

Old Fieldhouse Lane, Huddersfield, HD2 1AG

Reference: R1041 FRA-v1

Apr-26

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FLOOD RISK ASSESSMENT

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Purpose of this report

- 1.1 RIDA Reports Ltd has been appointed to undertake a Level 1 – Screening Study Flood Risk Assessment for a development located at HD2 1AG.

Objectives

- 1.2 The objectives of this FRA are to demonstrate the following:
- Whether the proposed development will likely be affected by current or future flooding.
 - Whether the proposed development will increase flood risk elsewhere.
 - Whether the flood risks associated with the proposed development can be satisfactorily managed.
 - Whether the measures proposed to deal with the flood risk are sustainable.

Documents Consulted

- 1.3 To achieve these objectives, the following documents have been consulted and referenced:

The National Planning Policy Framework (NPPF)
CIRIA C753 document The SuDS Manual, 2015
Local Flood Risk Management Strategy (LFRMS)
Level 1 Strategic Flood Risk Assessment (SFRA)
Aerial photographs and topographical survey of the site
British Geological Society Records
Local Council flood Maps
Environment Agency flood maps
The CIRIA publication 'C635 Designing for exceedance in urban drainage Good practice'



Development Site and Location

- 2.1 The site is located at Old Fieldhouse Lane, Huddersfield. The nearest postcode is HD2 1AG. Refer to appendix A for site location plan.
- 2.2 The current use of the site is a traditional bus depot. The existing infrastructure includes a main workshop building, fueling building and associated above-ground fuel storage tanks located in the northern section of the yard. The external areas consist primarily of standard surfacing used for the parking. The current user vulnerability classification of the site is Less Vulnerable. The site is located in the River Flood Zone 1. Refer to Appendix B for more details.

Development Proposals

- 2.3 The proposed development includes the electrification of the depot to support a 100% electric bus fleet, involving the demolition of the existing fueling building and fuel tanks to facilitate new infrastructure. Key installations include steel gantries, charging reels, multiple ground-mounted chargers and power units distributed across the yard and workshop. Essential electrical infrastructure will be reinforced through the installation of new distribution feeder panels, a new chassis wash and a dedicated plant room. For this site, the flood risk assessment will assess the critical infrastructure located in three areas, each of them including a feeder panel and these areas are shown below. Refer to Appendix B for the layout of the proposed development.



- 2.4 The vulnerability classification of the proposed development is Less Vulnerable with an estimated lifetime between 20 and 50 years.

Site Hydrology and Hydrogeology

- | | |
|-------------------------------|---|
| Hydrology | 2.5 The Huddersfield Broad Canal is located approximately 10 m away from the development. |
| Aquifer | 2.6 The development is located within a secondary aquifer type A. Aquifers type A consist of permeable layers capable of supporting water supplies at a local rather than strategic scale. They are generally aquifers formerly classified as minor aquifers. |
| Source Protection Zone | 2.7 The site is not located within a Source Protection Zone. |
| Groundwater Levels | 2.8 The ground water levels for this site are unknown. |

Site Geology

- | | |
|-----------------------------|---|
| Bedrock | 2.9 The British Geological Survey records of the site show that it is located within the Pennine Lower Coal Measures Formation-Mudstone, siltstone and sandstone. |
| Superficial Deposits | 2.10 The British Geological Survey records show that the superficial deposits are Alluvium-Clay, silt, sand and gravel. |



National Planning Policy Framework (NPPF)

- 3.1 The NPPF and its technical guidance is a set of planning policies with the key objective of contributing to sustainable development. As part of it, they ensure that flood risk and sustainability are considered during the planning process. This ensures that developments are not located in flood risk areas and directs developments to lower risk areas. The NPPF applies a sequential risk-based approach to determining land suitability for development in flood risk areas. The NPPF also encourages developers to seek opportunities to reduce the overall level of flood risk through the development layout and the application of Sustainable Drainage Systems (SuDS).

The Flood and Water Management Act (2010)

- 3.2 The Flood and Water Management Act aims to reduce the flood risk associated with extreme weather events. It provides robust flood risk management for people, homes and businesses and encourages using SuDS for developments. A robust SuDS strategy should consider the recommendations in this Flood Risk Assessment.

Strategic Flood Risk Assessment (SFRA)

- 3.3 Planning policy with regard to development and flood risk in the area is detailed in the Calder Catchment Strategic Flood Risk Assessment (Volume 1) which was published in 2016. The proposed development site is located within the administrative boundary of the Kirklees Council.
- 3.4 The SFRA commits to direct new development to locations at the lowest flood risk. The SFRA provides information on the levels and flood hazards that could result from flooding. The Environment Agency flood zone maps and the SFRA ignore the presence of existing flood defences when defining the potential extent of flooding.
- 3.5 This report follows the guidance given in the Calder Catchment Strategic Flood Risk Assessment by evaluating the flood risk and providing relevant flood mitigation.



- 4.1 The NPPF guidance states that the sequential test "is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. This means avoiding, so far as possible, development in current and future medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding."

Applicability of the Sequential Test

- 4.2 The flood risks were determined by identifying all the sources of flooding and assessing their possible impact and likelihood to development. It is confirmed that the development is:

- In Flood Zone 1, based on the Planning Flood Risk Map
- At High risk of surface flooding
- At high risk of groundwater flooding
- Outside of a critical drainage area
- Outside of an area with sewer flooding

- 4.3 This type of development is exempt from applying the sequential test as per the National Planning Policy Framework paragraph 176, footnote 62. The development has been made safe and has not increased the risk to other properties. See copy of paragraph 176 below "Applications for some minor development and changes of use 62 should also not be subject to the sequential test, nor the exception test set out below, but should still meet the requirements for site-specific flood risk assessments set out in footnote 63." The text of footnote (62) is "This includes householder development, small non-residential extensions (with a footprint of less than 250m²) and changes of use; except for changes of use to a caravan, camping or chalet site, or to a mobile home or park home site, where the sequential and exception tests should be applied as appropriate."

Exception Test

- 4.4 Fluvial flood risk for this minor development has been assessed using the Environment Agency Flood Map for Planning and the standing advice approach set out in the NPPF, which considers both the scale of development and the vulnerability classification of the proposed land use.



Step 1	4.5	The proposed development is greater than 1 ha and falls within the Environment Agency (EA) Flood Zone 1. Therefore, a Site Specific Flood Risks Assessment is required under the NPPF. Flood Zone 1 is considered to have a low probability of flooding, with an annual probability of flooding of <0.1%. The chance of flooding is 1 in 1000 years or lower.
Flood Zone categorisation		
Step 2	4.6	The Exception Test is not required for this development.
The Exception Test		



- 5.1 The development has been assessed for the following potential flood risks, river and tidal flood risk, surface water flooding, flooding from groundwater, reservoir flood risk and drainage systems.

Flood Defence and Historic Flooding

- 5.2 The Environment Agency records show that the site does not benefit from flood defences. They also show that the area around the site has not been flooded in the past. See Appendix C for details.

Flooding from river and sea

- 5.3 The proposed development is greater than 1 ha and falls within the Environment Agency (EA) Flood Zone 1. Therefore, a Site Specific Flood Risks Assessment is required under the NPPF. Flood Zone 1 is considered to have a low probability of flooding, with an annual probability of flooding of <0.1%. The chance of flooding is 1 in 1000 years or lower.
- 5.4 The climate change allowance is not applicable for this site.
- 5.5 The site is located in an area outside of fluvial flooding flood risk.
- 5.6 It is concluded that the site is not affected by fluvial/sea flood risk.

