



RAINCLOUD

KIRKBY BESS

FLOOD RISK ASSESSMENT

MARCH 2025

CONTROL SHEET

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Site ID	Prepared by	Reviewed by	Date	Version	Comment
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TABLE OF CONTENTS

1	Introduction -----	1
	1.1 - Background -----	1
	1.2 - Site Characteristics -----	1
	1.3 - Flood Classification -----	3
	1.4 - Flood History -----	4
2	Flood Risk Assessment -----	4
	2.1 - Fluvial -----	5
	2.2 - Pluvial -----	5
	2.3- Site Access and Egress -----	6
	2.4- Tidal -----	7
	2.5- Groundwater -----	8
	2.6- Reservoirs -----	8
	2.7- Artificial Sources -----	9
	2.8- Sewer Flooding -----	9
	2.9- Flood Warnings -----	10
	2.10 Consents -----	10
	2.11 Sequential Test and Exception Test -----	10
3	Conclusion & Recommendations -----	11

Appendix A: Site Layout

Appendix B: Topographical Survey

1 INTRODUCTION

1.1 Background

Raincloud Consulting Ltd ('Raincloud') has been commissioned by Envams Ltd on behalf of Pivoted Power LLP ('the Client') to provide a Flood Risk Assessment (FRA) for the proposed Kirkby Battery Energy Storage System (BESS) ('the Proposed Development') on land north of Cut Lane, Kirkby, Knowsley (nearest postcode: L33 3AJ) ('the Site').

The Proposed Development would connect via underground cable located into the existing National Grid Super grid transformer approximately 600 m south east of the Site. The proposed layout of the Proposed Development is provided in Appendix A.

The Site comprises of two areas, the Proposed Development area which is north of Cut Lane and comprises of the Proposed Development infrastructure, BESS units and supporting infrastructure; and the cable route with starts on Cut Lane and connects to the existing Kirkby Substation.

This FRA is intended to meet the requirements of the:

- Environment Agency (EA);
- Knowsley Council Flood Risk Management Strategy (2017)¹;
- Knowsley Local Plan Core Strategy (adopted 2016)²;
- Knowsley Council and Sefton Council Strategic Flood Risk Assessment (2009)³;
- Knowsley Council Preliminary Flood Risk Assessment (2011)⁴; and
- The revised National Planning Policy Framework 2024 ('NPPF')⁵.

The Proposed Development is located wholly within the jurisdiction of Knowsley Council ('the Council').

1.2 Site Characteristics

The Site is located approximately 200 m north of the Knowsley Brook. An unnamed land drain is located approximately 90 m north of the Site.

A topographical survey was commissioned by the Client in January 2025 and identifies that the Site slopes from north to south from 59.53 m above ordnance datum (AOD) to 49.75 m AOD. Full details regarding the topographical survey are provided in Appendix B.

¹ [https://www.knowsley.gov.uk/sites/default/files/2023-](https://www.knowsley.gov.uk/sites/default/files/2023-11/Local%20Flood%20Risk%20Management%20Strategy%20%28LFRMS%29.pdf)

[11/Local%20Flood%20Risk%20Management%20Strategy%20%28LFRMS%29.pdf](https://www.knowsley.gov.uk/sites/default/files/2023-11/Local%20Flood%20Risk%20Management%20Strategy%20%28LFRMS%29.pdf)

² <https://localplanmaps.knowsley.gov.uk/documents/knowsley-local-plan-adopted-core-strategy.pdf>

