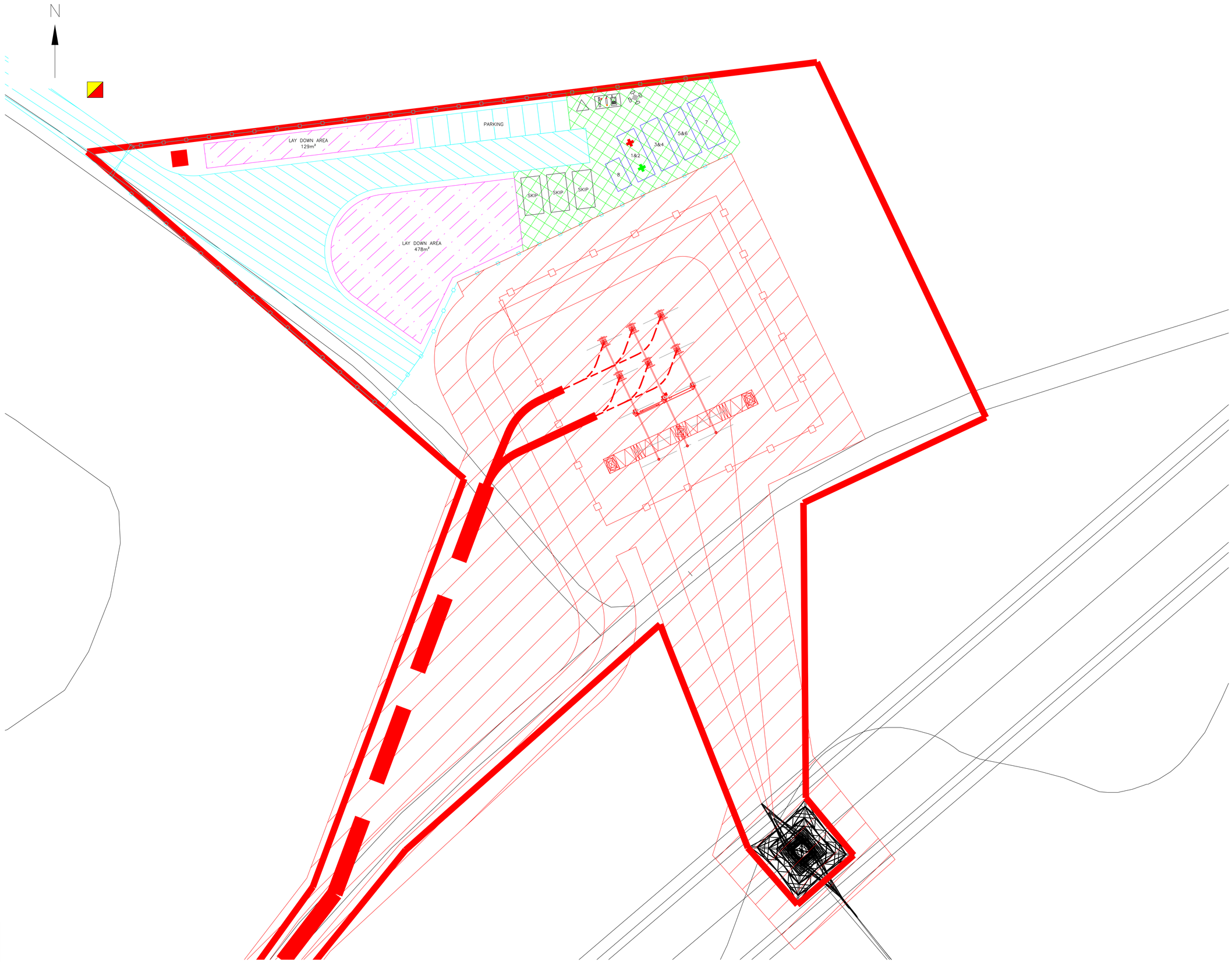
1:200 DETAIL



SUBSTATION MINIMUM ELECTRICAL CLEARANCES IN ACCORDANCE WITH TS 2.1 AND TGN(E) 186		
REF	NOMINAL SYSTEM VOLTAGE (rms)	400kV
1	PHASE TO EARTH CLEARANCE	2.8m
2	PHASE TO PHASE CLEARANCE	3.6m
3	SAFETY DISTANCE (FROM NGC SAFETY RULES)	3.1m
4	DESIGN CLEARANCE FOR SAFETY (HORIZONTAL) DSH1	4.6m
5	DESIGN CLEARANCE FOR SAFETY (VERTICAL) DS1	5.5m
6	INSULATION HEIGHT (PEDESTRIAN ACCESS)	2.4m
7	MEWP DESIGN CLEARANCE FOR SAFETY (HORIZONTAL) DSH2	6.6m
8	MEWP ACCESS CORRIDOR TO DEAD CIRCUIT	3m
9	CRANE ALLOWANCE	7.5m

CABIN ID:

1. MEETING ROOM
2. OFFICE
3. CHANGING ROOM
4. WC/WASHING FACILITY
5. MESS FACILITY
6. STORE
7. WORKSHOP
8. DIESEL GENERATOR WITH BUNDED FUEL TANK & ENCLOSURE

NOTES:

1. CABLE ROUTES SHOWN AS PER LAYOUT OPTIONS B, C & D.
2. LAYOUT SHOWN AS PER OPTION D.

LEGEND:

- NEW NATIONAL GRID PLANT
- NEW USER PLANT
- EXISTING PLANT
- HERAS FENCE
- SITE ESTABLISHMENT AREA (NATIONAL GRID)
- SITE ESTABLISHMENT AREA (USER)
- NATIONAL GRID WORK AREA
- USER WORK AREA
- VEHICLE ACCESS
- LAYDOWN AREA
- MUSTER POINT
- INFO BOARD
- TEMPORARY LIGHTING
- FIRE POINT/ CLAXTON
- FIRST AID/ EYE WASH STATION
- SECURITY GUARD
- SMOKING, VAPING & MOBILE PHONE SAFE AREA

DRAFT

4 0 4 8 12 16 20m

ORIGINAL SCALE 1:200

Rev	Description	Cnr'd	Chk'd	Appr'd	Date
P1	ADDED CDM DETAILS FOR CSE COMPOUND	JD	**	**	05.02.24
P0	FIRST ISSUE	JD	AT	CN	30.11.23

nationalgrid

Master Scheme No:	Sub-Scheme No:	Site:
101839	*********	CULHAM JET 400kV SUBSTATION

Scheme Name: CULHAM JET 400kV SUBSTATION

Document Title: PROPOSED CDM LAYOUT

Created by:	Date:	Checked by:	Date:	Approved by:	Date:
JD	30/11/23	AT	30/11/23	CN	30/11/23

Development Eng:	Document Type:	Scale:	Format:	Sheet(s):	Rev:
M. HALES	LAY	1:200	A0	3 OF 3	P1

National Grid Document Number: PDD-101839-LAY-006

FEED Document Number: *********

OVERVIEW
1:1000

NORTH

NEW CSE COMPOUND
SEE SHEET 3 FOR DETAILS

TEMPORARY CONTRACTORS COMPOUND AREA DURING CONSTRUCTION

PLANNING BOUNDARY

NEW USER BESS SUBSTATION

NEW 400kV CABLES

EXTENDED CULHAM JET 400kV SUBSTATION
SEE SHEET 2 FOR DETAILS

NEW 400kV USER CABLES

PLANNING BOUNDARY

Track

Camp
(disused)

Tank

Furze Brake

Sports
Facility

Def

ETL

Hedgester

73.4m

68.2m

64.5m

64.7m

61.8m

61.3m

63.8m

60.1m

59.8m

MP
56.75

THAME LANE

Electricity Distribution Site

Culham Science Centre

Electricity Distribution Site

B1

B3

B

FBs

FB

P

LW

SL

SUBSTATION MINIMUM ELECTRICAL CLEARANCES IN ACCORDANCE WITH TS 2.1 AND TGN(E) 186		
REF	NOMINAL SYSTEM VOLTAGE (rms)	400kV
1	PHASE TO EARTH CLEARANCE	2.8m
2	PHASE TO PHASE CLEARANCE	3.6m
3	SAFETY DISTANCE (FROM NGC SAFETY RULES)	3.1m
4	DESIGN CLEARANCE FOR SAFETY (HORIZONTAL) DSH1	4.6m
5	DESIGN CLEARANCE FOR SAFETY (VERTICAL) DS1	5.5m
6	INSULATION HEIGHT (PEDESTRIAN ACCESS)	2.4m
7	MEWP DESIGN CLEARANCE FOR SAFETY (HORIZONTAL) DSH2	6.6m
8	MEWP ACCESS CORRIDOR TO DEAD CIRCUIT	3m
9	CRANE ALLOWANCE	7.5m

NOTES:

REFERENCE DRAWINGS:

LEGEND:

- NEW PERMANENT ESTABLISHMENT
- EXISTING ESTABLISHMENT
- TEMPORARY ESTABLISHMENT FOR CONSTRUCTION

DRAFT

20 0 20 40 60 80 100m
ORIGINAL SCALE 1:1000

Rev	Description	Cre'd	Chk'd	App'd	Date
P0	FIRST ISSUE	JD	**	**	05.02.24

nationalgrid

Master Scheme No:	Sub-Scheme No:	Site:
101839	*********	CULHAM JET 400kV SUBSTATION

Scheme Name: CULHAM JET 400kV SUBSTATION

Document Title:

PLANNING DRAWING
OPTION D

Created by:	Date:	Checked by:	Date:	Approved by:	Date:
JD	**/**/**	**	**/**/**	**	**/**/**

Development Eng:	Document Type:	Scale:	Format:	Sheet(s):	Rev:
M. HALES	PLANNING	1:1000	A0	1 OF 3	P0

National Grid Document Number:

PDD-101839-PLA-001

FEED Document Number:

****

CULHAM JET 400kV SUBSTATION DETAILS
1:250

NORTH

THAME LANE

NEW 400kV CABLES

PLANNING BOUNDARY

NEW EXTERNAL PALISADE FENCE TO TIE INTO EXISTING 2.4m TOTAL HEIGHT

NEW 400kV ELECTRICAL EQUIPMENT

EXISTING RELAY BUILDING

EXISTING AUXILIARY PLANT BUILDING

AUXILIARY PLANT BUILDING EXTENSION

EXISTING 400kV TERMINAL TOWER

NEW PERMANENT DIESEL GENERATOR

TYPE ST E1 M6 (LB) TERMINAL TOWER

NEW INTERNAL PALISADE FENCE 2.4m TOTAL HEIGHT

TARMAC AREA

MESS

RECORDS

WORKSHOP

STORE

WASH

LOO

CLEANING

GAS SERVICING

TRAILERS

HVAC & BATTERY

RELAY CONTROL & METERING

TRANSFORMER

CESSPIT

NEW DNO SUBSTATION EXACT POSTION TBC

EXISTING GANTRY

Electricity Distribution Site

WEST ELEVATION

NEW PORTABLE RELAY ROOM BUILDINGS

EXISTING EXTERNAL PALISADE FENCE

FENCE SEPARATING NATIONAL GRID & UKAEA SITES

EXISTING 400kV ELECTRICAL EQUIPMENT

EXISTING 400/33kV SUPERGRID TRANSFORMERS IN BUNDS

SOUTH ELEVATION

SUBSTATION MINIMUM ELECTRICAL CLEARANCES IN ACCORDANCE WITH TS 2.1 AND TGN(E) 186		
REF	NOMINAL SYSTEM VOLTAGE (rms)	400kV
1	PHASE TO EARTH CLEARANCE	2.8m
2	PHASE TO PHASE CLEARANCE	3.6m
3	SAFETY DISTANCE (FROM NGC SAFETY RULES)	3.1m
4	DESIGN CLEARANCE FOR SAFETY (HORIZONTAL) DSH1	4.6m
5	DESIGN CLEARANCE FOR SAFETY (VERTICAL) DS1	5.5m
6	INSULATION HEIGHT (PEDESTRIAN ACCESS)	2.4m
7	MEWP DESIGN CLEARANCE FOR SAFETY (HORIZONTAL) DSH2	6.6m
8	MEWP ACCESS CORRIDOR TO DEAD CIRCUIT	3m
9	CRANE ALLOWANCE	7.5m

NOTES:

REFERENCE DRAWINGS:

LEGEND:

- NEW PERMANENT ESTABLISHMENT
- EXISTING ESTABLISHMENT
- TEMPORARY ESTABLISHMENT FOR CONSTRUCTION

DRAFT

5 0 5 10 15 20 25m

ORIGINAL SCALE 1:250

Rev	Description	Cre'd	Chk'd	App'd	Date
P0	FIRST ISSUE	JD	**	**	05.02.24

nationalgrid

Master Scheme No:	Sub-Scheme No:	Site:
101839	*********	CULHAM JET 400kV SUBSTATION

Scheme Name: CULHAM JET 400kV SUBSTATION

Document Title: PLANNING DRAWING OPTION D

Created by:	Date:	Checked by:	Date:	Approved by:	Date:
JD	**/**/**	**	**/**/**	**	**/**/**

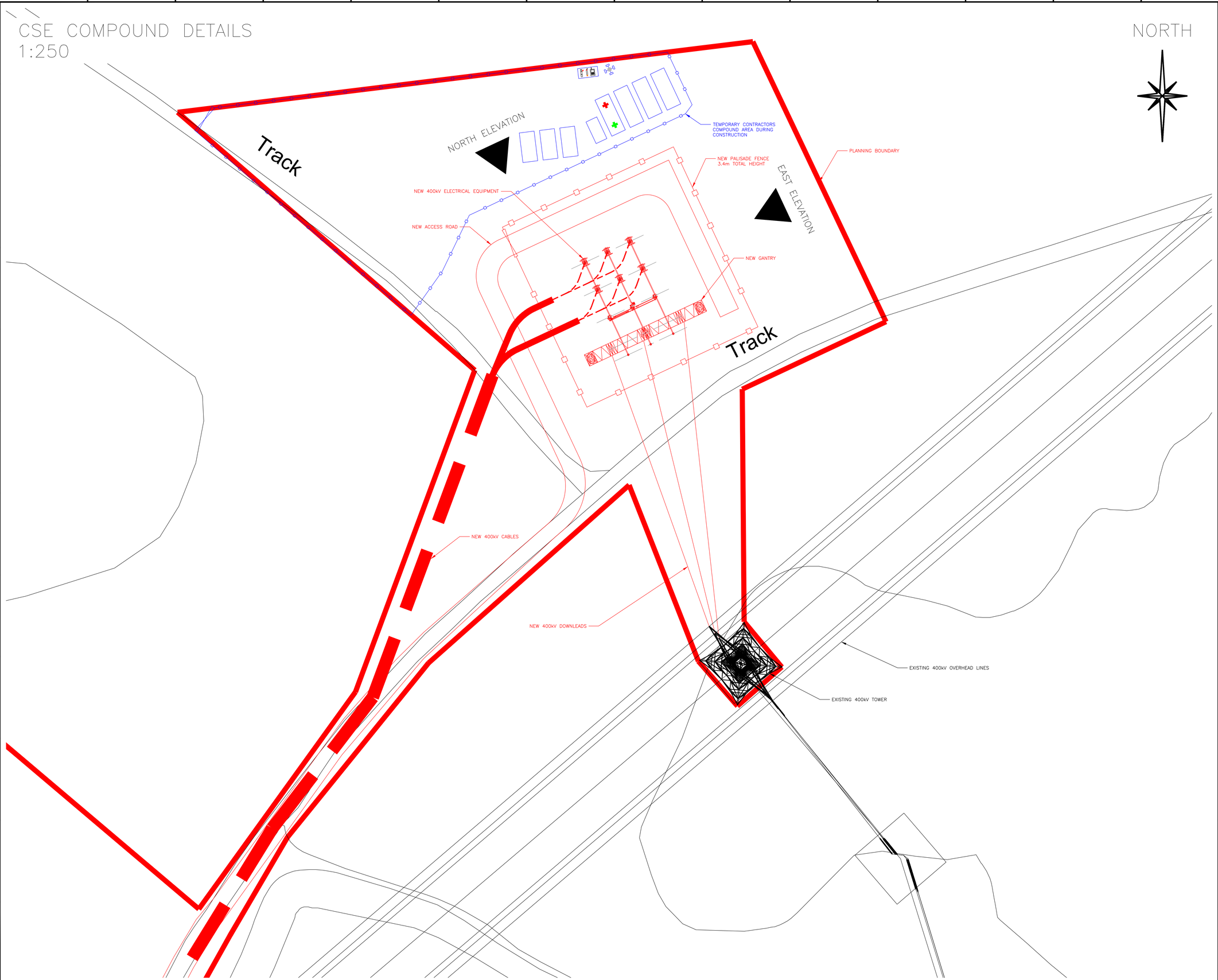
Development Eng:	Document Type:	Scale:	Format:	Sheet(s):	Rev:
M. HALES	PLANNING	1:250	A0	2 OF 3	P0

National Grid Document Number: PDD-101839-PLA-001

FEED Document Number: *********

CSE COMPOUND DETAILS
1:250

NORTH



SUBSTATION MINIMUM ELECTRICAL CLEARANCES IN ACCORDANCE WITH TS 2.1 AND TGN(E) 186

REF		
	NOMINAL SYSTEM VOLTAGE (rms)	400kV
1	PHASE TO EARTH CLEARANCE	2.8m
2	PHASE TO PHASE CLEARANCE	3.6m
3	SAFETY DISTANCE (FROM NGC SAFETY RULES)	3.1m
4	DESIGN CLEARANCE FOR SAFETY (HORIZONTAL) DSH1	4.6m
5	DESIGN CLEARANCE FOR SAFETY (VERTICAL) DS1	5.5m
6	INSULATION HEIGHT (PEDESTRIAN ACCESS)	2.4m
7	MEWP DESIGN CLEARANCE FOR SAFETY (HORIZONTAL) DSH2	6.6m
8	MEWP ACCESS CORRIDOR TO DEAD CIRCUIT	3m
9	CRANE ALLOWANCE	7.5m

NOTES:

REFERENCE DRAWINGS:

LEGEND:

- NEW PERMANENT ESTABLISHMENT
- EXISTING ESTABLISHMENT
- TEMPORARY ESTABLISHMENT FOR CONSTRUCTION

DRAFT

5 0 5 10 15 20 25m
ORIGINAL SCALE 1:250

Rev	Description	Cre'd	Chk'd	App'd	Date
P0	FIRST ISSUE	JD	**	**	05.02.24

nationalgrid

Master Scheme No:	Sub-Scheme No:	Site:
101839	*********	CULHAM JET 400kV SUBSTATION

Scheme Name: CULHAM JET 400kV SUBSTATION

Document Title:

PLANNING DRAWING
OPTION D

Created by:	Date:	Checked by:	Date:	Approved by:	Date:
JD	**/**/**	**	**/**/**	**	**/**/**

Development Eng:	Document Type:	Scale:	Format:	Sheet(s):	Rev:
M. HALES	PLANNING	1:250	A0	2 OF 2	P0

National Grid Document Number:

PDD-101839-PLA-001

FEED Document Number:

