Cronton Road, Huyton

Factual Ground Investigation Report

For: Maro Developments Ltd.

Multidisciplinary Environmental Consultants

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1.0 INTRODUCTION

This factual geotechnical ground investigation report has been prepared at the request of Maro Developments Ltd. Instructions to proceed with this report were received in August 2017.

The site is located to the north of Cronton Road, Huyton, at approximate postcode L35 1QZ and National Ordnance Survey grid reference 346775E, 389275N, approximately 2.8km south east of Huyton Town Centre.

The site is an approximately 9.3 Ha rhomboidal shaped site situated to the north of Cronton Road. The site is a densely vegetated open field with the exception of a woodland area and a watercourse, Church Brook, in the western corner of the site. The site is bound by Cronton road along the south western boundary, Tarbock Roundabout and an M62 slip road along the north western boundary and open land along the north eastern and south eastern boundaries, formerly Cronton Colliery. Access to the site is off Cronton Road.

Following completion of a desk study, the site investigation work across the site was undertaken between 15th and 16th August 2017 and consisted of 11 No. trial pits.

This report comprises the factual geotechnical findings of the investigation only, with the exception of sulphate testing for geotechnical purposes. No environmental testing was requested.

The current proposed development plan is contained in Appendix 2 and consists of a 25,200 sqm industrial unit with associated concrete external areas, access road and soft landscaping.

2.0 BRIEF

The brief was to carry out a factual geotechnical ground investigation of the site off Cronton Road, Huyton. The extent of the site is shown in the site location plan contained in Appendix 1. The investigation was to include the following studies:

a) The construction of appropriate trial pits to establish the actual geological conditions below the site.

b) Undertake on site in-situ testing of the soils.

c) Undertake geotechnical and chemical laboratory testing of shallow soils to determine suitability for earthworks and possible lime stabilisation.

A factual non-interpretative report was to be provided in the first instance to summarise findings.

3.0 LIMITATIONS OF INVESTIGATION WORK AND REPORT

Desk Study Documentation

For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information, it has been assumed it is correct. No attempt has been made to verify the information.

Exploratory Holes

Where exploratory holes have been carried out as part of this investigation, the spacing has been determined to provide a reasonable indication of the general ground conditions across the site, but the number has ultimately been limited by commercial constraints. The findings of the exploratory holes relate specifically to the exploratory hole locations and are no absolute guarantee of the foundation / ground conditions between such locations. Due allowance should be made for the possibility of variation in conditions between exploratory hole locations when preparing any assessments of the final foundation proposals.

Chemical Contamination / Ground Gas

Site investigation works, including chemical testing of soil and liquid samples in regards to contamination and the monitoring of ground gas monitoring have not been carried out.

Third Parties

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4.0 SCOPE OF GROUND INVESTIGATION

The ground investigation was designed to investigate the underlying ground and groundwater conditions at the site. The scope of the site investigation was determined based on the proposed development and on the available desk study information.

The ground investigation was undertaken in general accordance with:

- BS 5930 (2015) Code of Practice for Ground Investigation;
- BS 1377 (1990) Methods of testing for Soils for Civil Engineering Purposes;
- BS EN 1997-2 (2007) Eurocode 7 – Geotechnical Design – Ground Investigation and Testing.

The locations of the exploratory holes are shown on the plan in Appendix 3.

4.1 Trial Pits

11 No. trial pits were undertaken across the envelope of the proposed building as specified by the project civil engineer. The trial pits were excavated to depths between 2.30m and 3.15m bgl (17.60 – 21.71m AOD). Trial pit construction was carried out on 15th and 16th August 2017.

The trial pits were undertaken to achieve the following:

- Allow a geotechnical assessment of the underlying natural superficial deposits and where encountered, bedrock;
- Allow in-situ and ex-situ hand shear vane testing of underlying cohesive deposits;
- Allow for the collection of samples to undertake geotechnical and chemical laboratory testing;

The trial pit logs and photographs are contained within Appendix 4.

