

KIRKBY – BESS SITE DRAINAGE STRATEGY REPORT

Coopers Lane, Kirkby

KIRK-BML-XX-XX-RP-C-0512

Date

04th February 2026

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BarnsleyMarshall

Contents Amendment Record

This report has been issued and amended as follows:

Revision	Description	Issued by	Checked by	Date
P03	Updated to suit LLFA comments	IW	NS	04.02.2026
P02	Final Issue	NS	AM	02.10.2025
P01	Preliminary Issue	NS	AM	28.10.2024

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1. Introduction

1.1 Project Background

Barnsley Marshall Ltd was appointed by Omnia Projects Ltd to provide a Flood Risk Assessment & SuDS Drainage Strategy for the proposed Battery Energy Storage System (BESS) site located on land adjacent to Coopers Lane, Kirkby, L33 7TT.

The report provides a SuDS-based surface water drainage strategy for the proposed development based on Government and local authority guidance with regard to flood risk and sustainable drainage.

The report is based on currently available information and preliminary discussions.

Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

Where the proposed works to which this report refers are undertaken more than twelve months following the issue of this report, Barnsley Marshall shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Barnsley Marshall.

1.2 Scope of Drainage Strategy Report

The assessment has been undertaken in accordance with the standing advice and requirements of the Environment Agency for Flood Risk Assessments as outlined in the Communities and Local Governments Planning Practice Guidance (PPG) to the National Planning Policy Framework (NPPF).

The development area is currently greenfield and is situated to the north of Fusiliers Way. The area for the development is approximately 0.5Ha in size. Following scrutiny of the Environment Agency flood maps it has been identified that the existing site lies within an area classified as Flood Zone 1 indicating that the risk of flooding from rivers and sea is low, with an Annual Exceedance Probability of flooding of less than 0.1%. A Flood Risk Assessment (KIRK-BML-XX-XX-RP-C-0511) has been undertaken which outlines the drainage strategy for the development, this report expands on that section of the report.

This report is also to be read in conjunction with Barnsley Marshall report KIRK-BML-XX-XX-RP-C-0513, drainage statement.

The Strategy reviews the following information:

- Environment Agency flood maps for rivers and sea flooding.
- Sustainable Drainage Systems (SuDS) Handbook
- Public Sewer Records.
- Design & Construction Guidance, June 2023.
- Part H of the Building Regulations: Drainage and waste disposal.
- BE EN12056 Part 2 Gravity Drainage Systems Inside Buildings.
- Technical Guidance to the National Planning Policy Framework.
- CIRIA Report C753 SUDS Manual 2016.
- BS EN 752:2017 Drain and sewer systems outside buildings. Sewer system management
- BS 8582:2013, Code of Practice for surface water management for development sites.
- BS 8533:2017, Assessing and managing flood risk in development – Code of practice.
- CIRIA C635 Designing for exceedance in urban drainage - good practice
- Flood Estimation Handbook (FEH) /Flood Studies Report (FSR) methods.
- Institute of Hydrology (IH) Reports No. 124.
- Environmental Agency (EA) / Department for Environment, Food and Rural Affairs (DEFRA) recommendations.
- DMRB Design Manual for Roads and Bridges Volume 4 Section 2 'Drainage'.
- Floods and Water Management Act 2010
- Flood plan guidance for communities and groups – EA
- Adapting to Climate Change: Advice for Flood and Coastal Erosion Risk Management Authorities – EA

2. Existing Site Details

2.1 Location and Description

The proposed development is a Battery Energy Storage System (BESS) located on a greenfield site adjacent to Coopers Lane, Kirkby, L33 7TT. The site, covering approximately 0.5Ha, is located next to the Coopers Lane National Grid Substation and about 3 km southeast of Kirkby Town Centre. Knowsley Brook flows approximately 60m southeast of the development site in a south-westerly direction, as shown in **Figure 1 (Drainage route to the brook & ownership boundary highlighted in Red & Blue lines respectively).**

For a site location plan refer to **Appendix A.**



Figure 1: The drainage route to the brook & ownership boundary shown in Red & Blue lines respectively

(Source: Google Maps, Accessed on 2024-09-03, 1330hrs)

2.2 Topography

Current topographical survey demonstrates that the proposed development site slopes generally from the north (with ground levels at approximately 42.900mAOD) to the south (with ground levels at approximately 41.500mAOD).

Refer to **Appendix B** for the site topography

2.3 Existing Watercourses

Knowsley Brook flows approximately 60m southeast of the development site in a south-westerly direction. Knowsley Brook gets culverted to the south of the site beyond East Lancashire Road. See Flood Risk Assessment Report KIRK-BML-XX-XX-RP-C-0511 for further information.

No other watercourses are evident within or in the vicinity of the site.

2.4 Existing Public Drainage

No Existing public drainage is evident within or in the vicinity of the site. The postcode of the site falls within a region supplied by United Utilities.

2.5 Existing Private Drainage

The site is currently a greenfield land. As per the information provided by topographical survey, no private drainage is present within or in the vicinity of the site.

2.6 Site Geology

A Site Investigation (SI) was carried out on site by SP Associates in April 2022. In summary, the report indicates that the site is made up of 0.3m deep soft clay underlain by firm sandy clay with occasional fine to coarse gravel.

Refer to **Appendix C** for details.