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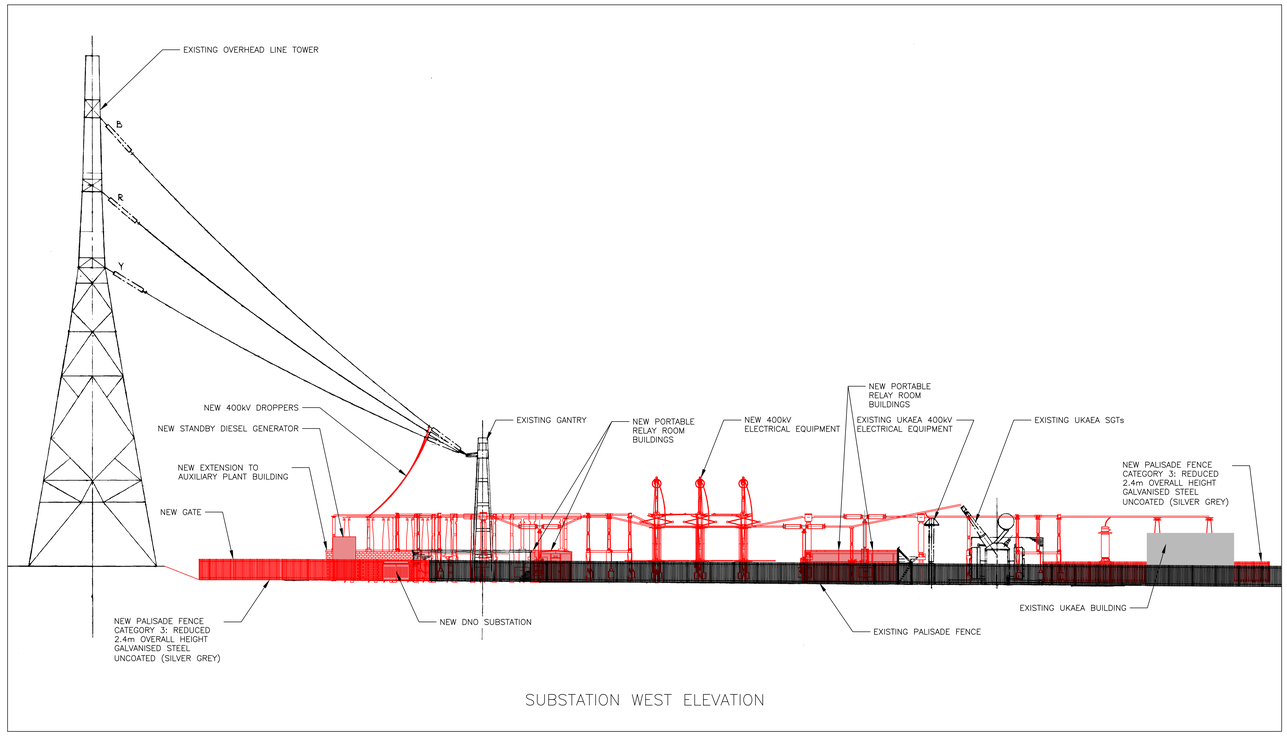
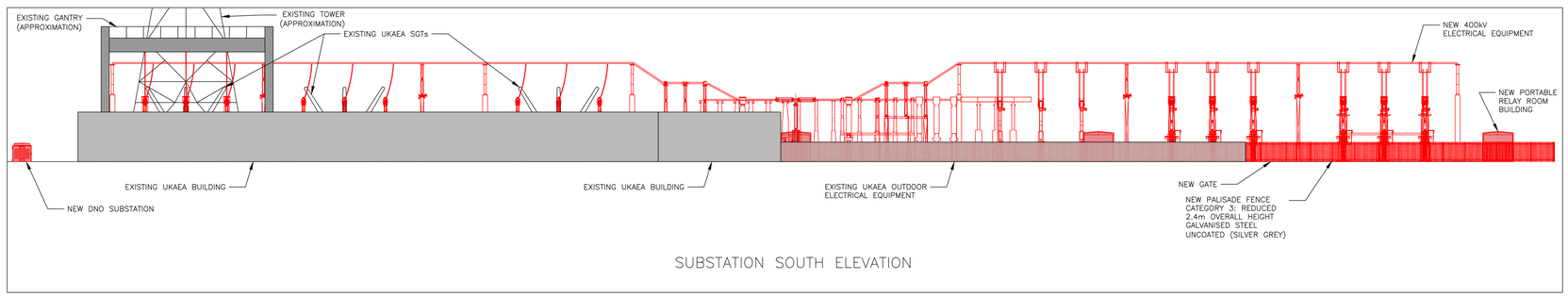
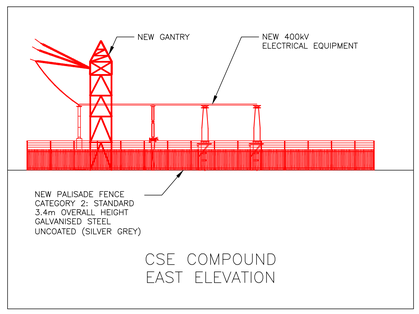


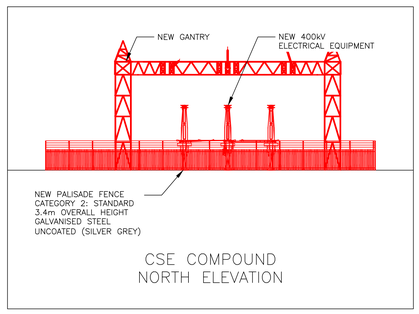
SUBSTATION WEST ELEVATION



SUBSTATION SOUTH ELEVATION



CSE COMPOUND EAST ELEVATION



CSE COMPOUND NORTH ELEVATION

SUBSTATION MINIMUM ELECTRICAL CLEARANCES IN ACCORDANCE WITH TS 2.1 AND TGN(E) 186		
REF	NOMINAL SYSTEM VOLTAGE (rms)	400kV
1	PHASE TO EARTH CLEARANCE	2.8m
2	PHASE TO PHASE CLEARANCE	3.6m
3	SAFETY DISTANCE (FROM NGC SAFETY RULES)	3.1m
4	DESIGN CLEARANCE FOR SAFETY (HORIZONTAL) DSH1	4.6m
5	DESIGN CLEARANCE FOR SAFETY (VERTICAL) DS1	5.5m
6	INSULATION HEIGHT (PEDESTRIAN ACCESS)	2.4m
7	MEWP DESIGN CLEARANCE FOR SAFETY (HORIZONTAL) DSH2	6.6m
8	MEWP ACCESS CORRIDOR TO DEAD CIRCUIT	3m
9	CRANE ALLOWANCE	7.5m

NOTES:

REFERENCE DRAWINGS:

LEGEND:

NEW PLANT

EXISTING PLANT

DRAFT

5 0 5 10 15 20 25m

ORIGINAL SCALE 1:250

Rev	Description	Cre'd	Chk'd	App'd	Date
P0	FIRST ISSUE	JD	**	**	05.02.24

nationalgrid

Master Scheme No:	Sub-Scheme No:	Site:
101839	*********	CULHAM JET 400kV SUBSTATION

Scheme Name: CULHAM JET 400kV SUBSTATION

Document Title: PLANNING DRAWING EXISTING & PROPOSED ELEVATIONS

Created by:	Date:	Checked by:	Date:	Approved by:	Date:
JD	**/**/**	**	**/**/**	**	**/**/**

Development Eng:	Document Type:	Scale:	Format:	Sheet(s):	Rev:
M. HALES	PLA	1:250	A0	1 OF 1	P0

National Grid Document Number: PDD-101839-PLA-002

FEED Document Number: *********

Appendix E – Ground Investigation Report

6th October 2022

Our ref: GE21162/SA01/221006

Oliver Troup
Statera Energy
145 Kensington Church Street
London
W8 7LP

By email

Dear Oliver,

RE: Land to the rear of Culham Science Centre, Culham, Abingdon, OX14 3DB – Letter Report

1. Introduction

Further to your instruction, we write to present the findings of the intrusive investigation undertaken at land to the rear of Culham Science Centre, Culham, Abingdon, OX14 3DB (Figure 1).

2. Proposed Development

The proposed development is understood to comprise a battery energy storage facility with associated infrastructure including a number of stormwater basins.

3. Objectives

The investigation was undertaken to inform the emerging drainage strategy for the proposed development.

4. Site Description

The site was located at NGR 452888, 196448 and was formed by an irregularly shaped parcel of land comprising sections of two grazing fields. The fields were separated by a concrete track initially running east to west in the very south of the site, before turning to run in a north-north-east direction through the centre of the site. Topographically, the site sloped gently downhill to the south.

Two strings of overhead electricity cables supported by pylons ran across the site. One string ran north to south through the western part of the site with one supporting pylon located in the northwest of the site. The second string of cables ran along the south-eastern boundary before crossing the eastern extend of the site. Two inspection chamber covers were observed in the northwest of the site to the south of the pylon in this area. When lifted, these appeared to be former soakaways. A trunk water main was mapped running southwest to northeast through the east of the site. Although no visible evidence of this utility was recorded, it was possible to trace its location using radio-detection techniques during the investigation.

The majority of the site boundaries did not coincide with any physical feature with the exception of the western boundary which was formed by post and wire fencing and a deciduous hedgerow. Access to the site was afforded by an external perimeter track around the Science Park accessed via the industrial estate to the southwest of the site.

A railway line within a cutting was located to the west of the site. A continuation of grazing fields, some woodland and cover crop (maize) were located to the north and northeast. A raised area covered by long grass with a number of deciduous trees was located to the east with a large warehouse type building approximately 200m beyond. An electricity pylon and small mobile telecommunications compound, surrounded by timber close-boarded fencing was located immediately adjacent to the southeast of the site with Culham Science Park beyond. The Science Park was secured by tall metal mesh fencing. Two further electricity pylons were located to the south

of the site in an area of long grass. One of these was noted to connect to a large substation located within the Science Park.

5. Fieldwork

The scope of works agreed with the Client comprised:

- Attendance of a Geo-Environmental Engineer to set out and supervise the intrusive investigation, undertake logging of recovered soils from exploratory holes and in-situ testing.
- Construction of 3No. dynamic windowless sampler boreholes (WS1 to WS3) to depths of up to 5.00m bgl.
- Installation of the boreholes with 3No. monitoring standpipes with upstanding covers to allow for future groundwater monitoring.
- Construction of 4No. machine excavated trial pits (TP1 to TP4) to depths between 1.60m and 2.00m bgl.
- Soakage testing in accordance with BRE365 undertaken in trial pits TP1 to TP4.
- 3No. return groundwater monitoring visits.
- Provision of a Letter Report.

The intrusive investigation was carried out on 27th, 28th and 29th September 2022. The positions were agreed with the Client but adjusted on site to avoid overhead and underground utilities. The locations of the exploratory holes are shown on Figure 2.

6. Ground Conditions

The ground conditions encountered by the investigation comprised a mantle of Topsoil overlying Summertown-Radley Sand and Gravel Member. A generalised summary of the encountered conditions is presented in Table 1.

Top (m bgl)	Base (m bgl)	Geology	Locations
0.00	0.20 – 0.35	**TOPSOIL:** Brown or light brown fine and medium SAND with low or moderate proportions of silt and gravel with occasional or some rootlets.	All
0.20 – 0.35	>1.60 – >5.00	**SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER:** Typically orange brown, but occasionally brown or light orange brown, medium or medium and coarse SAND with low to moderate silt and gravel content. Moderate clay content occasionally recorded. Silt and gravel also absent on occasion. Greenish grey and grey colouration, some decayed 5-10mm roots and natural organic odour recorded from 1.00m to 1.70m bgl in TP4.	All

Table 1 Summary of Ground Conditions

For further details of the ground conditions encountered, reference should be made to the exploratory hole logs in Appendix A.

