Geotechnical & Environmental Consultants

Our Ref: D34136/CB

9th May 2017

Seagate Homes Group
Seagate Hall
Vicarage Lane
Long Sutton
Lincs PE12 9AF

For the attention of Ian Dove

Dear Ian,

Re: Church Street, Holbeach – Post Demolition Investigation Report

GeoDyne Limited has been appointed by the Client, Seagate Homes, to undertake post-demolition investigation works on their site located off Church Street, Holbeach.

The following report has been previously prepared for the site, which we have reviewed prior to our site works:

- GeoDyne Limited report entitled '*Church Street, Holbeach – Combined Phase I Desk Study & Phase II Exploratory Investigation*' produced for Langwith Construction, Reference D34136, dated 17th February 2015.

It is recommended that the foregoing report be read in conjunction with this report.

PROJECT UNDERSTANDING

We understand that the site is currently being redeveloped for a residential end-use and, in order to assist in the discharge of planning conditions (associated with planning permission reference H09-0770-16), further investigation is required.

It is understood that Seagate Homes has acquired the site to construct 19No. dwellings, and that construction works have already commenced on site, based on observations during our most recent works (April 2017). We would note that our previous report was prepared on the understanding of a proposed commercial development, and that the risk assessments detailed therein were undertaken on that end-use. A revised human health risk assessment is therefore required for the proposed residential (with plant uptake) end-use in order to inform the requirement for any remediation.

In addition, the previous report provided the following recommendations for further works at the site:

'8.23 Further Works

The following further works are recommended the site:

- *Advance a series of cable percussive boreholes to assist in the design of the foundations for the proposed development.*

- *A programme of post-demolition trial pitting and soil sampling to confirm the findings of the contamination assessment detailed herein, and to inform the requirement for any general remedial requirements necessary at the site.*
- *The decommissioning and removal of the interceptor and UST identified at the site, to together with appropriate validation works.'*

Given that foundation construction has already been completed on the site, it is assumed that the piling contractor had acquired a sufficient level of ground information on which to design the most appropriate type and depth of pile. Any further investigations to assist in the design of foundations has therefore specifically been excluded.

Furthermore, we acknowledge receipt of the laboratory soil test certificates for soil samples obtained during the Underground fuel Storage Tank (UST) removal (undertaken by others). The locations of these sampling positions around the former UST, as indicated to ourselves by the Client, is indicated on the plan presented in Appendix II of this report (Figure No. D34136/102).

On the basis of the foregoing, a basic supplementary investigation was undertaken at the site, in order to confirm the ground conditions beneath the footprints of the former buildings and to undertake further site-wide soil sampling to better understand the nature of potentially contaminated soils beneath the site.

THE SITE

The main part of the site comprises an approximately rectangular shaped parcel of land, with an access route in the east of the site connecting it to Church Lane, Holbeach. The site may be located centred around approximate Ordnance Survey National Grid Reference 535760E 324610N, and extends to an area of approximately 0.49 hectares.

During the course of our works (April 2017), the site comprised an active construction site which included plots at various stages of development. The industrial warehouse, former works and office block present during our previous works (December 2014) had since been demolished.

Plates showing general views of the site are included in the Plates (Nos. 101 to 103) included in Appendix V.

SITE WORKS

Site works were undertaken on 10th April 2017 and comprised the following:

a) A sub-contracted sub-surface utility scan to attempt to avoid buried services prior to intrusive works.

b) Six trial pits (TP1 – TP6) to depths of between 2.00m and 2.30m below existing ground level (begl).

c) Sampling of the Made Ground and underlying Natural Strata.

The approximate locations of the trial pits are indicated on the plan presented in Appendix I of this report (Figure No. D34136/101). The trial pit logs are presented in Appendix III of this report. For reference and inclusivity, the previous window sampling boreholes are also included.

GROUND CONDITIONS

The following ground conditions relate specifically to the post-demolition trial pitting works. Reference to the previous report should be made for pre-demolition ground condition information.

Made Ground

Variable Made Ground was encountered in each exploratory hole to depths of between 0.30m and 0.90m begl and generally comprised gravelly Clay, Silt and Sand. The gravel component typically comprised limestone, brick and concrete.

Natural Strata

Beneath the Made Ground, natural soils typically comprising firm sandy very silty CLAY and/or slightly clayey sandy SILT were encountered to the bases of the majority of the trial pits. Within two trial pits, where the base of Clay/Silt was penetrated at depths of 1.20m and 1.50m begl, medium dense very silty SAND was encountered.

The Natural Strata is considered to comprise part of the Terrington Beds, indicated from the geological maps to underlie the site, and is consistent with findings from the previous report.

A photographic record of the exploratory investigation was obtained during the intrusive works. Photographs of the completed trial pit excavations are presented in the Plates included in Appendix V of this report (Plate Nos. 104 to 106).

REVISED GROUND GAS ASSESSMENT

During our site works from 2015, three of the window sampling boreholes were installed with combined ground gas and water monitoring standpipes to depths of up to 5.00m begl to facilitate a programme of monitoring. A total of six monitoring visits were undertaken over an eight week period.

GSVs of 0.0001 l/h and 0.0041 l/h were calculated for methane and carbon dioxide, respectively.

Therefore, with a maximum GSV of 0.0041 l/h, negligible methane and a maximum carbon dioxide concentration of 4.1% v/v, it was considered appropriate to classify the site as Characteristic Situation CS1 in accordance with CIRIA C665 and BS 8485:2015 guidance (i.e. no specific precautions are required at the site). The recommendations from our previous 2015 report continue to apply to the site, irrespective of the change from a commercial to a residential end-use.

TANK REMOVAL WORKS

The Client commissioned Speciated PAH and Speciated TPH testing on 4No. samples around the UST and 1No. sample beneath it, following its removal. Given the size of the feature, this sampling density and protocol is considered suitable for validation purposes.

On the basis of the supplied laboratory certification, the resultant residual hydrocarbon concentrations within the sides and base of the excavation appear to suggest that any grossly contaminated soils were removed as part of the tank removal process. It is noted that the underlying groundwater and wider environmental setting of the site is reflective of a generally low sensitivity to contamination; due to the presence of typically low permeability soils (characteristic of the Terrington Beds), the designation of the Terrington Beds as Unproductive Strata, and the absence of any Source Protection Zone classifications. The tank removal and subsequent validation exercise therefore appears to have been undertaken successfully, and any residual risks posed by hydrocarbons to Controlled Waters is considered to be very low (on the basis of our current understanding).

LABORATORY TESTING & CONTAMINATION ASSESSMENT

The following soil testing was carried out on visually representative samples' recovered from the trial pits:

- 10 No. Standard contamination suites (including metals, speciated PAH and TOC).
- 6 No. Speciated Total Petroleum Hydrocarbon tests (TPHCWG criteria).
- 6 No. Asbestos Screens.

All laboratory soil test results (i.e. including those from previous Phase II works and those supplied by the Client from the tank validation exercise) are included in Appendix IV.

Contamination Assessment Rationale

It is understood that the site is currently being redeveloped for a residential end-use including front and rear gardens. We have therefore adopted a residential with plant uptake end-use scenario for the purposes of a contamination assessment, which is considered to reflect the most appropriate end-use.

In order to conduct a re-assessment of all soil test data for a residential with plant uptake end-use (Phase II data was previously assessed for a commercial end-use), we have combined the test results of our 2017 and 2014 works together with works conducted by the Client (tank validation) into a single dataset, for individual comparison of the reported determinand concentrations against appropriate Tier 1 Generic Assessment Criteria (GAC). Based on our understanding of current good practice within the contaminated land field, we have adopted the S4UL values contained within the document listed below as GAC values:

- Nathanail, C.P., McCaffrey, C. Gillett, A.G, Ogden, R.C. and Nathanail, J.F 2015. '*The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham. "Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3026. All rights reserved."*'

Sampling Strategy

Our sampling strategy is based on a review of the historical, geological and environmental information obtained as part of our Phase I Desk Study from the previous report, together with the current site setting and the ground conditions encountered during our works, taking account of the proposed end-use.

Table 1 summarises the reasoning behind the trial pit positions.

TABLE 1 – REASONING FOR TRIAL PIT LOCATIONS

Exploratory Hole Reference	Reasoning Behind Location
TP1, TP3, TP4, TP6	Targeted to the footprints of the former buildings
TP2	Targeted to the removed UST and former offices
TP5	General site coverage
Key TP – Trial Pit	

The ground conditions encountered during our most recent site works revealed the presence of two distinct types of material i) Made Ground and ii) Natural Strata comprising Terrington Beds. These findings confirm the ground conditions encountered during the previous Phase II works.

Contamination Analysis

10No. standard chemical contamination tests (including speciated PAH and TOC) were carried out on selected soil samples obtained during the site works, which comprised 7No. tests of the Made Ground and 3No. tests of the underlying Natural Strata. Additionally, 6 No. Speciated Total Petroleum Hydrocarbon tests (TPHCWG criteria) and 6No. asbestos screens were undertaken on selected Made Ground soil samples.

6No. standard chemical contamination tests (including speciated PAH and TOC) were carried out on selected soil samples obtained during our Phase II site works from 2014, which comprised 3No. tests of the Made Ground and 3No. tests of the underlying Natural Strata.

Contamination Soil Test Results

The contamination assessment for the Made Ground and Natural Strata analysed at the site is summarised in Table 2.