4.2 Site Testing and Sampling

The following site tests were carried out across the site:

a) Where possible frequent in-situ shear strength testing was undertaken within cohesive / fine grained material (clay) using a hand shear vane (19mm vane) in accordance with BS1377-9, at depths of between 0.30m and 3.00m bgl (18.30m and 23.91m AOD) within the trial pits.

b) Retrieval of bulk disturbed samples from trial pits at depths of between 0.10m and 2.70 bgl (17.70m and 23.50m AOD).

The results of the in-situ site testing and sampling can be found in the trial pit logs contained within Appendix 4.

5.0 GEOTECHNICAL FINDINGS

5.1 Ground Conditions

A summary of the principal strata encountered across the site during the construction of the exploratory holes are outlined in the table below:

STRATA (thickness m)	TYPICAL DESCRIPTIONS	DEPTH RANGE m bgl (m AOD)				LOCATIONS
		TOP		BASE		
		Min:	Max:	Min:	Max:	
GRASSED TOPSOIL (0.15 – 0.30)	Soft to firm, dark brown, sandy CLAY with frequent rootlets	0.00 (24.21)	0.00 (20.30)	0.15 (24.01)	0.30 (20.10)	Al Trial Pit Locations
GLACIAL TILL (0.10 – 0.55)	Firm, light brownish grey, mottled orangish brown, slightly gravelly, sandy CLAY	0.15 (24.01)	0.30 (20.10)	0.30 (23.46)	0.75 (19.90)	TP101 – 105, TP107 – 111
GLACIAL TILL (1.20+ – 2.40+)	Firm to stiff, reddish brown, mottled grey, slightly gravelly, slightly sandy CLAY	0.30 (23.46)	1.60 (19.65)	2.00 (21.71)	2.80* (18.20)	All Trial Pit Locations
GLACIAL TILL (0.30+ - 0.75+)	Stiff to very stiff, brown, very thinly to thinly bedded, slightly sandy, gravelly CLAY	2.00 (20.35)	2.40 (18.20)	2.30* (19.60)	3.15* (17.60)	TP103, TP109 - 111

*Denotes those areas in which the base of the strata was not encountered.

The only exception to the above typical ground conditions encountered during the site investigation was the presence of suspected reworked ground in TP06 from 0.20m to 1.60m bgl (21.05m – 19.65m AOD). The suspected reworked ground comprised firm, damp and soft in places, dark reddish brown, mottled brownish grey, slightly gravelly, slightly sandy CLAY with occasional plant remains, rootlets and rare angular cobbles of weathered mudstone.

5.2 Geotechnical Site Testing

The results of the in-situ and ex-situ site tests are summarised below.

5.2.1 Hand Shear Vane (19mm) Tests

The following table outlines the undrained shear strength values obtained for the cohesive / fine grained strata encountered during the site investigation works.

Deposit Type	Depth Range of Tests m bgl (m AOD)	Number of Tests	Undrained Shear Strength Range kN/m^2 (Average kN/m^2)
Light brownish grey GLACIAL TILL	0.30 – 0.40 (20.00 – 23.91)	24	22 – 82 (50)
Reddish brown GLACIAL TILL	0.50 – 3.00 (18.30 – 23.41)	138	31 – 120 (76)

For detailed, specific information pertaining to the hand shear vane tests, please refer to the trial pit logs contained within Appendix 4.

5.3 Groundwater

5.3.1 Water Strikes

All exploratory holes were noted to be dry with the exception of a slight seepage in TP107 at 1.35m bgl, anticipated to be associated with a decaying tree trunk.