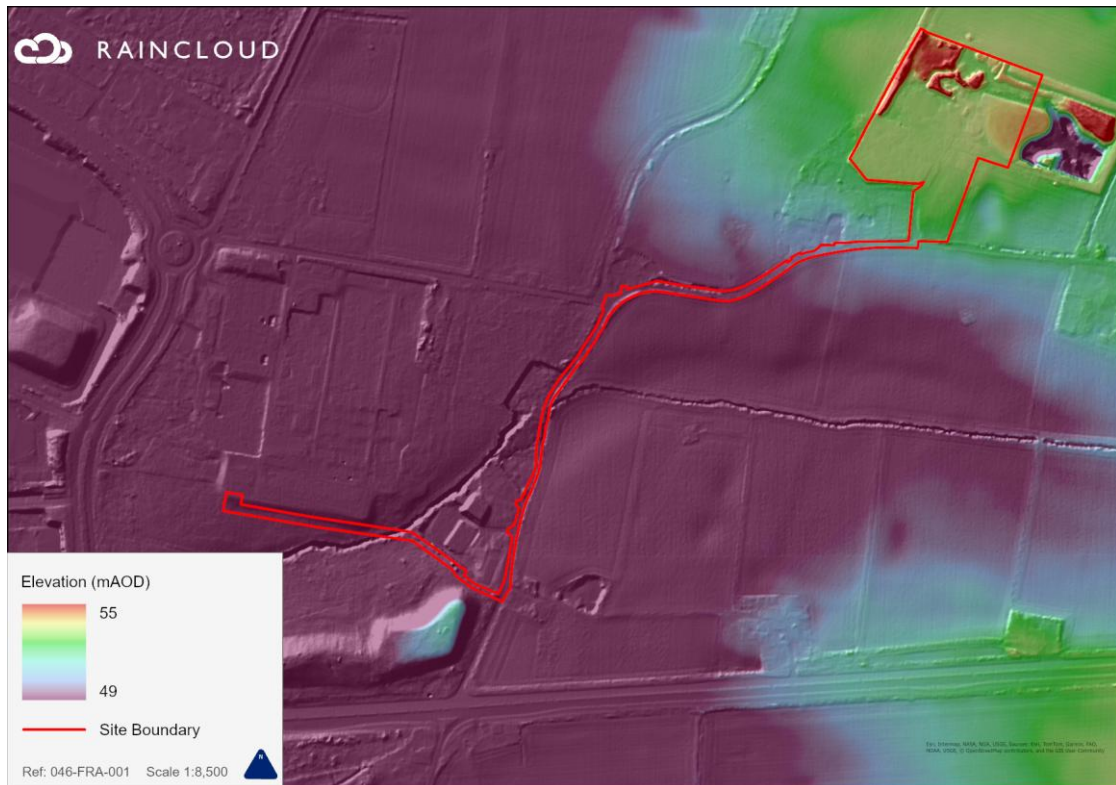
³ <https://www.knowsley.gov.uk/sites/default/files/2023-11/Level%201%20Strategic%20Flood%20Risk%20Assessment.pdf>

⁴ <https://www.knowsley.gov.uk/sites/default/files/2023-11/Preliminary%20Flood%20Risk%20Assessment.pdf>

⁵ <https://www.gov.uk/government/publications/national-planning-policy-framework--2>

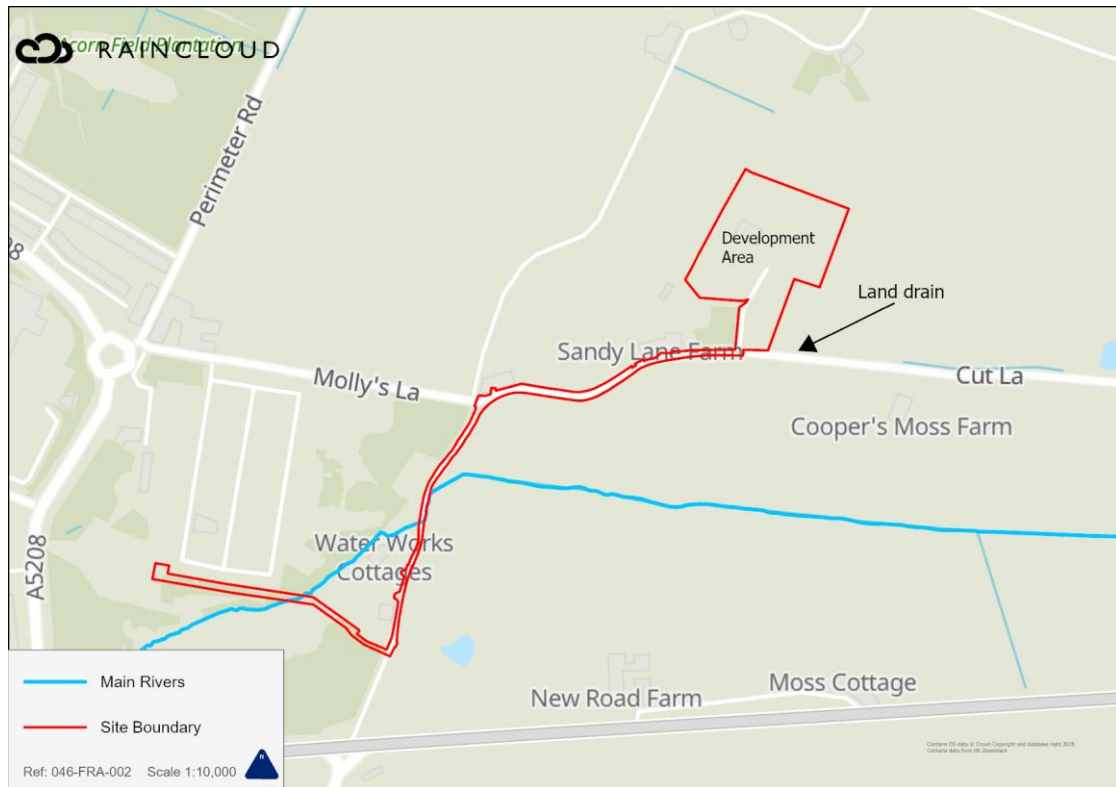
The topographical survey does not cover the cable route as it will be located underground. The elevation of the cable route ranges from 52 m AOD to 38 m AOD based on 1, LiDAR data, as shown in Plate 1.