3. Drainage Strategy

3.1 Key Principles of SuDS

Figure 3 gives the key design principles critical for the implementation of SuDS:

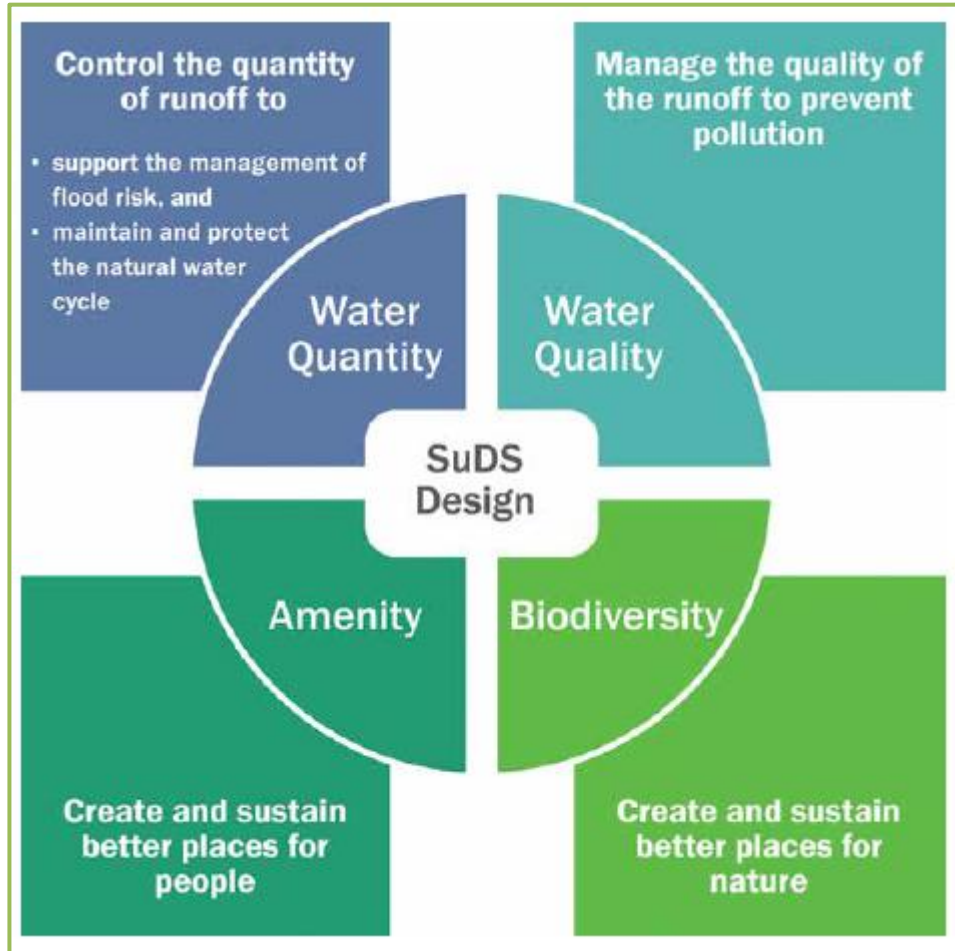


Figure 2: Four Main Categories of SuDS

(Source: CIRIA 753: The SuDS Manual)

Quantity Control : Achieved by controlling the quantity of surface water runoff reaching a watercourse, drainage system or sewer. Controlling runoff can aid in mitigating the risk of flooding. The benefits to quantity control include:

- Less surface water entering watercourses, thereby offsetting peak flows and reducing fluvial flood risk.
- Less surface water entering sewers, thereby freeing capacity and reducing flood risk
- Allows for adaption to climate change
- Allows for recharge of underground aquifer

Quality Control : Achieved by improving the quality of surface water reaching a watercourse, drainage system or sewer. The benefits to quality control include:

- Reduces of pollution levels in surface water bodies
- Protects groundwater resources from contamination
- Enables compliance with the Water Framework Directive

Biodiversity and Amenity Value : Achieved by introducing SuDS that enhance the existing biodiversity of the area and/or add amenity value to the community. The benefits include:

- Contributes to community health & wellbeing by providing green spaces with value in terms of landscape, recreation and walking routes
- Provides opportunities for multifunctional areas
- Provides wildlife habitat and ecological benefits
- Increases property values

These key design principles should be considered in all aspects of SuDS selection and design. All SuDS should aim to achieve **each of these principles**.

3.2 Discharge Hierarchy

Under the terms of Section H of the Building Regulations 2015, the SUDS Manual 2015 report C753, the disposal of surface water by means of soakaways should be considered as the primary method, refer to **Table 1**.

There is no requirement for water use on site, therefore rainwater harvesting is not feasible.

The main findings (refer to **section 2.6** of this report) were that drainage via infiltration is not feasible due to clay soils.

The watercourse which runs to the south east of the site is considered feasible and will be explored as a means of discharging stormwater.

Table 1: Surface Water Discharge Hierarchy

Surface Water Discharge Hierarchy	
1	Reuse on site (i.e., rainwater harvesting)
2	Into the ground (infiltration)
3	To a surface water body
4	To a surface water sewer, highway drain, or another drainage system
5	To a combined sewer

3.3 Sustainable Drainage Systems Appraisal

A SuDS appraisal was conducted based on the SuDS hierarchy given in **Table 1**. **Table 2** gives the results of the appraisal.

Table 2: Scheme Appraisal of SuDS Drainage Features

SuDS Feature	Is feature suitable for the proposed site?	Comment
Soakaway	NO	Infiltration tests have been carried out on-site and have proven that the infiltration is insufficient.
Green/Brown Roofs	NO	There are no buildings proposed for the development.
Filter Trench	YES	As shown on Drainage Plan Layout To collect the runoff from the site and adjacent sloping ground.
Swale	NO	There is insufficient space available on the development.
Porous Surfacing	YES	The site will be made up of 300mm deep permeable gravelled area.
Infiltration Basin	NO	There is insufficient space available on the development.
Detention Basin	NO	There is insufficient space available on the development.
Bioretention System (Rain Garden / Stormwater Planters)	NO	There is insufficient space available on the development.
Pond	NO	There is insufficient space available on the development.
Rainwater Harvesting	NO	There are no buildings and no requirement for water connection on site
Storage System: Geo-Cellular Tank	YES	As shown on Drainage Layout To attenuate runoff from the site before discharging to the adjacent watercourse.

Based on the selected SuDS features as per **Table 2**, the main SuDS features associated with the proposed drainage strategy are summarised below:

Flow Control Device: Runoff from the development to existing ditches shall be controlled to maximum 5 l/s for all storm events up to and including the 100-year + 40% CC storm event by flow control unit located downstream of the proposed to attenuation tank, details of which are shown on plan layouts in **Appendix D**.