TABLE 2 – SUMMARY OF TIER 1 GENERIC ACCEPTANCE CRITERIA DATA ASSESSMENT (RESIDENTIAL WITH PLANT UPTAKE END-USE)

Contaminants – Potentially Harmful to Human Health	No. of Samples Tested	Concentration Range (mg/kg)	Tier 1 GAC (mg/kg)	C4SL (mg/kg)	Tier 1 GAC Exceeded (Yes/No)
Metals					
Arsenic	16	3 – 19	37 S4UL	37	No
Cadmium	16	<0.5 – <1	11 S4UL	-	No
Copper	16	3 – 63	2400 S4UL	-	No
Chromium III	16	8 – 23	910 S4UL	-	No
Lead	16	6 – 340	200 C4SL	200	Yes#
Mercury	16	<0.17 – <1	40 S4UL	-	No
Nickel	16	7 – 59	130 S4UL	-	No
Zinc	16	23 – 310	3700 S4UL	-	No
PAHs					
Acenaphthene	21	0.01 – 7.5	210 S4UL	-	No
Acenaphthylene	21	<0.01 – 0.4	170 S4UL	-	No
Anthracene	21	0.03 – 14.7	2400 S4UL	-	No
Benzo(a)anthracene	21	0.07 – 35.3	7.2 S4UL	-	Yes#
Benzo(a)pyrene	21	0.07 – 29.4	2.2 S4UL	5	Yes#
Benzo(b)fluoranthene	21	<0.1 – 36.8	2.6 S4UL	-	Yes#
Benzo(ghi)perylene	21	0.04 – 11.4	320 S4UL	-	No
Benzo(k)fluoranthene	21	0.04 – 12.8	77 S4UL	-	No
Chrysene	21	0.09 – 33.4	15 S4UL	-	Yes#
Dibenzo(ah)anthracene	21	<0.02 – 3.2	0.24 S4UL	-	Yes#
Fluoranthene	21	<0.1 – 64.5	280 S4UL	-	No
Fluorene	21	0.01 – 7.7	170 S4UL	-	No
Indeno(123-cd)pyrene	21	<0.1 – 15.2	27 S4UL	-	No
Naphthalene	21	<0.01 – 0.79	2.3 S4UL	-	No
Phenanthrene	21	0.8 – 48.3	95 S4UL	-	No
Pyrene	21	<0.1 – 58.4	620 S4UL	-	No
TPHs/BTEX					
Aliphatics EC>8-10	13	<0.1 – 3.0	27 S4UL	-	No
Aliphatics EC>10-12	13	<0.1 – 65	130 S4UL	-	No
Aliphatics EC>12-16	13	<0.1 – 437	1100 S4UL	-	No
Aliphatics EC>16-35	13	<0.2 – 608	65000 S4UL	-	No
Aromatic EC>8-10	13	<0.01 – 0.07	34 S4UL	-	No
Aromatic EC>10-12	13	<0.1 – 1	74 S4UL	-	No
Aromatic EC>12-16	13	<0.1 – 10.9	140 S4UL	-	No
Aromatic EC>16-21	13	<0.1 – 81.4	260 S4UL	-	No
Aromatic EC>21-35	13	<0.1 – 242	1100 S4UL	-	No

Key
S4UL – CIEH/LQM Suitable 4 Use Levels (2015). Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3026. All rights reserved.
C4SL –value for Arsenic, Lead and Benzo(a)pyrene taken from DEFRA publication SP1010 and based on a Residential With Plant Uptake end-use adopting a soil organic matter of 1%.
- See comments below table (where relevant).

Lead

The soil test results have revealed an elevated lead concentration of 340mg/kg within the Made Ground at one location (WS1, 0.60m begl). The value exceeds the Tier 1 GAC for a residential with plant uptake end-use of 200mg/kg. All other samples (i.e. 15No.) tested recorded lead concentrations below the Tier 1 GAC.

PAHs

The soil test results have revealed elevated concentration(s) of:

- Benzo(a)pyrene, Benzo(b)fluoranthene and Dibenzo(ah)anthracene within Made Ground at three locations across the site (TP1, 0.10m begl; TP4, 0.30m begl, TP5, 0.30m begl) and at three locations around and one location beneath the former UST.

- Benzo(a)anthracene within the Made Ground at TP4 (0.30m begl) in addition to elevated values at two locations around the former UST.

- Chrysene at one location (TP4, 0.30m begl).

The values exceed the associated Tier 1 GAC values for a residential with plant uptake end-use. All other samples tested recorded PAH concentrations below the Tier 1 GAC.

All of the remaining determinands assessed were present either at individual concentrations below the limit of detection of the method of analysis adopted by the laboratory or below the appropriate Tier 1 GAC based on a residential with plant uptake end-use (including all TPH fractions).

Asbestos Screening Tests

The asbestos screening test results are summarised in Table 3.

TABLE 3 – SUMMARY OF ASBESTOS TESTING RESULTS

Hole Reference	Sample Reference	Sample Type	Asbestos in soil	Asbestos Form
TP1, 0.10m	TJV1	Made Ground (Silt)	Chrysotile	Loose fibres
TP1, 0.40m	TJV2	Made Ground (Clay)	NAD	NAD
TP2, 0.20m	TJV3	Made Ground (Sand)	NAD	NAD
TP3, 0.30m	TJV5	Made Ground (Clay)	NAD	NAD
TP4, 0.30m	TJV6	Made Ground (Silt)	Chrysotile	Loose fibres
TP6, 0.20m	T10	Made Ground (Sand)	NAD	NAD

Key

TP – Trial pit
T – Disturbed sample
TJV – Environmental sample
NAD – No Asbestos Detected

Based on the testing undertaken, a positive identification of Chrysotile in the form of loose fibres was revealed for two samples of Made Ground obtained from beneath the footprints of the demolished warehouse and works. At this stage, it must therefore be assumed that asbestos may be present in other locations within the Made Ground soils.

Contamination Assessment Summary

- Human Health

  Contamination testing was carried out on selected samples of the Made Ground and the underlying Natural Strata.

  The contamination assessment revealed the likely presence of pervasive benzo(a)pyrene, benzo(b)fluoranthene and dibenzo(ah)anthracene within Made Ground together with likely hotspots of benzo(a)anthracene and chrysene at TP4 (0.30m) and lead WS1 (0.60m).

- Controlled Waters

  The superficial and bedrock geologies beneath the site are classified as Unproductive Strata and the site does not lie within a Source Protection Zone, as revealed by the Phase I Desk Study. With the exception of a pond located 58m north of the site, no other significant surface water features are indicated in the general vicinity of the site. As a result, the presence of elevated PAHs in Made Ground across the site is considered to present no significant risk to impact Controlled Waters. Additionally, the Laboratory testing revealed post-removal TPH levels around the former UST to be insufficient to pose a significant risk to Controlled Waters.

- Ground Gas

  Based on the ground gas monitoring undertaken, the site may be classified as 'CS1' in accordance with CIRIA C665 and BS 8485:2015 guidance.

CONCLUSIONS & RECOMMENDATIONS

Contamination Assessment

Due to the presence of elevated PAHs and lead in addition to localised asbestos identified within the Made Ground soils (as loose fibres), the Made Ground across the site is considered to be undesirable and chemically unsuitable for placement or retention within any proposed gardens/soft landscape.

There is considered to be no risk to Controlled Waters based on the absence of mobile organic contaminants across the site or from the findings of the tank validation exercise (completed by others).

Remediation Proposals

Based on the findings of the contamination assessment, it will be necessary to adopt a remediation strategy for the site to afford an appropriate level of protection to human health (future end users).

It will be necessary to provide remedial capping to the Made Ground within all gardens and soft landscaping across the site. The remedial capping should be a minimum total thickness of 1.00m and should incorporate a minimum of 0.15m of suitably clean imported topsoil underlain by suitably clean subsoil. Alternatively, remedial capping of 0.60m total thickness, incorporating a minimum of 0.15m of suitably clean topsoil, underlain by a suitably robust geomembrane could be utilised at the site, if preferred by the Client and subject to approval by the Local Planning Authority.

Any topsoil and subsoil proposed to be imported to site should be chemically tested at source to ensure it is suitably clean (prior to importation) in accordance with CLEA/generic guidance. Imported topsoil should ideally conform to BS3882: 2015 *'Specification for topsoil'*, with respect to nutrient levels etc.

It is recommended that the results of the chemical analysis on the soils proposed for importation are forwarded to the Local Authority (Environmental Health Officer) for approval (prior to importation).

Specific remedial measures are not considered necessary in areas of proposed hard standing (i.e. external hard standing areas and beneath the floor slabs to the proposed dwellings).

Ground Gas Precautions

Based on the programme of ground gas monitoring undertaken, the site may be classified as Characteristic Situation CS1 in accordance with CIRIA C665 and BS 8485:2015 guidance; i.e. no specific precautions in relation to ground gas are required in the proposed development.

The tank validation works have revealed typically low levels of residual hydrocarbons in the soils at this location. The risk of residual hydrocarbon vapours is therefore also considered to be low, and we note that sub-floor ventilation (through the adoption of a suspended floor slab inclusive of periscopic air bricks) appears to have been incorporated as a standard design feature within the dwellings. On the basis of the information supplied, there appears to be no specific requirement for the inclusion of a hydrocarbon resistant membrane within the floor slab construction.

Construction Workers

It is assumed that site workers/contractors have undertaken the appropriate risk assessments to inform the necessary level of PPE required for their on-site activities.

A copy of this report should be included in the site health and safety file, and site workers should be made fully aware of the sites setting.

Utilities

We would recommend that a copy of this report is supplied to utility companies, and that their recommendations relating to appropriate supply pipes are adhered to.

Closing Comments

It should be noted that these recommendations should be considered to supersede those provided in the previous GeoDyne report albeit all other conclusions and recommendations detailed therein remain applicable.