Plate 1: Topography at the site



The cable route of the Proposed Development crosses Knowsley Brook in two different locations before connecting to the existing Kirkby Substation. An unnamed land drain is located approximately 40 m east of the Site's access. This is not shown in mapping however it is visual on LiDAR hillshade (Plate 1). The land drain has been highlighted in Plate 2.

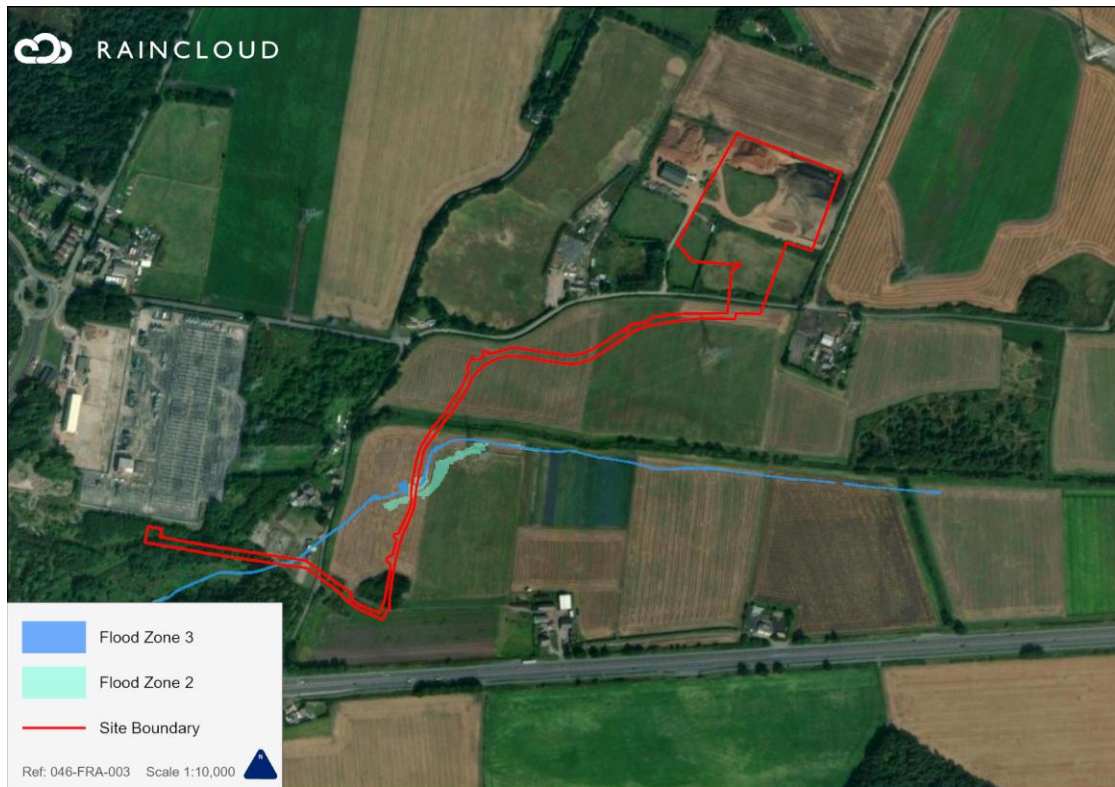
Plate 2: Unnamed tributaries of Knowsley Brook



1.3 Flood Classification

The EA Flood Map for Planning shows that the Proposed Development is entirely located in Flood Zone 1, except the cable route which is partly located within Flood Zone 2 and 3, as shown in Plate 3.

Plate 3: Flood Zones



1.4 Flood History

The EA historic flood outline dataset indicates that the Site has not previously flooded. The nearest recorded flood outline is located near Windle Island Braunton, approximately 4 km east of the Site.

In addition, anecdotal evidence suggests that the Site has not previously flooded.

2 FLOOD RISK ASSESSMENT

Flood risk will be classed as Negligible (where little or no risk is identified), Low (where theoretical risk is identified but mitigating factors may influence flood levels) or Moderate to High (where modelled levels or historical events show risk to the Site).

Several factors will be considered when attributing the residual risk of flooding to the Development, including:

- The depth of flooding;
- The hazard to life during flood water ingress;
- The velocity of floodwater;
- Flooding extent / ingress into site;
- Type of infrastructure affected;
- Any flood water displacement; and

- Intervening structures / flood protection.