Catchpit: The catchpits with a minimum of 300mm deep sumps have been strategically placed to capture debris and silt before the runoff reaches locations where it would be onerous to remove the silt.

Porous Surfacing: The water can be temporarily stored before infiltration to the filter trench. Surfaces with an aggregate sub-base can provide good water quality treatment.

Filter Trench: The proposed filter trench will have SHW Type B filter material (20-40mm stone). Filter Drains mimic the hydrological behaviour of soft landscaping by allowing the water to permeate the filter material before reaching the perforated pipe at the base of the trench. This ensures filtration of the runoff prior to conveyance to attenuation devices downstream.

Attenuation Tank: An underground geocellular tank is proposed to provide attenuation storage for the development, designed to accommodate up to a 1 in 100-year storm event with a 40% climate change allowance. The tank will also include an additional 180m³ of capacity to store fire water in the event of a fire occurring simultaneously. While above-ground attenuation storage would normally be preferable (attenuation pond), site constraints mean there is no suitable space within the development to accommodate this.

3.4 Surface Water Drainage Strategy

A SuDS Drainage Strategy was submitted alongside the Planning Application (Ref: KRS.0653.006.R.1.01.B – Drainage Assessment, submitted in February 2024), and planning permission has been granted with a controlled runoff rate of up to 5.0 l/s for all storm events, including those up to the 100-year event with a 40% climate change allowance.

Both the **CIRIA SuDS Manual (C753)** and guidance from the **Environment Agency** acknowledge that the greenfield rate is not always achievable and recommend a practical minimum discharge of 5 l/s to mitigate these circumstances. It is generally accepted that in accordance with **Report Number SC030219 "Rainfall Runoff Management for Developments"** produced by the **Environment Agency** and **DEFRA**,

"A practicable minimum limit on the discharge rate from a flow attenuation device is often a compromise between attenuating to a satisfactorily low flow rate while

keeping the risk of blockage to an acceptable level. It is suggested that this is 5 litres per second.”

In line with established national guidance and Lead Local Flood Authority practice, the adoption of a minimum discharge rate of 5 l/s is therefore the only feasible and robust solution to ensure both effective surface water management and the long-term reliability of the system.

Figure 3 gives a summary of the proposed SuDS Drainage Strategy.

The SuDS Approval Body shall be consulted and fully briefed on the proposed drainage strategy so they can provide a formal Discharge Consent to the existing ditches before construction begins. For outfall details refer to drainage strategy drawings attached to Appendix D.

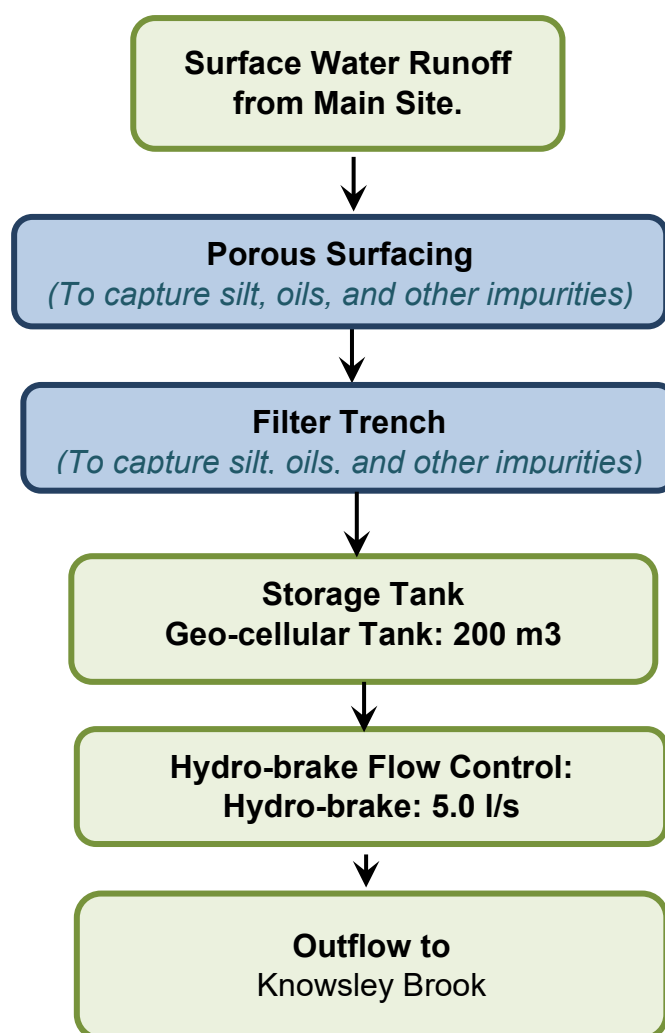


Figure 3: SuDS Drainage Strategy Summary

3.5 Pollution Control and Water Quality

The following pollution control devices have been proposed:

❖ **Porous Surfacing:**

Treat stormwater flows from whole site

The site will have 300mm of stone build up which will filter the storm water before entering the filter trenches. The internal access roads will also drain to these porous areas.

❖ **Filter Trench:**

Treat stormwater flows from whole site

Filter trenches are shallow excavations filled with rubble or stone that create temporary subsurface storage of stormwater runoff. These trenches can be used to filter and convey stormwater to downstream SuDS components.

❖ **Catchpit:**

Capture silt & debris

Catchpits have been strategically placed to capture debris and silt before the runoff reaches areas which would make it difficult to cleanse the system of the pollutants.

CIRIA report C753, The SuDS Manual, says on page 567 'To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index (for each contaminant type) that equals or exceeds the pollution hazard index (for each contaminant type).'

Table 3 shows Table 26.2 of the SuDS Manual, which gives the pollution hazard indices for various land uses.

Table 4 shows Table 26.3 of the SuDS Manual, which gives indicative SuDS mitigation indices for discharges to surface waters.

Table 5 gives a summary analysis of the adequacy of the proposed SuDS drainage in addressing pollution control and water quality.

