

The Highland Council

New Community Hall, Melvich

Ground Investigation Report



FAIRHURST

CONTROL SHEET

CLIENT: The Highland Council
PROJECT TITLE: New Community Hall, Melvich
REPORT TITLE: Ground Investigation Report
PROJECT REFERENCE: 149169
DOCUMENT NUMBER: DOC 01

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	Checked by	Andrew Mennie			11-07-2022	
	Approved by	Andrew Fleming			11-07-2022	
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					Checked	
					Approved	
	2				Prepared By	
					Checked	
					Approved	
	3				Prepared By	
					Checked	
					Approved	

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1.0 Introduction

Fairhurst were appointed by The Highland Council (*'the Client'*) to design, undertake and report on a geotechnical ground investigation at the site of the recently demolished Melvich Community Hall for a new and proposed Community Hall.

The aim of this report is to document the findings of the ground investigation works.

The report also aims to provide a preliminary assessment of the soil infiltration rate, to allow surface water drainage solutions to be designed. The infiltration rate was calculated in accordance with BRE Digest365 'Soakaway Design'

The specific objectives of this Report are set out below.

1.1. Geotechnical Objectives

- Provide a detailed summary of ground and groundwater conditions encountered during the investigation

1.2. Drainage Objectives

- Undertake an infiltration test
- Calculate the soil infiltration rate

2.0 Site Details

2.1. Location and Description

The site covers an area of approximately 0.13Ha and is generally rectangular in shape. At present the site is partially used as a communal picnic/seating area. The site is bound by the A836 trunk road to the east side. The south side of the site is bound by domestic properties (Pentland Terrace). The west side of the site is bound by privately owned land. The north side of the site is bound by Melvich Public Toilets, Public Parking, Coastline Coffee Shop and 1 single domestic dwelling.

A site location plan is presented in [Drawing 149169/002](#), [Appendix 2](#).

2.2. Topography

A topographical survey had previously been undertaken by the client. This indicated that the site generally falls from South-West to North-East, with a level of 67.81m AOD at the South-West side, falling to 65.0m AOD at the North-East side.

2.3. Superficial Geology

The 1:50,000 BGS mapping noted that the superficial deposits at the site are lithologically diverse and complex glacial deposits that have characteristic mounded topographic form. Composed of rock debris, clayey till and poorly-to well-stratified sand and gravel.

2.4. Solid Geology

The 1:50,000 BGS mapping noted that the solid geology at the site comprises migmatitic psammite with migmatitic semipelite (metamorphic bedrock).

2.5. Mining and Mineral Extraction

The Coal Authority GIS database identified that the site is not within an area of coal mining reporting or where coal outcrops are present. Based upon this information, it is concluded that coal mining is unlikely to affect the proposed development.

2.6. Radon

High resolution of the Radon risk associated site was viewed on the UKRadon website. This identified that the site is within an area of low (1-3%) radon potential, and as such 'Stage 1' radon protection measures will be required for new structures.

2.7. Hydrology

Approximately 120m to the east of the site is the Allt Mhallaig burn. This runs under the A836 and discharges to the sea approximately 600m to the north.

2.8. Flooding

SEPA's flood risk maps (SEPA 2016) indicates that the site is not considered to be at risk from river, surface water or coastal flooding.

2.9. Utilities Information

A public utilities plan was provided by the client along with an overmarked sketch. These identified that there were no existing onsite services, other than the following:

- A water supply main is recorded on the plans as bisecting the site diagonally from the west side to the south-east side. This water main was not discovered onsite during the course of the investigations.
- There is an overhead power line which extends into the site from the dwelling to the north- west side of the site to a pole at the north-east corner of the site boundary. The plan suggests it continues on to the dwellings to the south-east of the site.

It should be noted that publicly available utility plans do not indicate the presence of private utilities and the presence of private utilities at the site cannot be discounted. Selected copies of utilities plans obtained for the site are included in [Appendix 5](#).

3.0 Summary of Intrusive Investigation Works

3.1. Ground Investigation Rationale

The ground investigation works were undertaken in order to provide a record of the near surface soils across the site. One of the trial pits were subsequently used for an infiltration test to determine the soil infiltration rate and the suitability of the existing soils for a SUDS soakaway.

3.2. Intrusive Investigation Overview

During the 17th of May 2022, a phase of intrusive ground investigation works was undertaken at the site by Fairhurst. This consisted of forming 10 trial pits across the site, generally on a 3 x 2 rectangular grid (extras completed due to the unconfirmed building placement). The locations of the trial pit positions are presented in [Drawing 149169/001](#), [Appendix 1](#). Engineering logs for the trial pits are presented within [Appendix 3](#). PCT1 was used for infiltration tests. The results of the infiltration tests are presented within [Appendix 4](#).

3.3. Logging of Ground Conditions

A detailed log of each trial pit was recorded in accordance with BS 5930:2015 by a suitably qualified Fairhurst engineer. Copies of the logs are included in [Appendix 3](#).