The Conclusion section of this FRA provides justification for the risk category using professional judgement and experience of assessing similar types of projects / scenarios.

2.1 Fluvial

The Proposed Development (BESS) area is located entirely within Flood Zone 1. The cable route is partly located within Flood Zone 2 and 3, as shown in Plate 2

The cable route will be set below ground level for the entirety of the route and therefore will be unaffected in the case of a flood event. The cable route crosses the Knowsley Brook at two separate locations, as shown in Plate 2. The cable route at these locations will cross the watercourse using horizontal directional drilling (HDD) to have as minimal impact as possible on the watercourse and surrounding area.

The HDD launch pits will comprise a shallow excavation to enable the utilisation of grounds. Should any pits be located within the floodplain and a flood event occur during the HDD works displacement would be limited to the extent of the launch pits and excavated material which will be bounded by rural land. Therefore, any displacement of floodwaters will not be of a significant volume and will disperse within the surrounding grounds in accordance with the topographic characteristics of the floodplain.

The HDD method will limit the need for infrastructure to be located immediately adjacent to watercourses, therefore limiting the potential flood depths at the location of the infrastructure and this approach which will also result in the smallest displacement of floodwaters.

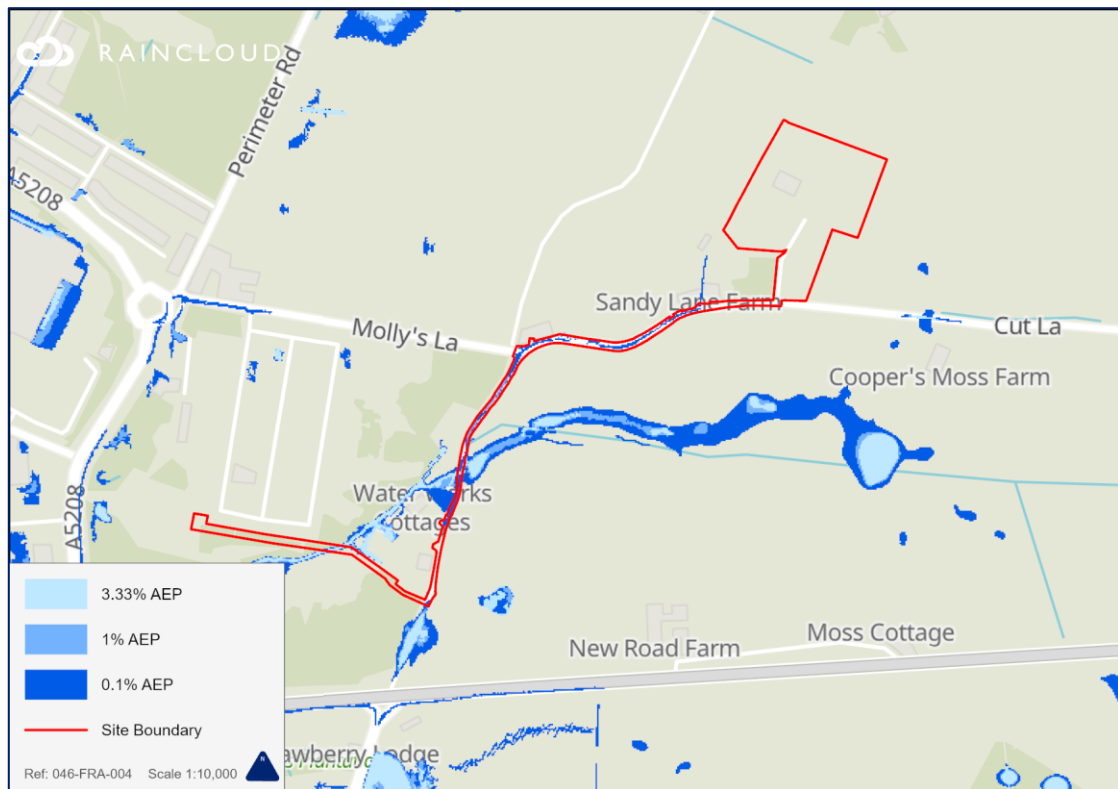
Prior to the commencement of the HDD works, the Principal Contractor will consult the EA flood warning service.

Based on the above ground aspects of the Proposed Development being located within Flood Zone 1 and only the cable route located within Flood Zone 2 and 3, the risk of fluvial flooding is considered to be **Low**.

2.2 Pluvial

The Proposed Development (BESS) Area is shown to be located outside the 3.3 %, 1 % and 0.1 % AEP surface water flooding extent, as shown in Plate 4.