Table 3: Pollution Hazard indices

TABLE 26.2 Pollution hazard indices for different land use classifications				
Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

Notes

1 Motorways and trunk roads should follow the guidance and risk assessment process set out in Highways Agency (2009).

2 These should only be used if considered appropriate as part of a detailed risk assessment – required for all these land use types (Table 4.3). When dealing with high hazard sites, the environmental regulator should first be consulted for pre-permitting advice. This will help determine the most appropriate approach to the development of a design solution.

Table 4: Indicative SuDS mitigation indices for discharges to surface waters

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters			
Type of SuDS component	Mitigation indices ¹		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ²	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond ⁴	0.7 ³	0.7	0.5
Wetland	0.8 ³	0.8	0.8
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Notes

- 1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.
- 2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.
- 3 Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.
- 4 Where a wetland is not specifically designed to provide significantly enhanced treatment, it should be considered as having the same mitigation indices as a pond.
- 5 See **Chapter 14** for approaches to demonstrate product performance. A British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: <http://tinyurl.com/q7yuj7>
- 6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. SEPA (2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

Table 5: Mitigation versus hazard indices for proposed layouts

SuDS Drainage Layout	SuDS device/Land Use	TSS	Metals	Hydro-carbons	Remark
Gravelled permeable area	Porous Areas	0.4	0.4	0.4	OK , SuDS element provides sufficient treatment.
Filter trench.	*Filter trench,	0.2	0.2	0.2	
	Total	0.6	0.6	0.6	
Pollution Hazard	Low trafficked area.	0.5	0.4	0.4	

* Only half of the mitigation applies for the second SuDS feature.

3.6 Spillage Management

The site is to be unmanned and will only be attended during maintenance periods, therefore the probability of an oil spillage on this site from HGVs is very low.

The transformer units require management of oil seepage. An oil pan under the transformer units will collect any oil that may be released and will discharge to a full retention separator which will filter out the oil.

The switch gear units are to be bunded with the bund calculated so that it can store all of the oil should an unplanned release happen.

These sites are to be remotely monitored and emergency plans put in place should a spillage event happen. A Penstock is also included at the so that the sites drainage system can be isolated in case of any pollution event.

3.7 Exceedance Flows

Exceedance flows are flows generated by a storm event greater than that which the system has been designed for. The proposed drainage has been designed to accommodate with no flooding the storm events up to and including the 1 in 100-year + 40% climate change event. Should a storm event greater than the maximum design event happen, then exceedance flows would be flow towards the south and entre the private watercourse to the south away from the site.

This demonstrates that the proposed site will be fairly resilient to flooding in the case that an exceedance flood event.

3.8 Foul Drainage Strategy

As the site is unmanned and no buildings are to be proposed, there is no requirement for foul drainage on site.

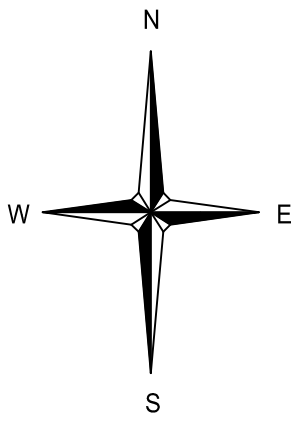
3.9 Maintenance and Operation

A SuDS Operation and Maintenance Manual will be produced and issued as a separate document from this report. The Manual shall be revised post-construction to suit as-built drainage (which should be in accordance with details approved at planning stage) and added to the Health and Safety File.

