 to confirm that suitable topsoil and subsoil was present in the gardens. During the visit, two main observations were made –

- Topsoil was yet to be put down in the front gardens of plot 167.
- A darker subsoil, with an appearance like that of previously identified unsuitable material, was logged in the back garden of plot 168. This was described as grey to dark grey slightly gravelly silty fine to

medium sand. The gravel was sub-angular to sub-rounded fine to medium flint. This material was considered to be potentially unsuitable for use in the cover system.

A return visit to site was completed on the 20/09/19 to delineate the extent of the darker subsoil identified in the rear garden of plot 168, to obtain samples of this material to submit for chemical testing and to complete verification of the front gardens of plot 167. Six hand dug trial pits were excavated in the area immediately surrounding where the potentially unsuitable material was identified, with two additional pits in the back garden of plot 168, to provide good coverage. The darker subsoil was identified in two trial pits (HDTP168-02b and DTP168-02c) and the extent of this material was successfully delineated.

Two trial pits were also excavated in the front gardens of plot 167. The following sections of this report outline the remediation completed for plots 167 and 168.

### **3.1 Cover System Material**

The material used for the front and back gardens of plots 167 and 168 included site won subsoil and imported topsoil (from previously verified stockpile S02 as mentioned in section 2.2 of this report), as well as the darker potentially unsuitable material.

The fieldwork locations are shown on drawing GN17820-DR502u included within the appendix. These were undertaken to record the thickness and physical descriptions of the materials present and to confirm their suitability.

Photo sheet 1 included in the appendix records the validation process, including the records of the thicknesses of the cover system.

#### **3.1.1 Site Won Subsoil**

The material was generally described as a combination of;

- Made Ground (reworked chalk) - Cream slightly gravelly silty fine to medium sand. Gravel is fine to medium angular to subrounded flint, with rare fine to medium concrete and brick.
- Made Ground – Orange mottled grey, cream mottled brown or greyish brown slightly to very gravelly slightly clayey fine to coarse sand. Gravel included fine to medium subangular to subrounded flint, chalk, brick and concrete.
- Made Ground - Grey to dark grey slightly gravelly silty fine to medium sand. The gravel was sub-angular to sub-rounded fine to medium flint (suspected potentially unsuitable material).
- Structureless Chalk composed of cream slightly gravelly silt. Gravel is weak low density subangular to subrounded fine to medium cream chalk with subangular to subrounded fine to medium flint.

With the exception of the grey to dark grey sand, the material encountered was considered satisfactory for use as subsoil from visual inspection. Samples of the potentially unsuitable material were taken and scheduled for chemical testing to confirm their suitability.

#### **3.1.2 Imported Topsoil**

Topsoil from stockpile S02 (imported from Hopkins Homes' Bramford Site) was previously considered suitable for reuse in gardens and chemical analysis of this material has confirmed its suitability. The results of the chemical analysis are appended to this report. The material was previously deemed physically suitable for use as a topsoil, as the soil appeared to be an appropriate consistency for use in garden areas. The material within S02 was described as dark brown slightly gravelly slightly silty sand with fine to medium subangular to subrounded flint. A total of ten samples were submitted to a laboratory in May 2019 for testing of a general suite of contaminants and an asbestos screen. No asbestos was detected, and the levels of all other contaminants were below the screening criteria adopted at the time.

The material was described (during the verification works) as dark brown slightly gravelly to gravelly silty fine to medium sand. Gravel is subangular to subrounded fine to medium flint and rare brick fragments. This recent description is consistent with the previous description, allowing for some variability, and therefore has been confirmed as the same material.

This material was used for the topsoil (ground level up to 300mm depth) within the all pits excavated in plots 167 and 168. The minimum thickness of 150mm of topsoil was encountered in all of the trial pits during the verification exercise.

### 3.2 Soil Sampling and Analysis

During a site visit on the 20/09/19, two soil samples from each location where the potentially unsuitable subsoil was encountered, were submitted for chemical testing. These samples were scheduled for a general suite of contaminants including heavy metals, polycyclic aromatic hydrocarbons (PAH), petroleum hydrocarbons (TPH) and an asbestos screen.

The results of this chemical analysis are appended to this report (19-61945-1) and summarised in table 3.2 below. As defined by the RMS the detected concentrations have been compared to soil screening values (S4UL and C4SL) for a residential land use with home grown produce.

Determinant	Maximum recorded concentration (mg/kg) – Range provided for TOC	S4UL and C4SL* for residential use with home grown produce (mg/kg)	Exceeded (Location and depth below ground level)
Asbestos	Not detected	-	No
Arsenic	12	37	No
Boron	1.5	290	No
Cadmium	<0.2	11	No
Chromium (VI)	<4.0	6	No
Chromium (III)	11	910	No
Copper	20	2400	No
Lead	40	200*	No
Mercury	Inorganic	No	No
	Elemental	<0.3	No
	Methylmercury	No	No
Nickel	12	130	No
Selenium	<1.0	250	No
Zinc	80	3700	No
Total Organic Carbon (%)	1.1 - 1.2	-	-
Naphthalene	<0.05	2.3	No
Acenaphthylene	<0.05	170	No
Acenaphthene	<0.05	210	No
Fluorene	0.16	170	No
Phenanthrene	1.5	95	No
Anthracene	0.38	2400	No
Fluoranthene	2.4	280	No
Pyrene	2.1	620	No
Benzo(a)anthracene	1.4	7.2	No
Chrysene	1.1	15	No
Benzo[b]fluoranthene	1.1	2.6	No
Benzo[k]fluoranthene	0.65	77	No
Benzo(a)pyrene	1.1	2.2	No
Indeno[1,2,3-cd]pyrene	0.50	27	No
Dibenzo(ah)anthracene	<0.05	0.24	No
Benzo[ghi]perylene	0.57	320	No
Benzene	<0.001	0.087	No
Toluene	<0.001	130	No
Ethylbenzene	<0.001	47	No
O-Xylene	<0.001	60	No
P & M-Xylene	<0.001	56	No
Methyl Tertiary Butyl Ether	<0.001	-	No
C5-6 Aliphatic	<0.001	42	No



Determinant	Maximum recorded concentration (mg/kg) – Range provided for TOC	S4UL and C4SL* for residential use with home grown produce (mg/kg)	Exceeded (Location and depth below ground level)
C6-8 Aliphatic	<0.001	100	No
C8-10 Aliphatic	<0.001	27	No
C10-12 Aliphatic	<1.0	130	No
C12-16 Aliphatic	<2.0	1100	No
C16-21 Aliphatic	<8.0	65000	No
C21-35 Aliphatic	<8.0		No
C5-7 Aromatic	<0.001	70	No
C7-8 Aromatic	<0.001	130	No
C8-10 Aromatic	<0.001	34	No
C10-12 Aromatic	<1.0	74	No
C12-16 Aromatic	<2.0	140	No
C16-21 Aromatic	<10	260	No
C21-35 Aromatic	29	1100	No

**Table 3.2:** Summary of soil chemical analysis for validation samples from rear garden of Plot 168.

The table shows that the detected concentrations of each contaminant were below the generic assessment criteria (C4SL and S4UL), and were therefore considered suitable for use. No asbestos was detected within any of the samples, the darker subsoil material was therefore considered suitable for use.