Plate 4: Surface Water Flood Extents



The cable route is located within the surface water extents however the cable will be underground for the entirety of the route and therefore unaffected.

The Site is in restored form i.e. regraded superficial deposits, with adjacent land to the west used for agriculture. As such, the baseline scenario will not generate substantial surface water run-off rates.

Flood warnings should be monitored during the construction phase in case a heavy rainfall event coincides during the installation of the cable route. Further details regarding flood warnings are provided in Section 2.9.

Based on only the cable route being located within the surface water flood extents, the risk of pluvial flooding is **Low**.

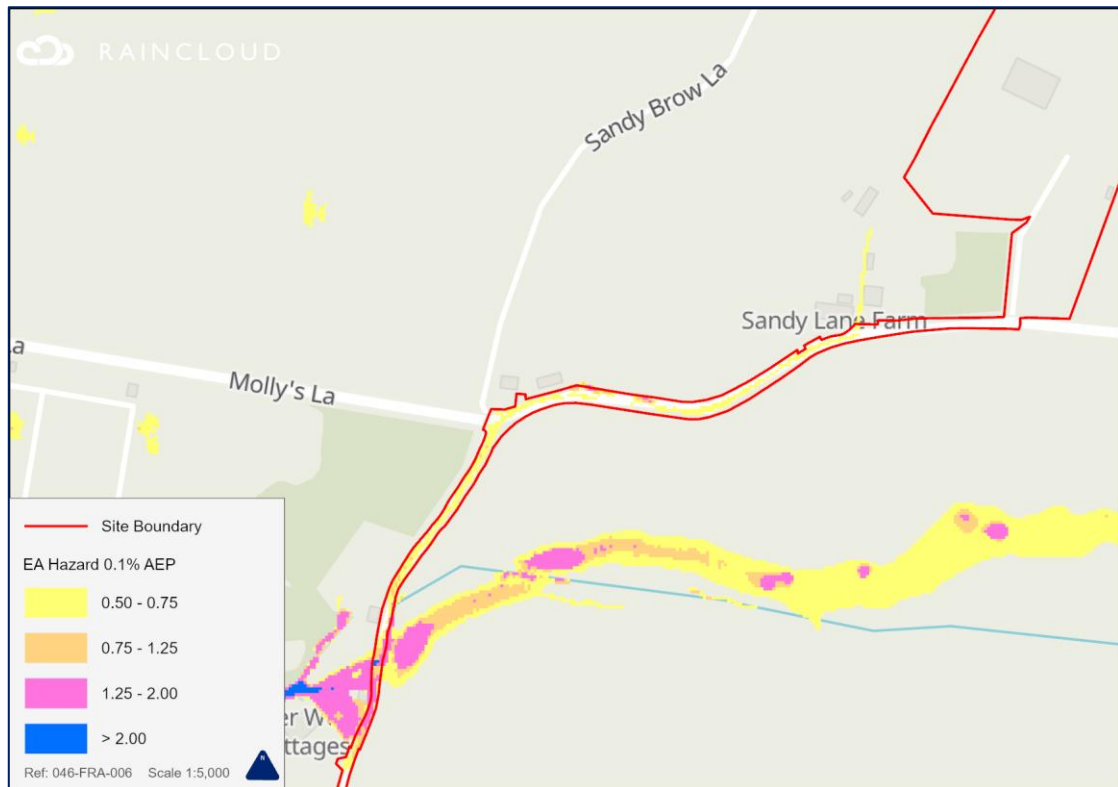
Management of surface water runoff from the Proposed Development (BESS) Area is outlined in the Surface Water Drainage Strategy which accompanies the planning application (document reference 041_Kirkby_SWDS).

2.3 Site Access and Egress

The Proposed Development will be predominantly unmanned except for occasional maintenance visits. Access/egress to the Site is via Cut Lane.

The surface water extents show Cut Lane is partly affected during the 0.1 % AEP event. The EA hazard mapping shows the surface water extent is classified as 'Low', as shown in Plate 5.

Plate 5: EA Hazard Mapping 0.1% AEP



Given the EA hazard mapping shows the access/egress to be 'Low' via Cut Lane, access/egress to the Site is available during events to the 0.1 % AEP.

2.4 Tidal

The Site is not located within the vicinity of any tidal influenced watercourses. The cable route is partly located within Flood Zone 2 and 3 associated to fluvial sources (see section 2.1).

In addition, the minimum elevation of the Proposed Development (BESS) Area is 49.75 m AOD.

As such, the tidal flood risk to the Site is considered to be **Negligible**.

2.5 Groundwater

The EA Long Term Flood Risk service⁶ reports "*Flooding from groundwater is unlikely in this area*".