Surface water (overland flows) flood risk

- 5.7 The Environment Agency maps show that the flood risk from surface water is high. The residual risk of localised deep ponding remains highly likely. The Environment Agency surface water flood risk maps are defined through a specific procedure based on digital terrain models and assumptions regarding infiltration and urban drainage losses. The surface water flood maps are determined by the Environment Agency as follows:
- 5.8 *"Once we combined the data from local detailed models and the national model, we removed flooding to a depth of less than 75mm. This is because in surface water flood modelling, most land is covered by some water as rain falls across the area. While this very shallow floodwater may be an inconvenience, it is generally unlikely to prevent access or cause flooding to properties."*



Building footprints are raised above their surroundings as part of the modelling process. We have used an uplift of 30cm above the 'zero' elevation of the building. This means that in the raw model outputs, buildings can look like they are not at risk of flooding.

The map does not provide property-specific data and cannot specify whether individual buildings are themselves at risk. However, it is important that the RoFSW maps indicate where buildings are considered to be in a flood risk area.

To do this, we infill building footprints, based on how much of the building's exterior wall and area of the property is wet.

We used building outlines from the OS MasterMap layer to do this.

Finally, we infill small dry areas (less than 50m²) surrounded by floodwater and remove small wet areas (less than 100m²). This is an important step in cleaning our data."

- 5.9 The strategic flood risk for the Kirklees Council confirms that the flood risk for the site is High. The surface water flood data has not been produced to determine the flood levels at individual properties. This data does not contain the climate change allowances for depth levels. Therefore, the Design flood level given below is an assumption. The new development may have greater or lower surface water flood depths.
- 5.10 Based on the Environment Agency and the Strategic Flood Risk Assessment's surface water mapping, together with the presence of surface water drainage systems at the site and surrounding area, it is concluded that the site is at High risk of flooding from surface water sources. The depth of water is taken from the future flood risk of the RoFSW dataset. This dataset shows future flood risk based on UKCP18 climate projections and the high-emission RCP 8.5 scenario. It uses the 'Central' allowance for the 2050s (2040–2060), accounting for increased peak rainfall and surface water flooding.
- 5.11 Surface water flood risk is only applicable to Area 2 (Feeder Panel 2). Due to topographical variation across the proposed development, flood levels vary across the site. The potential depth of flooding is approximately 200 mm, with a low probability of occurrence. Based on this risk, the average ground level within the affected Area 2 is 57.9 m AOD, with an estimated surface water flood level in the region of 58.1 m AOD. This level has been taken to complete this flood risk assessment for Area 2. The average ground levels for the affected areas and the corresponding estimated flood levels are summarised below.



Area ID	The average ground level at the location of the flood point (m AOD)	Surface water flood level (m AOD)
1 - Feeder Panel 1	No Risk	No Risk
2 - Feeder Panel 2	57.9	58.1
3 - Feeder Panel 3	No Risk	No Risk

Flooding from drainage systems in adjacent areas

- 5.12 The council records have been reviewed. The flooding from drainage incidents maps were not found in the Strategic Flood Risk Assessment. Therefore, for the purpose of this report, it has been assumed that the risk of flooding from drainage systems is low.

Reservoirs Risks

- 5.13 The Reservoir Flood Map (RFM) produced by the Environment Agency does not show the risk to individual properties of dam breach flooding. The maps do not indicate or relate to any particular probability of dam breach flooding. The maps were prepared for emergency planning purposes. They can be used to help reservoir owners produce on-site plans, and the Local Resilience Forum produce off-site plans and to prioritise areas for evacuation/early warning in the event of a potential dam failure. The RFM shows that the development could be outside of the possible dam breach flooding path. See Appendix C.

Groundwater flood risk

- 5.13 The British Geological Survey's flood risk susceptibility maps show that the development has the potential for groundwater flooding above ground level. Groundwater levels vary seasonally and are influenced by ground and meteorological conditions and proximity to water features. The groundwater flooding risk for this site is considered to be high. The groundwater flood depth could potentially be 0.15m. Based on this risk, the average ground levels for the affected areas and the corresponding estimated flood levels are summarised below. This level has been given as a precautionary measure. It is recommended that monitoring of groundwater is undertaken should this measure be reviewed. Refer to Appendix C for record drawings.



Area ID	The average ground level at the location of the flood point (m AOD)	Groundwater flood level (m AOD)
1 - Feeder Panel 1	58.1	58.25
2 - Feeder Panel 2	57.9	58.05
3 - Feeder Panel 3	59	59.15

Critical Drainage Areas

- 5.14 The Strategic Flood Risk Assessment was reviewed as part of this assessment. However, it does not show the critical drainage areas within the council. For this report, it has been assumed that the site is outside of a notified critical drainage area.



6.1 The Flood hazard assessment has demonstrated that the site is:

- In Flood Zone 1, based on the Planning Flood Risk Map
- At High risk of surface flooding
- At high risk of groundwater flooding
- Outside of a critical drainage area
- Outside of an area with sewer flooding

6.2 Under the NPPF it is necessary to demonstrate that, for any new development on the site, it is possible to provide an adequate level of flood protection for personnel working or living at the development.

Design Flood Level

6.3 The design flood level is the maximum estimated water level during the design storm event including an allowance for climate change in line with current best practice and the national planning policy guidance.

6.4 The Design Flood Level for this development has been determined by evaluating the levels from the Fluvial/Sea, Surface Water and Groundwater flood levels.

6.5 The design flood levels for the site have been assigned to specific impact zones based on the level of surface water floods. These zones and the corresponding flood depths are summarised in the table below.

Area ID	The average ground level (m AOD)	Design Flood Level (m AOD)	Type of risk
1 - Feeder Panel 1	58.1	58.25	Groundwater
2 - Feeder Panel 2	57.9	58.1	Surface Water
3 - Feeder Panel 3	59	59.15	Groundwater

Flood Protection

6.6 For this site the estimated free board has been determined to be 0.3m above the Design Flood Level due to the quality of the flood risk information available and the surface water flood risk. For groundwater flood risk no freeboard is required. Instead, a minimum level of 150 mm above ground level is specified. The following protection levels for resistance and resilience are therefore proposed for the study areas.



Area ID	The average ground level at the location of the development (m AOD)	Design Flood Level (m AOD)	Minimum FFL for the location of critical infrastructure (m AOD)	Water resistance and resilience interventions level (m AOD)
1 - Feeder Panel 1	58.1	58.25	58.25	58.55
2 - Feeder Panel 2	57.9	58.1	58.4	58.7
3 - Feeder Panel 3	59	59.15	59.15	59.45

6.7 There are several flood risk management and mitigation measures that can be incorporated into the site design to provide protection to the recommended level, including:

- Raising assets:
 - Raising assets above anticipated flood levels. This will see the equipment elevated on plinths to meet their respective zonal protection levels.
- Bespoke cabinets/buildings protection:
 - It involves elevating bunds so the top of the wall reaches the required protection level. These should be sealed with bentonite or a fire-resistant, waterproof system backing onto rubber insert sleeves.
- Concrete walls.
 - Install concrete walls around the equipment to the protection level. These concrete walls are to be fitted with a flood gate to allow for access and maintenance.