#### 4 CONCLUSIONS

Harrison Group Environmental Limited considers that a suitable cover system of suitable thickness, comprising chemically and physically suitable material, has been implemented. We are satisfied that there will be no significant risk to human health from residual contamination in plots 167 and 168 at the development known as Needham Market Quarry.

This report should be submitted to the regulators in order to conclude the remediation process.

Plots 161-166, 169, 170, 218-239 have previously been validated. The requirement for remediation in other plots is currently being assessed and the remediation undertaken as appropriate. Further remediation verification reports are in production for additional affected plots/areas on the whole development, as each area is built and remediated. These include plots 1-136, 184-193, 197-211, 240-266 and soft landscaping areas in these development phases.

Report by:



Mark Rivett BSc (Hons.) FGS  
Senior Geoenvironmental Engineer

Checked and approved by:



Jon Archer BA (hons.) MA FGS FRGS  
Associate Director

## **APPENDICES – Supporting Documentation**

Photographic Evidence:	Photo sheet 1
Chemical Analysis Reports:	19-41738-1
	19-61945-1
Hand Dug Trial Pit Logs	HDTP167-01 to HDTP167-04
	HDTP168-01 to HDTP168-06
Drawings:	GN17820-DR402
	GN17820-DR502t

**GN17820 – Needham Market Quarry  
Verification Report 14 - Photo Sheet 1**



**Photographs 1 - 4**, taken on the 2<sup>nd</sup> September 2019, showing the depth and nature of subsoil and topsoil within the garden areas of plot 167 (HOTP167-01 and HOTP167-02) and the arisings generated.



**Photographs 5 and 6**, taken on the 20<sup>th</sup> September 2019, showing the depth of the darker subsoil materials within the rear garden of plot 168 (HDTP168-02b). Chemical testing confirmed the suitability of these soils.



**Photographs 7 and 8**, taken on the 2<sup>nd</sup> September 2019, showing the depth and nature of subsoil and topsoil within the garden areas of plot 168 (HDTP168-03) and the arisings generated.



**Jamie Cushing**  
Harrison Group  
Kimbeley Street Norwich  
NR2 2RJ

**t:** 01603 613111  
**f:** 01603 618120  
**e:** jamiec@harrisingroupuk.com

i2 Analytical Ltd.  
7 Woodshots Meadow,  
Croxley Green  
Business Park,  
Watford,  
Herts,  
WD18 8YS

**t:** 01923 225404  
**f:** 01923 237404  
**e:** reception@i2analytical.com

## **Analytical Report Number : 19-41738**

<b>Project / Site name:</b>	Needham Market Quarry	<b>Samples received on:</b>	17/05/2019
<b>Your job number:</b>	GN17820	<b>Samples instructed on:</b>	17/05/2019
<b>Your order number:</b>	GN17820-33605-JC	<b>Analysis completed by:</b>	24/05/2019
<b>Report Issue Number:</b>	1	<b>Report issued on:</b>	24/05/2019
<b>Samples Analysed:</b>	10 soil samples		

**Signed:** 

Zina Abdul Razzak  
Senior Quality Specialist  
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

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

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

Analytical Report Number: 19-41738

Project / Site name: Needham Market Quarry

Your Order No: GN17820-33605-JC

Lab Sample Number	1224213	1224214	1224215	1224216	1224217			
Sample Reference	SO2-01	SO2-02	SO2-03	SO2-04	SO2-05			
Sample Number	1	1	1	1	1			
Depth (m)	0.00-0.50	0.00-0.50	0.00-0.50	0.00-0.50	0.00-0.50			
Date Sampled	15/05/2019	15/05/2019	15/05/2019	15/05/2019	15/05/2019			
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	25	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	8.8	7.6	8.8	8.7	9.4
Total mass of sample received	kg	0.001	NONE	0.47	0.50	0.48	0.49	0.49

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

#### General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	8.1	9.0	7.9	7.8
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.8	0.8	0.8	0.8	0.8

#### Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.64	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.87	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.83	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.46	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.26	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.26	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.19	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.18	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

#### Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	3.69	< 0.80	< 0.80
-----------------------------	-------	-----	--------	--------	--------	------	--------	--------

#### Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	5.2	10	14	7.2	6.5
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2	1.3	1.0	1.2	1.1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	11	11	8.7	12	13
Copper (aqua regia extractable)	mg/kg	1	MCERTS	15	16	18	13	14
Lead (aqua regia extractable)	mg/kg	1	MCERTS	28	25	25	25	24
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	10	11	11	11	11
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	1.2
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	40	39	55	37	38

Analytical Report Number: 19-41738

Project / Site name: Needham Market Quarry

Your Order No: GN17820-33605-JC

Lab Sample Number	1224213	1224214	1224215	1224216	1224217
Sample Reference	SO2-01	SO2-02	SO2-03	SO2-04	SO2-05
Sample Number	1	1	1	1	1
Depth (m)	0.00-0.50	0.00-0.50	0.00-0.50	0.00-0.50	0.00-0.50
Date Sampled	15/05/2019	15/05/2019	15/05/2019	15/05/2019	15/05/2019
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

#### Monoaromatics & Oxygenates

Compound	Units	Limit of detection	Accreditation Status	1224213	1224214	1224215	1224216	1224217
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

#### Petroleum Hydrocarbons

TPH-CWG - Aliphatic > EC5 - EC6	mg/kg	Limit of detection	Accreditation Status	1224213	1224214	1224215	1224216	1224217
TPH-CWG - Aliphatic > EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic > EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic > EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic > EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic > EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic > EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic > EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
<b>TPH-CWG - Aliphatic (EC5 - EC35)</b>	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic > EC5 - EC7	mg/kg	Limit of detection	Accreditation Status	1224213	1224214	1224215	1224216	1224217
TPH-CWG - Aromatic > EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic > EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic > EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic > EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic > EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic > EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic > EC21 - EC35	mg/kg	10	MCERTS	15	14	13	< 10	< 10
<b>TPH-CWG - Aromatic (EC5 - EC35)</b>	mg/kg	10	MCERTS	19	18	19	< 10	< 10