Yours sincerely
For and on behalf of GeoDyne Limited



Chris Bowley
Graduate Geo-Environmental Engineer

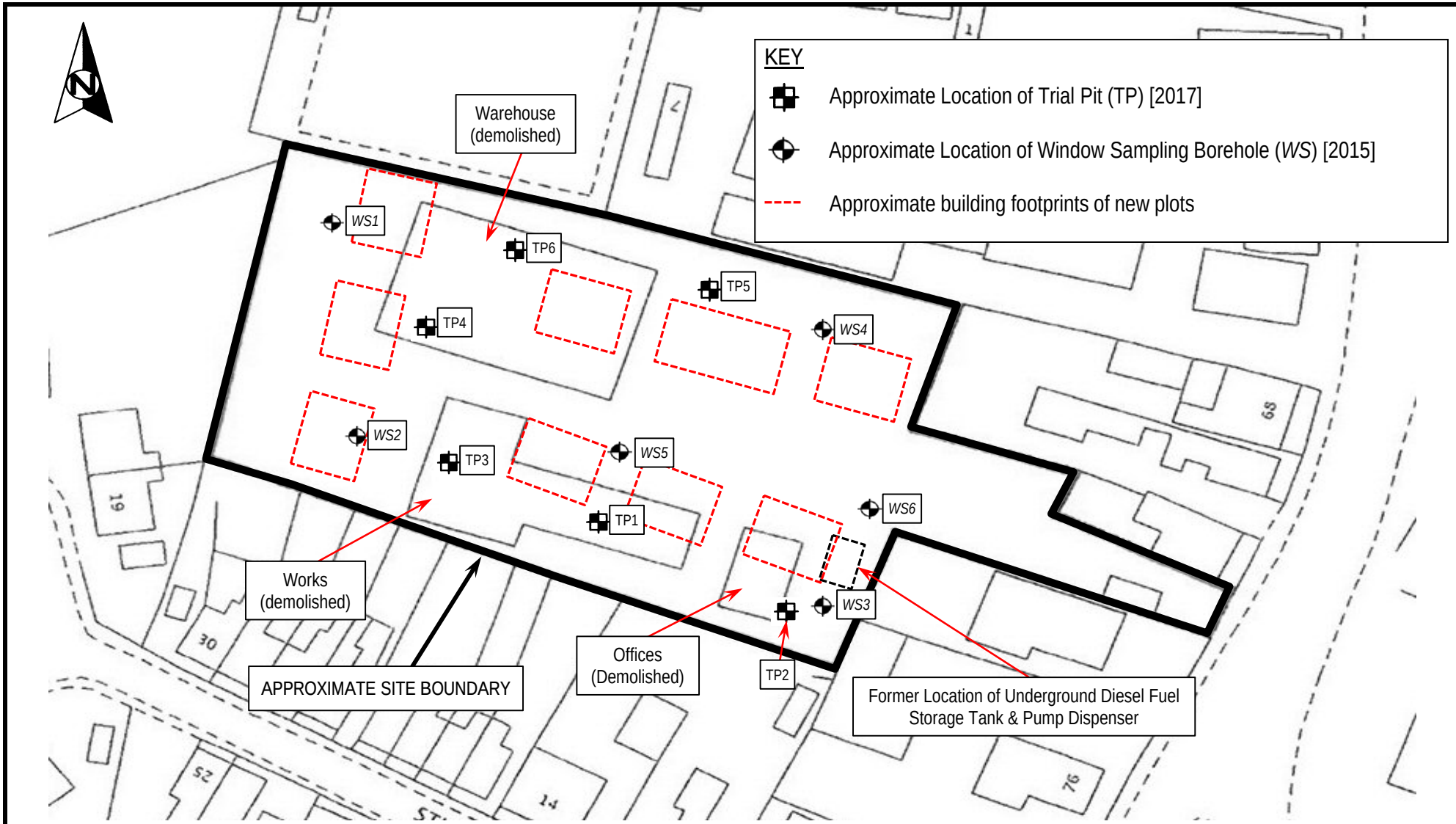
Appendices

Appendix I Exploratory Hole Locaton Plan
Appendix II Plan Illustrating Locations of Sampling Positions Around Former UST
Appendix III Exploratory Hole Logs
Appendix IV Laboratory Soil Test Results
Appendix V Plates
Appendix VI Conditions & Limitations

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APPENDIX I

Post Demolition Exploratory Hole Location Plan
(Figure No. D34136/101)



REPRODUCED FROM THE ORDNANCE SURVEY MAP WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE. CROWN COPYRIGHT RESERVED.
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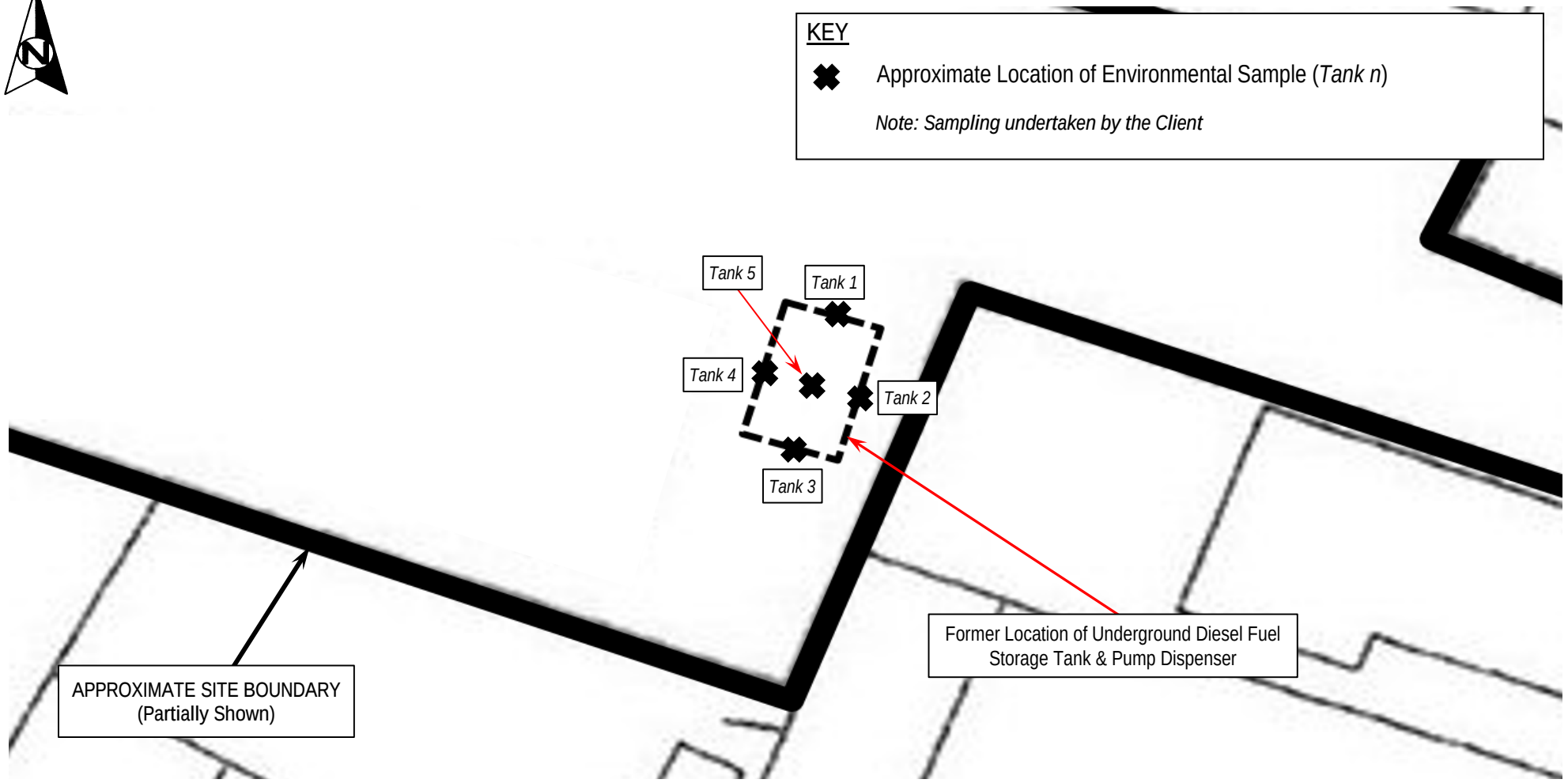
Project No.	D34136	Title	Post Demolition Exploratory Hole Location Plan	Drawn	CB
Client	Seagate Homes			Checked	*DJH*
Project	Church Street Holbeach	Date Drawn	05/05/2017	Approved	*RS*
		Scale	NTS	Figure No. D34136/101	
		Revision			

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APPENDIX II

Plan Illustrating Locations of Sampling Positions Around Former UST
(Figure No. D34136/102)



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Project No.	D34136	Title	Plan Illustrating Locations of Sampling Positions Around Former UST	Drawn	CB
Client	Seagate Homes			Checked	*DJH*
Project	Church Street Holbeach	Date Drawn	05/05/2017	Approved	*RS*
		Scale	NTS	Figure No. D34136/102	
		Revision			

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APPENDIX III

Exploratory Hole Logs
(TP1 to TP6 and WS1 to WS6)

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TP1

Project No: D34136

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Medium dense brown gravelly very sandy silt with occasional glass and ceramic pieces. Gravel is fine to coarse subangular to angular brick (MADE GROUND)		0.10	TJV1	D			
Firm dark brown slightly sandy slightly gravelly very silty clay. Gravel is fine to coarse subangular to angular brick (MADE GROUND)		0.30 0.40	TJV2	D			
Firm brown slightly sandy very silty CLAY (TIDAL FLAT DEPOSITS)		0.50					
End of Trial Pit at 2.10m		2.10					

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

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

Project: Church Street, Holbeach			**Client:** Seagate Homes	
Logged: CB	**Checked:** DJH	**Field Book Ref:** CB17/01	**Plant:** JCB 3CX	**Drawing No.** TP1
Date: 10/04/2017	**Approved:** PK		**Scale:** 1:25	

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TP2

Project No: D34136

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Medium dense yellow-brown silty gravelly fine to coarse sand. Gravel is fine to coarse subangular to angular limestone, brick and concrete (MADE GROUND)		0.20	TJV3	D			
Firm grey-brown slightly sandy clayey SILT (TIDAL FLAT DEPOSITS)		0.30					
		0.50	TJV4	D			
...darker blue-grey discolouration in top 1.00m							
End of Trial Pit at 2.00m		2.00					

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

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

Project: Church Street, Holbeach			**Client:** Seagate Homes	
Logged: CB	**Checked:** DJH	**Field Book Ref:** CB17/01	**Plant:** JCB 3CX	**Drawing No.** TP2
Date: 10/04/2017	**Approved:** PK		**Scale:** 1:25	

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TP3

Project No: D34136

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Medium dense yellow-brown silty gravelly fine to coarse sand. Gravel is fine to coarse subangular to angular limestone, brick and concrete (MADE GROUND)		0.10					
Firm dark blue-grey slightly sandy slightly silty gravelly clay. Gravel is fine to coarse subangular brick (MADE GROUND)		0.30	TJV5	D			
Firm brown slightly sandy very silty CLAY (TIDAL FLAT DEPOSITS)		0.50					
Medium dense brown very silty fine to medium SAND (TIDAL FLAT DEPOSITS)		1.20					
End of Trial Pit at 2.30m		2.30					

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

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

Project: Church Street, Holbeach			**Client:** Seagate Homes	
Logged: CB	**Checked:** DJH	**Field Book Ref:** CB17/01	**Plant:** JCB 3CX	**Drawing No.** TP3
Date: 10/04/2017	**Approved:** PK		**Scale:** 1:25	