6.8 Examples illustrating typical measures that can be employed, drawn from the general guidance, are shown below.



Figure 1. Raised bund and access platform around a transformer(ENA ETR138 Annex 1)



Figure 3. Concrete walls and flood gates



Figure 4. removable flood panels (ENA ETR138 Annex 1)



Figure 5. Access to Substation entrance (ENA ETR138 Annex 1)



- 6.8 The details of resilience measures to be applied to each structure or asset of the proposed development will be developed during detailed design. The design objective of providing up to 0.3 m avoidance above the flood level.



7.1

The NPPF specifically stipulates that consideration should be given to potential off-site flood impacts of any proposed development. These off-site impacts are in relation to the following:

- Surface water management
- Flood flow conveyance, storage and climate change

Surface Water Management

7.2

The surface water run-off will be disposed of using SuDS techniques. The aim is to provide a sustainable design that accommodates the proposed attenuation volume and replicates the existing drainage regime using the SuDS hierarchy, as shown in the figure below.

7.3

The Landis Top Soil classification is naturally wet. The SuDS techniques highlighted in red below could be used on-site. This assessment is based on the LANDIS Top Soil infiltration, ground conditions and available potential discharge points.

The SuDS Hierarchy (Source:EA Thames region, SuDS a practical guide)

Most Sustainable	SUDS technique	Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit
↑	Living roofs	✓	✓	✓
	Basins and ponds	✓	✓	✓
	- Constructed wetlands			
	- Balancing ponds			
	- Detention basins			
↓	Retention ponds			
	Filter strips and swales	✓	✓	✓
	Infiltration devices	✓	✓	✓
	- soakaways			
	- infiltration trenches and basins			
Least Sustainable	Permeable surfaces and filter drains	✓	✓	
	- gravelled areas			
	- solid paving blocks			
	- porous pavings			
	Tanked systems	✓		
	- over-sized pipes/tanks			
	- storms cells			

7.4

With no increase in the rate of surface water discharge from the site, compared to the site in its current configuration, the proposed development would have no adverse impact on surface water flood risk at the site or surrounding area. The SuDS should be designed at the detailed project stage.



Flood Flow conveyance and storage

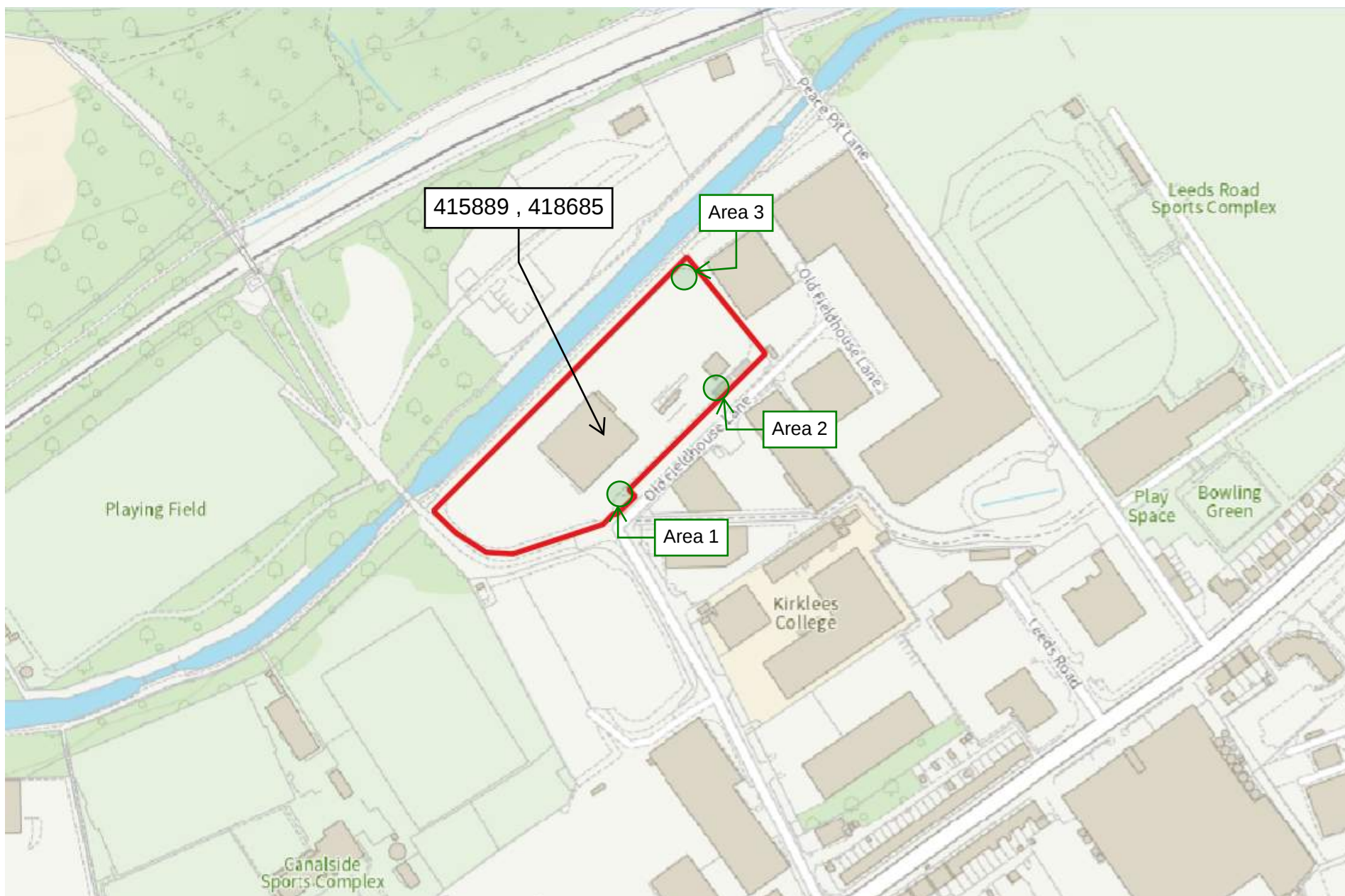
- 7.5 Due to the size of the development and its location in the flood risk zone, flood compensation for this development is not required.



- 8.1 It is concluded that subject to the proposed mitigation measures, the site can be developed in accordance with the provisions of the NPPF and the requirements of the Environment Agency and the local planning authority.
- 8.2 This report demonstrates that the proposal will be safe, in terms of flood risk, for its design life and will not increase the flood risk elsewhere.
- 8.3 It is proposed that a formal Flood Warning and Emergency Response Plan is developed for the proposed development to communicate flood emergency response procedures to all the occupants of the site.



Appendix A



Appendix B

Proposed Distribution
Feeder Panel 3 within GRP to be designed and installed by electrical contractor

Proposed Works
3No. . Proposed power units to be installed

Proposed Works
3No. . Proposed power units to be installed

Proposed Works
3No. . Proposed power units to be installed

Proposed Works
3No. . Proposed power units to be installed

Proposed Works
2No. . Proposed power units to be installed

Proposed Works
2No. . Proposed power units to be installed

EV Infrastructure
5 No. overhead steel gantries with platform deck containing 55 No. Heliox drop down EV charging reels.

EV Infrastructure
2 No. Heliox 250A ground mounted chargers to be installed.