The British Geological Survey (BGS) geology viewer shows superficial deposits of Till and Devensian – Diamicton underlying the Site. The bedrock geology is Chester Formation – Sandstone.

There are no BGS boreholes within a 500 m radius of the Site. EDF Energy Renewables Ltd commissioned infiltration testing (South West Geotechnical, November 2024) as part of the Surface Water Drainage Strategy and the underlying strata was recorded to a depth 2 to 2.5 m.

The trial pits highlight clay-based strata to a depth 1 to 1.5 m below ground level followed by 1 to 1.5 m of sandstone. The infiltration testing was unable to provide an infiltration rate highlighting the underlying geology is impermeable despite the sandstone geology. All trial pits did not interact with any groundwater. Full details regarding the infiltration testing are provide in the Surface Water Drainage Strategy and supporting Appendices.

The Proposed Development infrastructure will be located at ground level and therefore is unlikely to interact or impact any groundwater levels.

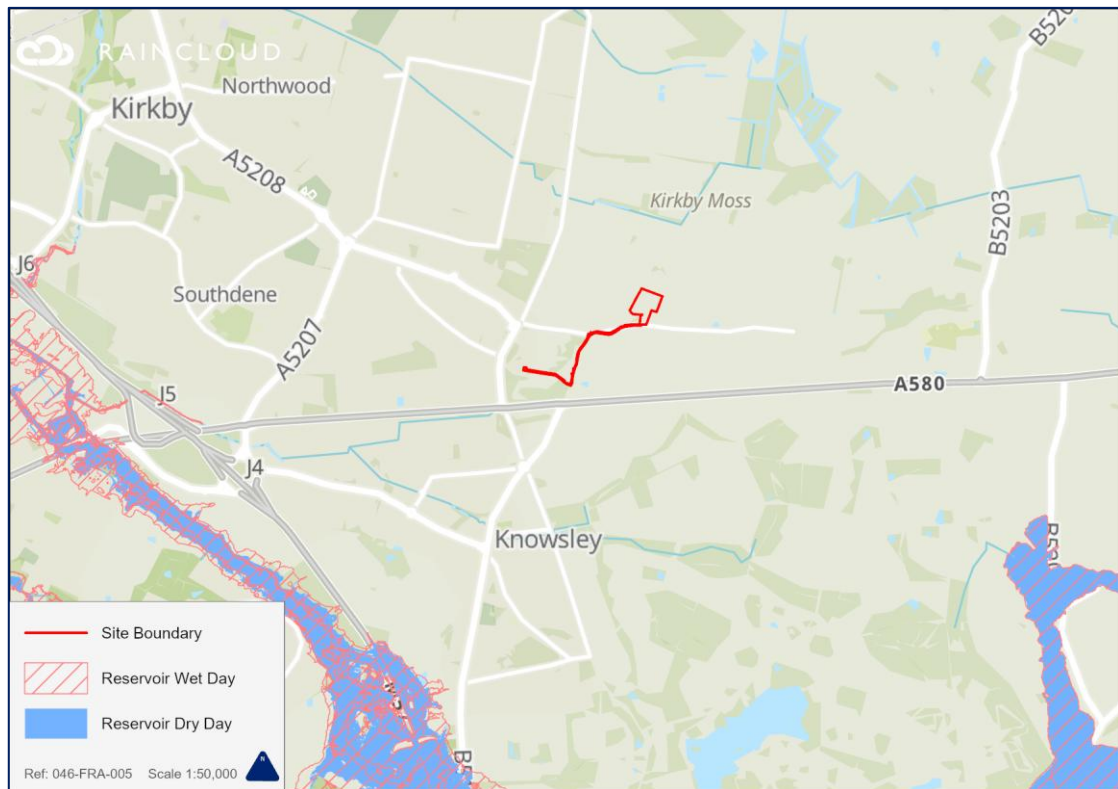
Based on the information above, the groundwater flood risk to the Site is considered to be **Negligible**.

2.6 Reservoirs

The Site is located outside the EA's Flood Risk from Reservoirs mapping, as shown in Plate 6.

⁶ <https://check-long-term-flood-risk.service.gov.uk/risk>

Plate 6: Reservoir Flood Risk



As such, the reservoirs flood risk to the Site is considered to be **Negligible**.

2.7 Artificial Sources

The Site is not located within the vicinity (less than 1 km) of any canals as per the Canal and River Trust network map⁷.

As such, the canal flood risk to the Proposed Development is considered to be **Negligible**.

2.8 Sewer Flooding

The Proposed Development is located within a rural area and does not require a sewer connection reducing the likelihood of sewer flooding occurring on the Site.

The Proposed Development infrastructure is located in the north of the Site, approximately 2 m above the elevation of Cut Lane and therefore is unlikely to be affected in the case of an event.