APPENDICES

Appendix A

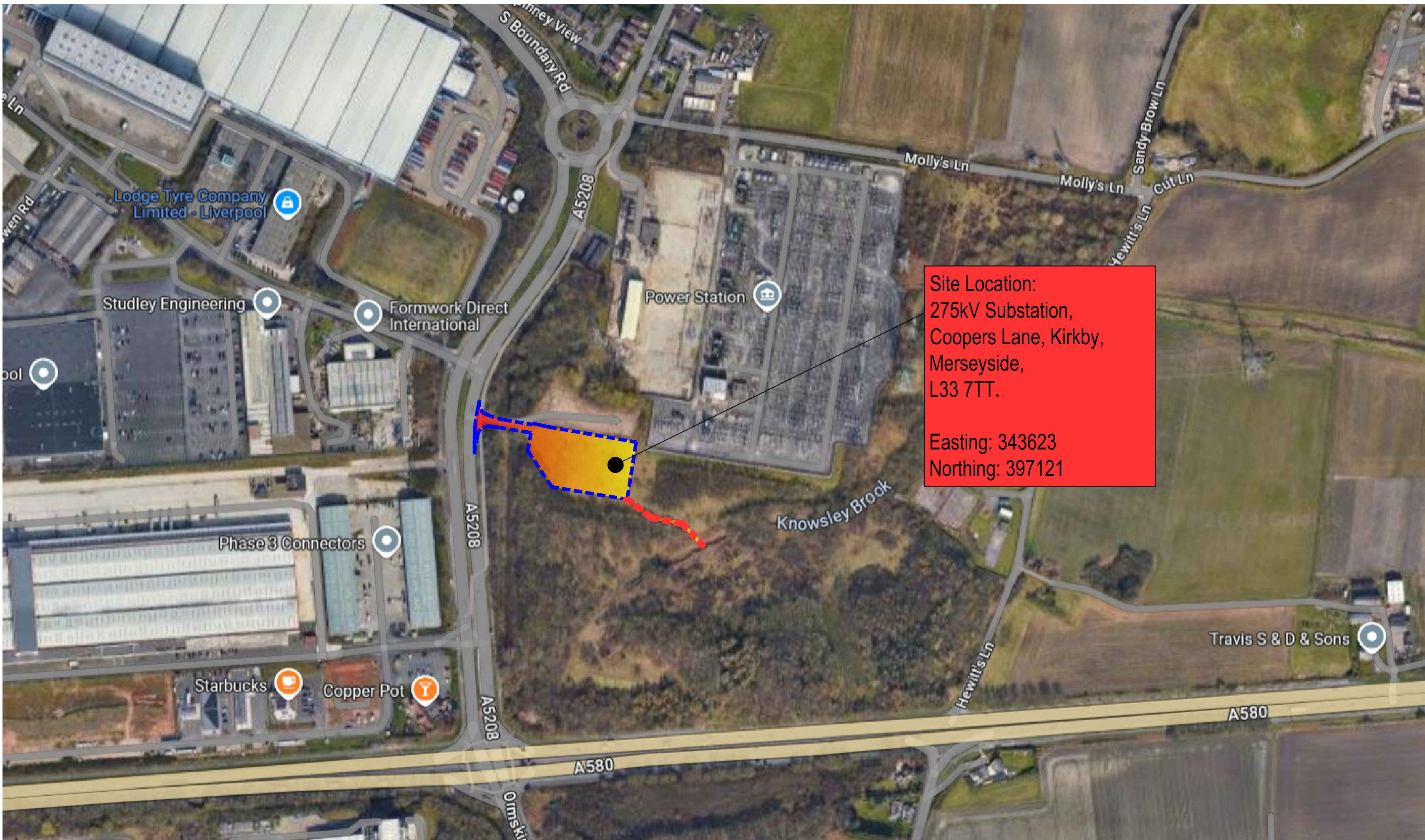
Site Location Plan



Safety, Health & Environmental Information: In addition to the hazards and risks normally associated with the types of work detailed on this drawing, please note the significant hazards identified by symbols below,  INDICATES A RESIDUAL RISK AS A WARNING  INDICATES A RESIDUAL RISK FOR INFORMATION and described below: Construction/Maintenance/Cleaning/Demolition Refer to Drawing:	
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- General Notes:**
- Do not scale from this drawing.
 - All dimensions are in meters (m), all levels in metres (m) unless noted otherwise.
 - Discrepancies or omissions are to be reported to the Engineer prior to work commencing.
 - Materials and workmanship are to comply in all respects with current British Standard Specifications, Codes of Practice, and Building Regulations Approved Documents.
 - The copyright of this drawing is vested in the Engineer and must not be copied or reproduced without written consent.
 - The Contractor is to check and verify all building and site dimensions, levels and sewer invert levels at connection points before work commences.
 - This drawing is to be read in conjunction with all relevant specifications and drawings issued by the Engineer, Architect and other Specialists.
 - Details and locations of existing services are based on the Topographical Survey and Utility Records received from Third Parties and Service Providers respectively, and should be considered indicative and approximate only. The existing services shown on Series 2700 drawings may not be exhaustive. The Contractor shall use Trial Pits and other approved methods to accurately locate and verify the positions and depths of all existing services before commencement of works on site.

- KEY:**
-  Site Extents
 -  Drainage route to Knowsley Brook
 -  Ownership Boundary



P01	IW/NJ	05/09/2024	Preliminary issue for client comments
Rev	By / Chk'd	Date	Description

PRELIMINARY DRAWING This drawing is not to be used for construction	
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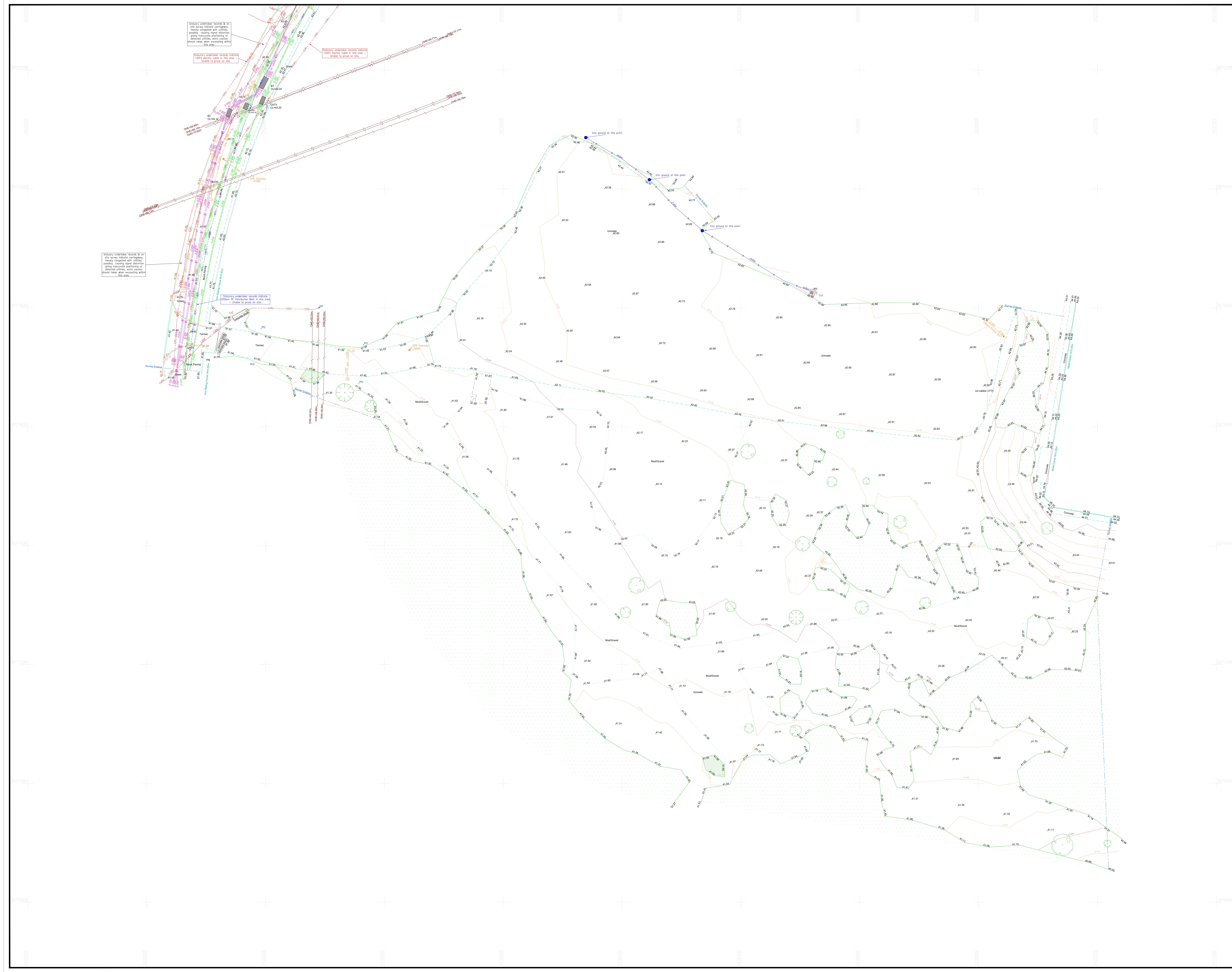
Project
**Kirkby 275kV Substation,
Coopers Lane, Kirkby
Merseyside L33 7TT**