8. Groundwater

Groundwater was encountered within WS2 at 3.18m bgl immediately after drilling, rising to 3.30m bgl with the installed monitoring standpipe after 3.5 hours. Groundwater was recorded at 4.95m bgl in WS3 immediately after drilling but had dropped to a depth of greater than 5.00m bgl in the monitoring standpipe after 2.5 hours. No other groundwater was encountered during the intrusive investigation.

Groundwater monitoring standpipes were installed within WS1 to WS3 in order to facilitate return spot monitoring of groundwater levels . 3No. groundwater monitoring visits are planned, upon completion this report will be updated to include the data collected.

The groundwater level in the 3No. monitoring standpipes was measured on 29th September 2022 (the final day of the investigation and two days following installation). No groundwater was recorded within the depth of the installed standpipes with the exception of WS2 where the water depth was recorded at 3.01m bgl.

It should be noted that changes in groundwater and perched water levels do occur for a number of reasons including seasonal effects and variations in drainage. Such fluctuations may only be recorded by the measurement of the groundwater level within a series of standpipes or piezometers installed within appropriate response zones.

9. Obstructions

Boreholes WS1 and WS2 refused on dense strata at depths of 3.70m and 4.70m bgl respectively. No other natural or manmade obstructions were encountered. Obstructions elsewhere on the site cannot be completely ruled out.

10. Soakaways

Soakage testing in broad accordance with BRE365 was undertaken in trial pits TP1 to TP4. Testing was undertaken on 28th and 29th September 2022 for the two day test period agreed with the Client.

The results of the testing are summarised in Table 2 below. The soakage test results are included within Appendix B. In trial pits TP1 and TP3 Test 1 was abandoned, and Test 2 commenced at the end of the first day of testing when it became apparent that Test 1 would conclude during the night when accurate measurement would not be possible.

Location	Pit depth (m bgl)	Permeability (m/s)		
		Test 1	Test 2	Test 3
TP1	1.70	2.6×10^{-6}*	2.6×10^{-6}	1.9×10^{-6}*
TP2	1.90	1.4×10^{-5}	1.1×10^{-5}	8.7×10^{-6}
TP3	1.60	3.3×10^{-6}*	2.9×10^{-6}	2.8×10^{-6}*
TP4	2.00	2.7×10^{-6}	Insufficient time to complete further tests	

NOTE: * - based on data extrapolation

Table 2 Soakage Test Results

In line with building control requirements soakaways should be located at least 5m from any structure.

11. Conditions

The data collected from the investigations have been used to provide an interpretation of the geotechnical and/or environmental conditions pertaining to the site. The recommendations and opinions expressed in this report are based on the data obtained. Geo-Environmental takes no responsibility for conditions that either have not been revealed in the available records, or that occur between or under points of physical investigation. Whilst every effort has been made to interpret the conditions, such information is only indicative and liability cannot be accepted for its accuracy.

A Discovery Strategy (Appendix C) should remain in force throughout groundworks and construction of the proposed development.

Information contained in this report is intended for the use of the Client and Geo-Environmental can take no responsibility for the use of this information by any party for uses other than that described in this report. Geo-Environmental makes no warranty or representation whatsoever express or implied with respect to the use of this information by any third party. Geo-Environmental does not indemnify the Client or any third parties against any dispute or claim arising from any finding or other result of this investigation report or any consequential losses.

This report remains the property of Geo-Environmental and the Client has no rights to, or reliance upon this document or supporting documents until such time as payment has been received in full for all invoices for works undertaken in connection with this report.

12. Closure

We trust that we have interpreted your instructions correctly. Please do not hesitate to contact us should you have any queries.

Yours sincerely
For and on Behalf of Geo-Environmental

SHAUN ARMITAGE BSc (Hons), FGS
Principal Consulting Engineer
shaun.armitage@gesl.net

Enclosed - Figure 1 – Site Location Plan
Figure 2 – Exploratory Hole Location Plan

Appendix A – Exploratory Hole Logs
Appendix B – Soakage Test Results
Appendix C – Discovery Strategy

FIGURES

Project:	Culham, Abingdon			**Title**	Site Location Plan
Client:	Statera Energy			**Geo-Environmental Services Ltd** **Unit 7 Danworth Farm, Cuckfield Road** **Hurstpierpoint, West Sussex BN6 9GL** **+44(0)1273 832972 www.gesl.net**	Geo-Environmental
Ref No:	GE21162	**Version:**	0.0		
Drawn:	SA	**Date:**	05/10/2022		
Figure:	1	**Scale:**	Not To Scale		

Project Title:	**Culham, Abingdon**	**Title :**	**Figure 2 - Exploratory Hole Location Plan**
Location :	**Oxfordshire, OX14 3DB**	**Scale:**	**1:3000**
Project No. :	**GE21162**	**Engineer:**	**CG**
Client :	**Statera Energy**		

Geo-Environmental

Legend Key

- Locations By Type - Empty
- Locations By Type - TP
- Locations By Type - WLS

APPENDIX A

Exploratory Hole Logs

Geo-Environmental
Unit 7, Danworth Farm
Hurstpierpoint
BN6 9GL
www.gesl.net

Borehole Log

Borehole No. **WS1**
Sheet 1 of 1

Project Name:	Culham, Abingdon	Project No. GE21162	Co-ords: 453010E - 196474N	Hole Type WLS
Location:	Oxfordshire, OX14 3DB		Level:	Scale 1:25
Client:	Statera Energy		Dates: 27/09/2022	Logged By SA

Well	Water Strikes	Sample and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
					0.20			Light brown silty slightly gravelly fine and medium SAND with some rootlets. TOPSOIL
					0.90			Orange brown slightly silty slightly gravelly medium SAND. Gravel is medium and coarse subrounded quartzite and various lithologies. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER
					1.20			Orange brown slightly gravelly medium and coarse SAND. Gravel is fine subrounded quartzite. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER
					2.20			Orange brown medium and coarse SAND. Trace of silt. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER
					3.70			Orange brown slightly silty slightly gravelly medium and coarse SAND. Gravel is fine subrounded quartzite. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER
								End of Borehole at 3.70m

1 2 3 4 5

Dynamic Sampling Run Details			Water Strike Details (mbgl)		Remarks
Depth Top	Depth Base	Diameter	Depth Strike	Rose To	Refused at 3.7m. No groundwater encountered. No groundwater in standpipe after 1.5 hours. No groundwater in standpipe on 29 September.

AGS

Geo-Environmental	Unit 7, Danworth Farm Hurstpierpoint BN6 9GL www.gesl.net	Borehole Log	Borehole No. **WS2** Sheet 1 of 1
Project Name:	Culham, Abingdon	Project No. GE21162	Co-ords: 452896E - 196269N	Hole Type WLS
Location:	Oxfordshire, OX14 3DB		Level:	Scale 1:25
Client:	Statera Energy		Dates: 27/09/2022	Logged By SA

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Brown slightly silty medium SAND with some rootlets. TOPSOIL
					0.30			Light orange brown gravelly medium SAND. Gravel is fine occasionally coarse subrounded quartzite and various lithologies. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER
					1.00			Orange brown gravelly medium SAND. Gravel is fine occasionally coarse subrounded quartzite and various lithologies. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER
								Ground wet from 2.6m
					3.10			Orange brown slightly silty gravelly medium SAND. Gravel is fine occasionally coarse subrounded quartzite and various lithologies. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER
					4.70			End of Borehole at 4.70m

1 2 3 4 5

Dynamic Sampling Run Details			Water Strike Details (mbgl)		**Remarks**
Depth Top	Depth Base	Diameter	Depth Strike	Rose To	Refused at 4.7m. Groundwater at 3.18m after drilling. Groundwater at 3.30m in standpipe after 3.5 hours. Groundwater at 3.01m in standpipe on 29 September.
			3.18	3.30	

AGS

Geo-Environmental
Unit 7, Danworth Farm
Hurstpierpoint
BN6 9GL
www.gesl.net

Borehole Log

Borehole No.
WS3
Sheet 1 of 1

Project Name:	Culham, Abingdon	Project No. GE21162	Co-ords: 452728E - 196561N	Hole Type WLS
Location:	Oxfordshire, OX14 3DB		Level:	Scale 1:25
Client:	Statera Energy		Dates: 27/09/2022	Logged By SA

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
								Brown slightly silty gravelly medium SAND with some rootlets. TOPSOIL
					0.25			Orange brown occasionally brown silty gravelly medium SAND. Gravel is fine subrounded quartzite and various lithologies. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER
					1.20			Orange brown slightly silty medium SAND. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER
					2.00			Orange brown clayey medium SAND with one coarse subrounded quartzite gravel clast. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER
					2.10			Orange brown slightly silty medium SAND. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER
					2.80			Orange medium and coarse SAND. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER
					5.00			End of Borehole at 5.00m

1 2 3 4 5

Dynamic Sampling Run Details			Water Strike Details (mbgl)	
Depth Top	Depth Base	Diameter	Depth Strike	Rose To
			4.95	4.95

Remarks

Groundwater at 4.95m after drilling. No groundwater in standpipe after 2.5 hours. No groundwater in standpipe on 29 September.