5.4 Geotechnical Laboratory Testing

5.4.1 Summary of Particle Size Distribution Tests

The results of the particle size distribution tests for each stratum are summarised in the table below:

Strata	Test Depth Range m bgl (m AOD)	No. Tests	Clay Range % (Average)	Silt Range % (Average)	Sand Range % (Average)	Gravel Range % (Average)	Cobble Range % (Average)
GLACIAL TILL	0.40 – 1.80 (19.85 – 23.46)	8	23 – 32 (26)	28 – 37 (30)	29 – 46 (40)	2 – 8 (4)	0

5.4.2 Atterberg Limits Tests

The results of the Atterberg Limit tests are summarised in the table below:

Strata	Depth Range of Tests m bgl (m AOD)	No. of Tests	Liquid Limit Range (Average) %	Plastic Limit Range (Average) %	Plasticity Index Range (Average)
GLACIAL TILL	0.50 – 1.60 (20.75m – 23.46m AOD)	8	30 – 37 (33)	15 – 18 (16)	15 – 19 (16)

5.4.3 Moisture Condition Value Tests

The results of the Moisture Condition Value Tests are summarised in the table below:

Strata	Depth Range of Tests m bgl (m AOD)	No. Tests	Moisture Content Range (Average) %	Moisture Condition Value Range (Average)
GLACIAL TILL	0.20 – 1.50 (19.85 – 24.01)	9	15 – 18 (16)	8.9 – 12.5 (10.2)

Geotechnical laboratory test results are included in Appendix 5.

6.0 Chemical Laboratory Testing

In total 9 No. samples were sent for chemical testing to determine the suitability of shallow natural deposits for lime stabilisation. The samples were tested for the following determinands:

Acid soluble sulphur, water soluble sulphur, oxidisable sulphides, total potential sulphate, pH, 2:1 water soluble sulphate, total sulphur and acid soluble sulphate.

The results of the chemical laboratory test results are summarised in the below table:

Determinands	No. Tests	Range	Average
Acid Soluble Sulphur (%)	9	0.01	0.01
Water Soluble Sulphur (%)	9	0.01	0.01
Oxidisable Sulphides (as SO_4) (%)	9	0.03	0.03
Total Potential Sulphides (as SO_4) (%)	9	0.03	0.03
pH	9	7.2 – 8.10	7.6
2:1 Soluble Sulphate (g/l)	9	0.01	0.01
Total Sulphur (%)	9	0.01	0.01
Sulphate (Acid Soluble) (%)	9	0.01	0.01

Chemical laboratory test results are included in Appendix 6.

