

BATTERY ENERGY STORAGE SYSTEM KIRKBY

Flood Risk Assessment Report

Coopers Lane, Kirkby, L33 7TT

KIRK-BML-XX-XX-RP-C-0511

Wednesday, 16th October 2024

Contents Amendment Record

This report has been issued and amended as follows:

Revision	Description	Issued by	Checked by	Date
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1. Introduction

1.1 Project Background

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

This Flood Risk Assessment has been prepared as per the Discharge Condition 03 of Planning Permission 23/02704/FUL, which relates to a standalone consent to provide a hydrant connection pipe and drainage connection to the BESS facility. The condition was requested by the Environment Agency due to a small section of the drainage connection (drainage pipe connection route which runs to Knowsley Brook on southeast of the proposed site) sitting within Flood Zone 3. To clarify, condition 3 is restated below:

“The development hereby permitted must not be commenced until such time as a Flood Risk Assessment (FRA) has been submitted to, and approved in writing by, the local planning authority. The FRA should be appropriate to the nature and scale of this development. The FRA should demonstrate that the development will be safe without increasing flood risk elsewhere.”

The report provides an assessment of flood risk from various sources on the proposed development based on Government and local authority guidance with regard to flood risk assessments.

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 Flood Risk Assessment

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 assessment has:

- Investigated all potential risks of current or future flooding to the site
- Considered the impact the development may have elsewhere with regards to flooding risk
- Considered design proposals to mitigate any potential risk of flooding determined to be present
- Determine any constraints to be imposed on the development layout or drainage systems

In April 2015, the Government made changes to the National Planning Policy Framework which made Sustainable Urban Drainage Systems (SUDS) a material consideration in the determination of planning applications for new developments. This report has therefore been produced to support the Planning Application in accordance with the Town and Country Planning Order 2015.

The Strategy reviews the following information:

- Environment Agency flood maps for rivers and sea flooding.
- Local Flood Risk Management Strategy – Knowsley Council
- Sustainable Drainage & Surface Water Management – Knowsley Council
- Relevant Water Public Sewer Records.
- Design and Construction Guidance Version 1 - Oct 2019
- 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 752:2008 Drain and sewer systems outside buildings.
- BS 8582:2013, Code of Practice for surface water management for development sites.
- BS 8533:2011, 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.
- 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

The 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.

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 parcel of 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 underlaid by firm sandy clay with occasional fine to coarse gravel.

Refer to **Appendix C** for details.

3. Policy and Guidance

3.1 National Planning Policy Framework

In March 2012, the Department of Communities and Local Government published the National Planning Policy Framework document (NPPF) which provides guidance on how flood risk should be assessed during the planning and development process. The main Framework is supplemented by a technical guidance document (“Planning Practice Guidance” - PPG) which advises specifically with respect to flooding. The most critical aspects are extracted below.

3.2 Flood Zone Classification

Table 1: Flood Zone Classification

(Source: Planning Practice Guidance Table 1, Accessed on 2020-05-26, 1110hrs)

Flood Zone	Definition
Zone 1 Low Probability	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as ‘clear’ on the Flood Map – all land outside Zones 2 and 3)
Zone 2 Medium Probability	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a High Probability	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b The Functional Floodplain	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

3.3 Flood Risk Vulnerability Classification

Table 2: Flood Risk Vulnerability Classification

(Source: Planning Practice Guidance Table 2, Accessed on 2020-05-26, 1140hrs)

Essential Infrastructure

- Essential transport infrastructure (including mass evacuation routes) which must cross the area at risk.
- Essential utility infrastructure which must be located in a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operational in times of flood.
- Wind turbines.

Highly Vulnerable

- Police stations, ambulance stations and fire stations and command centres and telecommunications installations required to be operational during flooding.
- Emergency dispersal points.
- Basement dwellings.
- Caravans, mobile homes and park homes intended for permanent residential use.
- Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as “essential infrastructure”).

More Vulnerable

- Hospitals.
- Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels.
- Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels.
- Non-residential uses for health services, nurseries and educational establishments.
- Landfill and sites used for waste management facilities for hazardous waste.
- Sites used for holiday or short-let caravans and camping, *subject to a specific warning and evacuation plan*.

Less Vulnerable

- Police, ambulance and fire stations which are not required to be operational during flooding.
- Buildings used for shops, financial, professional and other services, restaurants and cafes, hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in “more vulnerable”, and assembly and leisure.
- Land and buildings used for agriculture and forestry.
- Waste treatment (except landfill and hazardous waste facilities).
- Minerals working and processing (except for sand and gravel working).
- Water treatment works which do not need to remain operational during times of flood.
- Sewage treatment works (if adequate measures to control pollution and manage sewage during flooding events are in place).