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TP4

Project No: D34136

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Dense yellow-brown silty very gravelly fine to coarse sand. Gravel is fine to coarse subangular to angular limestone, brick, concrete and macadam		0.10					
(MADE GROUND)		0.30	TJV6	D			
Medium dense sandy gravelly silt. Gravel is fine to coarse subangular to angular brick, concrete and macadam		0.40					
(MADE GROUND) ...occasional macadam and concrete cobbles from between 0.10m and 0.20m		0.60	TJV7	D			
Firm brown slightly sandy very silty CLAY (TERRINGTON BEDS) ...dark blue-grey discolouration in top 1.00m							
End of Trial Pit at 2.00m		2.00					

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

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

Project: Church Street, Holbeach			**Client:** Seagate Homes	
Logged: CB	**Checked:** DJH	**Field Book Ref:** CB17/01	**Plant:** JCB 3CX	**Drawing No.** TP4
Date: 10/04/2017	**Approved:** PK		**Scale:** 1:25	

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TP5

Project No: D34136

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Firm dark brown sandy gravelly silt with occasional cobbles and occasional pieces of timber. Gravel is fine to coarse subrounded to subangular concrete and cobbles are subangular brick and concrete (MADE GROUND)		0.30	T8	D			
Firm dark brown silty slightly sandy CLAY (TIDAL FLAT DEPOSITS)		0.60 0.70	T9	D			
Medium dense brown slightly clayey sandy SILT (TIDAL FLAT DEPOSITS)		1.50					
End of Trial Pit at 2.00m		2.00					

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

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

Project: Church Street, Holbeach			**Client:** Seagate Homes	
Logged: CB	**Checked:** DJH	**Field Book Ref:** CB17/01	**Plant:** JCB 3CX	**Drawing No.** TP5
Date: 10/04/2017	**Approved:** PK		**Scale:** 1:25	

GeoDyne
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Tel: 01332 290798
email: info@geodyne.co.uk

TP6

Project No: D34136

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown silty gravelly fine to coarse sand. Gravel is fine to coarse subrounded to subangular brick, concrete, slate and macadam (MADE GROUND) ...plastic sheeting between 0.10m and 0.40m ...frequent polystyrene chunks at 0.40m		0.20	T10	D			
Firm brown slightly sandy silty CLAY (TIDAL FLAT DEPOSITS)		0.90 0.95	T11	D			
Medium dense brown very silty fine to medium SAND (TIDAL FLAT DEPOSITS)		1.50					
End of Trial Pit at 2.00m		2.00					

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

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

Project: Church Street, Holbeach			**Client:** Seagate Homes	
Logged: CB	**Checked:** DJH	**Field Book Ref:** CB17/01	**Plant:** JCB 3CX	**Drawing No.** TP6
Date: 10/04/2017	**Approved:** PK		**Scale:** 1:25	

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email: info@geodyne.co.uk

WS1

Project No. D34136

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Lightly reinforced concrete (MADE GROUND)		0.15			
0.60	D	D1		Layer of brick (0.10m) underlain by very loose to loose slightly clayey very gravelly sand. Gravel includes brick, concrete, coal, shale, slag, timber fragments and plastic sheeting (MADE GROUND) ...poor recovery through Made Ground due to loose compaction and the presence of groundwater at 1.00m (washing fines from core)		(2.85)		▽	
1.00-1.45	C		1						
2.00-2.45	C		7						
3.00-3.45	C		2	Very loose brown wet very silty SAND (TERRINGTON BEDS)		3.00			
3.90	D	D2		...with pockets of soft to firm very sandy SILT with depth		(2.00)	4.00		
4.00-4.45	C		2						
4.60-5.00	B	B1							
5.00-5.45	C		13	End of Borehole at 5.00 m		5.00			

Remarks:
1. Sides cased to 4.00m.
2. Water encountered below 1.00m. Wet throughout.
3. Plain pipe installed from ground level to 1.00m with a bentonite surround, slotted pipe installed from 1.00m to 4.40m with a gravel surround. Well sock installed across slotted section of pipe.
4. Bung, valve and lockable cover installed.

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

Project: Church Street, Holbeach
Client: Langwith Construction

Logged:	Checked:	Field Book Ref:	Plant:	Drawing Ref:
DH	PK	DH1402	Competitor rig	WS1
Date: 04/12/2014	**Approved:** PK		**Scale:** 1:50	

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WS2

Project No. D34136

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Unreinforced concrete (MADE GROUND)		0.17			
						(0.43)			
0.60-1.00	B	B1		Compact yellow-brown sandy fine to coarse gravel (sub-base type material) (MADE GROUND)		0.60			
0.90	D	D1				(0.60)			
1.00-1.45	C		10	Soft becoming soft to firm brown very sandy very silty CLAY (TERRINGTON BEDS)		1.20			
1.50-2.00	B	B2		Soft to firm brown damp slightly clayey very sandy SILT (TERRINGTON BEDS)				▽	
2.00-2.45	C		8	...with water encountered below 1.70m ...becoming thinly laminated with depth		(1.50)			
						2.70			
3.00-3.45	C		2	Very loose greyish-brown wet very silty SAND (TERRINGTON BEDS)					
3.60	D	D2				(2.30)			
4.00-4.45	C		7	...becoming loose below approximately 4.00m			4.00		
5.00-5.45	C		11			5.00			
				End of Borehole at 5.00 m					

Remarks:
1.Borehole cased to 4.00m.
2.Water encountered below 1.70m.
3.In-situ shear vane reading at 1.00m = 35kN/m2.

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

Project: Church Street, Holbeach
Client: Langwith Construction

Logged: DH
Checked: PK
Date: 04/12/2014
Approved: PK
Field Book Ref: DH1402
Plant: Competitor rig
Scale: 1:50
Drawing Ref: WS2

GeoDyne
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WS3

Project No. D34136

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Unreinforced concrete (MADE GROUND)		0.19			
				Compact yellow-brown sandy fine to coarse gravel (sub-base type material) (MADE GROUND)		(0.61) 0.80			
0.90	D	D1							
1.00-1.45	C		6	Soft dark brown very sandy very silty clay with occasional fine roots and fine gravel (POSSIBLE BURIED TOPSOIL)		(0.45) 1.25			
1.50-2.00	B	B1		Soft brown damp slightly clayey very sandy SILT (TERRINGTON BEDS)		(0.85)		▽	
1.80	D	D2							
2.00-2.45	C		5	...wet between 1.50m and 1.70m and becoming soft to firm below this depth		2.10		▽	
				Loose brown wet very silty SAND (TERRINGTON BEDS)					
3.00-3.45	C		10			(2.90)			
4.00-4.45	C		3	...becoming very loose to loose below 4.00m			4.00		
5.00-5.45	C		9	End of Borehole at 5.00 m		5.00			

Remarks:
1. Borehole cased to 4.00m.
2. Water encountered as a seepage at 1.50m and with soils recovered wet below 2.10m.
3. Plain pipe installed from ground level to 1.00m with a bentonite surround, slotted pipe installed from 1.00m to 5.00m with a gravel surround. Well sock installed across slotted section of pipe.
4. Bung, valve and lockable cover installed.
5. In-situ shear vane reading at 1.00m = 25kN/m2.

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

Project: Church Street, Holbeach
Client: Langwith Construction

Logged: DH
Checked: PK
Date: 04/12/2014
Approved: PK
Field Book Ref: DH1402
Plant: Competitor rig
Scale: 1:50
Drawing Ref: WS3

GeoDyne
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WS4

Project No. D34136

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Gravel surfacing over highly weathered macadam (recovered as fine to coarse gravel in a black slightly sandy matrix) (MADE GROUND)		(0.50) 0.50			
0.70-1.00	B	B1		Loose to medium dense brown slightly clayey silty sand with occasional fine gravel (including brick) (MADE GROUND)		0.70 (0.60) 1.30			
0.80	D	D1							
1.00-1.45	C		6						
1.50-2.00	B	B2		Soft very sandy CLAY/SILT (TERRINGTON BEDS)					
2.00-2.45	C		2	Soft brown slightly clayey very sandy damp SILT (TERRINGTON BEDS) ...becoming thinly laminated below 1.70m ...becoming wet below 2.30m		(1.50) 2.80		▽	
3.00-3.45	C		9	Loose to medium dense brown wet very silty SAND (TERRINGTON BEDS) ...becoming medium dense below 3.60m		(2.20)	4.00		
3.80	D	D2							
4.00-4.45	C		30						
5.00-5.45	C		17	End of Borehole at 5.00 m		5.00			

Remarks:
1. Borehole sides cased to 4.00m.
2. Water encountered below 2.30m.
3. Plain pipe installed from ground level to 1.00m with a bentonite surround, slotted pipe installed from 1.00m to 4.00m with a gravel surround. Well sock installed across slotted section of pipe.
4. Bung, valve and lockable cover installed.
5. In-situ shear vane reading at 1.00m = 22kN/m2.

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

Project: Church Street, Holbeach
Client: Langwith Construction

Logged: DH
Checked: PK
Date: 04/12/2014
Approved: PK
Field Book Ref: DH1402
Plant: Competitor rig
Scale: 1:50
Drawing Ref: WS4

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WS5

Project No. D34136

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Macadam surfacing (0.02m) over grey-brown sandy gravel. Gravel includes flint, brick and macadam (MADE GROUND)		0.25 0.45			
0.60	D	D1		Loose to medium dense brown slightly clayey silty sand with occasional fine gravel (MADE GROUND)		(0.45) 0.90			
1.00-1.45	C		7	Soft to firm grey slightly silty sandy clay with occasional fine to medium gravel (including brick) and frequent fine white shell fragments (MADE GROUND - REWORKED NATURAL STRATA)		(1.70)		▽	
1.60	D	D2							
2.00-2.45	C		8	Soft becoming soft to firm brown very clayey very sandy SILT (TERRINGTON BEDS) ...becoming wet below 1.20m ...becoming thinly laminated with depth		2.60	3.00	▽	
3.00-3.45	C		14	Loose to medium dense greyish-brown wet very silty SAND (TERRINGTON BEDS)		(1.40)			
3.70	D	D3							
4.00-4.45	C		8	End of Borehole at 4.00 m		4.00			

Remarks:
1.Borehole cased to 3.00m.
2.Water seepage encountered below 1.20m, with soils recovered wet below 2.00m.
3.In-situ shear vane reading at 1.00m = 25kN/m2.