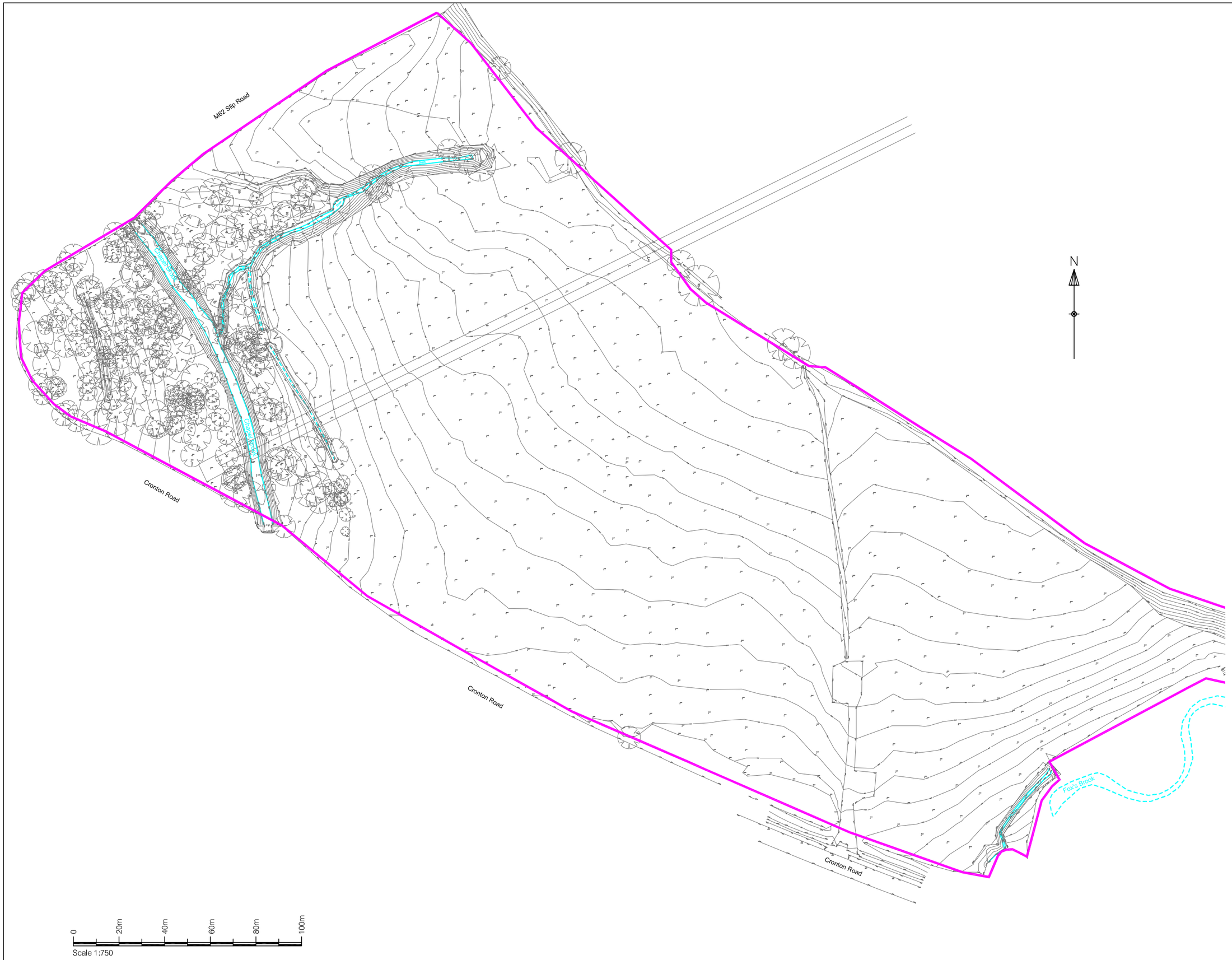
7.0 SUMMARY

The ground conditions typically encountered during the intrusive site investigation can be briefly summarised as follows:

- Grassed TOPSOIL comprising soft to firm, dark brown, sandy CLAY with frequent rootlets, to a depth of between 0.15m and 0.30m bgl, underlain by;
- GLACIAL TILL comprising firm, light brownish grey / greyish brown, mottled orangish brown, sandy CLAY to a depth of between 0.30m and 0.75m bgl, underlain by;
- GLACIAL TILL comprising firm to stiff, reddish brown, mottled grey, slightly gravelly, slightly sandy CLAY to a depth of between 2.00m and at least 2.80m bgl, underlain by;
- [In places] GLACIAL TILL comprising stiff to very stiff, brown, very thinly to thinly bedded, slightly sandy, gravelly CLAY to at least a depth of between 2.30m and 3.15m bgl where the deepest trial pit was terminated.

APPENDIX 1

SITE LOCATION PLAN



Notes.