AGS

Geo-Environmental

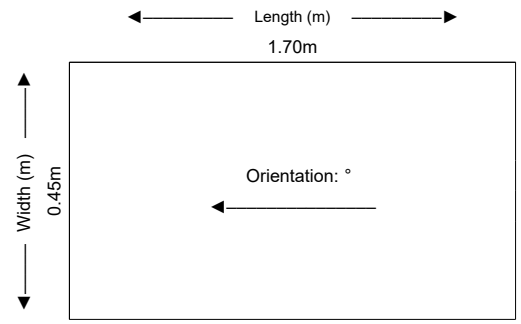
Contract Name: Culham, Abingdon			Client: Statera Energy		Trial Pit ID: TP1
Contract Number: GE21162	Date Started: 28/09/2022	Logged By: SA	Checked By: CG	Status: FINAL	Sheet 1 of 1
Trial Pit Log	Easting: 452866.0	Northing: 196274.0	Ground Level:	Plant Used: JCB 3CX	Date Printed: 06/10/2022	Scale: 1:25
Weather: Sunny	Hole Termination: Target depth reached			Stability: Sides stable	

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
				(0.30)		Brown slightly silty slightly gravelly medium SAND with occasional rootlets. TOPSOIL		
				0.30		Orange brown slight silty slightly gravelly medium SAND. Gravel is fine occasionally coarse subrounded quartzite and various lithologies. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER		
				(1.40)				
				1.70		End of Trial Pit at 1.70m		

0.5 1.0 1.5 2.0 2.5 3.0 3.5

Dimensions:

Final Depth: 1.70m



Inclination: °

Photo:

PhotoofPit

PhotoofSpoil

Geo-Environmental

Trial Pit Log

Contract Name:			Client:		Trial Pit ID:
Culham, Abingdon			Statera Energy		TP2
Contract Number:	Date Started:	Logged By:	Checked By:	Status:	Sheet 1 of 1
GE21162	28/09/2022	SA	CG	FINAL	
Easting:	Northing:	Ground Level:	Plant Used:	Date Printed:	Scale:
452797.0	196342.0		JCB 3CX	06/10/2022	1:25

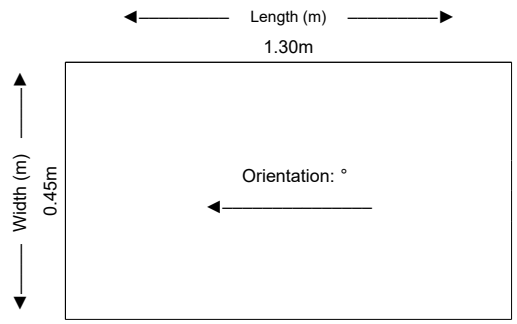
Weather: Sunny | Hole Termination: Target depth reached | Stability: Sides stable

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
				(0.35) 0.35		Brown slightly silty slightly gravelly medium SAND with some rootlets. TOPSOIL		
				(0.75) 1.10		Orange brown silty slightly gravelly medium SAND. Gravel is fine and medium subrounded quartzite and various lithologies. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER		
				(0.40) 1.50		Brown slightly silty medium SAND with rare medium subangular sandstone and subrounded quartzite gravel. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER		
				(0.40) 1.90		Orange brown medium SAND with rare medium subrounded quartzite gravel. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER		
						End of Trial Pit at 1.90m		

0.5 1.0 1.5 2.0 2.5 3.0 3.5

Dimensions:

Final Depth: 1.90m



Inclination: °

Photo:

PhotoofPit

PhotoofSpoil

Geo-Environmental

Contract Name:		Client:			Trial Pit ID:
Culham, Abingdon		Statera Energy			TP3
Contract Number:	Date Started:	Logged By:	Checked By:	Status:	Sheet 1 of 1
GE21162	28/09/2022	SA	CG	FINAL	
Trial Pit Log	Easting: 453042.0	Northing: 196353.0	Ground Level:	Plant Used: JCB 3CX	Date Printed: 06/10/2022	Scale: 1:25

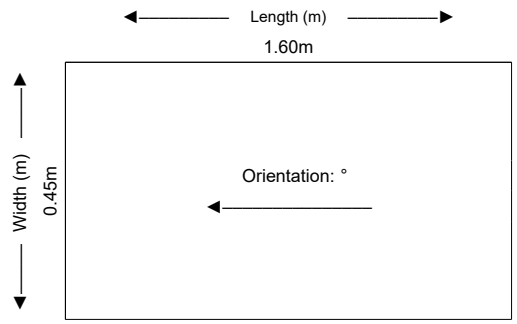
Weather: Sunny | Hole Termination: Target depth reached | Stability: Sides stable

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
				(0.30) 0.30		Brown slightly silty slightly gravelly medium SAND with occasional rootlets. TOPSOIL		
				(0.90) 1.20		Orange brown medium SAND with a trace of silt. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER		
				(0.40) 1.60		Orange brown slightly gravelly medium SAND. Gravel is fine subrounded quartzite. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER		
						End of Trial Pit at 1.60m		

0.5 1.0 1.5 2.0 2.5 3.0 3.5

Dimensions:

Final Depth: 1.60m



Inclination: °

Photo:

PhotoofPit

PhotoofSpoil

Geo-Environmental

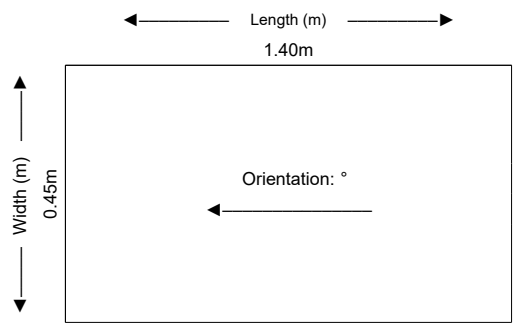
Contract Name: Culham, Abingdon		Client: Statera Energy			Trial Pit ID: TP4
Contract Number: GE21162	Date Started: 28/09/2022	Logged By: SA	Checked By: CG	Status: FINAL	Sheet 1 of 1
Trial Pit Log	Easting: 452825.0	Northing: 196462.0	Ground Level:	Plant Used: JCB 3CX	Date Printed: 06/10/2022	Scale: 1:25
Weather: Sunny	Hole Termination: Target depth reached			Stability: Sides stable	

Samples & In Situ Testing			Strata Details				Water	Backfill
Depths	Sample ID	Test Result	Reduced Level	Depth (m) (Thickness)	Legend	Strata Description		
				(0.30) 0.30		Brown slightly silty slightly gravelly medium SAND with some rootlets. TOPSOIL		
				(0.70) 1.00		Orange brown slightly gravelly medium and coarse SAND. Gravel is fine subrounded quartzite. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER		
				(0.70) 1.70		Greenish grey and grey brown clayey medium SAND with some decayed 5-10mm roots. Slight natural organic odour. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER		
				(0.30) 2.00		Orange brown silty medium and coarse SAND. SUMMERTOWN-RADLEY SAND AND GRAVEL MEMBER		
						End of Trial Pit at 2.00m		

0.5 1.0 1.5 2.0 2.5 3.0 3.5

Dimensions:

Final Depth: 2.00m



Inclination: °

Photo:

PhotoofPit

PhotoofSpoil

APPENDIX B

Soakage Test Results

Geo-Environmental	**Soakaway Test Results (after BRE Digest 365)**	**Geo-EnvironmentalServices Limited** Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Culham, Abingdon	**Job No. :**	GE21162
Client :	Statera Energy	**Date :**	28/09/2022 - 29/09/2022

Pit reference	**TP1**		
Test reference	Test1	Test2	Test3
Pit depth (m)	1.70	1.70	1.70
Pit width (m)	0.45	0.45	0.45
Pit length (m)	1.70	1.70	1.70
Depth to standing water (m)			

Test 1

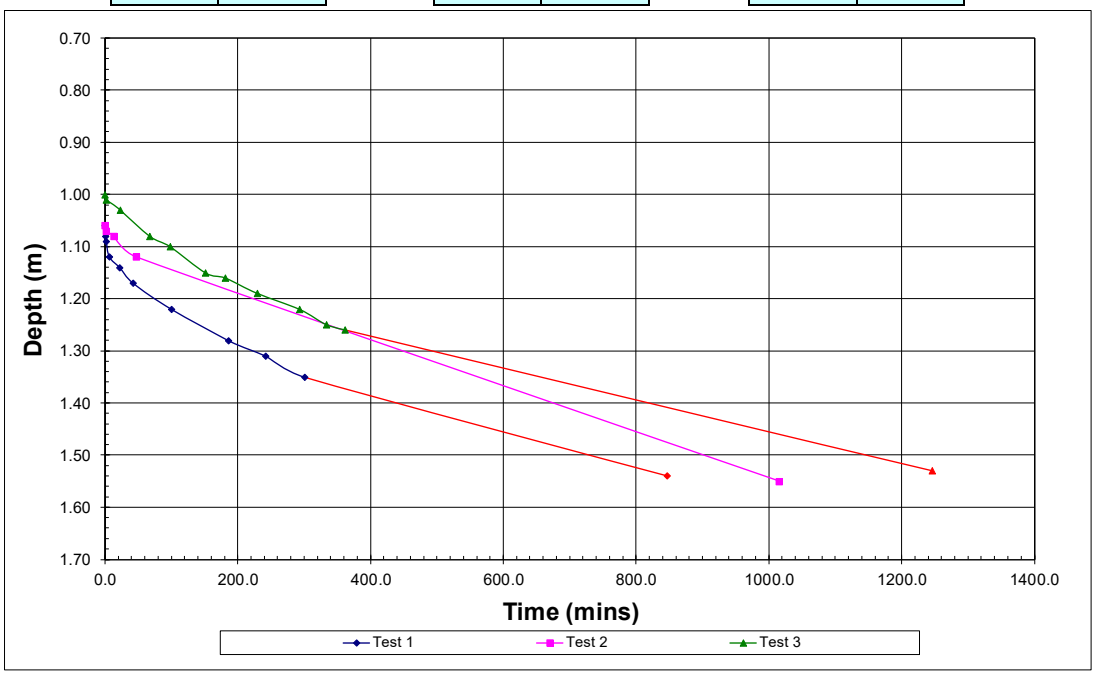
Time (min)	Depth (m)
0.0	1.06
1.0	1.08
2.0	1.09
6.0	1.12
22.0	1.14
42.0	1.17
100.0	1.22
186.0	1.28
242.0	1.31
301.0	1.35
847.0	1.54

Test 2

Time (min)	Depth (m)
0.0	1.06
2.0	1.07
13.0	1.08
47.0	1.12
1015.0	1.55

Test 3

Time (min)	Depth (m)
0.0	1.00
2.0	1.01
23.0	1.03
67.0	1.08
98.0	1.10
151.0	1.15
181.0	1.16
229.0	1.19
293.0	1.22
333.0	1.25
361.0	1.26
1246.0	1.53



Max. depth (m)	1.70	1.70	1.70
Effective depth (m)	0.64	0.64	0.70
75% effective depth (m)	1.22	1.22	1.18
50% effective depth (m)	1.38	1.38	1.35
25% effective depth (m)	1.54	1.54	1.53
t75 (min)	100.00	270.00	220.00
t50 (min)	380.00	630.00	660.00
t25 (min)	847.00	1015.00	1246.00
Vp 75-25	0.24	0.24	0.27
ap 50	2.141	2.141	2.27
tp 75-25	747.00	745.00	1026.00

Soil infiltration rate (m/s)	**2.6E-06**	**2.6E-06**	**1.9E-06**
Soil infiltration rate (mm/hr)	**9.18E+00**	**9.21E+00**	**6.90E+00**

Notes:

1	Blue cells require input data
2	Infiltration calculated to method in 'BRE Digest 365 (1991) - Soakaway Design'
3	First line of table must be depth at time = 0
4	Extrapolated data shown in red

Geo-Environmental	**Soakaway Test Results (after BRE Digest 365)**	**Geo-EnvironmentalServices Limited** Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Culham, Abingdon	**Job No. :**	GE21162
Client :	Statera Energy	**Date :**	28/09/2022 - 29/09/2022

Pit reference	**TP2**		
Test reference	Test1	Test2	Test3
Pit depth (m)	1.90	1.90	1.90
Pit width (m)	0.45	0.45	0.45
Pit length (m)	1.30	1.30	1.30
Depth to standing water (m)			

Test 1

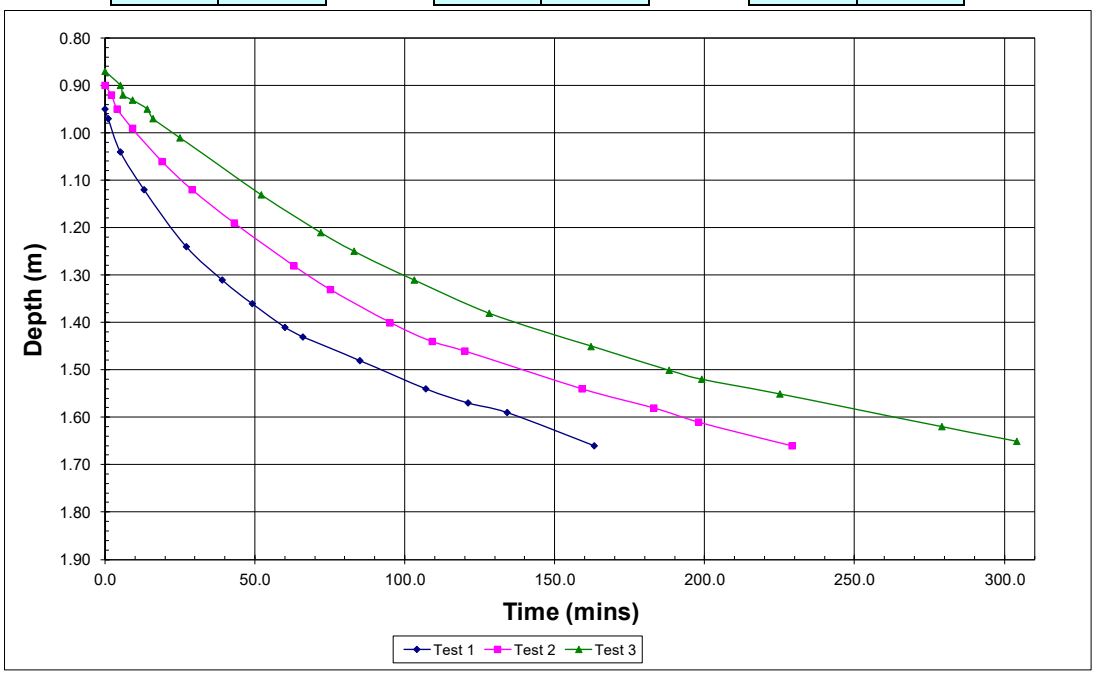
Time (min)	Depth (m)
0.0	0.95
1.0	0.97
5.0	1.04
13.0	1.12
27.0	1.24
39.0	1.31
49.0	1.36
60.0	1.41
66.0	1.43
85.0	1.48
107.0	1.54
121.0	1.57
134.0	1.59
163.0	1.66

Test 2

Time (min)	Depth (m)
0.0	0.90
2.0	0.92
4.0	0.95
9.0	0.99
19.0	1.06
29.0	1.12
43.0	1.19
63.0	1.28
75.0	1.33
95.0	1.40
109.0	1.44
120.0	1.46
159.0	1.54
183.0	1.58
198.0	1.61
229.0	1.66

Test 3

Time (min)	Depth (m)
0.0	0.87
5.0	0.90
6.0	0.92
9.0	0.93
14.0	0.95
16.0	0.97
25.0	1.01
52.0	1.13
72.0	1.21
83.0	1.25
103.0	1.31
128.0	1.38
162.0	1.45
188.0	1.50
199.0	1.52
225.0	1.55
279.0	1.62
304.0	1.65



Max. depth (m)	1.90	1.90	1.90
Effective depth (m)	0.95	1.00	1.03
75% effective depth (m)	1.19	1.15	1.13
50% effective depth (m)	1.43	1.40	1.39
25% effective depth (m)	1.66	1.65	1.64
t75 (min)	20.00	35.00	52.00
t50 (min)	66.00	95.00	135.00
t25 (min)	163.00	220.00	295.00
Vp 75-25	0.28	0.29	0.30
ap 50	2.2475	2.335	2.3875
tp 75-25	143.00	185.00	243.00

Soil infiltration rate (m/s)	**1.4E-05**	**1.1E-05**	**8.7E-06**
Soil infiltration rate (mm/hr)	**5.19E+01**	**4.06E+01**	**3.12E+01**

Notes:

1. Blue cells require input data
2. Infiltration calculated to method in 'BRE Digest 365 (1991) - Soakaway Design'
3. First line of table must be depth at time = 0

Geo-Environmental	**Soakaway Test Results (after BRE Digest 365)**	**Geo-EnvironmentalServices Limited** Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Culham, Abingdon	**Job No. :**	GE21162
Client :	Statera Energy	**Date :**	28/09/2022 - 29/09/2022

Pit reference	**TP3**		
Test reference	Test1	Test2	Test3
Pit depth (m)	1.60	1.60	1.60
Pit width (m)	0.45	0.45	0.45
Pit length (m)	1.60	1.60	1.60
Depth to standing water (m)			

Test 1

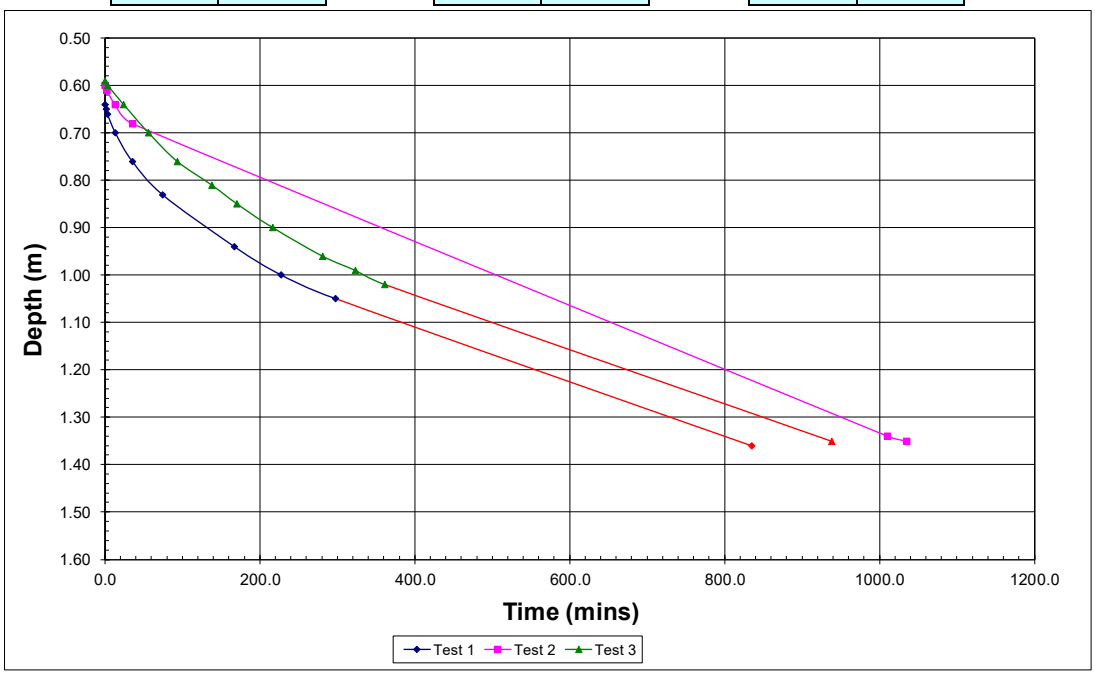
Time (min)	Depth (m)
0.0	0.64
1.0	0.65
3.0	0.66
13.0	0.70
35.0	0.76
74.0	0.83
167.0	0.94
227.0	1.00
297.0	1.05
835.0	1.36

Test 2

Time (min)	Depth (m)
0.0	0.60
2.0	0.61
13.0	0.64
35.0	0.68
1010.0	1.34
1035.0	1.35

Test 3

Time (min)	Depth (m)
0.0	0.59
3.0	0.60
24.0	0.64
56.0	0.70
93.0	0.76
138.0	0.81
170.0	0.85
216.0	0.90
281.0	0.96
323.0	0.99
361.0	1.02
938.0	1.35



Max. depth (m)	1.60	1.60	1.60
Effective depth (m)	0.96	1.00	1.01
75% effective depth (m)	0.88	0.85	0.84
50% effective depth (m)	1.12	1.10	1.10
25% effective depth (m)	1.36	1.35	1.35
t75 (min)	190.00	290.00	160.00
t50 (min)	250.00	520.00	500.00
t25 (min)	835.00	1035.00	938.00
Vp 75-25	0.35	0.36	0.36
ap 50	2.688	2.77	2.7905
tp 75-25	645.00	745.00	778.00

Soil infiltration rate (m/s)	**3.3E-06**	**2.9E-06**	**2.8E-06**
Soil infiltration rate (mm/hr)	**1.20E+01**	**1.05E+01**	**1.00E+01**

Notes:

1. Blue cells require input data
2. Infiltration calculated to method in 'BRE Digest 365 (1991) - Soakaway Design'
3. First line of table must be depth at time = 0
4. Extrapolated data shown in red

Geo-Environmental	**Soakaway Test Results (after BRE Digest 365)**	**Geo-EnvironmentalServices Limited** Unit 7 Danworth Farm, Cuckfield Road, Hurstpierpoint, West Sussex BN6 9GL +44(0)1273 832972 www.gesl.net

Project Name :	Culham, Abingdon	**Job No. :**	GE21162
Client :	Statera Energy	**Date :**	28/09/2022 - 29/09/2022

Pit reference	**TP4**		
Test reference	Test1	Test2	Test3
Pit depth (m)	2.00	2.00	
Pit width (m)	0.45	0.45	
Pit length (m)	1.40	1.40	
Depth to standing water (m)			