EV Infrastructure
3 No. Heliox 250A ground mounted chargers to be installed.

EV Infrastructure
Proposed 3 No. power units to be installed

EV Infrastructure
3 No. overhead steel gantries with platform deck containing 27 No. Heliox drop down EV charging reels.

EV Infrastructure
4 No. Heliox 250A ground mounted chargers to be installed.

EV Infrastructure
Proposed 6 No. power units to be installed

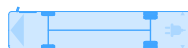
EV Infrastructure
3 No. Heliox 250A ground mounted chargers to be installed.

EV Infrastructure
Proposed 2 No. power units to be installed

EV Infrastructure
3 No. Heliox 250A ground mounted chargers to be installed.

100% Parking Plan
Scale 1:500

SITE PLAN - LEGEND



Denotes Proposed 12.0m EV Bus Parking Bay

117 No.



Denotes Proposed Heliox Flex 250A Charger Locations



Denotes Proposed Heliox Drop Down Reel Dispenser



Denotes Proposed Heliox Flex 180 Power Unit Locations



Denotes Proposed Vehicle Protection Barrier



Denotes Proposed Vehicle Protection Bollards



Denotes Proposed Bus Parking Bay Lining



Denotes Existing Vegetation



Denotes Vehicular Movement



Denotes Legal Site Boundary

EV Infrastructure

Proposed 10 No. power units to be installed

Demolition

Existing fueling building to be demolished

Proposed Works