1 All dimensions and levels are in metres unless noted otherwise.

2 This drawing is to be read in conjunction with all relevant Architects and Service Engineers drawings.

Key

Approximate Site Boundary

Rev	Drawn	Date	Description

Drawing Status
INFORMATION

Contract
CRONTON ROAD, HUYTON

Drawing Title
SITE LOCATION PLAN

Integra
consulting
environmental

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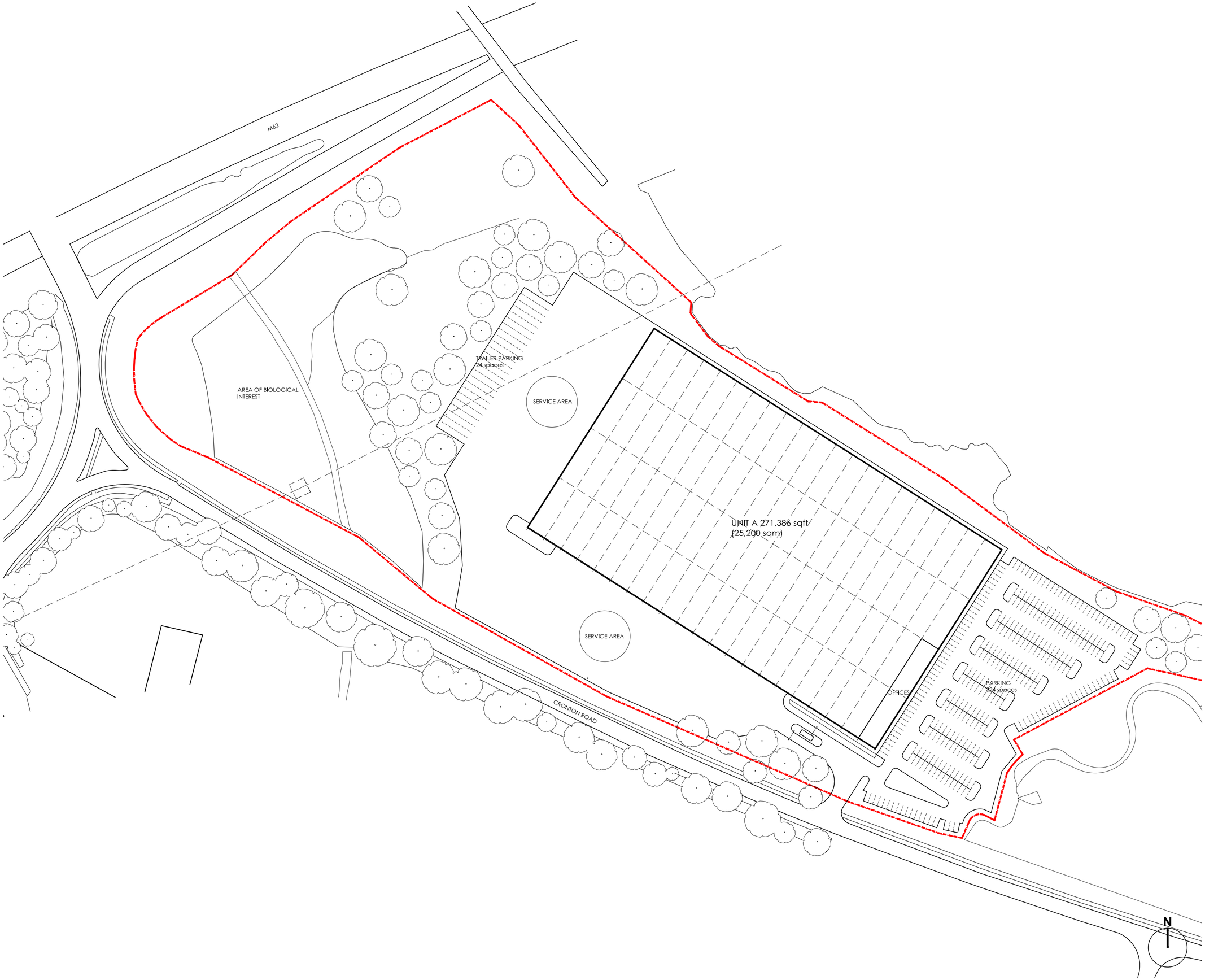
Scales 1:750@A1		Date AUGUST 2017	
Drawn AJ		Checked AE	
Contract No 2956		Drawing No SI–01	P1

APPENDIX 2

PROPOSED DEVELOPMENT PLAN



General Notes

All site dimensions shall be verified by the Contractor on site prior to commencing any works.

Do not scale from this drawing.

Only work to written dimensions.