Test 1

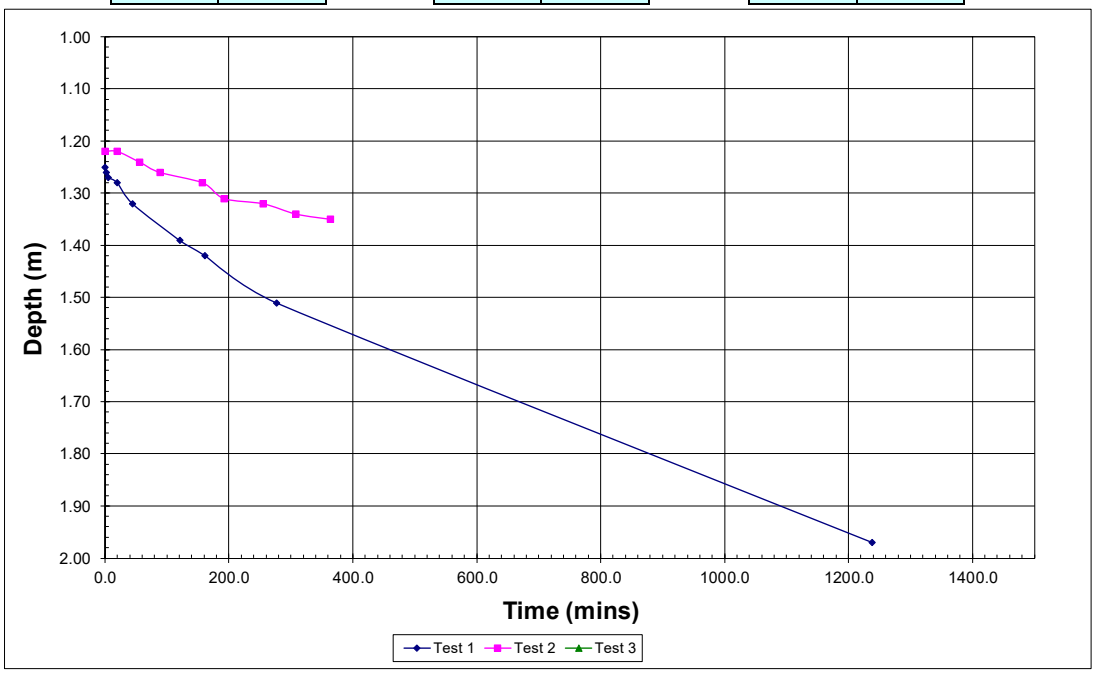
Time (min)	Depth (m)
0.0	1.25
2.0	1.26
5.0	1.27
19.0	1.28
44.0	1.32
120.0	1.39
161.0	1.42
277.0	1.51
1238.0	1.97

Test 2

Time (min)	Depth (m)
0.0	1.22
19.0	1.22
55.0	1.24
88.0	1.26
157.0	1.28
192.0	1.31
255.0	1.32
308.0	1.34
363.0	1.35

Test 3

Time (min)	Depth (m)



Max. depth (m)	2.00	2.00	0.00
Effective depth (m)	0.75	0.78	0.00
75% effective depth (m)	1.44	1.42	0.00
50% effective depth (m)	1.63	1.61	0.00
25% effective depth (m)	1.81	1.81	0.00
t75 (min)	180.00		
t50 (min)	530.00		
t25 (min)	900.00		
Vp 75-25	0.24	0.25	0.00
ap 50	2.0175	2.073	0
tp 75-25	720.00	0.00	0.00

Soil infiltration rate (m/s)	**2.7E-06**		
Soil infiltration rate (mm/hr)	**9.76E+00**		

Notes:

1	Blue cells require input data
2	Infiltration calculated to method in 'BRE Digest 365 (1991) - Soakaway Design'
3	First line of table must be depth at time = 0

APPENDIX C

Discovery Strategy

Discovery Strategy

Whilst an intrusive investigation has been undertaken on the site, it remains possible that unexpected ground and/or groundwater conditions may be encountered during the process of construction.

Should previously undiscovered contamination or unforeseen ground conditions be encountered during construction by the ground workers, this must be reported to the Site Manager immediately in order that the Consultant is notified.

Where deemed necessary, the Consultant shall attend the site to inspect the discovery and provide recommendations on the further actions required, if any. Where necessary the regulatory authority shall be informed. Post any additional investigation or laboratory testing the results and any proposed remedial measures shall be reported to the regulatory authority or other appropriate organisation for consent, before proceeding or implementing the remedial measures.

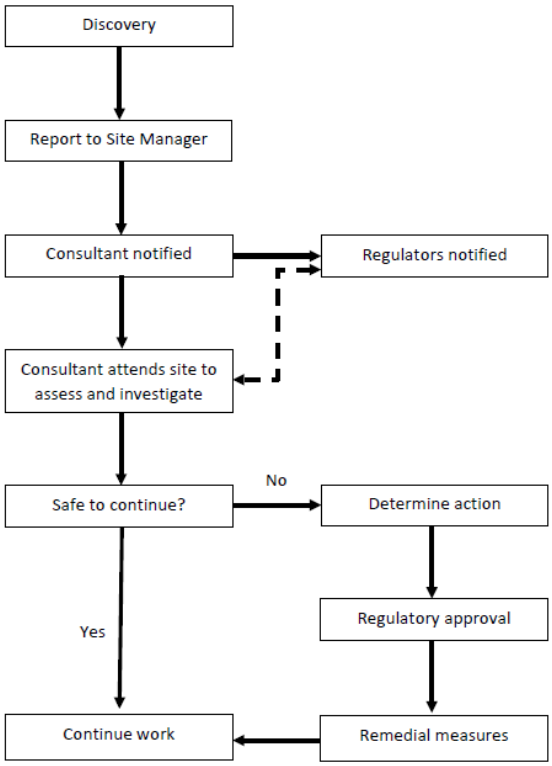
A copy of the discovery strategy must be lodged on site, and provisions made to ensure that all workers are made aware of their responsibility to observe, report, and act on any potentially suspicious, abnormal, unforeseen or contaminated ground and/or groundwater conditions they may encounter.

Depending on the type, nature and extent of any such 'discovery', it may be necessary to halt works in that location until such time as the assessment has been completed. This shall be reviewed on a 'discovery' specific basis and in conjunction with consultation with the client, other technical personnel and/or regulatory/approval organisations.

As a general guide, where such unexpected conditions are encountered the following approach is required as a minimum:

- All discoveries are to be reported to the Site Manager immediately and works at that location are to halt until further notice;
- The Site Manager is to report any such discoveries to the Client and the Consultant;
- Following notification from the Site Manager, the Consultant shall discuss the discovery with the Local Authority and/or other relevant parties and if considered necessary, arrange to meet on site to view the discovery;
- The Consultant shall attend the site to record the location, extent and nature of the discovery and implement an appropriate sampling and analysis regime, taking due account of the type and nature of the discovery, known and probable land uses in that area of the site;
- Where remedial action is required, regulatory consultation and approval will be sought;
- A record will be produced by the Consultant and held on site (with copies held by the Consultant, Client and Local Authority/other relevant organisation), detailing the discovery, assessment works undertaken, findings thereof, confirmation either of no action required or detailing the remedial action taken and validation thereof.

The process is summarised below:


Discovery
Report to Site Manager
Consultant notified
Regulators notified
Consultant attends site to assess and investigate
Safe to continue?
No
Determine action
Regulatory approval
Yes
Continue work
Remedial measures

Appendix F - Greenfield Runoff Rate

ICP SUDS Mean Annual Flood

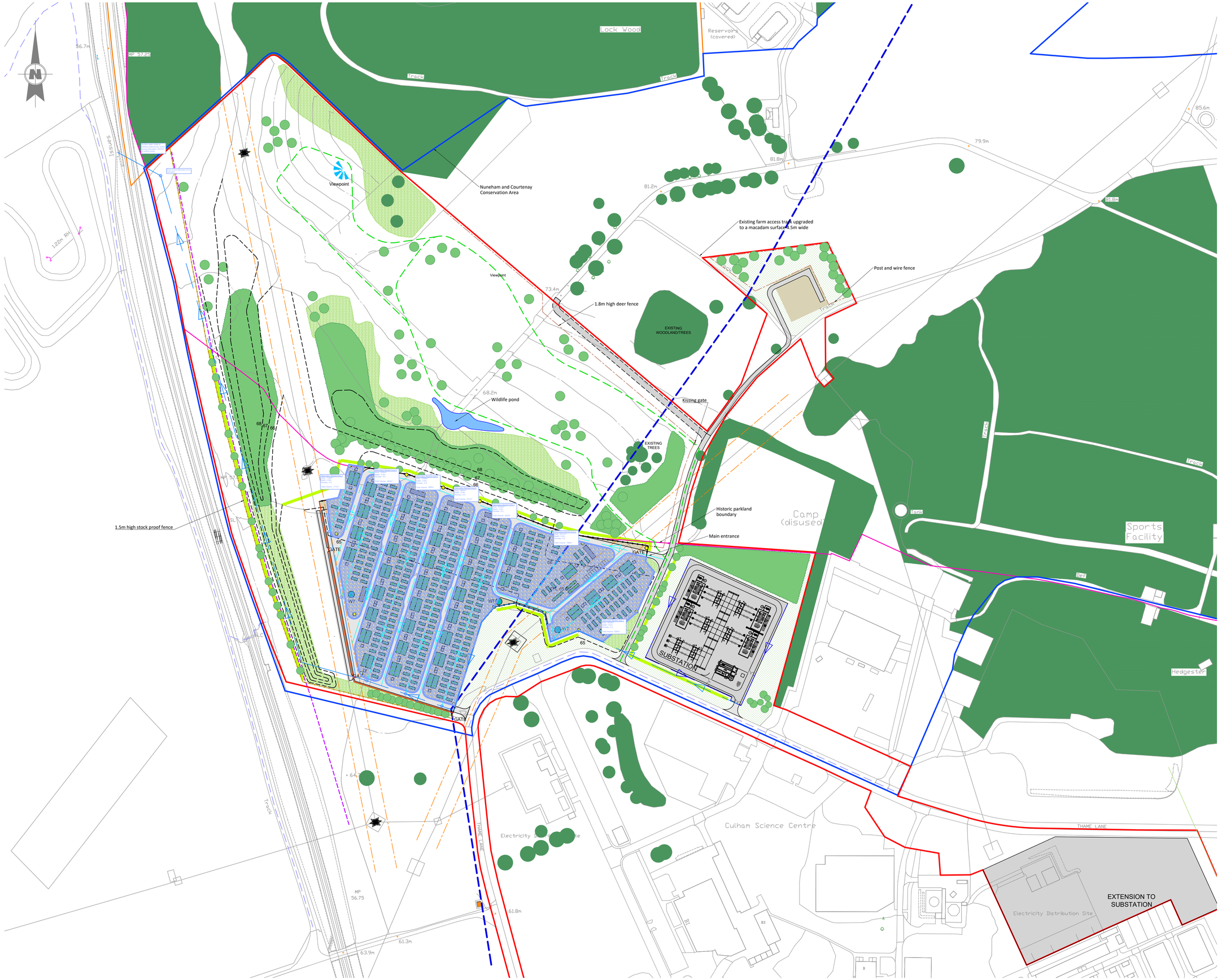
Input

Return Period (years)	100	Soil	0.300
Area (ha)	4.460	Urban	0.000
SAAR (mm)	600	Region Number	Region 6