As such, the sewer flood risk to the site is considered to be **Negligible**.

⁷ <https://canalrivertrust.org.uk/canals-and-rivers>

2.9 Flood Warnings

The cable route is shown to be located within the River Alt, Formby to Huyton an EA Flood Alerts Area. As a precautionary approach, the Site Manager and Principal Contractor should sign up to the EA Flood Warnings and Alerts to be aware that water levels may be high whilst coinciding with a Site visit.

The Site Manager and Principal Contractor should sign up to the Met Office Weather Warnings to be aware of periods of extreme weather which may coincide with a Site visit. Flood Warnings can be monitored via X (formerly Twitter) or directly via emails. Flood Warnings can occur during any time, day or night, signing up provides the Site manager some notice before a flood event. Notice periods may vary depending on location and flood mechanics (overtopping versus a breach event).

Installation of the cable route adjacent to the Knowsley Brook should not be conducted if any flood warnings or alerts are present.

2.10 Consents

The cable route crosses the Knowsley Brook which is an EA main river therefore a Flood Risk Activity Permit will be required before any works are undertaken and this can be secured through an appropriately worded planning condition.

2.11 Sequential Test and Exception Test

This FRA has demonstrated that all electrical aspects of the Proposed Development are not at risk of flooding from all sources assessed above.

The Site is located partly within Flood Zone 2 and 3 however this is only limited to the cable route. The Proposed Development (BESS) Area is located entirely within Flood Zone 1 and is at Negligible or Low risk from all sources of flooding showing a sequential approach to the Site.

As the Site is classified as Essential Infrastructure and partly located within Flood Zone 3, the exception test is required as outlined in Table 2 'Flood risk and coastal change' guidance⁸.

The exception test required the Proposed Development to demonstrate the following:

⁸ <https://www.gov.uk/guidance/flood-risk-and-coastal-change>

- Developments that have to be in a flood risk area will provide wider sustainability benefits to the community that outweigh flood risk; and
- The development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and where possible, will reduce flood risk overall.

The Proposed Development is a BESS Site which aligns with the UK government's plan to reach clean power by 2030, therefore satisfies the first requirement of the exception test.

As outlined in this report, the flood risk to the Site is considered to be Negligible to Low for all sources of flooding. All electrical infrastructure is located outside Flood Zone 2 and 3 therefore satisfying point two of the exception test.

Based on the above, the Site is deemed to satisfy the requirements of the Sequential and Exception tests.

3 CONCLUSION & RECOMMENDATIONS

The Proposed Development(BESS) Area is located in Flood Zone 1 and outside the surface water flood depths up to and including the 1 in 1,000-year event.

The Site is partly located within Flood Zone 2 and 3 however this applies to only a small section of the cable route adjacent to the Knowsley Brook. The cable would be routed underground.

All other sources of flood risk within the report are identified as Negligible or Low.