4.0 Ground Conditions

The ground conditions encountered during the investigation are detailed in the Trial Pit Logs, presented in [Appendix 3](#). A summary of the ground conditions encountered at the site during the investigation is presented in [Table 1](#) below.

Table 1: Summary of Ground Conditions

Stratum	Description and Distribution (based upon <i>Grampian Geotechnical descriptions</i>)	Depth to Top of Stratum	Proven Thickness	Interpretation
Artificial Geology	Evidence of artificial geology was only identified in Trial Pit 6. PCT1 Had small evidence of rubble at the origination of the digging due to the demolition of the previous structure (community hall).	0.10 – 0.70mbgl	0.70m	The area of the site has previously been dug out to lay water services and infilled.
Superficial Geology	Each of the investigation positions were noted to include a layer of TOPSOIL containing organic materials	Site Surface	0.30m – 0.50m	-
	The superficial deposits in each of the positions were noted to comprise SAND/silt with large stones and occasional boulders.	0.40 – 1.70mbgl	Unproven	Lithologically diverse and complex glacial deposits
Solid Geology	Hard digging occurred at the maximum depth of the investigation (1.70mbgl). Confirmed bedrock was not discovered in any of the trial pits.	Unproven (>1.70mbgl)	Unproven	Migmatitic Psammite With Migmatitic Semipelite. Metamorphic Bedrock. (Not identified by ground investigation)
Groundwater	There were no groundwater strikes in any of the investigation positions.	-	-	Groundwater is relatively deep at the site

4.1. Obstructions

During the investigation, Trial Pit 6 proved an obstructive water pipe (assumed), 0.70mbgl. The remaining exploratory works did not identify any anthropogenic obstructions which affected the progress of ground investigation positions.

4.2. Groundwater Strikes

Groundwater strikes were not encountered in any of the trial pits.

4.3. Visual-Olfactory Assessment of Contamination

There was no visual/olfactory evidence of contamination encountered during the intrusive investigation works.

5.0 Conclusions and Recommendations

An intrusive ground investigation was undertaken at the site of a proposed community hall at a site adjacent to the A836 in Melvich (adjacent to Melvich Public Lavatories). The development is considered to conform to 'Geotechnical Category 2' in accordance with BS EN 1997-1:2004+A1:2013 and as such all investigation and reporting has been advanced on this basis. The following outlines the main findings and conclusions:

Proposed Development

There is no Planning Application or final development proposals available for review at the time of writing. However it is understood that the Client proposes to develop the site into a new community hall with car parking.

Human Health Risk Assessment

At the time of writing, there are no known risks to human health from the existing soils. Soil sampling and laboratory testing was not requested or undertaken as part of the investigation works.

Groundwater Assessment

Groundwater sampling and chemical testing was not requested or undertaken as part of the recent investigation works.

Ground Gas/VOC Vapour Assessment

Ground gas/VOC vapour monitoring was not requested or undertaken as part of the recent ground investigation works.

Ground Conditions

Ground conditions at the site generally comprise of topsoil overlaying loose, silty sand, which contains large stones and boulders, becoming increasingly frequent with depth. The topsoil layer generally extended to 0.35mbgl throughout the site. The pits were generally excavated to 1.60mbgl, at which point they became difficult to dig. Confirmed bedrock was not discovered in any of the pits. Groundwater was not noted in any of the pits.

Site Preparation

It is likely that all topsoil material under the footprint of the proposed community hall and car park would require to be removed. If the ground level of the site is to be lowered to closer to the existing road level, then a significant quantity of the natural silty sand material would also require to be removed.

Foundation Design

Accurate recommendations regarding foundation solutions cannot be made without detailed structural information including design loadings. However, based upon the loose, silty sand discovered in the majority of the trial pits, it is likely that these natural soils would be suitable as a founding stratum for conventional strip or pad foundations. Alternatively, the foundations may bear upon the natural rock if the ground level of the site is to be lowered significantly.

Surface Water Drainage

It is currently suggested that the most suitable surface water drainage solution for the site would be a SUDS soakaway to the lower, east side of the site under the proposed car park. However, the infiltration rate returned by the infiltration tests render this solution impracticable. An alternative solution may be a partial soakaway under the car park area with a high level discharge to the existing Allt Mhallaig burn to the east of the site. This would involve the overflow drain passing below the existing A836 and crossing a significant distance through land owned by others.

Water Supply Pipework

The existing water main locations would require to be confirmed. If these are in close vicinity, and the new pipe serving the community hall was < Ø63mm, then a full UKWIR investigation and assessment may not be required and normal Polyethylene pipework may be used.