Water Compatible

- Flood control infrastructure.
- Water transmission infrastructure and pumping stations.
- Sewage transmission infrastructure and pumping stations.
- Sand and gravel working.
- Docks, marinas and wharves.
- Navigation facilities.
- Ministry of Defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, *subject to a specific warning and evacuation plan*.

3.4 Flood Risk Vulnerability and Flood Zone ‘Compatibility’

Table 3: Flood Risk Vulnerability & ‘Compatibility’

(Source: Planning Practice Guidance Table 3, Accessed on 2020-05-26, 1200hrs)

Flood Zones	Flood Risk Vulnerability Classification				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a †	Exception Test required †	X	Exception Test required	✓	✓
Zone 3b *	Exception Test required *	X	X	X	✓*

Key:

✓ Development is appropriate

X Development should not be permitted.

Notes to table 3:

- This table does not show the application of the Sequential Test which should be applied first to guide development to Flood Zone 1, then Zone 2, and then Zone 3; nor does it reflect the need to avoid flood risk from sources other than rivers and the sea;
- The Sequential and Exception Tests do not need to be applied to minor developments and changes of use, except for a change of use to a caravan, camping or chalet site, or to a mobile home or park home site;
- Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

† In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.

* In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:

- remain operational and safe for users in times of flood;
- result in no net loss of floodplain storage;
- not impede water flows and not increase flood risk elsewhere.

4. Development and Flood Risk

4.1 Proposed Development Vulnerability Classification

The proposed development is a Battery Energy Storage System (BESS) located on a parcel of greenfield land adjacent to Coopers Lane, Kirkby, L33 7TT. The site spans approximately 0.5Ha and is located beside the Coopers Lane National Grid Substation, approximately 3km south-east of Kirkby Town Centre at National Grid Reference SJ436971.

From **Table 2** above (Table 2 in the Planning Policy Guidance), the proposed development falls under '**Essential Infrastructure**' due to the fact that the proposed site falls within the category of essential utility infrastructure including primary substations that need to remain operational in times of flood.

4.2 Flood Risk from Rivers and the Sea

The Environment Agency website provides basic flood mapping data as a general guide to whether a site is at risk of flooding from various sources including rivers and seas for Flood Zoning classification.

This mapping indicates that the site is wholly located within an area with an undefended risk of flooding from rivers and the sea of less than 0.1% (or the 1 in 1000-year event), classified as Flood Zone 1, refer to **Figure 2**. The development site is therefore at **Very Low Risk** of flooding from rivers and the sea.

The route of the outlet drainage pipe leading to Knowsley Brook which is situated approximately 60 meters southeast of the site and flowing southwest, is classified as **Flood Zone 3**. However, given the distance to the site from Knowsley Brook & elevation difference, the potential flood impact on the site is considered very low.

Figure 2 shows the extents of the risk of flooding from Knowsley Brook.