Proposed concrete to be installed

Demolition

Existing fuel tanks to be demolished

EV Infrastructure

2 No. overhead steel gantries with platform deck containing 8 No. Heliox drop down EV charging reels.

Proposed Works

Proposed feeder panel 2 to be installed

EV Infrastructure

Proposed 3 No. power units to be installed

Proposed Works

Proposed chassis wash and plant room to be installed

EV Infrastructure

2 No. Heliox 250A ground mounted chargers to be installed.

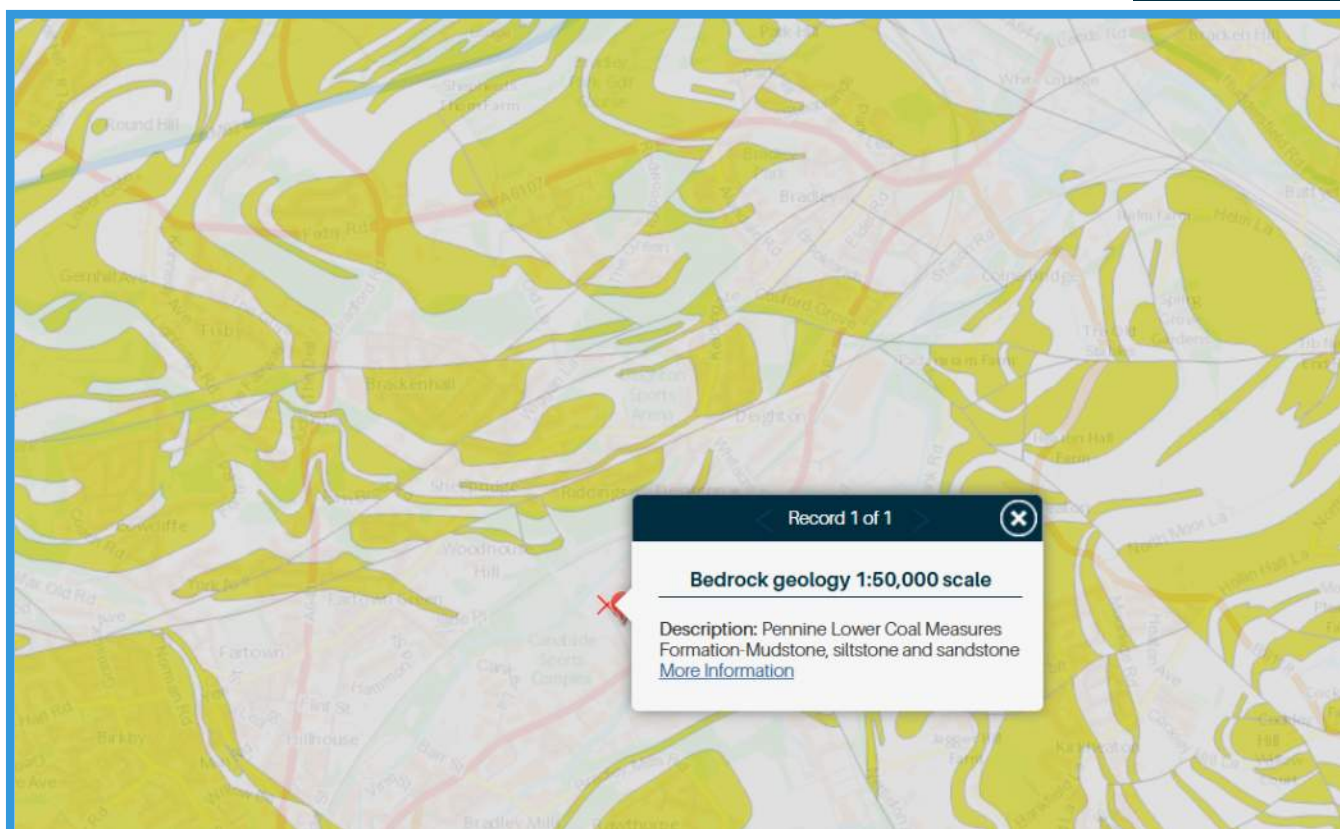
EV Infrastructure

3 No. Heliox 250A ground mounted chargers to be installed within workshop.

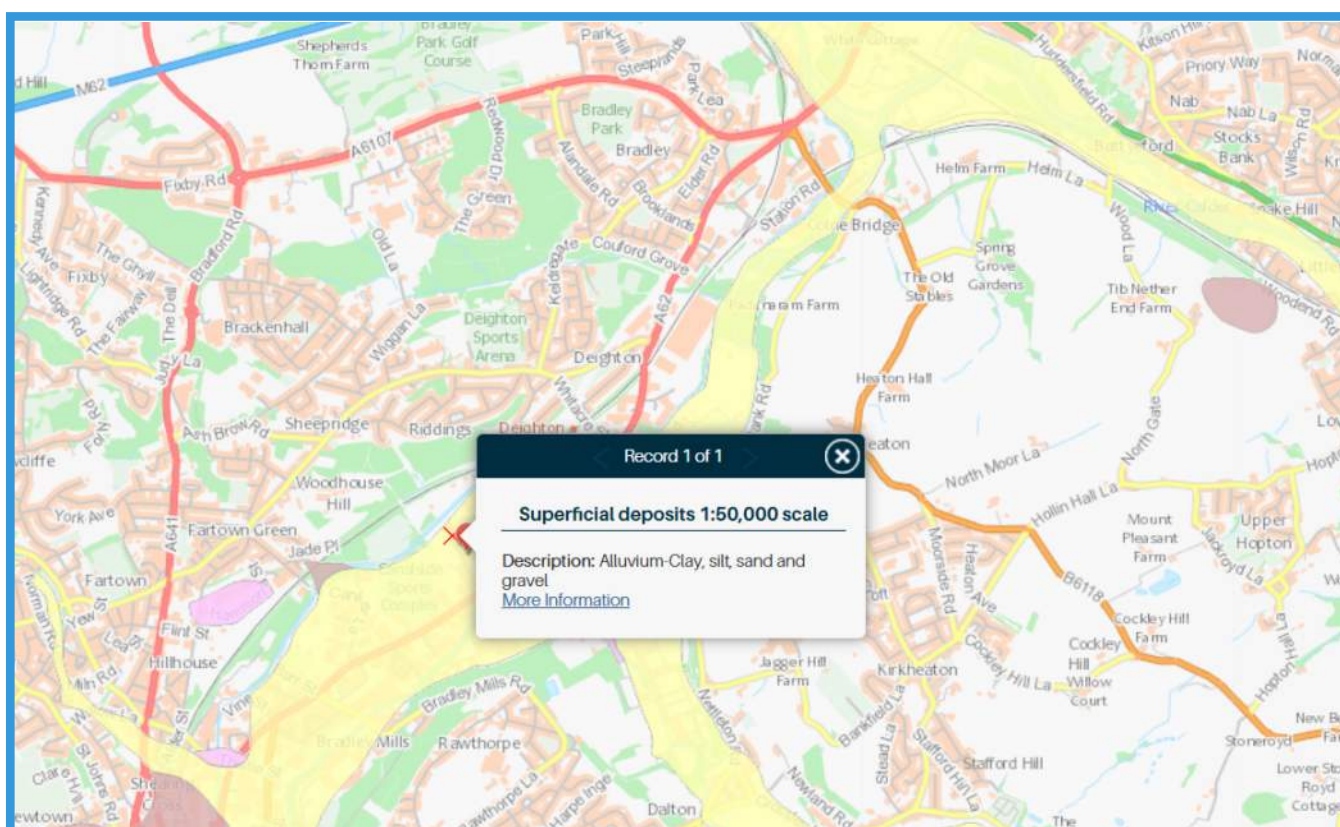
Revision	Description	Date
Client		
Project Title	Huddersfield Electrification Old Fieldhouse Ln, Huddersfield HD2 1AG	
Drawing Title	Proposed 100% Parking Plan	
		
Gateway Studio, Unit 3A, Link 606 Business Park, Staithgate Lane, Bradford, BD6 1YA +44 (0) 1274 424 884 www.janusarchitecture.co.uk		
Drawing Status	Scales	Size
PLANNING	1:500	A2
Date		MAR '26
Job Number - Drawing Number - Revision		
1483-203		

Appendix C

GEOLOGY - BEDROCK - Pennine Lower Coal Measures Formation-Mudstone, siltstone and sandstone



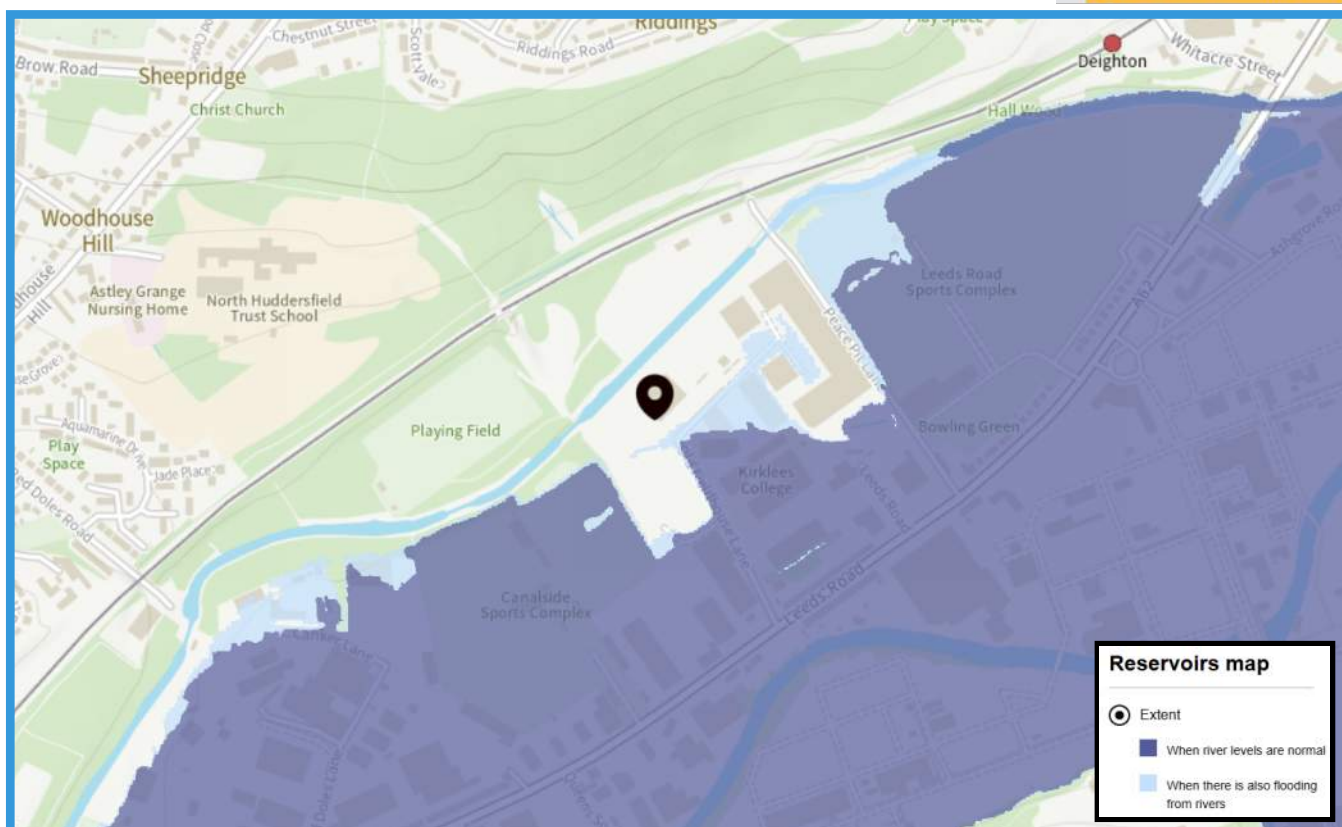
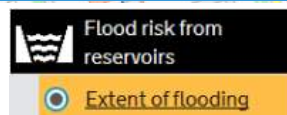
GEOLOGY - SUPERFICIAL DEPOSITS - Alluvium-Clay, silt, sand and gravel