Appendix 1

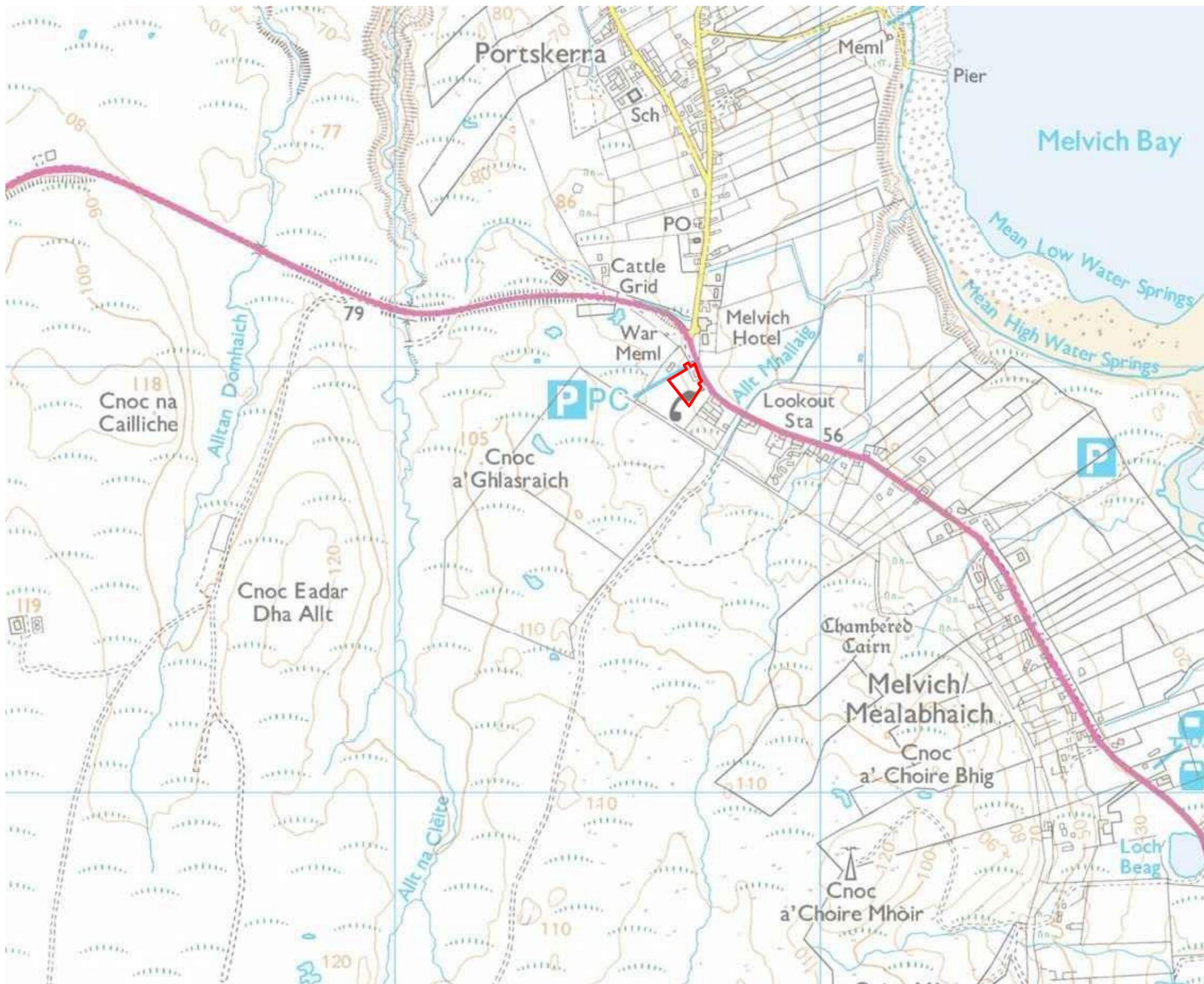
149169/001

Trial Pit Location Plan

Appendix 2

149169/002

Location Plan



Ordnance Survey © Crown Copyright 2022. All rights reserved. Licence number 100022432

Location Plan
(scale 1:25000)

Do not scale from this drawing.

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARD/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING RISKS AND INFORMATION.

RISKS LISTED HERE ARE NOT EXHAUSTIVE. REFER TO DESIGN ASSESSMENT FORM NO.

CONSTRUCTION:

NONE THAT WOULD BE OBVIOUS TO A COMPETENT CONTRACTOR

DEMOLITION:

NONE THAT WOULD BE OBVIOUS TO A COMPETENT CONTRACTOR

FOR INFORMATION RELATING TO USE, CLEANING AND MAINTENANCE SEE THE HEALTH AND SAFETY FILE.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

LEGEND:

— Site Boundary (estimated)

Rev.	Date	Description	Drawn	Chkd.	Appd.