Results l/s

QBAR Rural	6.8
QBAR Urban	6.8
Q100 years	21.6
Q1 year	5.8
Q30 years	15.4
Q100 years	21.6

Appendix G – Conceptual Drainage Strategy



Notes

1. This drawing has been prepared in accordance with the scope of RPS's appointment with its client and is subject to the terms and conditions of that appointment. RPS accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided.
2. If received electronically it is the recipients responsibility to print to correct scale. Only written dimensions should be used.
3. This drawing should be read in conjunction with all other relevant drawings and specifications.

PRELIMINARY

SUBJECT TO DETAILED DESIGN

This drawing illustrates a sketch proposal only and as such is subject to detailed site investigation including ground conditions/contaminants, drainage, design and planning/density negotiations. The layout maybe based upon an enlargement of an OS sheet or other small scale plans and its accuracy will need to be verified by Survey. Full risk analysis under the CDM Regulations has not been undertaken.

KEY

- Surface Water Manhole/ Inspection Chamber
- Interceptor Channel
- Surface Water Headwall
- Internal Compound Surface Water Drains
- Surface Water Outfall Routes
- Vortex Grit Separator
- Attenuation Blanket

Greenfield Runoff Rate = 6.8l/s
Impermeable Area = 4.46ha
Restriction Rate = 6.8l/s
Storage requirement for 1:100 year + 40% cc event = 4084.3m³

Attenuation provided across seven attenuation blankets, total storage volume provided = 4800.45m³

Penstocks and inspection chambers provided at outfall of each blanket to allow for pollution containment and control

Rev	Description	By	Ckd	Date
D	Update to Drainage Approach	JG	JM	11:04.24
C	Updates to Layout	JG	JM	23:02.24
B	Updates to Layout	JG	JM	30.10.23
A	First Issue	JG	JH	09.02.23

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Client: Statera

Project: Culham Battery

Title: Conceptual Drainage Strategy

Status	Scale	Date Created
DRAFT	@A1	11.04.2024

Task Team Manager	Information Author	Task Information Manager
JM	JG	JM

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Appendix H - MicroDrainage Calculations

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 5045 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	65.133	0.133	0.0	6.4	6.4	1281.5	O K
30 min Summer	65.174	0.174	0.0	6.8	6.8	1674.7	O K
60 min Summer	65.217	0.217	0.0	6.8	6.8	2086.1	Flood Risk
120 min Summer	65.263	0.263	0.0	6.8	6.8	2525.6	Flood Risk
180 min Summer	65.291	0.291	0.0	6.8	6.8	2789.4	Flood Risk
240 min Summer	65.309	0.309	0.0	6.8	6.8	2969.3	Flood Risk
360 min Summer	65.333	0.333	0.0	6.8	6.8	3195.5	Flood Risk
480 min Summer	65.347	0.347	0.0	6.8	6.8	3333.1	Flood Risk
600 min Summer	65.357	0.357	0.0	6.8	6.8	3424.0	Flood Risk
720 min Summer	65.363	0.363	0.0	6.8	6.8	3486.7	Flood Risk
960 min Summer	65.371	0.371	0.0	6.8	6.8	3560.7	Flood Risk
1440 min Summer	65.376	0.376	0.0	6.8	6.8	3613.9	Flood Risk
2160 min Summer	65.375	0.375	0.0	6.8	6.8	3604.7	Flood Risk
2880 min Summer	65.371	0.371	0.0	6.8	6.8	3557.7	Flood Risk
4320 min Summer	65.357	0.357	0.0	6.8	6.8	3428.5	Flood Risk
5760 min Summer	65.348	0.348	0.0	6.8	6.8	3339.4	Flood Risk
7200 min Summer	65.343	0.343	0.0	6.8	6.8	3289.7	Flood Risk
8640 min Summer	65.339	0.339	0.0	6.8	6.8	3256.9	Flood Risk
10080 min Summer	65.337	0.337	0.0	6.8	6.8	3233.4	Flood Risk
15 min Winter	65.150	0.150	0.0	6.7	6.7	1435.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	153.813	0.0	439.0	27
30 min Summer	100.662	0.0	554.6	42
60 min Summer	62.851	0.0	1100.0	72
120 min Summer	38.216	0.0	1145.1	132
180 min Summer	28.256	0.0	1132.6	192
240 min Summer	22.648	0.0	1117.6	250
360 min Summer	16.376	0.0	1088.8	370
480 min Summer	12.909	0.0	1062.7	490
600 min Summer	10.688	0.0	1038.7	610
720 min Summer	9.138	0.0	1016.5	730
960 min Summer	7.104	0.0	975.8	968
1440 min Summer	4.953	0.0	904.1	1448
2160 min Summer	3.446	0.0	1950.0	2164
2880 min Summer	2.670	0.0	1848.5	2884
4320 min Summer	1.879	0.0	1658.4	4020
5760 min Summer	1.476	0.0	3739.2	4568
7200 min Summer	1.235	0.0	3604.0	5328
8640 min Summer	1.075	0.0	3415.8	6128
10080 min Summer	0.960	0.0	3225.7	6952
15 min Winter	153.813	0.0	496.8	27

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	65.195	0.195	0.0	6.8	6.8	1876.4	O K
60 min Winter	65.244	0.244	0.0	6.8	6.8	2337.8	Flood Risk
120 min Winter	65.295	0.295	0.0	6.8	6.8	2831.5	Flood Risk
180 min Winter	65.326	0.326	0.0	6.8	6.8	3128.4	Flood Risk
240 min Winter	65.347	0.347	0.0	6.8	6.8	3331.3	Flood Risk
360 min Winter	65.374	0.374	0.0	6.8	6.8	3587.8	Flood Risk
480 min Winter	65.390	0.390	0.0	6.8	6.8	3745.2	Flood Risk
600 min Winter	65.401	0.401	0.0	6.8	6.8	3849.7	Flood Risk
720 min Winter	65.409	0.409	0.0	6.8	6.8	3922.4	Flood Risk
960 min Winter	65.418	0.418	0.0	6.8	6.8	4009.8	Flood Risk
1440 min Winter	65.425	0.425	0.0	6.8	6.8	4078.4	Flood Risk
2160 min Winter	65.425	0.425	0.0	6.8	6.8	4084.3	Flood Risk
2880 min Winter	65.422	0.422	0.0	6.8	6.8	4051.4	Flood Risk
4320 min Winter	65.411	0.411	0.0	6.8	6.8	3950.2	Flood Risk
5760 min Winter	65.399	0.399	0.0	6.8	6.8	3832.8	Flood Risk
7200 min Winter	65.390	0.390	0.0	6.8	6.8	3743.7	Flood Risk
8640 min Winter	65.384	0.384	0.0	6.8	6.8	3687.9	Flood Risk
10080 min Winter	65.379	0.379	0.0	6.8	6.8	3637.9	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	100.662	0.0	574.4	41
60 min Winter	62.851	0.0	1148.0	72
120 min Winter	38.216	0.0	1142.3	130
180 min Winter	28.256	0.0	1122.1	188
240 min Winter	22.648	0.0	1102.0	248
360 min Winter	16.376	0.0	1064.8	366
480 min Winter	12.909	0.0	1032.6	484
600 min Winter	10.688	0.0	1008.8	602
720 min Winter	9.138	0.0	989.7	720
960 min Winter	7.104	0.0	958.4	956
1440 min Winter	4.953	0.0	906.6	1426
2160 min Winter	3.446	0.0	1934.2	2120
2880 min Winter	2.670	0.0	1844.1	2804
4320 min Winter	1.879	0.0	1677.2	4148
5760 min Winter	1.476	0.0	3797.0	5368
7200 min Winter	1.235	0.0	3612.3	5832
8640 min Winter	1.075	0.0	3435.2	6672
10080 min Winter	0.960	0.0	3278.3	7656

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 452975 196383 SU 52975 96383
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	0.750
Cv (Winter)	0.840
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 4.460

Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)	Time From:	(mins) To:	Area (ha)
0	4	1.487	4	8	1.487	8	12	1.487

Model Details

Storage is Online Cover Level (m) 65.500

Infiltration Blanket Structure

Infiltration Coefficient Base (m/hr)	0.00000	Diameter/Width (m)	100.0
Safety Factor	2.0	Length (m)	320.0
Porosity	0.30	Cap Volume Depth (m)	0.000
Invert Level (m)	65.000		

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0129-6800-0500-6800
Design Head (m)	0.500
Design Flow (l/s)	6.8
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	129
Invert Level (m)	65.000
Minimum Outlet Pipe Diameter (mm)	150
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.500	6.8
Flush-Flo™	0.198	6.8
Kick-Flo®	0.382	6.0
Mean Flow over Head Range	-	5.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	4.6	1.200	10.3	3.000	15.8	7.000	23.8
0.200	6.8	1.400	11.0	3.500	17.1	7.500	24.7
0.300	6.6	1.600	11.7	4.000	18.2	8.000	25.5
0.400	6.1	1.800	12.4	4.500	19.2	8.500	26.3
0.500	6.8	2.000	13.1	5.000	20.2	9.000	27.1
0.600	7.4	2.200	13.7	5.500	21.1	9.500	27.8
0.800	8.5	2.400	14.2	6.000	22.1		
1.000	9.4	2.600	14.8	6.500	23.0		