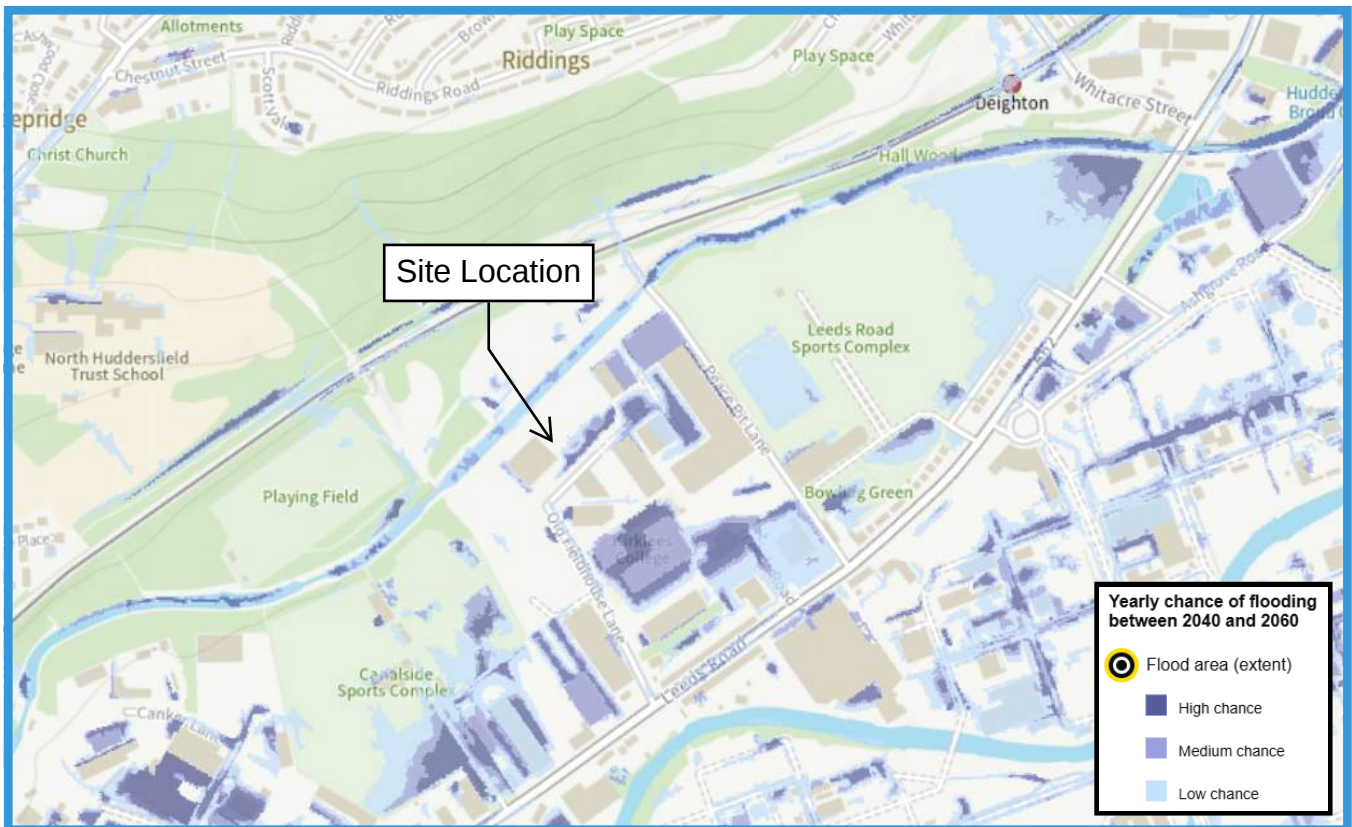
Main River Map



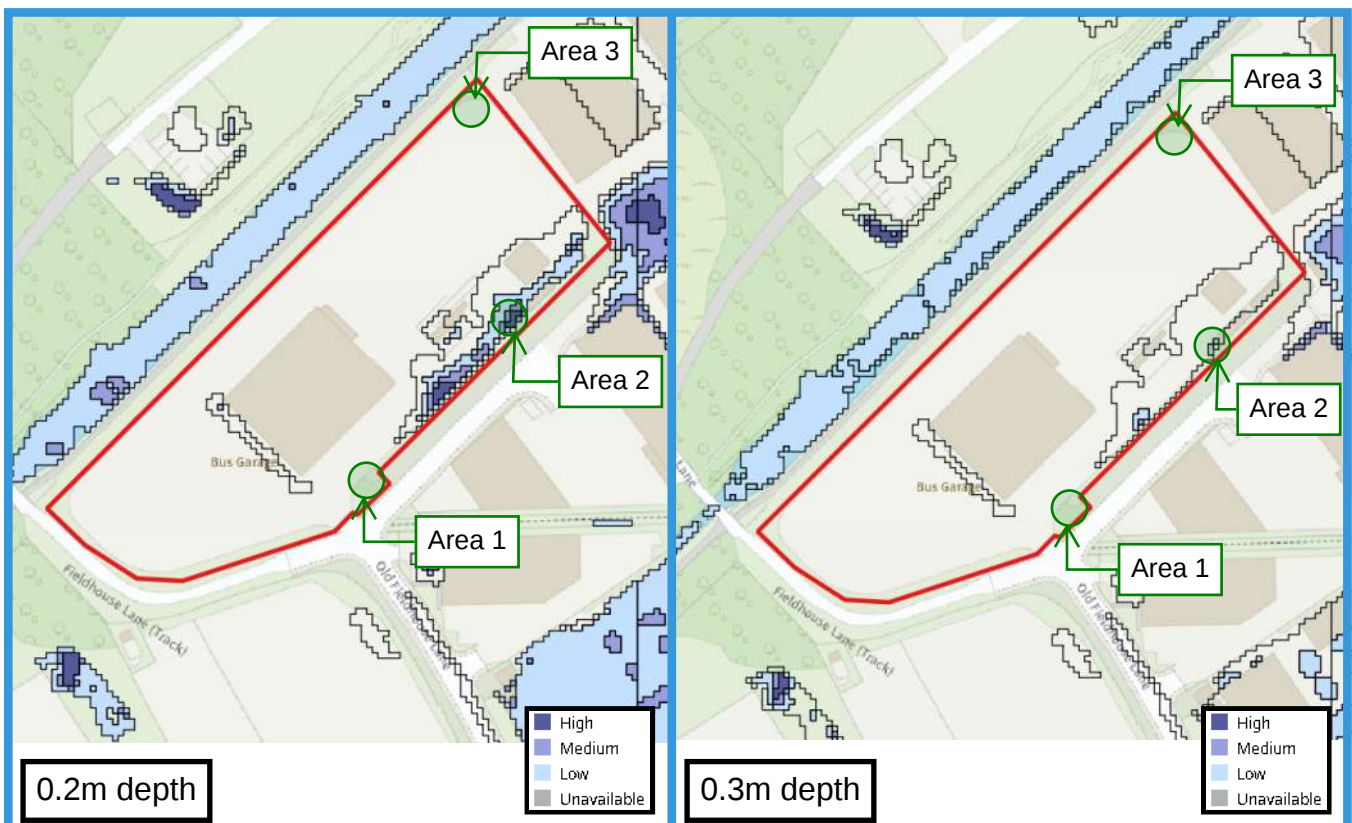
Reservoirs Map



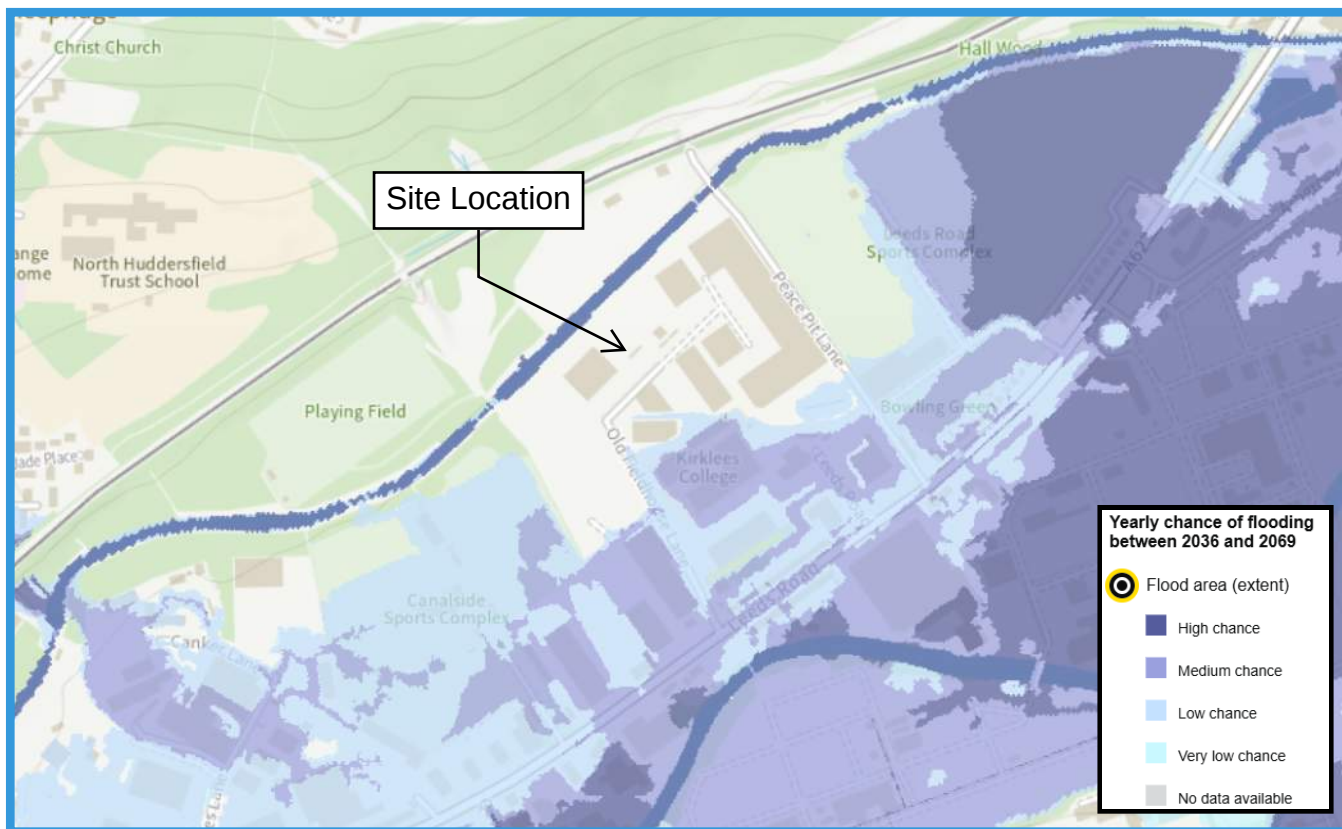
High risk means a chance of flooding greater than 3.3% (1:30)
 Medium risk means a chance of flooding of btw 1% (1:100) and 3.3%
 Low risk means a chance of flooding of btw 0.1% (1:1000) and 1%
 Flooding from surface water is difficult to predict as rainfall location and volume are difficult to forecast. In addition, local features can greatly affect the chance and severity of flooding



DEPTH

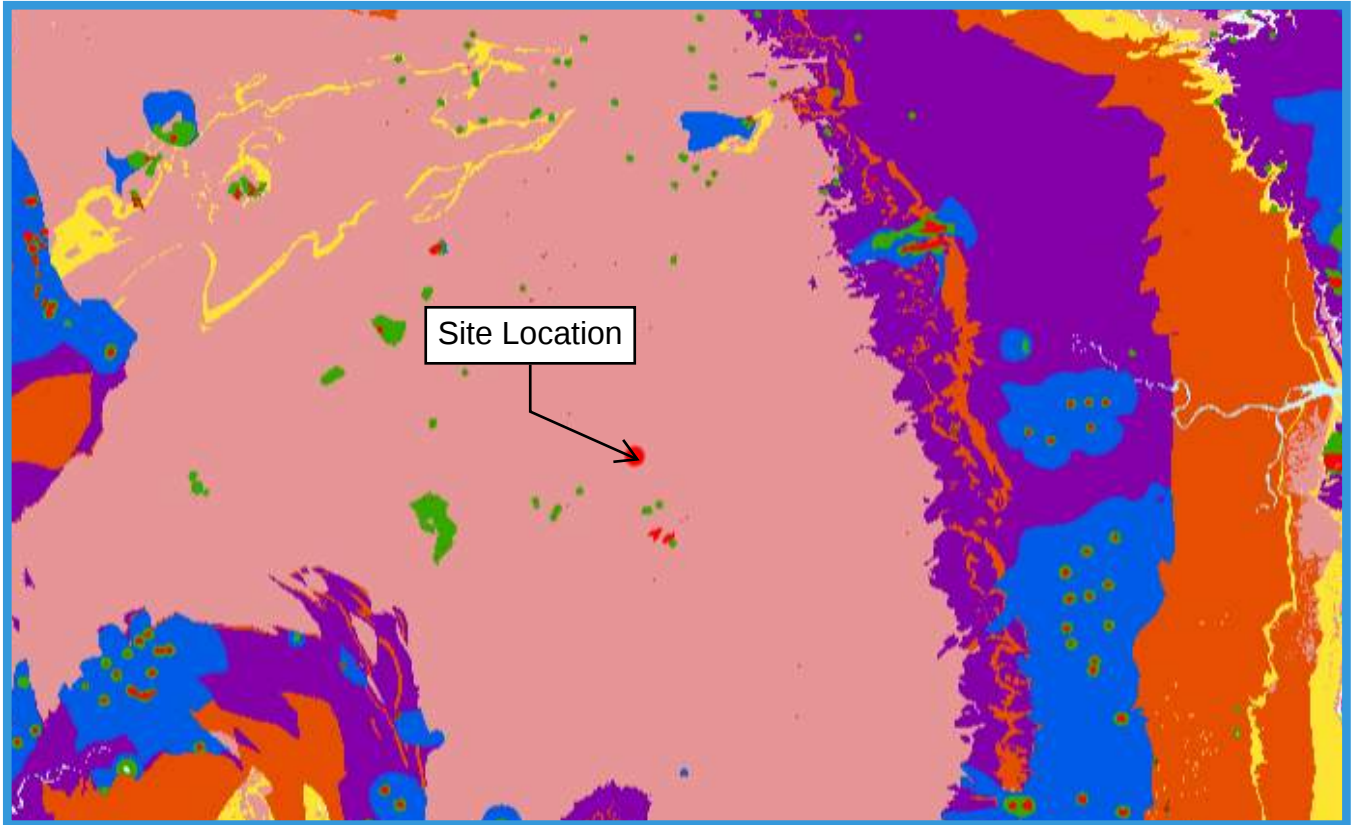


- High - greater than or equal to 1 in 30 (3.3%) chance of flooding in any year
- Medium –Less than 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) chance of flooding in any given year
- Low –Less than 1 in 100 (1%) but greater than or equal to 1 in 1000 (0.1%) chance of flooding in any given year
- Very low –less than 1 in 1000 (0.1%) chance of flooding in any given year



DEPTH





Site Check Results

Site Check Report generated on Mon Apr 27 2026

The following features have been found in your search area:

You selected the location: Centroid Grid Ref: SE15891869

Aquifer Designation Map (Superficial Drift) (England)