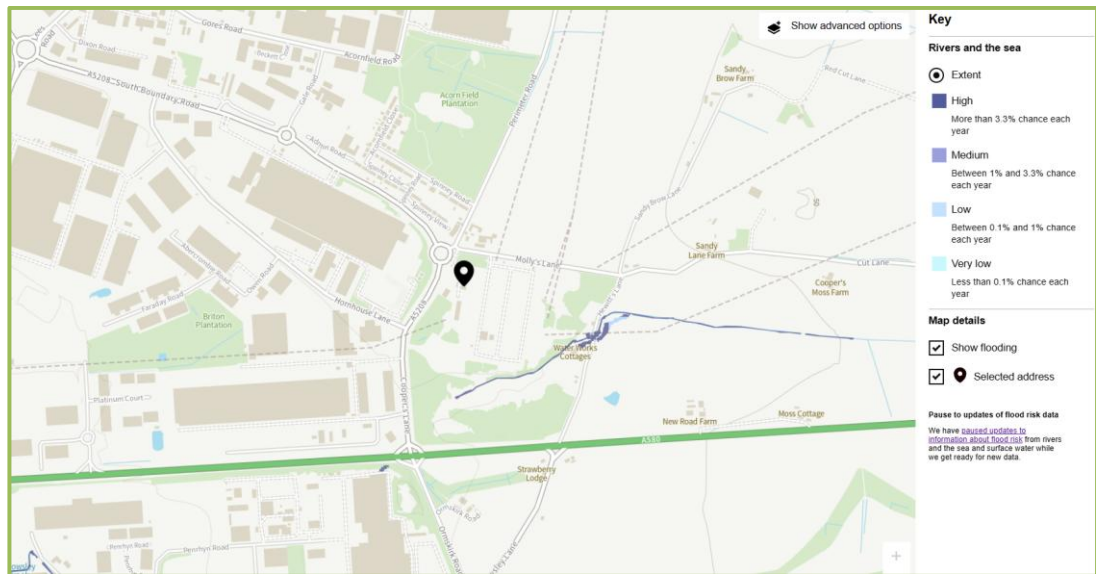


Figure 2: Flood Risk from Knowsley Brook – Flood Extents

(Source: <https://check-long-term-flood-risk.service.gov.uk/risk>, Accessed on 2024-09-03, 1530hrs)

4.3 Historic Flooding

According to Local Flood Risk Management Strategy (2017) by Knowsley Council there is no evidence or data indicating any historic flooding within the site bounds.

Knowsley Brook flows approximately 60m southeast of the development site in a south-westerly direction and gets culverted to the south of the site beyond East Lancashire Road. The site generally slopes from north (with ground levels at approximately 42.900mAOD) to the south (with ground levels at approximately 41.500mAOD).

4.4 Flood Defences

There are no formal flood defences recorded on the Environment Agency maps in the immediate vicinity of the site. The site is also not indicated as being used for flood storage, therefore, the flood risk to the development from failed or breached flood defences is considered to be low.

4.5 Flooding induced by Climate Change

The nearest flood zone - Flood Zones 3 is approximately 60m to the south of the site and is associated with maximum flood extents of Knowsley Brook. Given the considerable distance and elevation difference between the Brook and the development site, it is evident that there is a **Low Risk** of flooding from the Brook, refer to **Figure 3**.

There is no record of any historical flooding of the current site, therefore the proximity of the EA Flood Zone 3 (around Knowsley Brook) is not considered a risk.

4.6 Flooding from Groundwater

A Site Investigation (SI) was carried out on site by SP Associates (refer to **Appendix C**). Two trial pits were drilled at the site extents up to a depth of 1.9m below ground level (bgl) and following pertinent information were recorded.

- Overburden to a depth of 0.3m bgl, underlain by:
- Firm, red brown, sandy clay with occasional fine to coarse gravel, underlain by:
- Firm, red brown, mottled grey, sandy clay

In summary, the report indicates that the site is made up of 0.3m deep topsoil underlain by firm sandy clay. No groundwater has been encountered up to the depth of 1.8m.

From the trial pit data, it appears that the existing ground water levels are reasonably low and are potentially capped by the firm sandy clay strata. It is therefore considered unlikely that any seasonal rise in ground water would result in surface flooding of the site due to rising ground water.

4.7 Flooding from Adopted Sewers

There is no record of flooding from the adopted sewers within the site, refer to **section 2.4** of this report.

4.8 Flooding from Private Drainage

As per the information provided by topographical survey, no private drainage is present within or in the vicinity of the site. A detailed CCTV & Drainage Survey shall be commissioned to determine whether sewers are on site and propose remedial works if required to ensure continuity of the sewers during and after construction.

4.9 Flooding from Surface Water

The UK government *Long Term Flood Risk Information Flood Map* was consulted to check the risk of site flooding from surface water; an extract from the map is presented in **Figure 3**. The figure indicates that the extent of flooding risk for the site from surface water is considered **very low**.