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

Project: Church Street, Holbeach		**Client:** Langwith Construction	
Logged: DH	**Checked:** PK	**Field Book Ref:** DH1402	**Plant:** Competitor rig
Date: 04/12/2014	**Approved:** PK		**Scale:** 1:50
			Drawing Ref: WS5

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WS6

Project No. D34136

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Macadam surfacing (0.07m) over light brown sandy gravel (sub-base type material) (MADE GROUND)		0.20			
0.50	D/J	D1/J1				0.40			
				Layer of black completely weathered macadam (0.10m) underlain by brick (MADE GROUND)		(0.40)			
0.90	D/J	D2/J2				0.80			
				Soft to firm grey slightly silty clay with occasional fine to medium gravel (MADE GROUND)		(1.40)			
				Very soft to soft brown clayey very sandy SILT (TERRINGTON BEDS) ...becoming wet below 1.90m		2.20		▽	
				Loose to medium dense greyish-brown wet very silty SAND (TERRINGTON BEDS)		(0.80)			
2.80	D/J	D3/J3				3.00			
				End of Borehole at 3.00 m					

Remarks:
1. Sides becoming unstable in wet granular strata.
2. Water seepage encountered below 1.90m.
3. Borehole targeted near underground fuel tank and pump for visual inspection of soils. No obvious odour or visible evidence of contamination.
4. In-situ shear vane reading at 1.00m = 19kN/m2.

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

Project: Church Street, Holbeach		**Client:** Langwith Construction	
Logged: DH	**Checked:** PK	**Field Book Ref:** DH1402	**Plant:** Competitor rig
Date: 04/12/2014	**Approved:** PK		**Scale:** 1:50
			Drawing Ref: WS6

GeoDyne

APPENDIX IV

Laboratory Soil Test Results

Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT
SUPPLEMENT TO TEST REPORT 17/02691/1

Envirolab Job Number: 17/02691
Issue Number: 2 **Date:** 05 May, 2017

Client:
GeoDyne (Derby)
9 Brunel Parkway
Pride Park
Derby
Derbyshire
UK
DE24 8HR

Project Manager: Chris Bowley
Project Name: Church Street, Holbeach
Project Ref: D34136
Order No: D34136
Date Samples Received: 18/04/17
Date Instructions Received: 18/04/17
Date Analysis Completed: 25/04/17

Prepared by:

Danielle Brierley
Client Service Manager

Approved by:

Georgia King
Adminstration & Client Service Supervisor

Envirolab Job Number: 17/02691

Client Project Name: Church Street, Holbeach

Client Project Ref: D34136

Lab Sample ID	17/02691/1	17/02691/2	17/02691/3	17/02691/4	17/02691/5	17/02691/6	17/02691/7	17/02691/8	Units	Method ref
Client Sample No	TJV1	TJV2	TJV3	T4	TJV5	TJV6	T7	T8		
Client Sample ID	TP1	TP1	TP2	TP2	TP3	TP4	TP4	TP5		
Depth to Top	0.10	0.40	0.20	0.50	0.30	0.30	0.60	0.30		
Depth To Bottom										
Date Sampled	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4AB	6ABE	5A	3	3	4A	3	4AE		
% Stones >10mm$_A^{\#}$	<0.1	2.0	17.2	<0.1	<0.1	13.0	<0.1	11.4	% w/w	A-T-044
pH$_D^{M\#}$	9.12	7.72	8.19	8.02	6.98	8.32	7.25	7.78	pH	A-T-031s
Total Organic Carbon$_D^{M\#}$	1.60	1.35	0.39	0.76	1.32	2.72	0.63	2.76	% w/w	A-T-032s
Arsenic$_D^{M\#}$	5	5	5	3	6	10	4	7	mg/kg	A-T-024s
Cadmium$_D^{M\#}$	0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	0.7	mg/kg	A-T-024s
Copper$_D^{M\#}$	7	14	6	10	18	18	7	19	mg/kg	A-T-024s
Chromium$_D^{M\#}$	18	15	8	13	17	18	14	21	mg/kg	A-T-024s
Chromium (hexavalent)$_D$	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-040s
Chromium (trivalent)	18	15	8	13	17	18	14	21	mg/kg	Calc
Lead$_D^{M\#}$	39	34	18	16	38	100	13	63	mg/kg	A-T-024s
Mercury$_D$	0.27	0.72	0.53	<0.17	0.58	<0.17	<0.17	0.27	mg/kg	A-T-024s
Nickel$_D^{M\#}$	11	13	7	13	14	13	16	15	mg/kg	A-T-024s
Selenium$_D$	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	A-T-024s
Zinc$_D^{M\#}$	68	58	31	48	60	97	38	175	mg/kg	A-T-024s

Envirolab Job Number: 17/02691

Client Project Name: Church Street, Holbeach

Client Project Ref: D34136

Lab Sample ID	17/02691/1	17/02691/2	17/02691/3	17/02691/4	17/02691/5	17/02691/6	17/02691/7	17/02691/8	Units	Method ref
Client Sample No	TJV1	TJV2	TJV3	T4	TJV5	TJV6	T7	T8		
Client Sample ID	TP1	TP1	TP2	TP2	TP3	TP4	TP4	TP5		
Depth to Top	0.10	0.40	0.20	0.50	0.30	0.30	0.60	0.30		
Depth To Bottom										
Date Sampled	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4AB	6ABE	5A	3	3	4A	3	4AE		
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_A^{\#}$	Chrysotile	NAD	NAD	-	NAD	NAD	-	-		A-T-045
Asbestos Matrix (microscope)$_A$	Loose fibres	-	-	-	-	-	-	-		A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	N/A	N/A	N/A	-	N/A	N/A	-	-		

Envirolab Job Number: 17/02691

Client Project Name: Church Street, Holbeach

Client Project Ref: D34136

Lab Sample ID	17/02691/1	17/02691/2	17/02691/3	17/02691/4	17/02691/5	17/02691/6	17/02691/7	17/02691/8	Units	Method ref
Client Sample No	TJV1	TJV2	TJV3	T4	TJV5	TJV6	T7	T8		
Client Sample ID	TP1	TP1	TP2	TP2	TP3	TP4	TP4	TP5		
Depth to Top	0.10	0.40	0.20	0.50	0.30	0.30	0.60	0.30		
Depth To Bottom										
Date Sampled	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4AB	6ABE	5A	3	3	4A	3	4AE		
PAH 16										
Acenaphthene$_A^{M\#}$	1.1	<0.1	<0.1	<0.1	<0.1	7.5	<0.1	<0.1	mg/kg	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	<0.1	<0.1	mg/kg	A-T-019s
Anthracene$_A^{M\#}$	3.4	<0.1	<0.1	<0.1	<0.1	14.7	<0.1	0.3	mg/kg	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	5.6	0.2	0.2	<0.1	<0.1	35.3	<0.1	2.7	mg/kg	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	5.1	0.2	0.2	<0.1	<0.1	29.4	<0.1	3.1	mg/kg	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	6.1	0.4	0.2	<0.1	<0.1	36.8	<0.1	4.0	mg/kg	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	2.1	0.1	<0.1	<0.1	<0.1	11.4	<0.1	1.4	mg/kg	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	2.3	<0.1	<0.1	<0.1	<0.1	12.8	<0.1	1.5	mg/kg	A-T-019s
Chrysene$_A^{M\#}$	5.5	0.2	0.2	<0.1	<0.1	33.4	<0.1	2.7	mg/kg	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	0.5	<0.1	<0.1	<0.1	<0.1	3.2	<0.1	0.3	mg/kg	A-T-019s
Fluoranthene$_A^{M\#}$	14.0	0.5	0.3	<0.1	<0.1	64.5	<0.1	4.4	mg/kg	A-T-019s
Fluorene$_A^{M\#}$	1.1	<0.1	<0.1	<0.1	<0.1	7.7	<0.1	<0.1	mg/kg	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	2.6	0.1	<0.1	<0.1	<0.1	15.2	<0.1	1.7	mg/kg	A-T-019s
Naphthalene$_A^{M\#}$	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	<0.1	<0.1	mg/kg	A-T-019s
Phenanthrene$_A^{M\#}$	8.5	0.1	<0.1	0.1	<0.1	48.3	<0.1	1.3	mg/kg	A-T-019s
Pyrene$_A^{M\#}$	11.5	0.5	0.2	<0.1	<0.1	58.4	<0.1	4.2	mg/kg	A-T-019s
PAH (total 16)$_A^{M\#}$	69.3	2.5	1.3	0.1	<0.1	380	<0.1	27.4	mg/kg	A-T-019s

Envirolab Job Number: 17/02691

Client Project Name: Church Street, Holbeach

Client Project Ref: D34136

Lab Sample ID	17/02691/1	17/02691/2	17/02691/3	17/02691/4	17/02691/5	17/02691/6	17/02691/7	17/02691/8	Units	Method ref
Client Sample No	TJV1	TJV2	TJV3	T4	TJV5	TJV6	T7	T8		
Client Sample ID	TP1	TP1	TP2	TP2	TP3	TP4	TP4	TP5		
Depth to Top	0.10	0.40	0.20	0.50	0.30	0.30	0.60	0.30		
Depth To Bottom										
Date Sampled	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17	10-Apr-17		
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES		
Sample Matrix Code	4AB	6ABE	5A	3	3	4A	3	4AE		
TPH CWG										
Ali >C5-C6$_A^\#$	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
Ali >C6-C8$_A^\#$	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
Ali >C8-C10$_A^\#$	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
Ali >C10-C12$_A^\#$	0.5	-	<0.1	-	<0.1	<0.1	-	<0.1	mg/kg	A-T-023s
Ali >C12-C16$_A^\#$	8.8	-	<0.1	-	<0.1	6.2	-	5.1	mg/kg	A-T-023s
Ali >C16-C21$_A^\#$	26.3	-	<0.1	-	<0.1	19.7	-	34.3	mg/kg	A-T-023s
Ali >C21-C35$_A^\#$	251	-	<0.1	-	<0.1	46.0	-	76.8	mg/kg	A-T-023s
Total Aliphatics$_A$	286	-	<0.1	-	<0.1	71.9	-	116	mg/kg	A-T-023s
Aro >C5-C7$_A^\#$	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
Aro >C7-C8$_A^\#$	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
Aro >C8-C10$_A^\#$	0.01	-	<0.01	-	0.04	<0.01	-	<0.01	mg/kg	A-T-022s
Aro >C10-C12$_A^\#$	<0.1	-	<0.1	-	<0.1	0.3	-	<0.1	mg/kg	A-T-023s
Aro >C12-C16$_A^\#$	3.9	-	<0.1	-	<0.1	10.9	-	2.2	mg/kg	A-T-023s
Aro >C16-C21$_A^\#$	40.3	-	<0.1	-	<0.1	81.4	-	24.3	mg/kg	A-T-023s
Aro >C21-C35$_A^\#$	195	-	<0.1	-	<0.1	242	-	68.7	mg/kg	A-T-023s
Total Aromatics$_A$	240	-	<0.1	-	<0.1	334	-	95.2	mg/kg	A-T-023s
TPH (Ali & Aro)$_A$	526	-	<0.1	-	<0.1	406	-	211	mg/kg	A-T-023s
BTEX - Benzene$_A^\#$	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
BTEX - Toluene$_A^\#$	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
BTEX - Ethyl Benzene$_A^\#$	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
BTEX - m & p Xylene$_A^\#$	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
BTEX - o Xylene$_A^\#$	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s
MTBE$_A^\#$	<0.01	-	<0.01	-	<0.01	<0.01	-	<0.01	mg/kg	A-T-022s