Drawing
Site Location Plan

By		IWINJ		Date		08/08/2024	
Drawing No.						Revision	
KIRK-BML-XX-XX-DR-C-0111						P01	
BML Job No.						Status	
1126-01						-	
Drawing Scale at A1: Nts							
CAD Filename: Y:\Projects\1126-01 Omnia Projects Kirkby\04 - Working Information\05 - DWG\Drawings\KIRK-BML-XX-XX-DR-C-0111 P01 Site Location Plan.dwg							

Appendix B

Site Topography



GRID: OS NATIONAL GRID
Using the OS GPS Network and applying OSTN15 Transformation
and then removing the scale factor for true distances with a one-step
transformation centred on: 4801
DATUM: OS LEVEL DATUM
Using the OS GPS Network and applying OSGM15 National Grid
Model to obtain local area corrections

- Topographic Legend**
- | | |
|-----------------|----------------|
| Bottom of Bank | OH Electric |
| Top of Banking | Railway Line |
| Building | Road Centre |
| Building Canopy | Road Markings |
| Concrete Base | SC Hard/Hard |
| Contour Major | SC Hard/Soft |
| Contour Minor | SC Soft/Soft |
| Fences | Steps |
| General | Tree Canopy |
| Kerb Bottom | Vegetation |
| Kerb Top | Visible Trench |
| Kerb Drop | Walls |
| OH Comms | Water Edge |

- Topographic Abbreviations**
- | | | | |
|-------|-----------------------|-------|-------------------------|
| AV | Air Valve | PB | Pedestrian Beacon |
| BH | Borehole | PBX | Post Box |
| BO(L) | Bollard (Illuminated) | PGR | Pedestrian Guard Rail |
| BS | Bus Stop | PM | Parking Meter |
| Cab | Cabinet | PO | Post |
| CL | Cover Level | RE | Rodding Eye |
| COL | Column | RS(L) | Road Sign (Illuminated) |
| Conc | Concrete | RWP | Rain Water Pipe |
| DC | Drainage Channel | SH(L) | Sign Post (Illuminated) |
| DFBin | Dog Foul Bin | SPCam | Speed Camera |
| DP | Down Pipe | ST | Stop Tap |
| EP | Electricity Pole | SV | Sluice Valve |
| ER | Earth Rod | SVP | Soil Vent Pipe |
| FLL | Finished Floor Level | TBox | Telephone Box |
| FF | Fire Hydrant | TL | Traffic Light |
| FP | Flag Pole | TOF | Top of Fence Level |
| GP | Gate Post | TOW | Top of Wall Level |
| GV | Gas Valve | TP | Telecoms Pole |
| Gully | Gully | VP | Vent Pipe |
| IC | Inspection Cover | WB | Waste Bin |
| KO | Kerb Outlet | WBM | Window Bottom Level |
| LP | Lamp Post | WM | Water Meter |
| MH | Manhole | WO | Wash Out |
| Mk | Marker | WTT | Window Top Level |
| MP | Marker Post | WV | Water Valve |
| | | WW | Water Valve |
| | | MW | Monitoring Well |

- Utility Legend**
- | | |
|--------------------|-------------------|
| Air Line | SWD Sewer |
| Alarm Cable | Survey Extents |
| BT Cable | Heating Pipes |
| CATV Cable | HV Electric Cable |
| Chamber Extent | Kingston Comms |
| Comms Cable | OS Pipe |
| CWD Sewer | Rising Main |
| Earth Wire/Tape | Traffic Control |
| Electric Cable | Unknown Utility |
| Fibre Optic Cable | Vent Pipe |
| Fuel Line | Water |
| FWD Sewer | GPR Detection |
| Gas Pipe | Assumed Route |
| Band of Cables | Records Route |
| Empty Service Duct | Drainage Backdrop |
| | /Cable Riser |

- Utility Abbreviations**
- | | | | |
|------|----------------------|--------------|-----------------------|
| CP | Cathodic Protection | LoS | Loss of Signal |
| Cut | Disconnected Utility | MDPE | Middle Density PE |
| DI | Discrete Iron | SI | Span Iron |
| DoB | Depth of Bottom | TLC | Traffic Light Control |
| DoC | Depth of Cover | UDI | Unreliable Depth Info |
| ED | Empty Duct | Unidentified | |
| EoT | End of Trace | UPVC | Polyvinyl Chloride |
| PE | Polyethylene | UTR | Unable to Raise |
| HDPE | High Density PE | UTT | Unable to Trace |
| | | VC | Vitrified Clay |

- Manufacturer Stated Depths**
- Detected Using Electromagnetic Location Methods
e.g. Any metallic pipe/cable. Accuracy $\pm 2.5\%$ of depth reading.
 - Detected Using Electromagnetic Location Methods
eg. Using a Sonde to locate drainage pipework
Accuracy $\pm 2.5\%$ of depth reading.
 - Detected Using Ground Penetrating Radar
e.g. A plastic pipe or service not located by other means.
Accuracy depends on ground conditions.