Analytical Report Number: 19-41738

Project / Site name: Needham Market Quarry

Your Order No: GN17820-33605-JC

Lab Sample Number	1224218	1224219	1224220	1224221	1224222			
Sample Reference	SO2-06	SO2-07	SO2-08	SO2-09	SO2-10			
Sample Number	1	1	1	1	1			
Depth (m)	0.00-0.50	0.00-0.50	0.00-0.50	0.00-0.50	0.00-0.50			
Date Sampled	15/05/2019	15/05/2019	15/05/2019	15/05/2019	15/05/2019			
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	8.9	9.0	8.5	9.4	11
Total mass of sample received	kg	0.001	NONE	0.51	0.51	0.50	0.58	0.59

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

#### General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7	7.8	8.0	7.5	7.8
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.9	0.7	0.7	0.9	0.8

#### Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

#### Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80
-----------------------------	-------	-----	--------	--------	--------	--------	--------	--------

#### Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.5	11	12	9.1	8.7
Boron (water soluble)	mg/kg	0.2	MCERTS	1.1	1.1	1.1	0.9	1.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	11	14	9.2	11	13
Copper (aqua regia extractable)	mg/kg	1	MCERTS	13	14	15	11	12
Lead (aqua regia extractable)	mg/kg	1	MCERTS	24	23	22	24	23
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	0.6	0.5	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	10	11	11	10	11
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	37	35	31	35	37





4041



Environmental Science

Analytical Report Number: 19-41738

Project / Site name: Needham Market Quarry

Your Order No: GN17820-33605-JC

Lab Sample Number				1224218	1224219	1224220	1224221	1224222
Sample Reference				SO2-06	SO2-07	SO2-08	SO2-09	SO2-10
Sample Number				1	1	1	1	1
Depth (m)				0.00-0.50	0.00-0.50	0.00-0.50	0.00-0.50	0.00-0.50
Date Sampled				15/05/2019	15/05/2019	15/05/2019	15/05/2019	15/05/2019
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
				<b>Monoaromatics &amp; Oxygenates</b>				
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

**Petroleum Hydrocarbons**

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

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

**Analytical Report Number : 19-41738**

**Project / Site name: Needham Market Quarry**

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1224213	SO2-01	1	0.00-0.50	Brown loam and sand with vegetation and gravel.
1224214	SO2-02	1	0.00-0.50	Brown loam and sand with gravel and stones.
1224215	SO2-03	1	0.00-0.50	Brown loam and sand with gravel.
1224216	SO2-04	1	0.00-0.50	Brown loam and sand with vegetation and gravel.
1224217	SO2-05	1	0.00-0.50	Brown loam and sand with vegetation and gravel.
1224218	SO2-06	1	0.00-0.50	Brown loam and sand with vegetation and gravel.
1224219	SO2-07	1	0.00-0.50	Brown loam and sand with vegetation and gravel.
1224220	SO2-08	1	0.00-0.50	Brown loam and sand with gravel.
1224221	SO2-09	1	0.00-0.50	Brown loam and sand with vegetation and gravel.
1224222	SO2-10	1	0.00-0.50	Brown loam and sand with gravel.



4041



Environmental Science

Analytical Report Number : 19-41738

Project / Site name: Needham Market Quarry

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L0738-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests"	L009-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

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

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

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



**Jamie Cushing**  
Harrison Group  
Kimbeley Street  
Norwich  
NR2 2RJ

**t:** 01603 613111  
**f:** 01603 618120  
**e:** jamiec@harrisingroupuk.com

i2 Analytical Ltd.  
7 Woodshots Meadow,  
Croxley Green  
Business Park,  
Watford,  
Herts,  
WD18 8YS

**t:** 01923 225404  
**f:** 01923 237404  
**e:** reception@i2analytical.com

## **Analytical Report Number : 19-61945**

<b>Project / Site name:</b>	Needham Market Quarry	<b>Samples received on:</b>	23/09/2019
<b>Your job number:</b>	GN17820	<b>Samples instructed on:</b>	23/09/2019
<b>Your order number:</b>	GN17820-JC	<b>Analysis completed by:</b>	26/09/2019
<b>Report Issue Number:</b>	1	<b>Report issued on:</b>	26/09/2019
<b>Samples Analysed:</b>	4 soil samples		

**Signed:** 

Zina Abdul Razzak  
Senior Quality Specialist  
**For & on behalf of i2 Analytical Ltd.**

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

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

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

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

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

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



Analytical Report Number: 19-61945

Project / Site name: Needham Market Quarry

Your Order No: GN17820-JC

Lab Sample Number	10946		10947		10948		10949	
Sample Reference	HOTP 168-02b		HOTP 168-02b		HOTP 168-02c		HOTP 168-02c	
Sample Number	1		2		1		2	
Depth (m)	0.50		0.60		0.40		0.60	
Date Sampled	20/09/2019		20/09/2019		20/09/2019		20/09/2019	
Time Taken	None Supplied		None Supplied		None Supplied		None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
<b>SOILS</b>								
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	6.8	7.2	5.9	6.1	
Total mass of sample received	kg	0.001	NONE	0.48	0.46	0.48	0.47	

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

**General Inorganics**

pH - Automated	pH Units	N/A	MCERTS	8.4	8.4	8.3	8.3
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.2	1.1	1.2	1.1

**Total Phenols**

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

**Speciated PAHs**

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	0.16
Phenanthrene	mg/kg	0.05	MCERTS	0.24	0.29	0.52	1.5
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.11	0.38
Fluoranthene	mg/kg	0.05	MCERTS	0.67	0.71	1.3	2.4
Pyrene	mg/kg	0.05	MCERTS	0.65	0.67	1.3	2.1
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.45	0.40	0.68	1.4
Chrysene	mg/kg	0.05	MCERTS	0.36	0.40	0.69	1.1
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.44	0.39	0.58	1.1
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.27	0.30	0.45	0.65
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.40	0.41	0.63	1.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.33	0.50
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.44	0.57

**Total PAH**

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	3.48	3.57	6.97	13.0
-----------------------------	-------	-----	--------	------	------	------	------

**Heavy Metals / Metalloids**

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.6	5.4	12	4.5
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.44	0.39	0.41	0.36
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7	1.4	1.4	1.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	11	11	10	11
Copper (aqua regia extractable)	mg/kg	1	MCERTS	20	19	19	16
Lead (aqua regia extractable)	mg/kg	1	MCERTS	40	34	36	36
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	10	11	11	12
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	26	22	26	25
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	80	74	58	66



Analytical Report Number: 19-61945

Project / Site name: Needham Market Quarry

Your Order No: GN17820-JC

Lab Sample Number	10946			10947			10948			10949		
Sample Reference	HOTP 168-02b			HOTP 168-02b			HOTP 168-02c			HOTP 168-02c		
Sample Number	1			2			1			2		
Depth (m)	0.50			0.60			0.40			0.60		
Date Sampled	20/09/2019			20/09/2019			20/09/2019			20/09/2019		
Time Taken	None Supplied			None Supplied			None Supplied			None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status									

**Monoaromatics & Oxygenates**

Compound	Units	Limit of detection	Accreditation Status	10946	10947	10948	10949
Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0

**Petroleum Hydrocarbons**

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

TPH-CWG - Aromatic > EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic > EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic > EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic > EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic > EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic > EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic > EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	13	29
<b>TPH-CWG - Aromatic (EC5 - EC35)</b>	mg/kg	10	MCERTS	< 10	< 10	20	39

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



**Analytical Report Number : 19-61945**

**Project / Site name: Needham Market Quarry**

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
10946	HOTP 168-02	1	0.50	Brown sandy loam with gravel.
10947	HOTP 168-02	2	0.60	Brown sandy loam with gravel.
10948	HOTP 168-02	1	0.40	Brown sandy loam with gravel.
10949	HOTP 168-02	2	0.60	Brown sandy loam with gravel.