Envirolab Job Number: 17/02691

Client Project Name: Church Street, Holbeach

Client Project Ref: D34136

Lab Sample ID	17/02691/10	17/02691/11							Units	Method ref
Client Sample No	T10	T11								
Client Sample ID	TP6	TP6								
Depth to Top	0.20	0.95								
Depth To Bottom										
Date Sampled	10-Apr-17	10-Apr-17								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	5AB	6E								
% Stones >10mm$_A^{\#}$	<0.1	<0.1							% w/w	A-T-044
pH$_D^{M\#}$	8.12	8.02							pH	A-T-031s
Total Organic Carbon$_D^{M\#}$	0.81	0.36							% w/w	A-T-032s
Arsenic$_D^{M\#}$	5	5							mg/kg	A-T-024s
Cadmium$_D^{M\#}$	<0.5	<0.5							mg/kg	A-T-024s
Copper$_D^{M\#}$	17	4							mg/kg	A-T-024s
Chromium$_D^{M\#}$	18	15							mg/kg	A-T-024s
Chromium (hexavalent)$_D$	<1	<1							mg/kg	A-T-040s
Chromium (trivalent)	18	15							mg/kg	Calc
Lead$_D^{M\#}$	35	10							mg/kg	A-T-024s
Mercury$_D$	0.35	<0.17							mg/kg	A-T-024s
Nickel$_D^{M\#}$	16	14							mg/kg	A-T-024s
Selenium$_D$	<1	<1							mg/kg	A-T-024s
Zinc$_D^{M\#}$	70	66							mg/kg	A-T-024s

Envirolab Job Number: 17/02691

Client Project Name: Church Street, Holbeach

Client Project Ref: D34136

Lab Sample ID	17/02691/10	17/02691/11							Units	Method ref
Client Sample No	T10	T11								
Client Sample ID	TP6	TP6								
Depth to Top	0.20	0.95								
Depth To Bottom										
Date Sampled	10-Apr-17	10-Apr-17								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	5AB	6E								
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{A}^{\#}$	Chrysotile	-								A-T-045
Asbestos Matrix (microscope)$_{A}$	Loose fibres	-								A-T-045
Asbestos ACM - Suitable for Water Absorption Test?	N/A	-								

Envirolab Job Number: 17/02691

Client Project Name: Church Street, Holbeach

Client Project Ref: D34136

Lab Sample ID	17/02691/10	17/02691/11							Units	Method ref
Client Sample No	T10	T11								
Client Sample ID	TP6	TP6								
Depth to Top	0.20	0.95								
Depth To Bottom										
Date Sampled	10-Apr-17	10-Apr-17								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	5AB	6E								
PAH 16										
Acenaphthene$_{A}^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Acenaphthylene$_{A}^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Anthracene$_{A}^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Benzo(a)anthracene$_{A}^{M\#}$	0.7	<0.1							mg/kg	A-T-019s
Benzo(a)pyrene$_{A}^{M\#}$	0.8	<0.1							mg/kg	A-T-019s
Benzo(b)fluoranthene$_{A}^{M\#}$	1.0	<0.1							mg/kg	A-T-019s
Benzo(ghi)perylene$_{A}^{M\#}$	0.5	<0.1							mg/kg	A-T-019s
Benzo(k)fluoranthene$_{A}^{M\#}$	0.3	<0.1							mg/kg	A-T-019s
Chrysene$_{A}^{M\#}$	0.7	<0.1							mg/kg	A-T-019s
Dibenzo(ah)anthracene$_{A}^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Fluoranthene$_{A}^{M\#}$	1.2	<0.1							mg/kg	A-T-019s
Fluorene$_{A}^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Indeno(123-cd)pyrene$_{A}^{M\#}$	0.5	<0.1							mg/kg	A-T-019s
Naphthalene$_{A}^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Phenanthrene$_{A}^{M\#}$	0.3	<0.1							mg/kg	A-T-019s
Pyrene$_{A}^{M\#}$	1.2	<0.1							mg/kg	A-T-019s
PAH (total 16)$_{A}^{M\#}$	7.5	<0.1							mg/kg	A-T-019s

Envirolab Job Number: 17/02691

Client Project Name: Church Street, Holbeach

Client Project Ref: D34136

Lab Sample ID	17/02691/10	17/02691/11							Units	Method ref
Client Sample No	T10	T11								
Client Sample ID	TP6	TP6								
Depth to Top	0.20	0.95								
Depth To Bottom										
Date Sampled	10-Apr-17	10-Apr-17								
Sample Type	Soil - ES	Soil - ES								
Sample Matrix Code	5AB	6E								
TPH CWG										
Ali >C5-C6$_A^\#$	<0.01	-							mg/kg	A-T-022s
Ali >C6-C8$_A^\#$	<0.01	-							mg/kg	A-T-022s
Ali >C8-C10$_A^\#$	<0.01	-							mg/kg	A-T-022s
Ali >C10-C12$_A^\#$	<0.1	-							mg/kg	A-T-023s
Ali >C12-C16$_A^\#$	<0.1	-							mg/kg	A-T-023s
Ali >C16-C21$_A^\#$	<0.1	-							mg/kg	A-T-023s
Ali >C21-C35$_A^\#$	<0.1	-							mg/kg	A-T-023s
Total Aliphatics$_A$	<0.1	-							mg/kg	A-T-023s
Aro >C5-C7$_A^\#$	<0.01	-							mg/kg	A-T-022s
Aro >C7-C8$_A^\#$	<0.01	-							mg/kg	A-T-022s
Aro >C8-C10$_A^\#$	<0.01	-							mg/kg	A-T-022s
Aro >C10-C12$_A^\#$	<0.1	-							mg/kg	A-T-023s
Aro >C12-C16$_A^\#$	<0.1	-							mg/kg	A-T-023s
Aro >C16-C21$_A^\#$	3.1	-							mg/kg	A-T-023s
Aro >C21-C35$_A^\#$	10.5	-							mg/kg	A-T-023s
Total Aromatics$_A$	13.6	-							mg/kg	A-T-023s
TPH (Ali & Aro)$_A$	13.6	-							mg/kg	A-T-023s
BTEX - Benzene$_A^\#$	<0.01	-							mg/kg	A-T-022s
BTEX - Toluene$_A^\#$	<0.01	-							mg/kg	A-T-022s
BTEX - Ethyl Benzene$_A^\#$	<0.01	-							mg/kg	A-T-022s
BTEX - m & p Xylene$_A^\#$	<0.01	-							mg/kg	A-T-022s
BTEX - o Xylene$_A^\#$	<0.01	-							mg/kg	A-T-022s
MTBE$_A^\#$	<0.01	-							mg/kg	A-T-022s

REPORT NOTES

General:
This report shall not be reproduced, except in full, without written approval from Envirolab.
All samples contained within this report, and any received with the same delivery, will be disposed of one month after the date of this report.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure. These are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

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Scientific Analysis Laboratories Ltd

Certificate of Analysis

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

Report Number: 442323-1

Date of Report: 15-Dec-2014

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

Customer Contact: Mr David Hooton

Customer Job Reference: D34136
Customer Purchase Order: Geo/D34136/DHJ
Customer Site Reference: Church Street Holbeach
Date Job Received at SAL: 08-Dec-2014
Date Analysis Started: 10-Dec-2014
Date Analysis Completed: 15-Dec-2014

The results reported relate to samples received in the laboratory
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
Tests covered by this certificate were conducted in accordance with SAL SOPs
All results have been reviewed in accordance with QP22

1549

Report checked and authorised by :
Chris Murphy
Project Manager

Issued by :
Chris Murphy
Project Manager

SAL Reference: 442323
Project Site: Church Street Holbeach
Customer Reference: D34136

Soil Analysed as Soil
MCERTS Preparation

SAL Reference		**442323 001**	**442323 002**	**442323 005**	**442323 006**	**442323 009**	**442323 010**	**442323 014**
Customer Sample Reference		**WS1**	**WS1**	**WS3**	**WS3**	**WS5**	**WS5**	**WS6**
Depth		**0.60**	**3.90**	**0.90**	**1.80**	**0.60**	**1.60**	**2.80**
Date Sampled		**04-DEC-2014**	**04-DEC-2014**	**04-DEC-2014**	**04-DEC-2014**	**04-DEC-2014**	**04-DEC-2014**	**04-DEC-2014**
Type		**Sandy Soil**	**Sandy Soil**	**Clay**	**Sandy Soil**	**Sandy Soil**	**Clay**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**				
MCERTS Classification	T143	AR						
Moisture @ 105 C	T162	AR	0.1	%	**18**	**26**	**25**	**24**	**23**	**20**	**24**

SAL Reference: 442323
Project Site: Church Street Holbeach
Customer Reference: D34136

Soil Analysed as Soil
Miscellaneous

SAL Reference		**442323 001**	**442323 002**	**442323 006**	**442323 009**	**442323 010**	**442323 012**
Customer Sample Reference		**WS1**	**WS1**	**WS3**	**WS5**	**WS5**	**WS6**
Depth		**0.60**	**3.90**	**1.80**	**0.60**	**1.60**	**0.50**
Date Sampled		**04-DEC-2014**	**04-DEC-2014**	**04-DEC-2014**	**04-DEC-2014**	**04-DEC-2014**	**04-DEC-2014**
Type		**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Sandy Soil**	**Clay**	
Determinand	**Method**	**Test Sample**	**LOD**	**Units**				
Asbestos ID	T27	AR			N.D.	-	-	N.D.	-	N.D.
(Water Soluble) SO4 expressed as SO4	T242	AR	0.01	g/l	-	**0.03**	<0.01	-	**0.01**	-