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ACCOMMODATION SCHEDULE

UNIT A = 271,386sqft

TOTAL = 271,386sqft

SITE AREA = 22.14 acres

Revision

Scale	1:1250@A2
Status	SKETCH
Drawn by	NP
Date	05/08/15

Client
Maro Developments

Project
Cronton

Drawing Description
Proposed Site Plan - Option 3

Drawing No. PR366_SK03 Rev.

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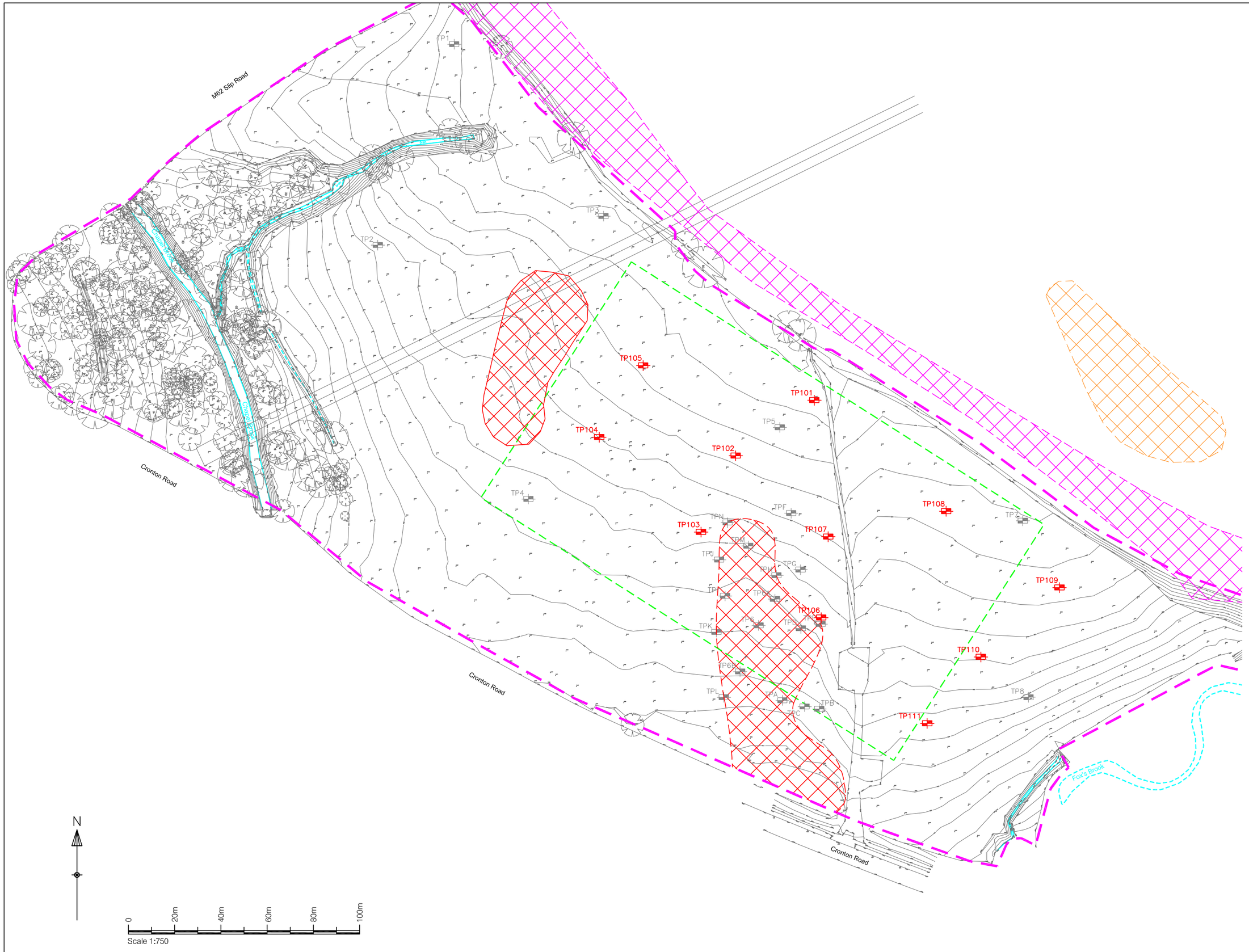
APPENDIX 3

EXPLORATORY HOLE LOCATION PLAN



Notes.