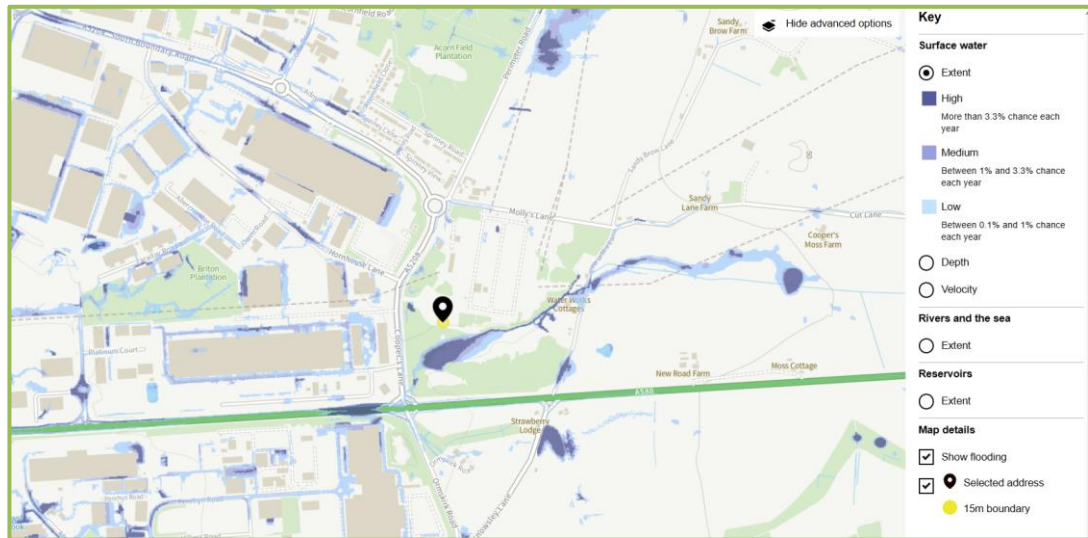


Figure 3: Flood Risk from Surface Water - 'Extent of flooding'

(Source: <https://check-long-term-flood-risk.service.gov.uk/risk>, Accessed on 2024-09-03, 1630hrs)

4.10 Flooding from Reservoirs, Canals and Artificial Sources

The UK government *Long Term Flood Risk Information Flood Map* was consulted to check the risk of site flooding from reservoirs, and it indicates that the flooding from reservoirs is unlikely in the site area.

4.11 Overall Flood Risk

As noted in the previous sections the flood risk to the proposed development is considered to be **very low** from all sources. The fact that the development site is within **Flood Zone 1**, coupled with the fact that the site is considerably distant from surface water flooding extents within Knowsley Brook, implies that this site is suitable for the type of development proposed. Therefore, the development site is considered to be safe without no increase in flood risk.

The route of the outlet drainage pipe leading to Knowsley Brook which is situated approximately 60 meters southeast of the site and flowing southwest, is classified as **Flood Zone 3**. However, given the distance to the site from Knowsley Brook & elevation difference, the potential flood impact on the site is considered very low.

4.12 The Sequential Test

The aim of the Sequential Test is to guide development away from areas at risk of flooding towards land situated within the Environment Agency's Flood Zone 1 classification. As the site is already situated within Flood Zone 1 the requirements of the Sequential Test are satisfied.

4.13 The Exception Test

As the site is situated within Flood Zone 1 the Exception Test is not required.

5. Drainage Strategy

5.1 Recommended Surface Water Drainage Strategy

The proposed development covers an area of approximately 0.5 hectares, with the entire site being impermeable. The IH124 method was used to estimate the greenfield runoff rates from the site since the site is less than 200Ha. *Because the site is also less than 50Ha, the ICP SUDS tool in MicroDrainage Source Control module was used to calculate the greenfield runoff rates.* The tool uses the IH124 approach to calculate the greenfield runoff for 50Ha, then linearly interpolate to get the flows for smaller catchments. The 1-year, 30-year, and 100-year Greenfield runoff rates were found to be 0.5 l/s, 0.9 l/s, and 1.1 l/s respectively, refer to **Appendix D**.

Qbar is 0.5 l/s for both rural and urban.

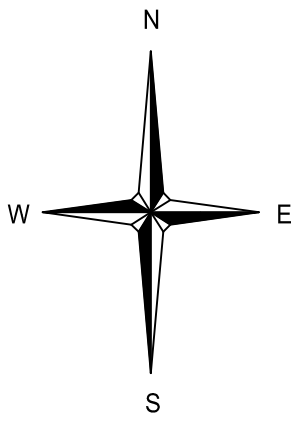
A SuDS Drainage Strategy was submitted alongside the Planning Application (Ref: KRS.0653.006.R.1.01.B – Drainage Assessment, submitted in February 2024), and planning permission has been granted with a controlled runoff rate of up to 5.0 l/s for all storm events, including those up to the 100-year event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

As the current site topography falls towards Knowsley Brook, the proposed surface water discharge from the site should not increase the volume of water entering the watercourse. The proposed SuDS features (with filter drains, attenuation tank and hydrobrake) will effectively limit the discharge rate from the site to a practical greenfield runoff rate. It is therefore considered that the development (being in Flood Zone 1) is safe from flooding and that the surface water discharge from the site will not increase the flood risk to the surrounding areas.