SAL Reference: 442323
Project Site: Church Street Holbeach
Customer Reference: D34136

Soil Analysed as Soil
Geodyne Suite 1

SAL Reference		**442323 001**	**442323 002**	**442323 005**	**442323 006**	**442323 009**	**442323 010**
Customer Sample Reference		**WS1**	**WS1**	**WS3**	**WS3**	**WS5**	**WS5**
Depth		**0.60**	**3.90**	**0.90**	**1.80**	**0.60**	**1.60**
Date Sampled		**04-DEC-2014**	**04-DEC-2014**	**04-DEC-2014**	**04-DEC-2014**	**04-DEC-2014**	**04-DEC-2014**
Type		**Sandy Soil**	**Sandy Soil**	**Clay**	**Sandy Soil**	**Sandy Soil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**						
Arsenic	T6	M40	2	mg/kg	**19**	**6**	**6**	**4**	**8**	**9**
Cadmium	T6	M40	1	mg/kg	<1	<1	<1	<1	<1	<1
Chromium	T6	M40	1	mg/kg	**23**	**9**	**16**	**10**	**13**	**18**
Chromium VI	T6	AR	1	mg/kg	<1	<1	<1	<1	<1	<1
Copper	T6	M40	1	mg/kg	**63**	**3**	**19**	**5**	**6**	**18**
Lead	T6	M40	1	mg/kg	**340**	**6**	**24**	**6**	**9**	**37**
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	**59**	**9**	**14**	**12**	**12**	**15**
pH	T7	AR			**7.5**	**7.6**	**7.3**	**7.7**	**7.7**	**7.6**
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3	<3	<3
Total Organic Carbon	T21	M40	0.1	%	**2.6**	**0.7**	**1.0**	**0.3**	**0.3**	**1.0**
Zinc	T6	M40	1	mg/kg	**310**	**23**	**65**	**29**	**32**	**63**

SAL Reference: 442323
Project Site: Church Street Holbeach
Customer Reference: D34136

Soil Analysed as Soil
Total and Speciated USEPA16 PAH

				SAL Reference	**442323 001**	**442323 002**	**442323 005**	**442323 006**	**442323 009**	**442323 010**
				Customer Sample Reference	**WS1**	**WS1**	**WS3**	**WS3**	**WS5**	**WS5**
				Depth	**0.60**	**3.90**	**0.90**	**1.80**	**0.60**	**1.60**
				Date Sampled	**04-DEC-2014**	**04-DEC-2014**	**04-DEC-2014**	**04-DEC-2014**	**04-DEC-2014**	**04-DEC-2014**
				Type	**Sandy Soil**	**Sandy Soil**	**Clay**	**Sandy Soil**	**Sandy Soil**	**Clay**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**						
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	**0.6**	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	T207	M105	0.1	mg/kg	**0.2**	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	**2.0**	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	T207	M105	0.1	mg/kg	**1.8**	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	**1.0**	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	T207	M105	0.1	mg/kg	**0.9**	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	**1.7**	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	**0.9**	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	**0.5**	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	**0.1**	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	**0.7**	<0.1	<0.1	<0.1	<0.1	<0.1
PAH(total)	T207	M105	0.1	mg/kg	**10**	<0.1	<0.1	<0.1	<0.1	<0.1

SAL Reference: 442323
Project Site: Church Street Holbeach
Customer Reference: D34136

Soil Analysed as Soil
Geodyne TPH (CWG)

				SAL Reference	**442323 006**	**442323 014**
				Customer Sample Reference	**WS3**	**WS6**
				Depth	**1.80**	**2.80**
				Date Sampled	**04-DEC-2014**	**04-DEC-2014**
				Type	**Sandy Soil**	**Sandy Soil**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**		
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	<0.100	<0.100
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	<0.10	<0.10
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	**0.18**	<0.10
TPH (C10-C12 aliphatic)	T206	M105	1	mg/kg	<1	<1
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	<2	<2
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	<1	<1
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	<4	<4
TPH (C35-C44 aliphatic)	T8	M105	1	mg/kg	<1	<1
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	<0.10	<0.10
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	<1	<1
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	<1	<1
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	<1	<1
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	<1	<1
TPH (C35-C44 aromatic)	T8	M105	1	mg/kg	<1	<1
TPH (Aliphatic) total	T85	M105		mg/kg	**0.18**	N.D.
TPH (Aromatic) total	T85	M105		mg/kg	N.D.	N.D.
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	**0.18**	N.D.

SAL Reference: 442323
Project Site: Church Street Holbeach
Customer Reference: D34136

Soil Analysed as Soil
BTEX GRO MTBE

SAL Reference	**442323 006**	**442323 014**
Customer Sample Reference	**WS3**	**WS6**
Depth	**1.80**	**2.80**
Date Sampled	**04-DEC-2014**	**04-DEC-2014**
Type	**Sandy Soil**	**Sandy Soil**

Determinand	Method	Test Sample	LOD	Units		
Benzene	T209	M105	10	µg/kg	(13) <10	(13) <10
EthylBenzene	T209	M105	10	µg/kg	<10	<10
Gasoline Range Organics	T54	M105	100	µg/kg	**190**	<100
M/P Xylene	T209	M105	10	µg/kg	<10	<10
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	<10	<10
O Xylene	T209	M105	10	µg/kg	<10	<10
Toluene	T209	M105	10	µg/kg	<10	<10

Index to symbols used in 442323-1

Value	Description
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
AR	As Received
N.D.	Not Detected
13	Results have been blank corrected.
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos was subcontracted to REC Asbestos

Method Index

Value	Description
T54	GC/MS (Headspace)
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T8	GC/FID
T85	Calc
T162	Grav (1 Dec) (105 C)
T21	OX/IR
T206	GC/FID (MCERTS)
T6	ICP/OES
T27	PLM
T143	Process
T207	GC/MS (MCERTS)
T7	Probe
T209	GC/MS(Head Space)(MCERTS)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Asbestos ID	T27	AR			SU	001,009,012
(Water Soluble) SO4 expressed as SO4	T242	AR	0.01	g/l	N	002,006,010
Arsenic	T6	M40	2	mg/kg	M	001-002,005-006,009-010
Cadmium	T6	M40	1	mg/kg	M	001-002,005-006,009-010
Chromium	T6	M40	1	mg/kg	M	001-002,005-006,009-010

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Chromium VI	T6	AR	1	mg/kg	N	001-002,005-006,009-010
Copper	T6	M40	1	mg/kg	M	001-002,005-006,009-010
Lead	T6	M40	1	mg/kg	M	001-002,005-006,009-010
Mercury	T6	M40	1	mg/kg	M	001-002,005-006,009-010
Nickel	T6	M40	1	mg/kg	M	001-002,005-006,009-010
pH	T7	AR			M	001-002,005-006,009-010
Selenium	T6	M40	3	mg/kg	M	001-002,005-006,009-010
Total Organic Carbon	T21	M40	0.1	%	N	001-002,005-006,009-010
Zinc	T6	M40	1	mg/kg	M	001-002,005-006,009-010
Naphthalene	T207	M105	0.1	mg/kg	M	001-002,005-006,009-010
Acenaphthylene	T207	M105	0.1	mg/kg	U	001-002,005-006,009-010
Acenaphthene	T207	M105	0.1	mg/kg	M	001-002,005-006,009-010
Fluorene	T207	M105	0.1	mg/kg	M	001-002,005-006,009-010
Phenanthrene	T207	M105	0.1	mg/kg	M	001-002,005-006,009-010
Anthracene	T207	M105	0.1	mg/kg	U	001-002,005-006,009-010
Fluoranthene	T207	M105	0.1	mg/kg	M	001-002,005-006,009-010
Pyrene	T207	M105	0.1	mg/kg	M	001-002,005-006,009-010
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001-002,005-006,009-010
Chrysene	T207	M105	0.1	mg/kg	M	001-002,005-006,009-010
Benzo(b/k)Fluoranthene	T207	M105	0.1	mg/kg	M	001-002,005-006,009-010
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001-002,005-006,009-010
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001-002,005-006,009-010
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001-002,005-006,009-010
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001-002,005-006,009-010
PAH(total)	T207	M105	0.1	mg/kg	U	001-002,005-006,009-010
TPH (C5-C6 aliphatic)	T209	M105	0.100	mg/kg	N	006,014
TPH (C6-C8 aliphatic)	T209	M105	0.10	mg/kg	N	006,014
TPH (C8-C10 aliphatic)	T209	M105	0.10	mg/kg	N	006,014
TPH (C10-C12 aliphatic)	T206	M105	1	mg/kg	M	006,014
TPH (C12-C16 aliphatic)	T206	M105	2	mg/kg	M	006,014
TPH (C16-C21 aliphatic)	T206	M105	1	mg/kg	M	006,014
TPH (C21-C35 aliphatic)	T206	M105	4	mg/kg	M	006,014
TPH (C35-C44 aliphatic)	T8	M105	1	mg/kg	N	006,014
TPH (C6-C7 aromatic)	T209	M105	0.10	mg/kg	N	006,014
TPH (C7-C8 aromatic)	T209	M105	0.10	mg/kg	N	006,014
TPH (C8-C10 aromatic)	T209	M105	0.10	mg/kg	N	006,014
TPH (C10-C12 aromatic)	T206	M105	1	mg/kg	N	006,014
TPH (C12-C16 aromatic)	T206	M105	1	mg/kg	M	006,014
TPH (C16-C21 aromatic)	T206	M105	1	mg/kg	M	006,014
TPH (C21-C35 aromatic)	T206	M105	1	mg/kg	M	006,014
TPH (C35-C44 aromatic)	T8	M105	1	mg/kg	N	006,014
TPH (Aliphatic) total	T85	M105		mg/kg	N	006,014
TPH (Aromatic) total	T85	M105		mg/kg	N	006,014
TPH (Aliphatic+Aromatic) (sum)	T85	M105		mg/kg	N	006,014
Benzene	T209	M105	10	µg/kg	M	006,014
EthylBenzene	T209	M105	10	µg/kg	M	006,014
Gasoline Range Organics	T54	M105	100	µg/kg	N	006,014
M/P Xylene	T209	M105	10	µg/kg	M	006,014
Methyl tert-Butyl Ether	T209	M105	10	µg/kg	M	006,014
O Xylene	T209	M105	10	µg/kg	M	006,014
Toluene	T209	M105	10	µg/kg	M	006,014
MCERTS Classification	T143	AR			M	001-002,005-006,009-010,014
Moisture @ 105 C	T162	AR	0.1	%	N	001-002,005-006,009-010,014