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If this drawing and any associated drawings should be used in relation to works, we advise that the users of this information follow the principles detailed by the Health and Safety Executive guidance directive HSG 47, 'Avoiding Danger from Underground Services'. Further details of this directive are available at www.hse.gov.uk <<http://www.hse.gov.uk>>

Notes
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Rev.	Date	Comments

Client	PELAGIC ENERGY
Site Location	LAND AT KIRKBY SUBSTATION COOPERS LANE KIRKBY LIVERPOOL L33 7TT
Purpose of Drawing	UTILITY SURVEY PRESENTED ON A TOPOGRAPHICAL SURVEY
Surveyed:	JB JM
Checked:	Drawn: DH
Date:	27-30/04/23
Scale:	1:200@A0
Scale 1:200 0 5 10 15	
Office 10, Ripley Drive, Normanton Business Park, Wakefield, WF6 1QT. info@centara-ltd.com	
Project No	108675
Revision Status	00
Sheet Number:	1 of 4

Appendix C

Site Investigation

SP ASSOCIATES SOAKAWAY TEST

1 Market Place, Warwick, CV34 4SA
Tel: 01926 494271

Site: Coopers Lane, Kirby

Job No: S1650

Test Date: 25/04/2022 Report date: 28/04/22

Test Method: BRE 365 (2007)

Trial Pit Number: TPA

Depth: 1.8m, Length 1.0m Width 0.4m

Start Water Depth for Analysis – Datum (mbgl): **0.92**

75% Effective Depth (mbgl): -

Elapsed Time (Mins):

50% Effective Depth (mbgl): -

25% Effective Depth (mbgl): -

Elapsed Time (Mins):

Base of Soakage Zone (mbgl): **1.8**

Volume outflow between 75% and 25% effective depth (m3):

Mean surface area of outflow (m²):

Time for outflow between 75% and 25% effective depth (mins):

Elapsed Time (minutes)	Water Depth (m below datum)	Elapsed Time (minutes)	Water Depth (m below datum)
0	0.92	90	1.01
1	0.92	100	1.01
2	0.92	110	1.02
3	0.92	120	1.03
4	0.92	130	1.04
5	0.92	140	1.04
6	0.92	150	1.04
7	0.92	160	1.05
8	0.92	170	1.05
9	0.92	180	1.06
10	0.93	190	1.07
15	0.93	200	1.07
20	0.94	210	1.07
25	0.95	220	1.07
30	0.95	230	1.07
40	0.96	240	1.07
50	0.97	250	1.07
60	0.99	260	1.07
70	1.00	270	1.07
80	1.00	280	1.07

Soil Infiltration Rate (m/s): Test abandoned due to very low rate of infiltration.

SP ASSOCIATES SOAKAWAY TEST

1 Market Place, Warwick, CV34 4SA
Tel: 01926 494271

Site: Coopers Lane, Kirby

Job No: S1650

Test Date: 25/04/2022 Report date: 28/04/22

Test Method: BRE 365 (2007)

Trial Pit Number: TPB

Depth: 1.9m, Length 1.0m Width 0.4m

Start Water Depth for Analysis – Datum (mbgl): **0.98**

75% Effective Depth (mbgl): - Elapsed Time (Mins):

50% Effective Depth (mbgl): -

25% Effective Depth (mbgl): - Elapsed Time (Mins):

Base of Soakage Zone (mbgl): **1.9**

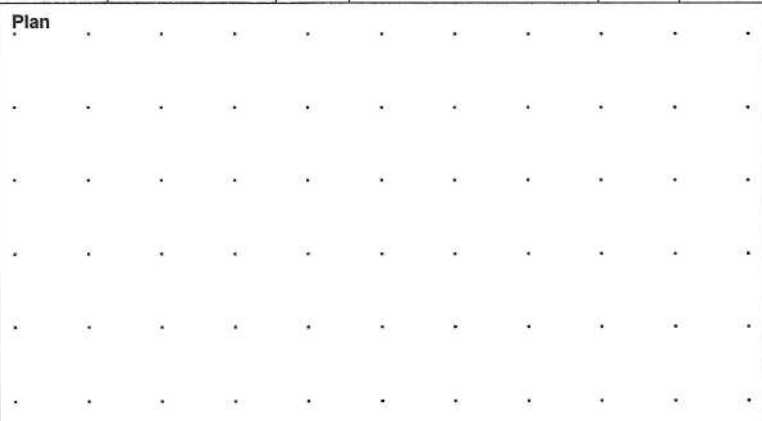
Volume outflow between 75% and 25% effective depth (m3):

Mean surface area of outflow (m²):

Time for outflow between 75% and 25% effective depth (mins):

Elapsed Time (minutes)	Water Depth (m below datum)	Elapsed Time (minutes)	Water Depth (m below datum)
0	0.98	90	0.99
1	0.98	100	0.99
2	0.98	110	0.99
3	0.98	120	0.99
4	0.98	130	0.99
5	0.98	140	0.99
6	0.98	150	0.99
7	0.98	160	0.99
8	0.98	170	0.99
9	0.98	180	0.99
10	0.98	190	0.99
15	0.98	200	0.99
20	0.98	210	0.99
25	0.98	220	0.99
30	0.98	230	0.99
40	0.98	240	0.99
50	0.98	250	-
60	0.98	260	-
70	0.99	270	-
80	0.99	280	-

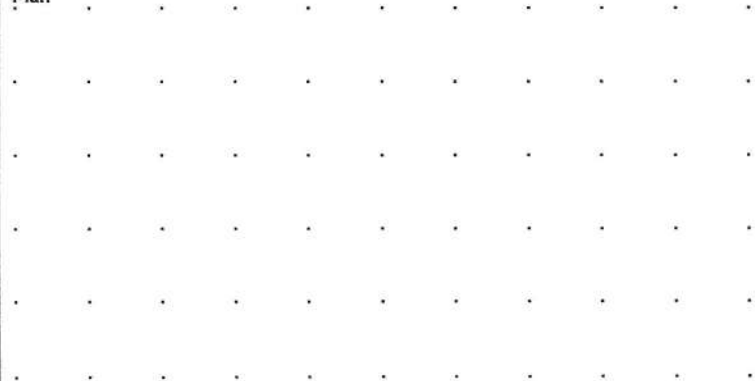
Soil Infiltration Rate (m/s): Test abandoned due to very low rate of infiltration.