APPENDICES

Appendix A

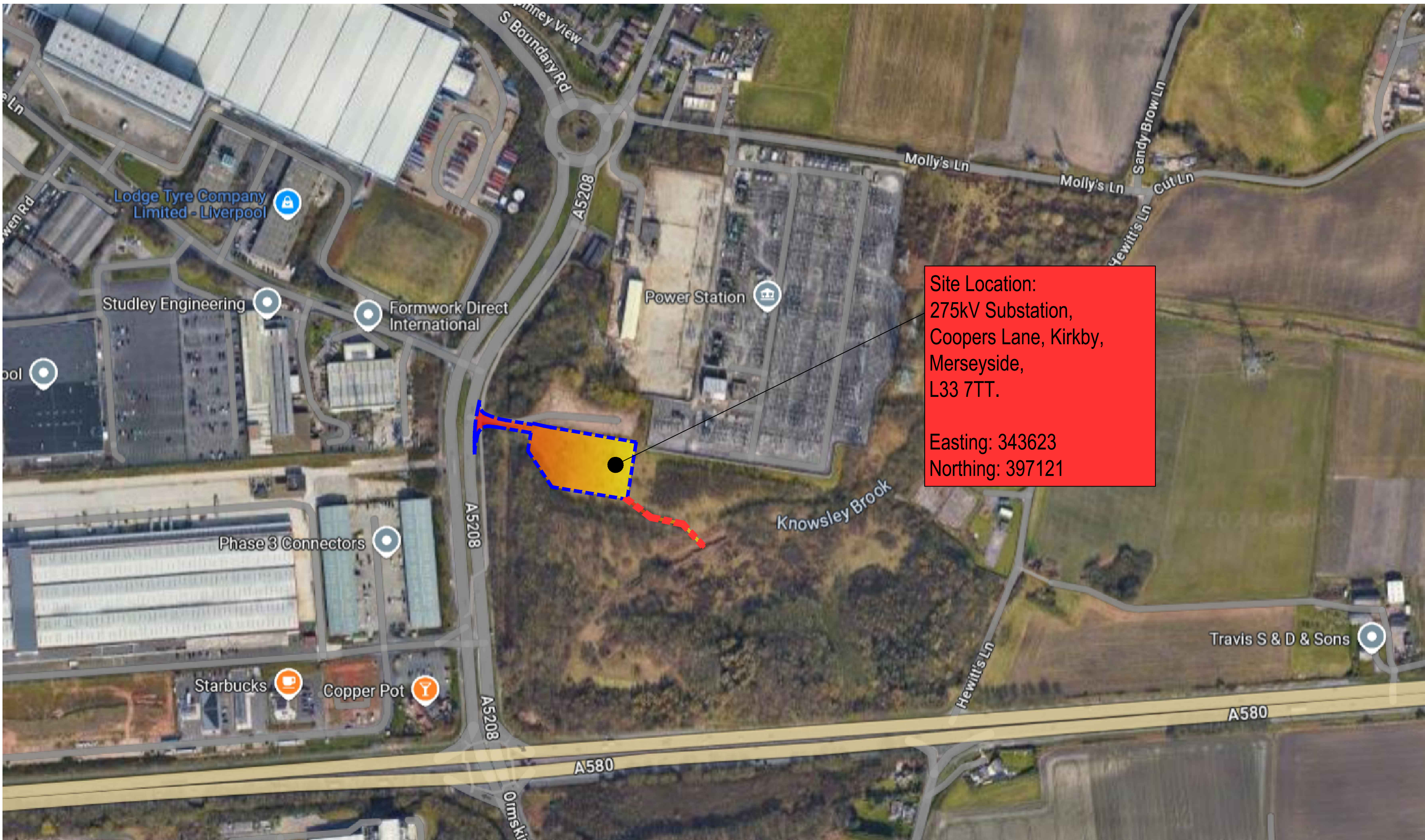
Site Location Plan



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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Client
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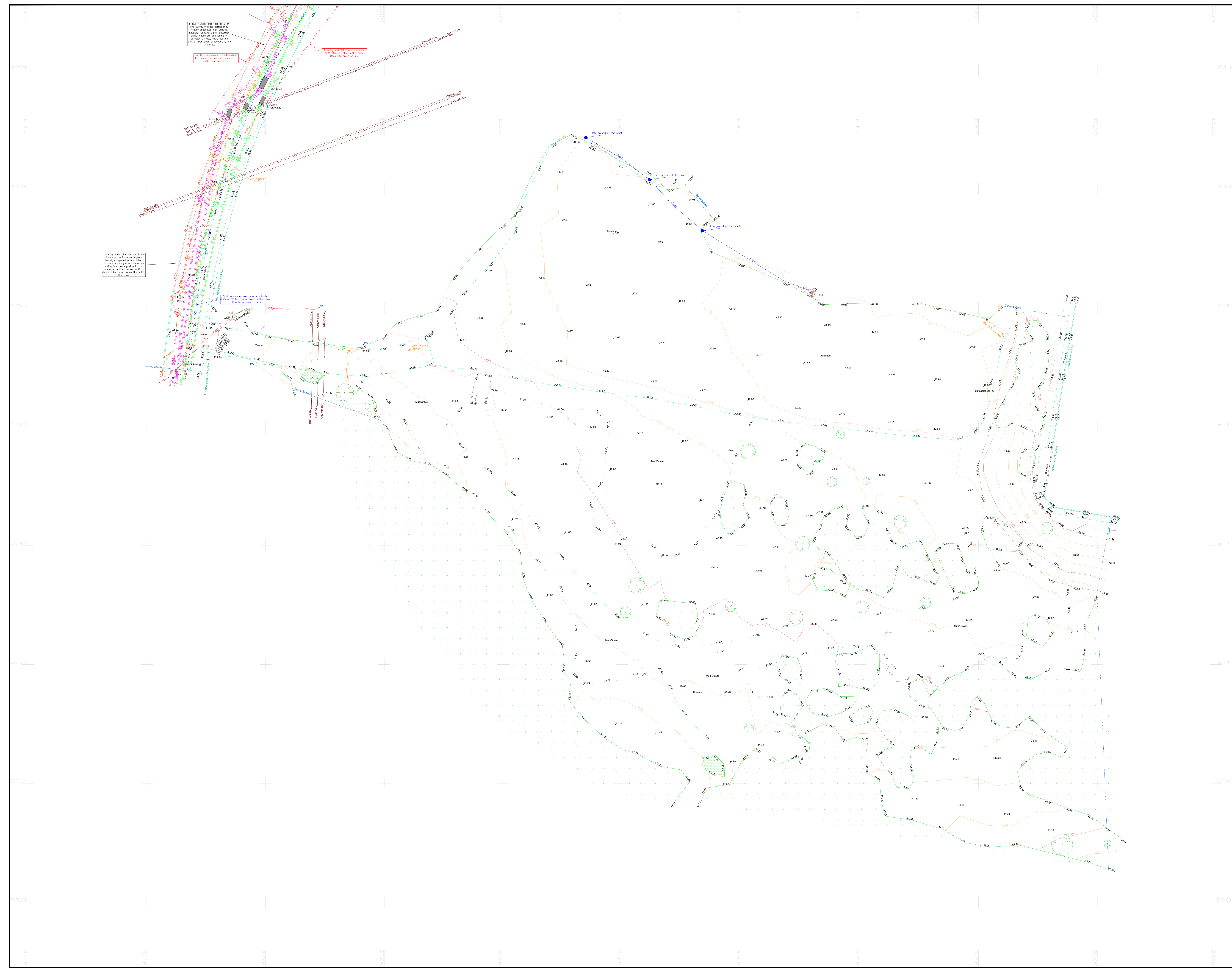
Project
**Kirkby 275kV Substation,
Coopers Lane, Kirkby
Merseyside L33 7TT**

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 Comm | 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.

CAUTION LIVE SERVICES PRESENT - EXTREME CARE SHOULD BE TAKEN WHEN EXCAVATING

Centara Ltd. and their agents or partners, are not responsible for any situation, incident or loss resulting from actions or planning resulting from total reliance upon this drawing or accompanying information. The completeness of the underground network information cannot be wholly guaranteed and as such no guarantees or warranties are provided or implied. The location and/or identification of a service will not positively indicate whether it is live or dead. A service indicated from records that has not been located or identified on site does not necessarily imply that it does not exist or is dead, however, its presence should be anticipated. The results of Electro Magnetic and GPR detection techniques are not reliable and ground probing for the actual position and depth of services should be established.

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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ALL DIMENSIONS SHOULD BE VERIFIED ON SITE PRIOR TO CONSTRUCTION.
ALL HATCHING IS FOR PRESENTATIONAL PURPOSES ONLY.