HUMBERSIDE MATERIALS LABORATORY
Atherton Way, Brigg
North Lincolnshire, DN20 8AR
Tel & Fax 01652 652753

CHEMICAL ANALYSIS

Summary Sheet

Sample Ref **S/43836 – S/43840** **Client** Seagate Homes

Site	Church Street, Holbeach
Location	see below
Material	Silt / Clay

Date sampled 16/01/2017 Sampled by client

Analytical Report

Report / Contract No.	-	63124-1	63124-2	63124-3	63124-4	63124-5
Sample I.D.	-	**S**/43836	S/43837	S/43838	S/43839	S/43840
Location	-	Tank 1	Tank 2	Tank 3	Tank 4	Tank 5
Testing	-	TPH Speciated				
Accompanying Pages	-	page 2 of 5 to 5 of 5				

Comments

File ref 136/4105/G
Date tested 07/11/2016
Date reported 14/12/2016

Signed: - M.J. Green C. Driver
Director

Certificate of sampling when submitted is retained by the Laboratory and available upon request
Samples will normally be kept for 14 days from the date reported
Tested by UKAS laboratory 2531

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
63124-1	Tank 1	-	Silty Clay	-	-	21.8
63124-2	Tank 2	-	Silt	-	-	21.1
63124-3	Tank 3	-	Silt	-	-	18.2
63124-4	Tank 4	-	Silt	-	-	13.1
63124-5	Tank 5	-	Silty Clay	-	-	17.5

Chemtech Environmental Limited

SOILS

Lab number			63124-1	63124-2	63124-3	63124-4	63124-5
Sample id			Tank 1 S/43836	Tank 2 S/43837	Tank 3 S/43838	Tank 4 S/43839	Tank 5 S/43840
Depth (m)			-	-	-	-	-
Date sampled			16/01/2017	16/01/2017	16/01/2017	16/01/2017	16/01/2017
Test	**Method**	**Units**					
PAH							
Naphthalene	CE087 M	mg/kg	<0.01	0.79	0.11	0.25	0.36
Acenaphthylene	CE087 M	mg/kg	<0.01	0.11	0.03	0.08	0.36
Acenaphthene	CE087 M	mg/kg	0.01	0.31	0.52	1.32	0.15
Fluorene	CE087 U	mg/kg	0.01	0.38	0.60	1.55	0.32
Phenanthrene	CE087 M	mg/kg	0.08	4.89	5.54	15.98	3.66
Anthracene	CE087 U	mg/kg	0.03	2.09	1.23	3.73	0.97
Fluoranthene	CE087 M	mg/kg	0.20	18.35	9.32	28.18	8.54
Pyrene	CE087 M	mg/kg	0.16	16.19	7.11	21.16	7.65
Benzo(a)anthracene	CE087 U	mg/kg	0.07	11.35	3.56	11.50	4.37
Chrysene	CE087 M	mg/kg	0.09	12.28	4.08	11.83	4.65
Benzo(b)fluoranthene	CE087 M	mg/kg	0.09	15.13	4.47	13.33	5.24
Benzo(k)fluoranthene	CE087 M	mg/kg	0.04	7.03	2.02	6.42	2.35
Benzo(a)pyrene	CE087 U	mg/kg	0.07	12.88	3.65	11.44	4.52
Indeno(123cd)pyrene	CE087 M	mg/kg	0.04	9.45	2.42	7.58	2.72
Dibenz(ah)anthracene	CE087 M	mg/kg	<0.02	2.40	0.64	1.96	0.73
Benzo(ghi)perylene	CE087 M	mg/kg	0.04	8.73	2.16	6.82	2.40
PAH (total of USEPA 16)	CE087	mg/kg	0.93	122	47.5	143	49.0
TPH							
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01	0.02	0.07	<0.01	<0.01
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1	1	1	<1	<1
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	<1	3	2	4	2
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	2	26	18	50	14
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	2	87	28	86	32
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	<1	2	<1	3	<1
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1	1.3	3.0	0.1	<0.1
EPH Aliphatic (>C10-C12)	CE068	mg/kg	47	65	18	<4	<4
EPH Aliphatic (>C12-C16)	CE068	mg/kg	437	300	112	9	21
EPH Aliphatic (>C16-C35)	CE068	mg/kg	608	333	199	39	65
EPH Aliphatic (>C35-C44)	CE068	mg/kg	20	<10	<10	<10	<10

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	Wet		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	Wet		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	Wet		0.01	mg/kg
CE068	EPH Aromatic (>EC10-EC12)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC12-EC16)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC16-EC21)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC21-EC35)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE068	EPH Aromatic (>EC35-EC44)	Solvent extraction, GC-FID	Wet		1	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	Wet		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	Wet		0.1	mg/kg
CE068	EPH Aliphatic (>C10-C12)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C12-C16)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C16-C35)	Solvent extraction, GC-FID	Wet		4	mg/kg
CE068	EPH Aliphatic (>C35-C44)	Solvent extraction, GC-FID	Wet		10	mg/kg

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DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
IT	Sample not cooled
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
63124-1	Tank 1	-	N	
63124-2	Tank 2	-	N	
63124-3	Tank 3	-	N	
63124-4	Tank 4	-	N	
63124-5	Tank 5	-	N	

GeoDyne

APPENDIX V

Plates



Photograph of the site entrance



Photograph showing the level of development in the east of the site

Project No.	D34136	Drawn	CB
Client	Seagate Homes	Checked	*DJH*
		Approved	*RS*
Project	Church Street Holbeach	Scale	NTS
		Date Drawn	05/05/2017
Title	General Site Views (I)	Rev.	
		Plate No.	101

GeoDyne



Photograph of plots in the west of the site



Photograph of plots in the north of the site

Project No.	D34136	Drawn	CB
Client	Seagate Homes	Checked	*DJH*
		Approved	*RS*
Project	Church Street Holbeach	Scale	NTS
		Date Drawn	05/05/2017
Title	General Site Views (II)	Rev.	
		Plate No.	102

GeoDyne



Photograph facing northeast



Photograph facing southwest

Project No.	D34136	Drawn	CB
Client	Seagate Homes	Checked	*DJH*
		Approved	*RS*
Project	Church Street Holbeach	Scale	NTS
		Date Drawn	05/05/2017
Title	Photographs around area of former UST	Rev.	
		Plate No.	103

GeoDyne



Project No.	D34136	Drawn	CB
Client	Seagate Homes	Checked	*DJH*
		Approved	*RS*
Project	Church Street Holbeach	Scale	NTS
		Date Drawn	05/05/2017
Title	View of TP1 (completed excavation)	Rev.	
		Plate No.	104

GeoDyne



Project No.	D34136	Drawn	CB
Client	Seagate Homes	Checked	*DJH*
		Approved	*RS*
Project	Church Street Holbeach	Scale	NTS
		Date Drawn	05/05/2017
Title	View of TP4 (completed excavation)	Rev.	
		Plate No.	105

GeoDyne



Project No.	D34136	Drawn	CB
Client	Seagate Homes	Checked	*DJH*
		Approved	*RS*
Project	Church Street Holbeach	Scale	NTS
		Date Drawn	05/05/2017
Title	View of TP6 (completed excavation)	Rev.	
		Plate No.	106

GeoDyne

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APPENDIX VI

Conditions & Limitations

Conditions & Limitations

Phase I Desk Studies

1. Works undertaken to provide the basis of the Phase I Desk Study report comprise a review of information available from a number of sources/parties (potentially also including the Client) together with a walk over of the site (where applicable and included within the quotation). The opinions given in the Phase I Desk Study are based on the information available from third parties/sources that has been obtained within the available timeframe. GeoDyne Limited assumes all third party information to be true and correct and therefore cannot accept liability for the accuracy of such information supplied.

2. Should additional information become available that may affect the comments and opinions made within the Phase I Desk Study, GeoDyne Limited reserves the right to review such information and make modifications to comments/opinions as appropriate.

3. It should be borne in mind that a Phase I Desk Study collates available information to generate a conceptual model of the site. The actual geotechnical and environmental considerations can only be fully quantified by intrusive investigation works to confirm the accuracy of the conceptual site model.

Phase II Intrusive Investigations

1. Our quotation assumes that access to the site will be arranged by others at no cost to ourselves.

2. We have assumed that free access is available throughout to the entire site and that works can be undertaken during a single mobilisation. Where restricted access is encountered, or where additional unscheduled mobilisations are required, additional costs may be incurred to the client.

3. We have assumed that all available information relating to buried services will be supplied by the Client at no cost to ourselves. No responsibility will be accepted for damage to underground services that have not been brought to our prior attention by the Client.

4. All excavations/boreholes will be backfilled with compacted arisings upon completion, with any excess arisings left proud of ground levels. Excess arisings will not be removed from the site unless specifically requested by the Client. Where we are requested to remove excess arisings, all associated costs will be passed to the Client.

5. We will attempt to leave the site in a clean and tidy state, however, it must be understood that some disturbance of the site is unavoidable during intrusive works.

6. Exploratory holes are positioned approximately on site by GeoDyne Limited. Should the client require precise locations of all exploratory points, additional fees will be incurred. It must be borne in mind that backfilled trial pits can create ‘soft spots’, therefore, should the Client wish to designate ‘no dig’ zones, for example under the footprint of proposed structures, these must be brought to our attention prior to commencement of works.

7. Groundwater observations relate to conditions encountered at the time of investigation. It must be understood that groundwater levels may vary as a result of recent climatic conditions or seasonal variation.

8. Trial pits and boreholes examine only a small proportion of the total site area. No liability can be accepted for conditions not revealed in exploratory holes, particularly between positions. All extrapolations of available data are given in good faith.

Payment

1 Payment terms are strictly 28 days from the invoice date.

2 Prior to commencement of works, we require receipt of formal written instruction from the party accepting full financial responsibility for the work. In the absence of such an instruction, we would expect the instructing Consulting Engineers/Architects to accept full financial responsibility for the works.

3 Receipt of instruction to commence work shall be taken as acceptance and compliance of the foregoing conditions.

Liability

1. GeoDyne Limited offer £5,000,000.00 Professional Indemnity Insurance (in aggregate over the year). This shall be the limit of our liability for works undertaken. No individual liability shall be implied to, or accepted by, any employee for works undertaken for and on the behalf of GeoDyne Limited.