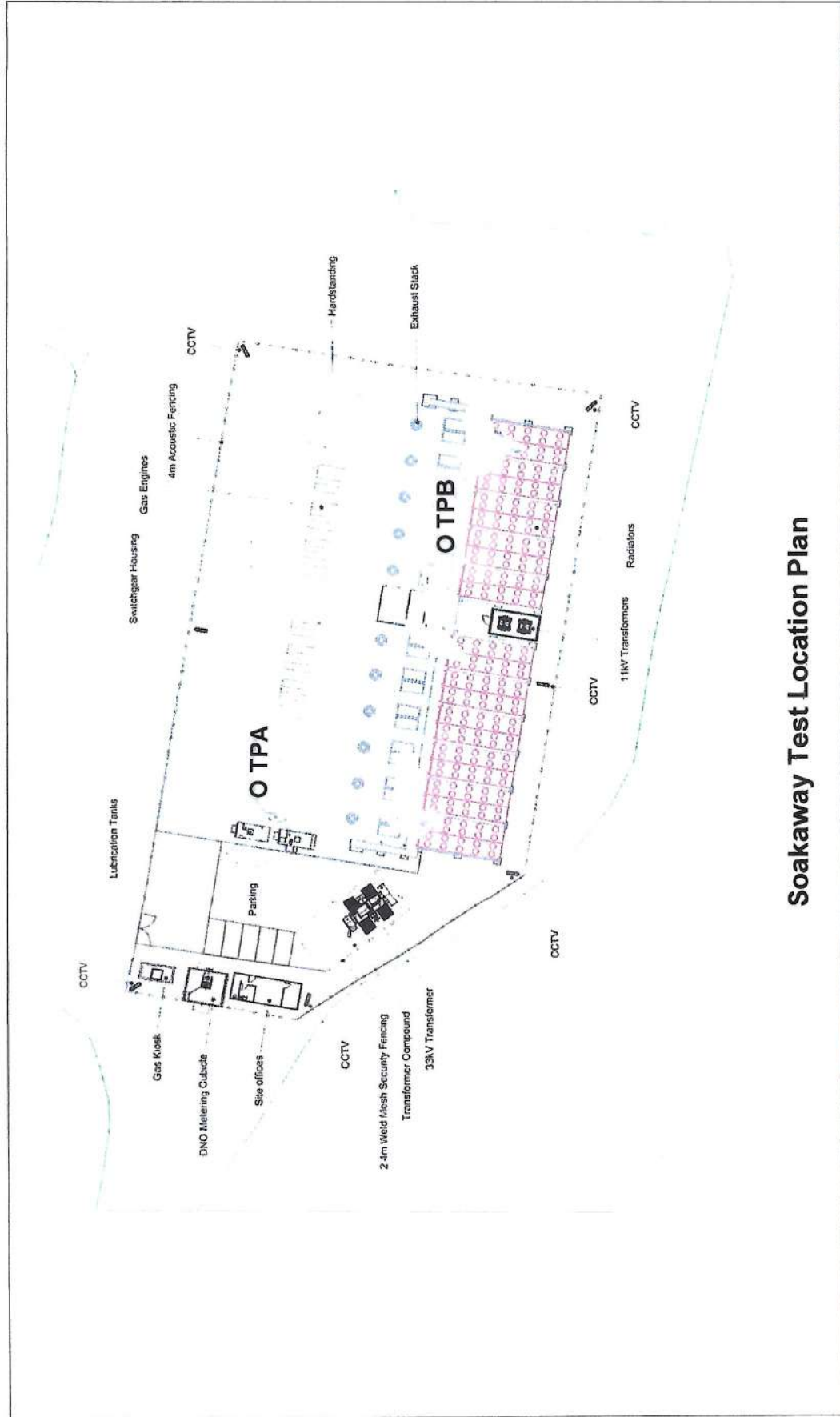
SP ASSOCIATES Geoenvironmental & Geotechnical Services 1 Market Place, Warwick, CV34 4SA tel: 01926 494271 email: spassociates@hotmail.co.uk						Site Kirby Substation, Coopers Lane		Trial Pit Number TPA	
Excavation Method Trial Pit		Dimensions 1 x 0.4 x 1.8		Ground Level (mOD)		Client Pelagic Energy Ltd		Job Number S1650	
		Location		Dates 25/04/2022		Engineer SMP		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
					(0.30) 0.30 (0.30) 0.60 (1.20) 1.80	Soft, brown CLAY with occasional fine to medium, angular gravel and occasional roots (Made Ground - reworked Topsoil) Loose, fine to medium, angular GRAVEL with some fine gravel of brick, concrete and clinker (Made Ground) Soft to firm, brown CLAY (Glacial Till)		                               	
					Complete at 1.80m				
Plan 					Remarks				
					Scale (approx) 1:50		Logged By PVC		Figure No. S1650 TPA

	SP ASSOCIATES Geoenvironmental & Geotechnical Services 1 Market Place, Warwick, CV34 4SA tel: 01926 494271 email: spassociates@hotmail.co.uk		Site Kirby Substation, Coopers Lane	Trial Pit Number TPB
	Excavation Method Trial Pit		Client Pelagic Energy Ltd	Job Number S1650

Dimensions 1 x 0.4 x 1.9	Ground Level (mOD)	Dates 01/05/2022	Engineer SMP	Sheet 1/1
		Location		

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Soft, brown CLAY with occasional fine to medium, angular gravel and occasional roots (Topsoil)		
					0.30			
					(0.70)	Firm, red brown, sandy CLAY with occasional fine to coarse, angular gravel (Glacial Till)		
					1.00			
					(0.90)	Firm, red brown, mottled grey, sandy CLAY (Glacial Till)		
					1.90			
						Complete at 1.90m		

Plan 	Remarks 		
	Scale (approx) 1:50	Logged By PVC	Figure No. S1650 TPB



Soakaway Test Location Plan

SP ASSOCIATES	Report No. S1650	Project: Coopers Lane, Kirby	Figure: 1
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Appendix D

Proposed drainage concept