 10 Sinclair Street, Thurso, Caithness, KW14 7AJ Tel: 01847 500133	Client:
	Mr Bob Kerr

Project Title:
MELVICH COMMUNITY HALL

Drawing Title:
LOCATION PLAN

Scale of A3: 1:25000	Status: Information
Drawn: CC	Checked: AM
Date: 07-06-22	Approved: AKF
Date: 07-06-22	Date: 07-06-22

Drawing No.: 149069/002

Appendix 3

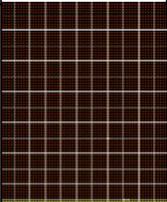
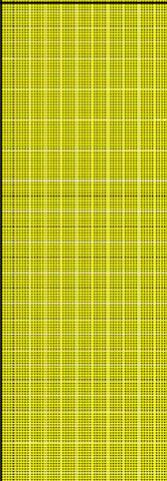
Trial Pit Logs

FAIRHURST

TRIAL PIT LOG

Trial Pit No: **TP1**

Client:	The Highland Council	Site:	Community Hall	Date(s):	17/05/2022	Sheet:	1 of 19
Job No:	149169	Location:	Melvich	Weather:	Dry & Bright	Plant	2.5T Machine

Level (mOD)	Depth (mbgl)	Description of strata	Legend
		TOPSOIL	
0.5	0.50	SAND/Silt. Boulders & Large Stone	
1.0			
1.5			
1.70		Pit Terminated Due To Hard Digging.	
2.0			
2.5			
3.0			

Remarks & groundwater observations	Dimensions	Logged by	Figure no/ status
Pit sides stable No Groundwater encountered No evidence of gas or other contamination	0.6m x 1.5m	C.Carter	0

Client:	The Highland Council	Site:	Community Hall	Date(s):	17/05/2022	Sheet:	2 of 19
Job No:	149169	Location:	Melvich	Weather:	Dry & Bright	Plant:	2.5T Machine
Easting:	Northing:		Elevation (AOD):				

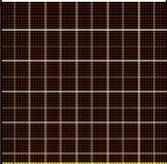
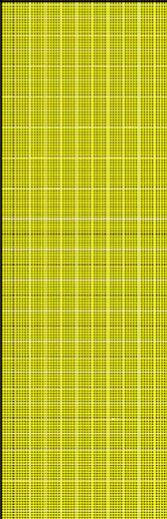


FAIRHURST

TRIAL PIT LOG

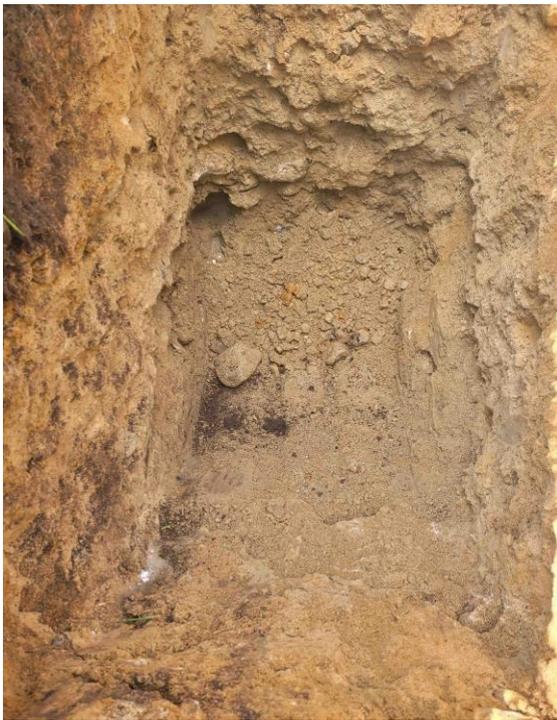
Trial Pit No: **TP2**

Cilent:	The Highland Council	Site:	Community Hall	Date(s):	17/05/2022	Sheet:	3 of 19
Job No:	149169	Location:	Melvich	Weather:	Dry & Bright	Plant	2.5T Machine

Level (mOD)	Depth (mbgl)	Description of strata	Legend
		TOPSOIL	
0.40		SAND/Silt. Boulders & Large Stone	
0.5			
1.0		Pit Terminated Due To Hard Digging.	
1.5			
1.70			
2.0			
2.5			
3.0			

Remarks & groundwater observations	Dimensions	Logged by	Figure no/ status
Pit sides stable No Groundwater encountered No evidence of gas or other contamination	0.6m x 1.5m	C.Carter	0

Client:	The Highland Council	Site:	Community Hall	Date(s):	17/05/2022	Sheet:	4 of 19
Job No:	149169	Location:	Melvich	Weather:	Dry & Bright	Plant:	2.5T Machine
Easting:	Northing:		Elevation (AOD):				

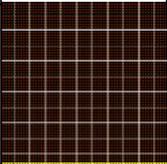
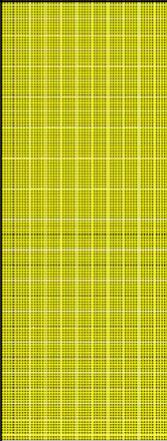


FAIRHURST

TRIAL PIT LOG

Trial Pit No: **TP3**

Cilent:	The Highland Council	Site:	Community Hall	Date(s):	17/05/2022	Sheet:	5 of 19
Job No:	149169	Location:	Melvich	Weather:	Dry & Bright	Plant	2.5T Machine