**Analytical Report Number : 19-61945**

**Project / Site name: Needham Market Quarry**

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

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L0738-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests <sup>***</sup>	L009-PL	D	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

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

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

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



Sample ID	Other ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name
HDTP 168-02c	1	SOIL	19-61945	10948	b	BTEX and MTBE in soil (Monoaromatics)




test_ref	Test Deviation code
L073B-PL	b

Project ID: <b>GN17820</b>	Client: Hopkins Homes Limited	E: 609453.00	N: 254183.00
Location: Needham Market Quarry	Consultant:		
	Plant used: Hand Dug	Date: 02/09/2019	

Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
				Type	Depth	Results / Remarks	
MADE GROUND. Dark brown slightly gravelly silty fine to medium SAND. Gravel is angular to sub-rounded fine to medium flint with rare fine to medium concrete and brick.		0.30					
MADE GROUND. Greyish brown slightly gravelly very silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to medium flint and chalk. Occasional pockets of silt present.		0.55					
MADE GROUND reworked chalk. Cream slightly sandy gravelly SILT. Gravel is sub-angular to sub-rounded fine to medium flint and chalk.		0.70					
Trial pit terminated at 0.70m.							


Weather: Dry and Sunny	Water Strike				
Pit Stability: Stable	Date	Water Strike (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
Shoring Used:					No groundwater encountered

Pit Dimensions: L: 0.35m x W: 0.30m	Remarks				
Norwich Office: 01603 613111 London Office: 020 7537 9233 Cambridge Office: 01223 781585 Colchester Office: 01206 986675 Testing Services: 01603 416333 E-mail: info@harrisingroupuk.com Website: www.harrisingroupuk.com	1. Backfill: GL to 0.70m arisings. 2. Approximate coordinates.				
	Logged by: JC	Checked by: MR	Fm-Hn-R-3069-Rev E		

Project ID: <b>GN17820</b>	Client: Hopkins Homes Limited	E: 609448.00 N: 254180.00
Location: Needham Market Quarry	Consultant:	
	Plant used: Hand Dug	Date: 02/09/2019

Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
				Type	Depth	Results / Remarks	
MADE GROUND. Dark brown slightly gravelly silty fine to medium SAND. Gravel is angular to sub-rounded fine to medium flint with rare fine to medium concrete and brick.		0.30					
MADE GROUND. Greyish brown slightly gravelly very silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to medium flint and chalk. Rare pockets of silty clay present.		0.70					
Trial pit terminated at 0.70m.							


Weather: Dry and Sunny	Water Strike				
Pit Stability: Stable	Date	Water Strike (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
Shoring Used:					No groundwater encountered

Pit Dimensions: L: 0.35m x W: 0.30m	Remarks				
Norwich Office: 01603 613111 London Office: 020 7537 9233 Cambridge Office: 01223 781585 Colchester Office: 01206 986675 Testing Services: 01603 416333 E-mail: info@harrisingroupuk.com Website: www.harrisingroupuk.com		1. Backfill: GL to 0.70m arisings. 2. Approximate coordinates.			
Logged by: JC			Checked by: MR		Fm-Hn-R-3069-Rev E

Project ID: <b>GN17820</b>	Client: Hopkins Homes Limited	E: 609458.00	N: 254184.00
Location: Needham Market Quarry	Consultant:		
	Plant used: Hand Dug	Date: 20/09/2019	

Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
				Type	Depth	Results / Remarks	
Grass over MADE GROUND. Dark brown gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to medium flint with rare brick. <i>From 0.30m: Becoming structureless chalk.</i> Trial pit terminated at 0.30m.		0.30					


Weather: Dry and Sunny	Water Strike				
Pit Stability: Stable	Date	Water Strike (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
Shoring Used:					No groundwater encountered

Pit Dimensions: L: 0.30m x W: 0.25m	<b>Remarks</b> 1. Backfill: GL to 0.30m arisings. 2. Approximate coordinates.				
Norwich Office: 01603 613111 London Office: 020 7537 9233 Cambridge Office: 01223 781585 Colchester Office: 01206 986675 Testing Services: 01603 416333 E-mail: info@harrisingroupuk.com Website: www.harrisingroupuk.com		Logged by: DM	Checked by: MR	Fm-Hn-R-3069-Rev E	

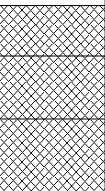

Project ID: <b>GN17820</b>	Client: Hopkins Homes Limited	E: 609456.00	N: 254168.00
Location: Needham Market Quarry	Consultant:		
	Plant used: Hand Dug	Date: 20/09/2019	


Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
				Type	Depth	Results / Remarks	
Grass over TOPSOIL. Dark brown gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to medium flint. <i>From 0.30m: Becoming structureless chalk.</i> Trial pit terminated at 0.30m.		0.30					

Weather: Dry and Sunny	Water Strike				
Pit Stability: Stable	Date	Water Strike (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
Shoring Used:					No groundwater encountered

Pit Dimensions: L: 0.30m x W: 0.25m	Remarks				
Norwich Office: 01603 613111 London Office: 020 7537 9233 Cambridge Office: 01223 781585 Colchester Office: 01206 986675 Testing Services: 01603 416333 E-mail: info@harrisingroupuk.com Website: www.harrisingroupuk.com	1. Backfill: GL to 0.30m arisings. 2. Approximate coordinates.				
	Logged by: DM	Checked by: MR	Fm-Hn-R-3069-Rev E		


Project ID: <b>GN17820</b>	Client: Hopkins Homes Limited	E: 609443.00 N: 254174.00
Location: Needham Market Quarry	Consultant:	
	Plant used: Hand Dug	Date: 02/09/2019

Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
				Type	Depth	Results / Remarks	
<p>MADE GROUND. Dark brown slightly gravelly silty fine to medium SAND. Gravel is angular to sub-rounded fine to medium flint with rare fine to medium concrete and brick.</p> <p>MADE GROUND. Greyish brown gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to coarse flint, brick and concrete.</p> <p><i>At 0.45m: Piece of metal rebar present.</i></p> <p>MADE GROUND. Brown mottled grey gravelly SILT. Gravel is sub-angular to sub-rounded fine to coarse flint and quartz.</p> <p style="text-align: center;">Trial pit terminated at 0.75m.</p>		<p>0.20</p> <p>0.45</p> <p>0.75</p>	<p>0.20</p> <p>0.45</p> <p>0.75</p>				