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 Geology

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):

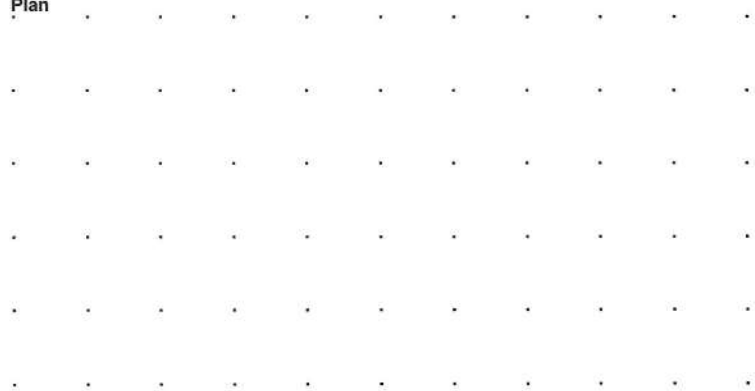
Elapsed Time (minutes)	Water Depth (m below datum)	Elapsed Time (minutes)	Water Depth (m below datum)
0	0.98	90	0.99
1	0.98	100	0.99
2	0.98	110	0.99
3	0.98	120	0.99
4	0.98	130	0.99
5	0.98	140	0.99
6	0.98	150	0.99
7	0.98	160	0.99
8	0.98	170	0.99
9	0.98	180	0.99
10	0.98	190	0.99
15	0.98	200	0.99
20	0.98	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	-

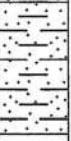
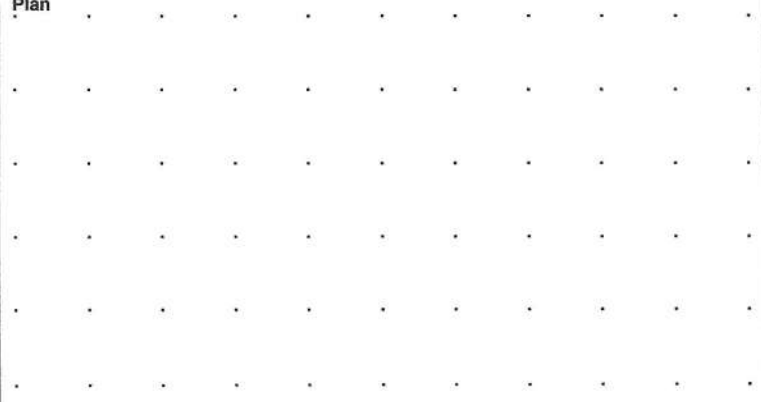
Soil Infiltration Rate (m/s): Test abandoned due to very low rate of infiltration.