Level (mOD)	Depth (mbgl)	Description of strata	Legend
0.00		TOPSOIL	
0.40	0.40	SAND/Silt. Boulders & Large Stone	
0.50	0.50		
1.00	1.00	Pit Terminated Due To Hard Digging.	
1.50	1.50		
2.00	2.00		
2.50	2.50		
3.00	3.00		

Remarks & groundwater observations	Dimensions	Logged by	Figure no/ status
Pit sides stable No Groundwater encountered No evidence of gas or other contamination	0.6m x 1.5m	C.Carter	0

Client:	The Highland Council	Site:	Community Hall	Date(s):	17/05/2022	Sheet:	6 of 19
Job No:	149169	Location:	Melvich	Weather:	Dry & Bright	Plant:	2.5T Machine
Easting:	Northing:		Elevation (AOD):				



FAIRHURST	TRIAL PIT LOG	Trial Pit No: TP4
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Client:	The Highland Council	Site:	Community Hall	Date(s):	17/05/2022	Sheet:	7 of 19
Job No:	149169	Location:	Melvich	Weather:	Dry & Bright	Plant	2.5T Machine

	Samples & tests	Water depth	Level (mOD)	Depth (mbgl)	Description of strata	Legend
				0.50	TOPSOIL	
				1.60	SAND/Silt. Boulders & Large Stone	
					Pit Terminated Due To Hard Digging.	

Remarks & groundwater observations Pit sides stable No Groundwater encountered No evidence of gas or other contamination	Dimensions 0.6m x 1.5m	Logged by C.Carter	Figure no/ status 0
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Client:	The Highland Council	Site:	Community Hall	Date(s):	17/05/2022	Sheet:	8 of 19
Job No:	149169	Location:	Melvich	Weather:	Dry & Bright	Plant:	2.5T Machine
Easting:	Northing:		Elevation (AOD):				

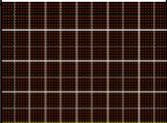
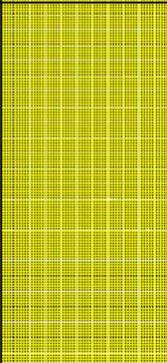


FAIRHURST

TRIAL PIT LOG

Trial Pit No: **TP5**

Client:	The Highland Council	Site:	Community Hall	Date(s):	17/05/2022	Sheet:	9 of 19
Job No:	149169	Location:	Melvich	Weather:	Dry & Bright	Plant	2.5T Machine

Level (mOD)	Depth (mbgl)	Description of strata	Legend
	0.30	TOPSOIL	
0.5		SAND/Silt. Boulders & Large Stone	
1.0		Pit Terminated Due To Hard Digging.	
1.20			
1.5			
2.0			
2.5			
3.0			

Remarks & groundwater observations	Dimensions	Logged by	Figure no/ status
Pit sides stable No Groundwater encountered No evidence of gas or other contamination	0.6m x 1.5m	C.Carter	0

Client:	The Highland Council	Site:	Community Hall	Date(s):	17/05/2022	Sheet:	10 of 19
Job No:	149169	Location:	Melvich	Weather:	Dry & Bright	Plant:	2.5T Machine
Easting:	Northing:		Elevation (AOD) :				

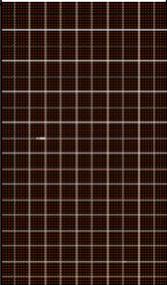


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TRIAL PIT LOG

Trial Pit No: **TP6**

Client:	The Highland Council	Site:	Community Hall	Date(s):	17/05/2022	Sheet:	11 of 19
Job No:	149169	Location:	Melvich	Weather:	Dry & Bright	Plant	2.5T Machine

Level (mOD)	Depth (mbgl)	Description of strata	Legend
		TOPSOIL	
0.5			
	0.70	Pit Terminated Due To Old Water Pipe.	
1.0			
1.5			
2.0			
2.5			
3.0			

Remarks & groundwater observations	Dimensions	Logged by	Figure no/ status
Pit sides stable No Groundwater encountered No evidence of gas or other contamination	0.6m x 1.5m	C.Carter	0

Client:	The Highland Council	Site:	Community Hall	Date(s):	17/05/2022	Sheet:	12 of 19
Job No:	149169	Location:	Melvich	Weather:	Dry & Bright	Plant:	2.5T Machine
Easting:	Northing:		Elevation (AOD) :				

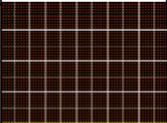
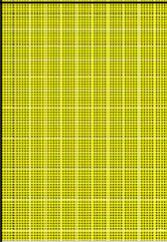