Weather: Dry and Sunny	Water Strike				
Pit Stability: Stable	Date	Water Strike (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
Shoring Used:					No groundwater encountered
Pit Dimensions: L: 0.30m x W: 0.30m	<p>Remarks</p> <p>1. Backfill: GL to 0.75m arisings.</p> <p>2. Approximate coordinates.</p>				
<p>Norwich Office: 01603 613111            London Office: 020 7537 9233            Cambridge Office: 01223 781585            Colchester Office: 01206 986675            Testing Services: 01603 416333            E-mail: info@harrisingroupuk.com            Website: www.harrisingroupuk.com</p>		Logged by: JC		Checked by: MR	
					Fm-Hn-R-3069-Rev E

Project ID: <b>GN17820</b>	Client: Hopkins Homes Limited	E: 609434.00	N: 254177.00
Location: Needham Market Quarry	Consultant:		
	Plant used: Hand Dug	Date: 02/09/2019	

Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
				Type	Depth	Results / Remarks	
MADE GROUND. Dark brown slightly gravelly silty fine to medium SAND. Gravel is angular to sub-rounded fine to medium flint with rare fine to medium concrete and brick.		0.30					
MADE GROUND. Greyish brown gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to coarse flint, brick and concrete.		0.40					
MADE GROUND reworked chalk. Cream slightly gravelly SILT. Gravel is weak low density sub-angular to sub-rounded fine to medium cream chalk with sub-angular to sub-rounded fine to medium flint.		0.45					
MADE GROUND. Grey to dark grey slightly gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to medium flint.		0.70					
Trial pit terminated at 0.70m.							


Weather: Dry and Sunny	Water Strike				
Pit Stability: Stable	Date	Water Strike (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
Shoring Used:					No groundwater encountered
Pit Dimensions: L: 0.30m x W: 0.35m	Remarks 1. Backfill: GL to 0.70m arisings. 2. Approximate coordinates.				
Norwich Office: 01603 613111 London Office: 020 7537 9233 Cambridge Office: 01223 781585 Colchester Office: 01206 986675 Testing Services: 01603 416333 E-mail: info@harrisingroupuk.com Website: www.harrisingroupuk.com					
	Logged by: JC		Checked by: MR		Fm-Hn-R-3069-Rev E



Project ID: <b>GN17820</b>	Client: Hopkins Homes Limited	E: 609432.00	N: 254175.00
Location: Needham Market Quarry	Consultant:		
	Plant used: Hand Dug	Date: 20/09/2019	


Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
				Type	Depth	Results / Remarks	
MADE GROUND. Dark brown slightly gravelly silty fine to medium SAND. Gravel is angular to sub-rounded fine to medium flint with rare fine to medium concrete and brick.		0.30		ES1	0.50		
MADE GROUND. Cream mottled brown slightly gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to medium flint with rare brick.		0.60					
Trial pit terminated at 0.60m.							

Weather: Dry and Sunny	Water Strike				
Pit Stability: Stable	Date	Water Strike (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
Shoring Used:					No groundwater encountered

Pit Dimensions: L: 0.25m x W: 0.25m	Remarks				
Norwich Office: 01603 613111 London Office: 020 7537 9233 Cambridge Office: 01223 781585 Colchester Office: 01206 986675 Testing Services: 01603 416333 E-mail: info@harrisingroupuk.com Website: www.harrisingroupuk.com	1. Backfill: GL to 0.60m arisings. 2. Approximate coordinates.				
	Logged by: JC	Checked by: MR		Fm-Hn-R-3069-Rev E	


Project ID: <b>GN17820</b>	Client: Hopkins Homes Limited	E: 609435.00 N: 254178.00
Location: Needham Market Quarry	Consultant:	
	Plant used: Hand Dug	Date: 20/09/2019

Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
				Type	Depth	Results / Remarks	
MADE GROUND. Dark brown gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to coarse flint with rare brick.		0.25					
MADE GROUND. Orange mottled grey very gravelly slightly clayey fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to medium flint, chalk, concrete and brick.		0.45					
MADE GROUND. Grey to dark grey slightly gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to medium flint.		0.65					
Trial pit terminated at 0.65m.							

Weather: Dry and Sunny	Water Strike				
Pit Stability: Stable	Date	Water Strike (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
Shoring Used:					No groundwater encountered
Pit Dimensions: L: 0.25m x W: 0.30m	Remarks				
Norwich Office: 01603 613111 London Office: 020 7537 9233 Cambridge Office: 01223 781585 Colchester Office: 01206 986675 Testing Services: 01603 416333 E-mail: info@harrisingroupuk.com Website: www.harrisingroupuk.com	1. Backfill: GL to 0.65m arisings. 2. Approximate coordinates.				
		Logged by: DM		Checked by: MR	


Project ID: <b>GN17820</b>	Client: Hopkins Homes Limited	E: 609437.00 N: 254178.00
Location: Needham Market Quarry	Consultant:	
	Plant used: Hand Dug	Date: 20/09/2019

Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
				Type	Depth	Results / Remarks	
MADE GROUND. Dark brown gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to coarse flint with rare brick.		0.30					
MADE GROUND. Grey to dark grey slightly gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to medium flint.		0.60		ES1	0.40		
Trial pit terminated at 0.60m.				ES2	0.60		

Weather: Dry and Sunny	Water Strike				
Pit Stability: Stable	Date	Water Strike (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
Shoring Used:					No groundwater encountered
Pit Dimensions: L: 0.25m x W: 0.25m	Remarks 1. Backfill: GL to 0.60m arisings. 2. Approximate coordinates.				
Norwich Office: 01603 613111 London Office: 020 7537 9233 Cambridge Office: 01223 781585 Colchester Office: 01206 986675 Testing Services: 01603 416333 E-mail: info@harrisingroupuk.com Website: www.harrisingroupuk.com		Logged by: DM		Checked by: MR	
					Fm-Hn-R-3069-Rev E

Project ID: <b>GN17820</b>	Client: Hopkins Homes Limited	E: 609437.00 N: 254177.00
Location: Needham Market Quarry	Consultant:	
	Plant used: Hand Dug	Date: 20/09/2019


Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
				Type	Depth	Results / Remarks	
MADE GROUND. Dark brown gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to coarse flint with rare brick.		0.25					
MADE GROUND. Orange mottled grey very gravelly slightly clayey fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to medium flint, chalk, concrete and brick.		0.45		ES1	0.50		
MADE GROUND. Cream mottled brown slightly gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to medium flint.		0.60					
Trial pit terminated at 0.60m.							