1 All dimensions and levels are in metres unless noted otherwise.

2 This drawing is to be read in conjunction with all relevant Architects and Service Engineers drawings.

Key

- Approximate Site Boundary
- TP101 Indicative Trial Pit Location (2017)
- TP1 Approximate Location of Trial Pit (2016)
- Approximate Location of Historic Mineral Railway
- Integra Conjectured Location of Historic Ravenhurst Pits
- Approximate Location of Historic Sour Hey Pit
- Approximate Location of Water Feature
- Approximate Proposed 'Option 3' Building Envelope

Rev	Drawn	Date	Description

Drawing Status
INFORMATION

Contract
CRONTON ROAD, HUYTON

Drawing Title
EXPLORATORY HOLE AND SITE FEATURES PLAN

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Scales 1:750@A1		Date AUGUST 2017	
Drawn AJ		Checked MB	
Contract No 2956		Drawing No SI–05	P1

APPENDIX 4

TRIAL PIT LOGS AND PHOTOGRAPHS

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Trial Pit Log

ver. 0.1

Trial Pit No. TP101

Sheet 1 of 1

Project Name:	Cronton Road, Cronton	**Level (mAOD):**	24.21	**Date:**	15/08/2017
Project No.	2956				
Location:	Huyton	**Weather:**	Clear and sunny	**Logged By**	AJ
Client:	Maro Developments	**Co-ords:**	346864E - 389309N	**Checked By**	MB

Water Strike	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (mbgl)	Level (mAOD)	Stratum Description
	0.20 - 0.40	B	5kg	0.20	24.01	Grassed TOPSOIL comprising soft to firm, dark brown, sandy clay with frequent rootlets. TOPSOIL
	0.30		HVP=68			Firm to stiff, light brownish grey, mottled orangish brown, slightly gravelly, slightly sandy CLAY with occasional cobbles (100mm x 150mm x 50mm and 300mm x 150mm x 100mm). Gravel is subangular to well rounded of fine to coarse mudstone, sandstone, coal and mixed lithologies. GLACIAL TILL
	0.30		HVP=75			
	0.75 - 0.90	B	5kg	0.75	23.46	Firm to stiff, reddish brown, mottled grey and greenish yellow, slightly gravelly, slightly sandy CLAY. Gravel is angular to subrounded of fine to coarse sandstone, mudstone and coal. GLACIAL TILL
	0.80		HVP=52			
	0.80		HVP=82			
						Becoming hard to dig with rare cobble to boulder sized pockets of red clayey sand from 1.30m bgl.
	1.50	B	5kg			*Becoming sandy and friable from 1.50m bgl.*
	1.50		HVP=50			
	1.50		HVP=52			
	1.50		HVP=79			
	1.80 - 1.90	B	5kg			
	2.10		HVP=62			
	2.10		HVP=89			
	2.10		HVP=89			
	2.30 - 2.50	B	5kg			
	2.30		HVP=120			
	2.30		HVP=82	2.50	21.71	Trial Pit terminated at 2.50m.
	2.30		HVP=98			
	2.50		HVP=110			
	2.50		HVP=75			

1
2
3
4
5

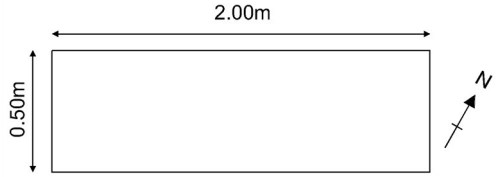
Water Strike

Depth Strike (mbgl)	Remarks
	Dry

Stability:

Collapse between 0.20m and 0.40m bgl along northern pit wall

Remarks:

Hand shear vane (HSV) tests in friable material anticipated to be un-representative of in-situ shear strengths.

PLAN VIEW