FAIRHURST

TRIAL PIT LOG

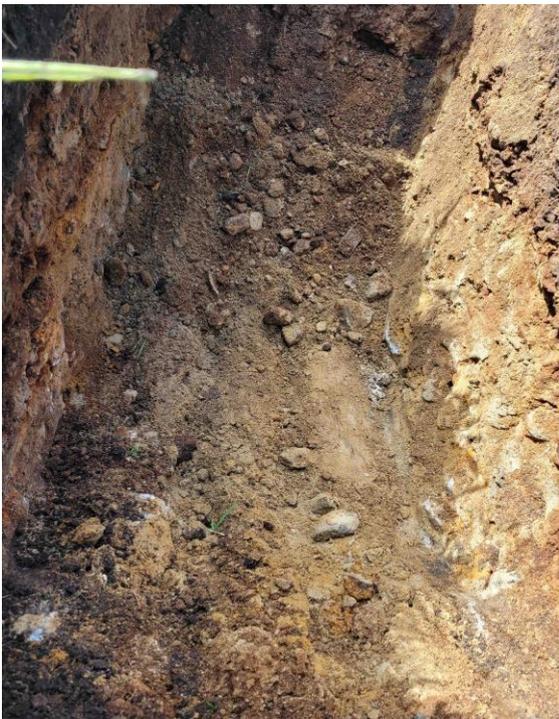
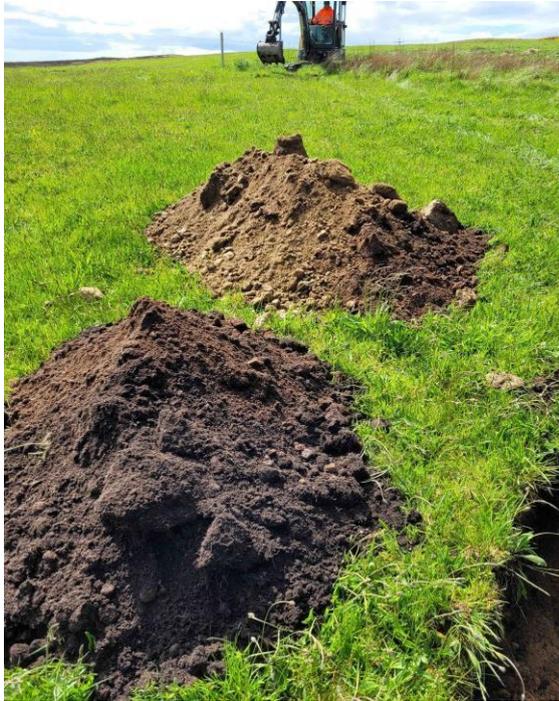
Trial Pit No: **TP7**

Client:	The Highland Council	Site:	Community Hall	Date(s):	17/05/2022	Sheet:	13 of 19
Job No:	149169	Location:	Melvich	Weather:	Dry & Bright	Plant	2.5T Machine

Level (mOD)	Depth (mbgl)	Description of strata	Legend
	0.30	TOPSOIL	
0.5	0.90	SAND/Silt. Boulders & Large Stone	
1.0		Pit Terminated Due To Hard Digging.	
1.5			
2.0			
2.5			
3.0			

Remarks & groundwater observations	Dimensions	Logged by	Figure no/ status
Pit sides stable No Groundwater encountered No evidence of gas or other contamination	0.6m x 1.5m	C.Carter	0

Client:	The Highland Council	Site:	Community Hall	Date(s):	17/05/2022	Sheet:	14 of 19
Job No:	149169	Location:	Melvich	Weather:	Dry & Bright	Plant:	2.5T Machine
Easting:	Northing:		Elevation (AOD):				

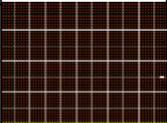
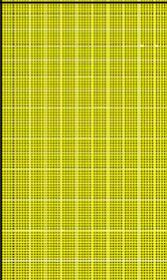


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TRIAL PIT LOG

Trial Pit No: **TP8**

Client:	The Highland Council	Site:	Community Hall	Date(s):	17/05/2022	Sheet:	15 of 19
Job No:	149169	Location:	Melvich	Weather:	Dry & Bright	Plant	2.5T Machine

Level (mOD)	Depth (mbgl)	Description of strata	Legend
		TOPSOIL	
	0.30	SAND/Silt. Boulders & Large Stone	
	0.5		
	1.00	Pit Terminated Due To Hard Digging.	
	1.5		
	2.0		
	2.5		
	3.0		

Remarks & groundwater observations	Dimensions	Logged by	Figure no/ status
Pit sides stable No Groundwater encountered No evidence of gas or other contamination	0.6m x 1.5m	C.Carter	0

Client:	The Highland Council	Site:	Community Hall	Date(s):	17/05/2022	Sheet:	16 of 19
Job No:	149169	Location:	Melvich	Weather:	Dry & Bright	Plant:	2.5T Machine
Easting:	Northing:		Elevation (AOD):				



FAIRHURST	TRIAL PIT LOG	Trial Pit No: TP9
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Client:	The Highland Council	Site:	Community Hall	Date(s):	17/05/2022	Sheet:	17 of 19
Job No:	149169	Location:	Melvich	Weather:	Dry & Bright	Plant	2.5T Machine