Weather: Dry and Sunny	Water Strike				
Pit Stability: Stable	Date	Water Strike (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
Shoring Used:					No groundwater encountered
Pit Dimensions: L: 0.25m x W: 0.25m	Remarks				
Norwich Office: 01603 613111 London Office: 020 7537 9233 Cambridge Office: 01223 781585 Colchester Office: 01206 986675 Testing Services: 01603 416333 E-mail: info@harrisingroupuk.com Website: www.harrisingroupuk.com	1. Backfill: GL to 0.60m arisings. 2. Approximate coordinates.				
Logged by: DM			Checked by: MR		Fm-Hn-R-3069-Rev E

Project ID: <b>GN17820</b>	Client: Hopkins Homes Limited	E: 609438.00	N: 254179.00
Location: Needham Market Quarry	Consultant:		
	Plant used: Hand Dug	Date: 20/09/2019	


Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
				Type	Depth	Results / Remarks	
MADE GROUND. Dark brown gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to coarse flint with rare brick.		0.25					
MADE GROUND. Orange mottled grey very gravelly slightly clayey fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to medium flint, chalk, concrete and brick.		0.45		ES1	0.50		
MADE GROUND. Cream mottled brown slightly gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to medium flint.		0.60					
Trial pit terminated at 0.60m.							

Weather: Dry and Sunny	Water Strike				
Pit Stability: Stable	Date	Water Strike (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
Shoring Used:					No groundwater encountered

Pit Dimensions: L: 0.25m x W: 0.25m	Remarks				
Norwich Office: 01603 613111 London Office: 020 7537 9233 Cambridge Office: 01223 781585 Colchester Office: 01206 986675 Testing Services: 01603 416333 E-mail: info@harrisingroupuk.com Website: www.harrisingroupuk.com	1. Backfill: GL to 0.60m arisings. 2. Approximate coordinates.				
	Logged by: DM	Checked by: MR	Fm-Hn-R-3069-Rev E		


Project ID: <b>GN17820</b>	Client: Hopkins Homes Limited	E: 609436.00 N: 254175.00
Location: Needham Market Quarry	Consultant:	
	Plant used: Hand Dug	Date: 20/09/2019

Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
				Type	Depth	Results / Remarks	
MADE GROUND. Dark brown gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to coarse flint with rare brick.		0.25					
MADE GROUND. Orange mottled grey very gravelly slightly clayey fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to medium flint, chalk, concrete and brick.		0.50		ES1	0.50		
MADE GROUND. Cream mottled brown slightly gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to medium flint.		0.60					
Trial pit terminated at 0.60m.							

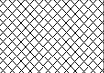



Weather: Dry and Sunny	Water Strike				
Pit Stability: Stable	Date	Water Strike (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
Shoring Used:					No groundwater encountered
Pit Dimensions: L: 0.25m x W: 0.25m	Remarks 1. Backfill: GL to 0.60m arisings. 2. Approximate coordinates.				
Norwich Office: 01603 613111 London Office: 020 7537 9233 Cambridge Office: 01223 781585 Colchester Office: 01206 986675 Testing Services: 01603 416333 E-mail: info@harrisingroupuk.com Website: www.harrisingroupuk.com		Logged by: DM		Checked by: MR	
					Fm-Hn-R-3069-Rev E

Project ID: <b>GN17820</b>	Client: Hopkins Homes Limited	E: 609443.00	N: 254159.00
Location: Needham Market Quarry	Consultant:		
	Plant used: Hand Dug	Date: 02/09/2019	


Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
				Type	Depth	Results / Remarks	
MADE GROUND. Dark brown slightly gravelly silty fine to medium SAND. Gravel is angular to sub-rounded fine to medium flint with rare fine to medium concrete and brick.		0.30					
MADE GROUND. Cream gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to coarse flint, concrete and quartz with rare brick. (Reworked chalk)		0.70					
Trial pit terminated at 0.70m.							

Weather: Dry and Sunny	Water Strike				
Pit Stability: Stable	Date	Water Strike (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
Shoring Used:					No groundwater encountered
Pit Dimensions: L: 0.40m x W: 0.35m	Remarks 1. Backfill: GL to 0.70m arisings. 2. Approximate coordinates.				
Norwich Office: 01603 613111 London Office: 020 7537 9233 Cambridge Office: 01223 781585 Colchester Office: 01206 986675 Testing Services: 01603 416333 E-mail: info@harrisingroupuk.com Website: www.harrisingroupuk.com					
	Logged by: JC		Checked by: MR		Fm-Hn-R-3069-Rev E

Project ID: <b>GN17820</b>	Client: Hopkins Homes Limited	E: 609447.00	N: 254162.00
Location: Needham Market Quarry	Consultant:		
	Plant used: Hand Dug	Date: 02/09/2019	

Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
				Type	Depth	Results / Remarks	
MADE GROUND. Dark brown slightly gravelly silty fine to medium SAND. Gravel is angular to sub-rounded fine to medium flint with rare fine to medium concrete and brick.							
MADE GROUND. Greyish brown gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to coarse flint, brick and concrete. <i>From 0.40m: Fine to medium pea shingle present.</i> Trial pit terminated at 0.50m.		0.30 0.50					


Weather: Dry and Sunny	Water Strike				
Pit Stability: Stable	Date	Water Strike (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
Shoring Used:					No groundwater encountered

Pit Dimensions: L: 0.40m x W: 0.30m	Remarks				
Norwich Office: 01603 613111 London Office: 020 7537 9233 Cambridge Office: 01223 781585 Colchester Office: 01206 986675 Testing Services: 01603 416333 E-mail: info@harrisingroupuk.com Website: www.harrisingroupuk.com	1. Backfill: GL to 0.50m arisings. 2. Approximate coordinates.				
	Logged by: JC	Checked by: MR	Fm-Hn-R-3069-Rev E		



Project ID: <b>GN17820</b>	Client: Hopkins Homes Limited	E: 609442.00	N: 254179.00
Location: Needham Market Quarry	Consultant:		
	Plant used: Hand Dug	Date: 20/09/2019	


Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
				Type	Depth	Results / Remarks	
MADE GROUND. Dark brown gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to coarse flint with rare brick.		0.25					
MADE GROUND. Orange mottled grey very gravelly slightly clayey fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to medium flint, chalk, concrete and brick.		0.45					
MADE GROUND. Cream mottled brown slightly gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to medium flint.		0.60					
Trial pit terminated at 0.60m.							