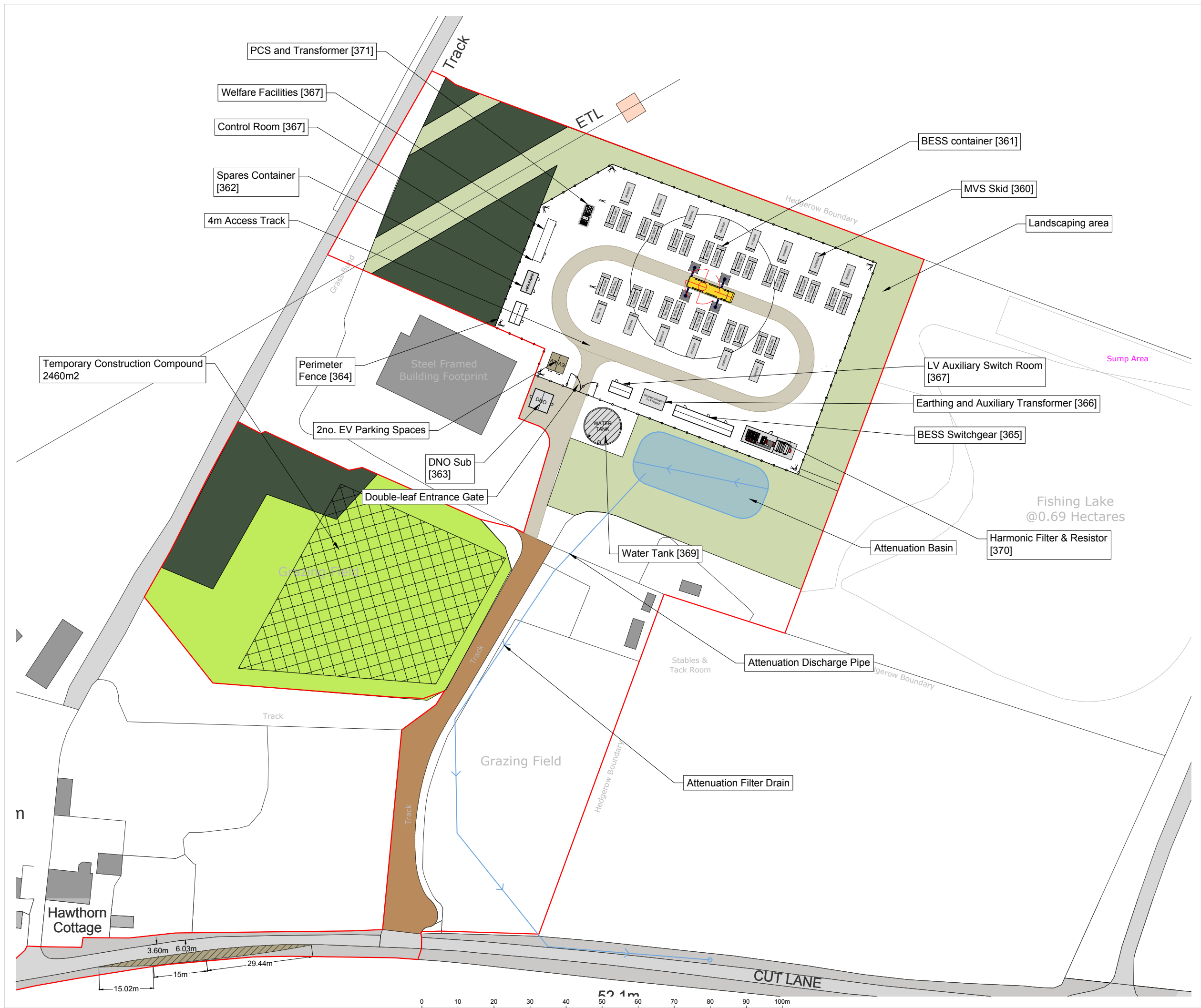
A Surface Water Drainage Strategy will manage runoff generated from the Development., full details are provided in the Surface Water Drainage Strategy report (046_Kirkby_SWDS)

The Proposed Development is compliant with both the NPPF and local planning policy.

APPENDIX A: SITE LAYOUT



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NOTES

1. All details are indicative only.

LEGEND

- PLANNING APPLICATION BOUNDARY
- PERIMETER FENCE
- OTHER BROAD LEAVED WOODLAND
- OTHER NEUTRAL GRASSLAND, ENHANCED
- OTHER NEUTRAL GRASSLAND, MODERATE
- BIOSWALE

13.	Drainage attenuation updated	25.03.25	JL	SRY
12.	Drainage attenuation updated	24.03.25	JL	SRY
11.	RLB updated	20.03.25	JL	SRY
10.	Y Layout added to plan	19.03.25	JL	SRY
09.	BNG Layout added to plan	18.03.25	JL	SRY
08.	Drainage Layout added to plan	27.02.25	JL	SRY
07.	Passing places added	24.02.25	JL	SRY
06.	Site layout components updated	17.02.25	JL	SRY
05.	Temp compound moved	11.02.25	JL	SRY
04.	Site moved 5m North	05.02.25	JL	SRY
03.	Site moved 12m South	09.01.25	JL	SRY
02.	12m Landscape gap to West	20.12.24	JL	SRY
01.	Site layout updated for landscaping	12.12.24	JL	SRY
Rev	Description	Date	Checked	

Drawing No. **KIR-EDFR-BESS-CIV-PLN-300.13**

Project **Kirkby BESS**

Title **Site Layout Plan**

Scale **1:1000 @A3** Drawn by **JL** Checked **SRY** Date **19.11.24**



W: www.edf-re.uk
A: Cardinal Place, 80 Victoria Street, London SW1E 5JL

APPENDIX B: TOPOGRAPHICAL SURVEY



ly Lane Farm

Hawthorn Cottage

Steel Framed Building Footprint

Grazing Field

Grazing Field

Stables & Tack Room

Fishing Pond
@0.69 He

15.02m
3.60m
6.03m
15m
29.44m

CUT LANE

NOTES

1. All details are indicative only.

01	Updated values	11.03.25	SRY
Rev	Description	Date	Checked
Drawing No. KIR-EDFR-BESS-LAND-PLN-160.01			
Project Kirkby BESS			
Title Indicative Topo Layout			
Scale	1:1000 @A3	Drawn by JL	Checked SRY Date 30.01.25



W: www.edf-re.uk
A: Cardinal Place, 80 Victoria Street, London SW1E 5JL



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