	Samples & tests	Water depth	Level (mOD)	Depth (mbgl)	Description of strata	Legend
				0.30	TOPSOIL	
				0.5	SAND/Silt. Boulders & Large Stone	
				0.80	Pit Terminated Due To Hard Digging.	
				1.0		
				1.5		
				2.0		
				2.5		
				3.0		

Remarks & groundwater observations Pit sides stable No Groundwater encountered No evidence of gas or other contamination	Dimensions 0.6m x 1.5m	Logged by C.Carter	Figure no/ status 0
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Client:	The Highland Council	Site:	Community Hall	Date(s):	17/05/2022	Sheet:	18 of 19
Job No:	149169	Location:	Melvich	Weather:	Dry & Bright	Plant:	2.5T Machine
Easting:	Northing:		Elevation (AOD):				



Appendix 4

Infiltration Rate Calculation

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CONSULTING STRUCTURAL
AND CIVIL ENGINEERS

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CALCULATION SHEETS

PROJECT	Melvich Community Hall	JOB No	149169	Calcs	
CLIENT	The Highland Council	SHEET	1 of 1	By	AM
Infiltration Tests to BRE Digest 365		No's		Checked	
		DATE	28/06/2022	By	DE

Infiltration Test Calculations

Trial Pit PCT1

L = 1.200 m
B = 0.700 m
D = 1.800 m

Test 1

Depth of water (m)	Time (min)
1.100	0
1.020	325

Interpolated results:

V = 0.07 m³

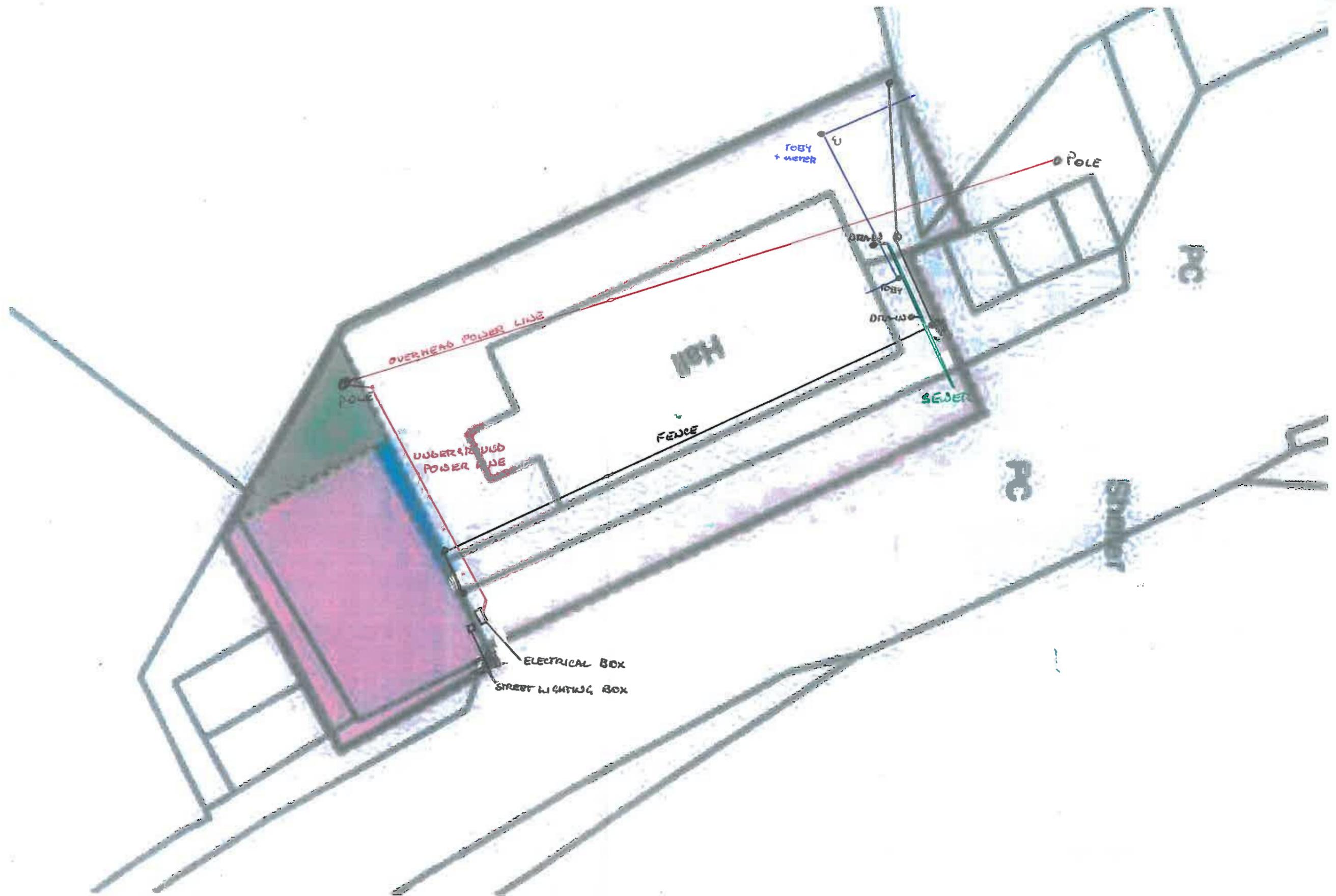
A_{P50} = 2.930m²

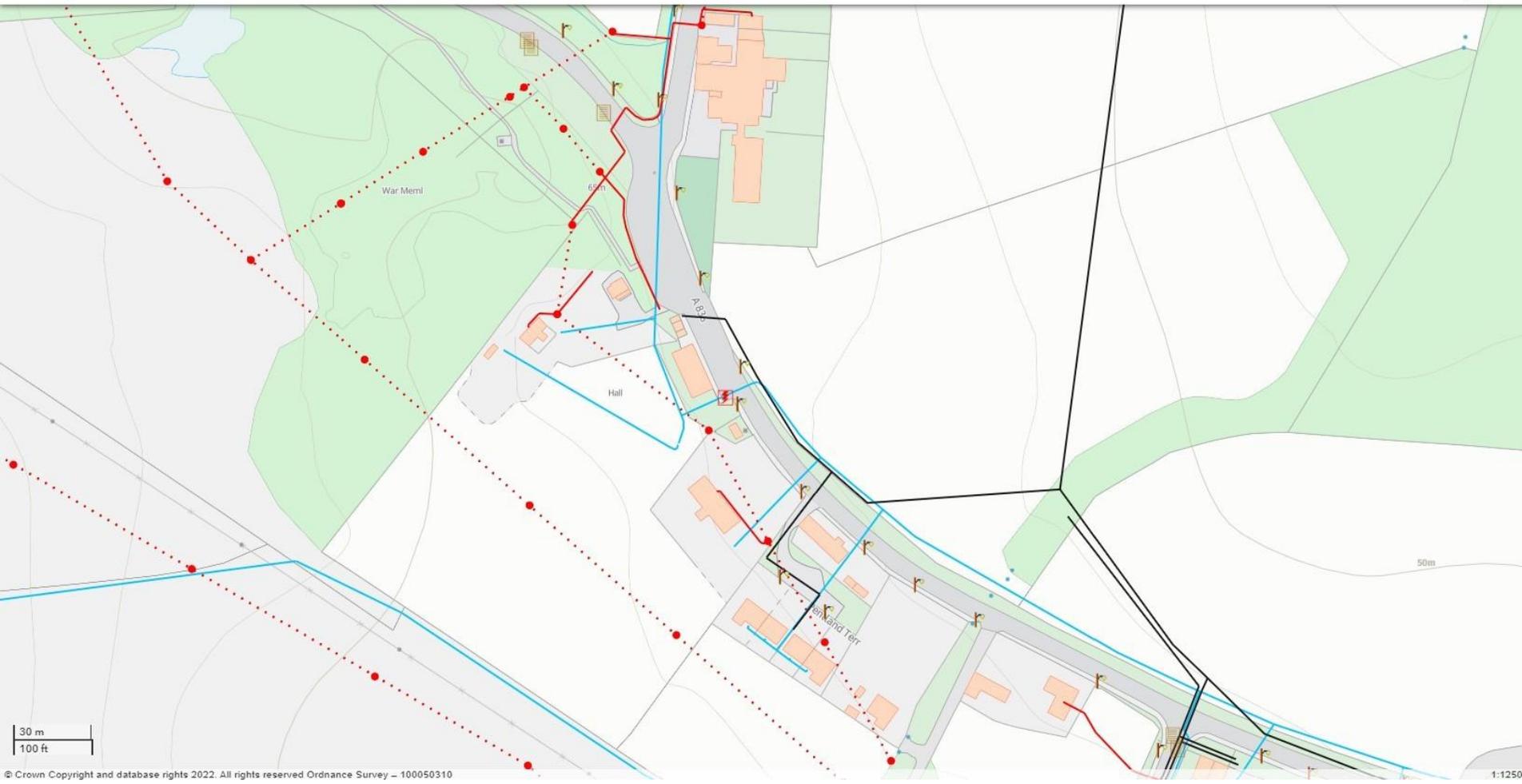
T_{P75-25} = 325

f = 1.17E-06 m/s

Appendix 5

Utilities





- Vault
 - Road Authority
 - Street Light
 - Gully
 - Other Lighting
 - Other Drainage
 - Other Electrical
 - Other Assets
 - Cables and Ducts
 - Drainage Systems
 - All other values
 - Electricity
 - Electricity Point Features
 - Overhead Line
 - Other Electrical
 - Gas
 - Gas
 - Fuel
 - All other values
 - Sewer
 - Sewer Linear Features
 - Telecoms
 - Telecoms Point Features
 - Telecoms Linear Features
 - Water
 - Water Linear Features

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