Weather: Dry and Sunny	Water Strike				
Pit Stability: Stable	Date	Water Strike (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
Shoring Used:					No groundwater encountered
Pit Dimensions: L: 0.25m x W: 0.25m	Remarks 1. Backfill: GL to 0.60m arisings. 2. Approximate coordinates.				
Norwich Office: 01603 613111 London Office: 020 7537 9233 Cambridge Office: 01223 781585 Colchester Office: 01206 986675 Testing Services: 01603 416333 E-mail: info@harrisingroupuk.com Website: www.harrisingroupuk.com					
	Logged by: DM		Checked by: MR		Fm-Hn-R-3069-Rev E

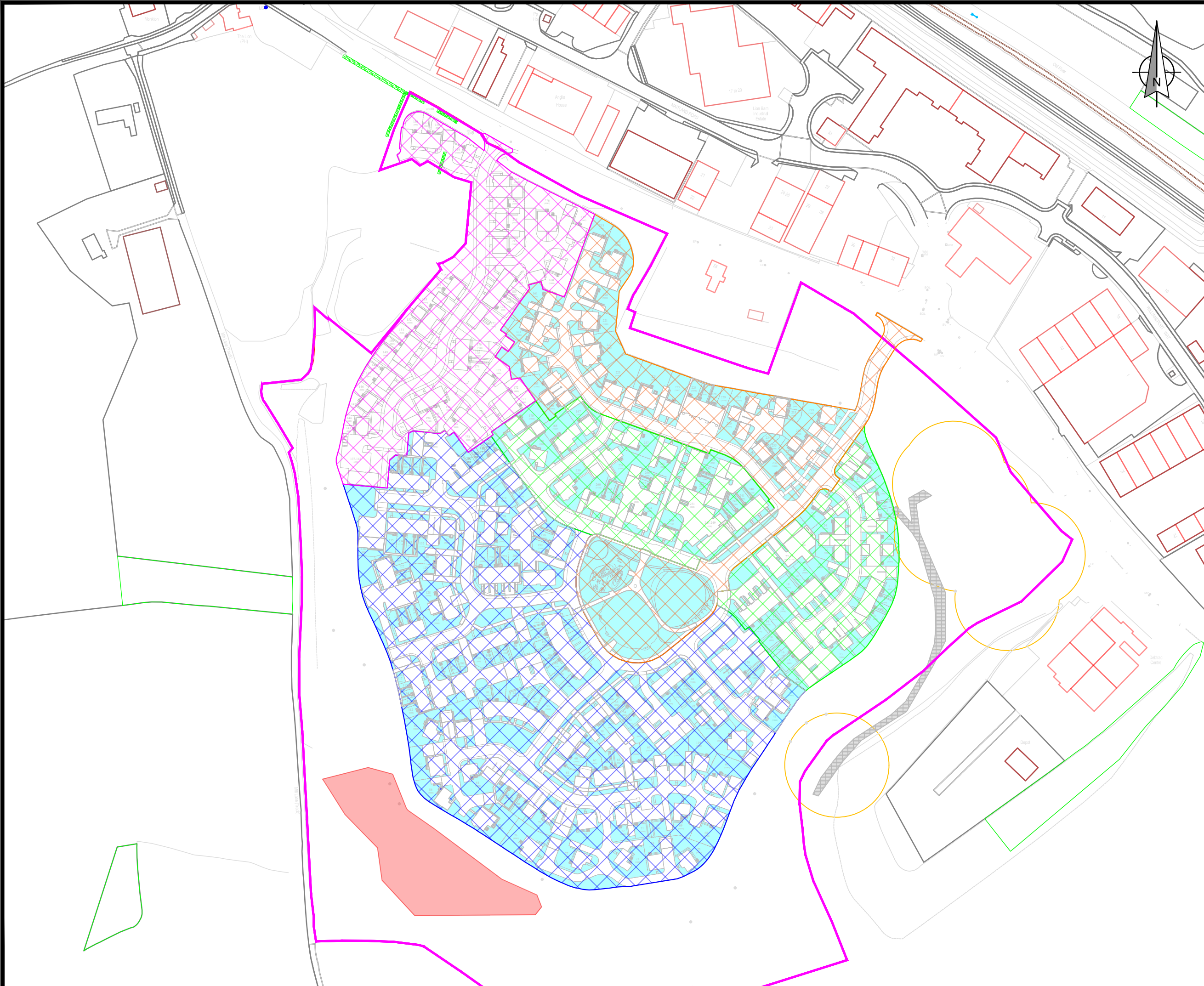
Project ID: <b>GN17820</b>	Client: Hopkins Homes Limited	E: 609433.00 N: 254170.00
Location: Needham Market Quarry	Consultant:	
	Plant used: Hand Dug	Date: 20/09/2019








Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
				Type	Depth	Results / Remarks	
MADE GROUND. Dark brown gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to coarse flint with rare brick.		0.25					
MADE GROUND. Orange mottled grey very gravelly slightly clayey fine to coarse SAND. Gravel is sub-angular to sub-rounded fine to medium flint, chalk, concrete and brick.		0.45					
MADE GROUND. Cream mottled brown slightly gravelly silty fine to medium SAND. Gravel is sub-angular to sub-rounded fine to medium flint. <i>From 0.50m: Becoming gravelly.</i> Trial pit terminated at 0.60m.		0.60					

Weather: Dry and Sunny	Water Strike				
Pit Stability: Stable	Date	Water Strike (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
Shoring Used:					No groundwater encountered

Pit Dimensions: L: 0.25m x W: 0.25m	Remarks				
<p>Norwich Office: 01603 613111          London Office: 020 7537 9233          Cambridge Office: 01223 781585          Colchester Office: 01206 986675          Testing Services: 01603 416333          E-mail: info@harrisingroupuk.com          Website: www.harrisingroupuk.com</p> 	<p>1. Backfill: GL to 0.60m arisings.          2. Approximate coordinates.</p>				
	Logged by: DM	Checked by: MR	Fm-Hn-R-3069-Rev E		


PL-HI-D-101 Rev B N:\work\p\projects\Jobs 17000s\Jobs 17800\GN17820 Needham Market Quarry\Renovation\Drawings\CAD Files\GN17820 - DR402.dwg



- Key :**
-  Site Boundary
  -  Area of Phase 1A
  -  Area of Phase 1B
  -  Area of Phase 2
  -  Area of Phase 3
  -  Areas of Soft Landscaping
  -  Area of Potential Backfill

Notes:

Notes:

 <b>HOPKINS HOMES</b>		
Client : Hopkins Homes Limited		
Project : Needham Market Quarry		
Job No : GN17820	Date : December 2017	
Drawing Title : Development Layout with Phases and Plots Requiring Suitable Soil Verifying		
Drawing No : GN17820 - DR402		
Scale : 1:2000 @ A3		
Drawn by : RW	Checked by : JA	
Eastings : 009411	Northings : 254247	
<b>Revision history</b>		
<b>Rev</b>	<b>Date</b>	<b>Revision Data</b>

  
**harrisongroup ENVIRONMENTAL**

Norwich: 01603 613111 London: 020 7537 9233  
Cambridge: 01223 781585 Laboratory: 01603 416333