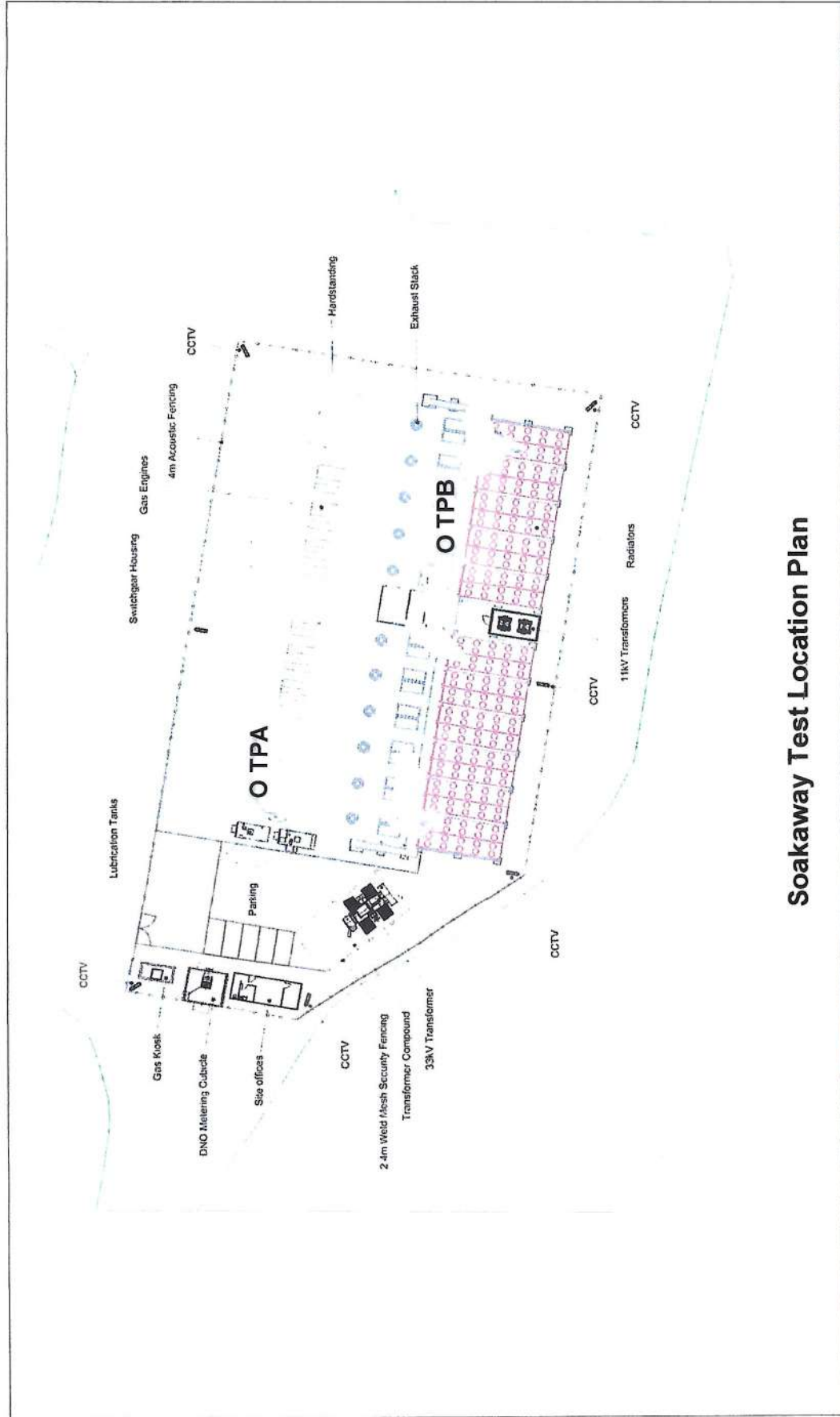
 SP ASSOCIATES Geoenvironmental & Geotechnical Services 1 Market Place, Warwick, CV34 4SA tel: 01926 494271 email: spassociates@hotmail.co.uk			Site Kirby Substation, Coopers Lane	Trial Pit Number TPA
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Excavation Method Trial Pit	Dimensions 1 x 0.4 x 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	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)		
					(1.20)			
					1.80	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			Dimensions 1 x 0.4 x 1.9			Ground Level (mOD)		Client Pelagic Energy Ltd			Job Number S1650					
			Location			Dates 01/05/2022		Engineer SMP			Sheet 1/1					
Depth (m)	Sample / Tests		Water Depth (m)	Field Records		Level (mOD)	Depth (m) (Thickness)	Description			Legend	Water				
								Soft, brown CLAY with occasional fine to medium, angular gravel and occasional roots (Topsoil)								
								Firm, red brown, sandy CLAY with occasional fine to coarse, angular gravel (Glacial Till)								
								Firm, red brown, mottled grey, sandy CLAY (Glacial Till)								
								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

Greenfield Runoff Rates

KRS Environmental Ltd		Page 1																								
3 Princes Square, Princes St... Montgomery SY15 6PZ																										
Date 18/02/2024 20:44 File	Designed by Emma Checked by																									
Innovyze																										
Source Control 2020.1.3																										
<u>ICP SUDS Mean Annual Flood</u> Input <table><tr><td>Return Period (years)</td><td>100</td><td>Soil</td><td>0.300</td></tr><tr><td>Area (ha)</td><td>0.230</td><td>Urban</td><td>0.000</td></tr><tr><td>SAAR (mm)</td><td>869</td><td>Region Number</td><td>Region 10</td></tr></table> Results 1/s <table><tr><td>QBAR Rural</td><td>0.5</td></tr><tr><td>QBAR Urban</td><td>0.5</td></tr><tr><td>Q100 years</td><td>1.1</td></tr><tr><td>Q1 year</td><td>0.5</td></tr><tr><td>Q30 years</td><td>0.9</td></tr><tr><td>Q100 years</td><td>1.1</td></tr></table>			Return Period (years)	100	Soil	0.300	Area (ha)	0.230	Urban	0.000	SAAR (mm)	869	Region Number	Region 10	QBAR Rural	0.5	QBAR Urban	0.5	Q100 years	1.1	Q1 year	0.5	Q30 years	0.9	Q100 years	1.1
Return Period (years)	100	Soil	0.300																							
Area (ha)	0.230	Urban	0.000																							
SAAR (mm)	869	Region Number	Region 10																							
QBAR Rural	0.5																									
QBAR Urban	0.5																									
Q100 years	1.1																									
Q1 year	0.5																									
Q30 years	0.9																									
Q100 years	1.1																									
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