Email: info@harrisongroupuk.com  
Website: www.harrisongroupuk.com

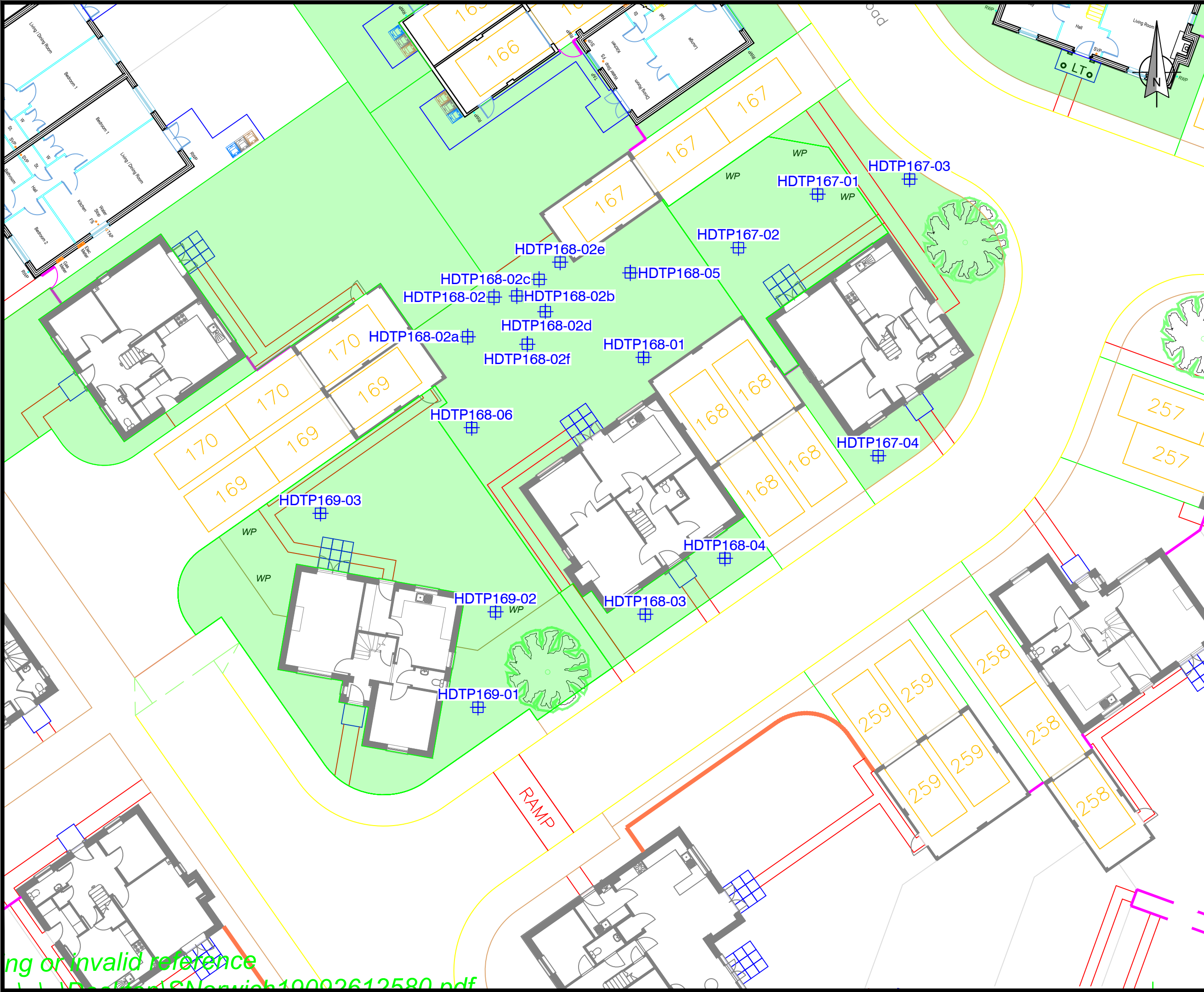
 ISOQAR REGISTERED	 UKAS MANAGEMENT SYSTEMS 0026	 UKAS TESTING 4031
---	--	--

Certificate Number 5933  
ISO 9001, ISO 14001

Reproduced by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office © Crown Copyright Harrison Group Environmental Ltd., Kimberley Street, Norwich, NR2 3RU; AL10021199

THIS DRAWING IS THE PROPERTY OF HARRISON GROUP LIMITED AND NO REPRODUCTION MAY BE MADE IN WHOLE OR IN PART WITHOUT PERMISSION

PL-HI-D-101 Rev B N:\Work\Projects\Jobs 17000s\Jobs 17820\GN17820 Needham Market Quarry Remediation Drawings\CAD Files\GN17820 - DR502.dwg



**Key :**

- HOTP167-01 Hand Dug Trial Pit
- Acceptable Cover System

**Notes :**

**HOPKINS HOMES**

Client : Hopkins Homes Ltd  
 Project : Needham Market Quarry  
 Job No : GN17820 Date : September 2019  
 Drawing Title : Fieldwork Location Plan - Plot 167-169

Drawing No : GN17820 - DR502u  
 Scale : 1:200 @ A3  
 Drawn by : RW Checked by : MR  
 Eastings : 009440 Northings : 254170

**Revision history**

Rev	Date	Revision Data

**harrisongroup ENVIRONMENTAL**

Norwich: 01603 613111 London: 020 7537 9233  
 Cambridge: 01223 781585 Laboratory: 01603 416333

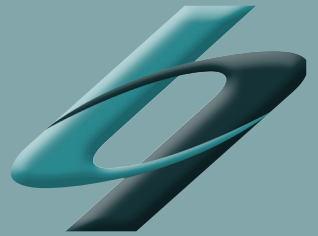
Email: info@harrisongroupuk.com  
 Website: www.harrisongroupuk.com

Certificate Number 5933 ISO 9001, ISO 14001 4031

Reproduced by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office © Crown Copyright Harrison Group Environmental Ltd., Kimberley Street, Norwich, NR2 3RU; AL100221199

THIS DRAWING IS THE PROPERTY OF HARRISON GROUP LIMITED AND NO REPRODUCTION MAY BE MADE IN WHOLE OR IN PART WITHOUT PERMISSION

ng or invalid reference  
 \N:\Work\Projects\Jobs 17000s\Jobs 17820\GN17820 Needham Market Quarry Remediation Drawings\CAD Files\GN17820 - DR502.dwg



**Norwich** (Registered Office)

Kimberley Street  
Norwich  
Norfolk  
NR2 2RJ

Tel: 01603 613111

**London**

12 Waterways Business Centre  
Navigation Drive  
South Ordnance Road  
Enfield, EN3 6JJ

Tel: 020 7537 9233

**Cambridge**

Future Business Centre  
Kings Hedges Road  
Cambridge  
CB4 2HY

Tel: 01223 781585

**Colchester**

Colchester Business Centre  
1 George Williams Way  
Colchester  
CO1 2JS

Tel: 01206 986675