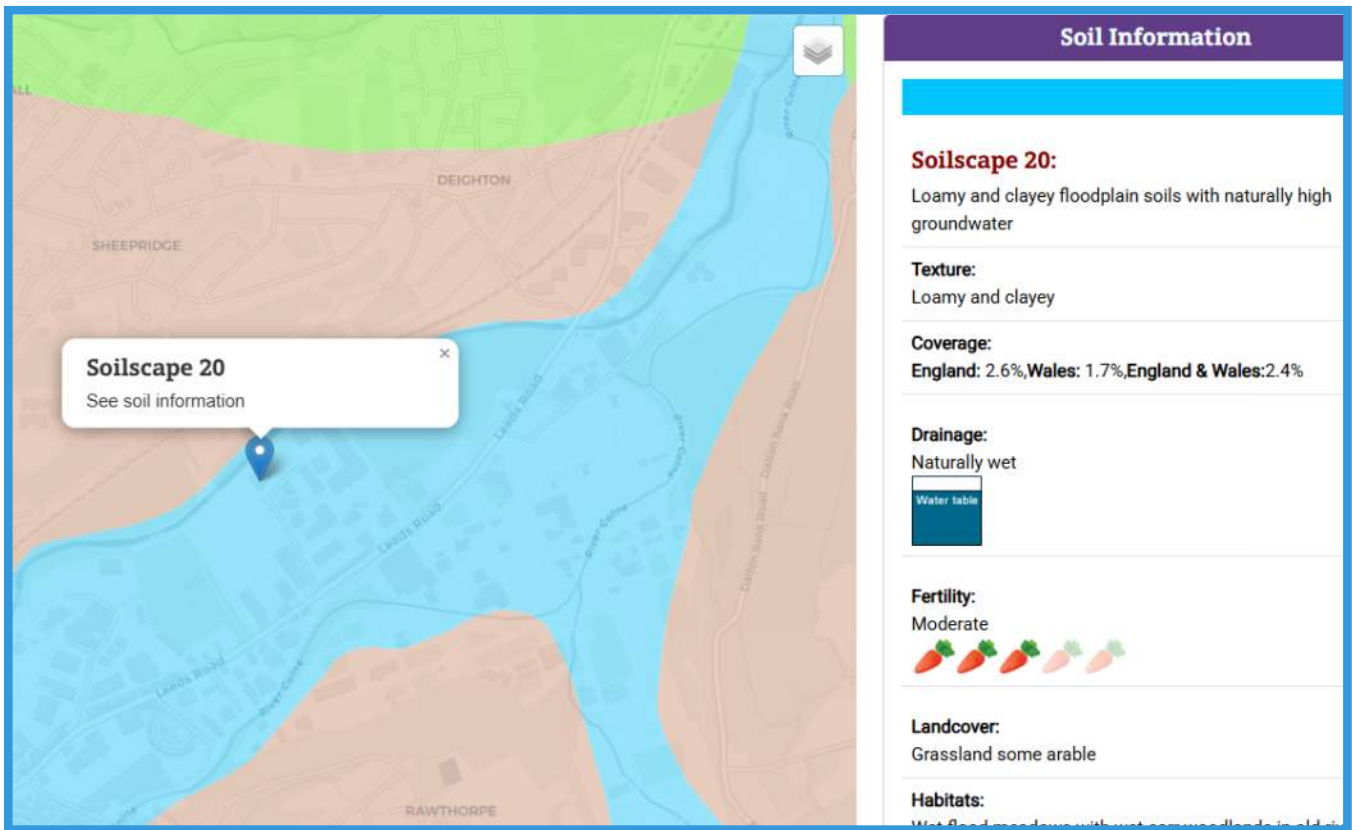
TYPOLGY Secondary A

Aquifer Designation Map (Bedrock) (England)

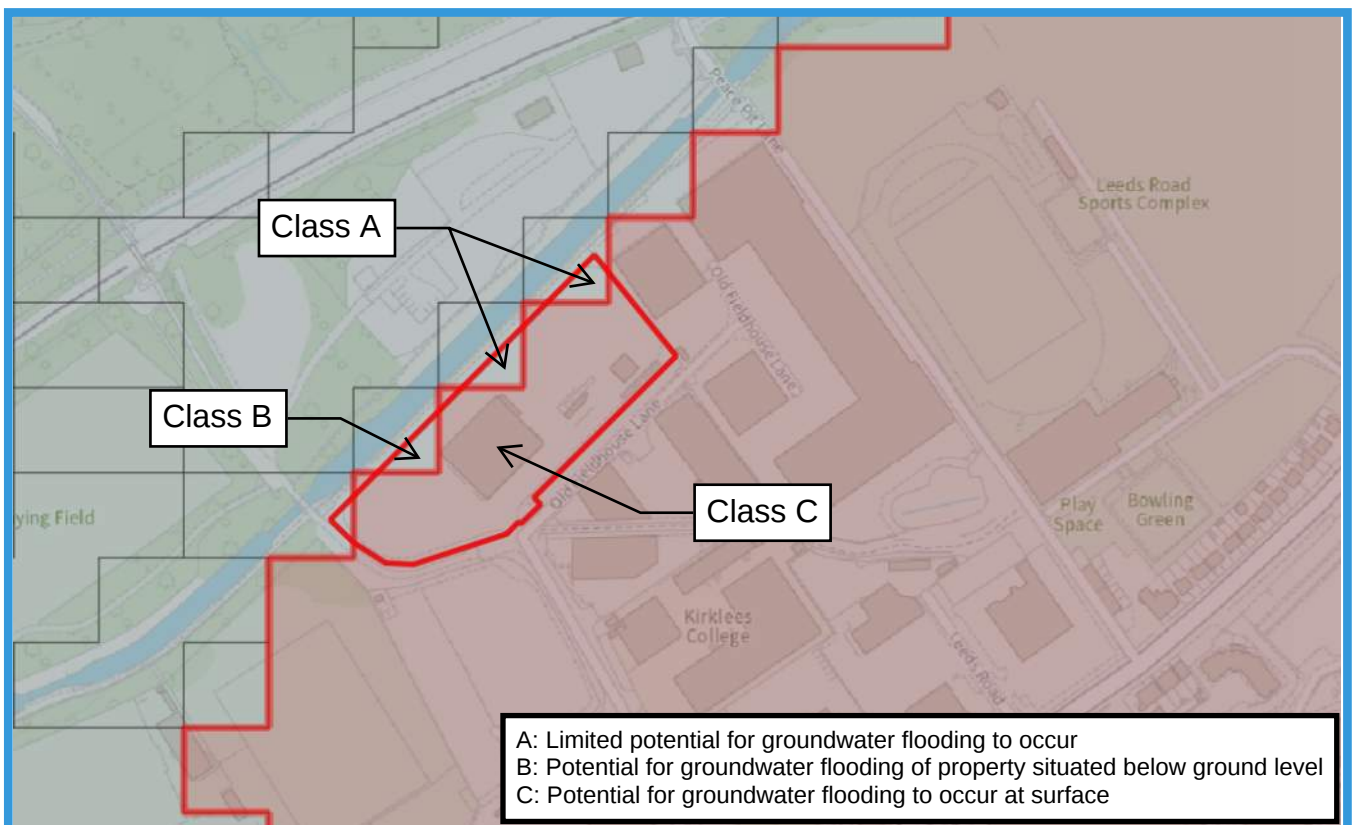
TYPOLGY Secondary A

Source Protection Zones merged (England)

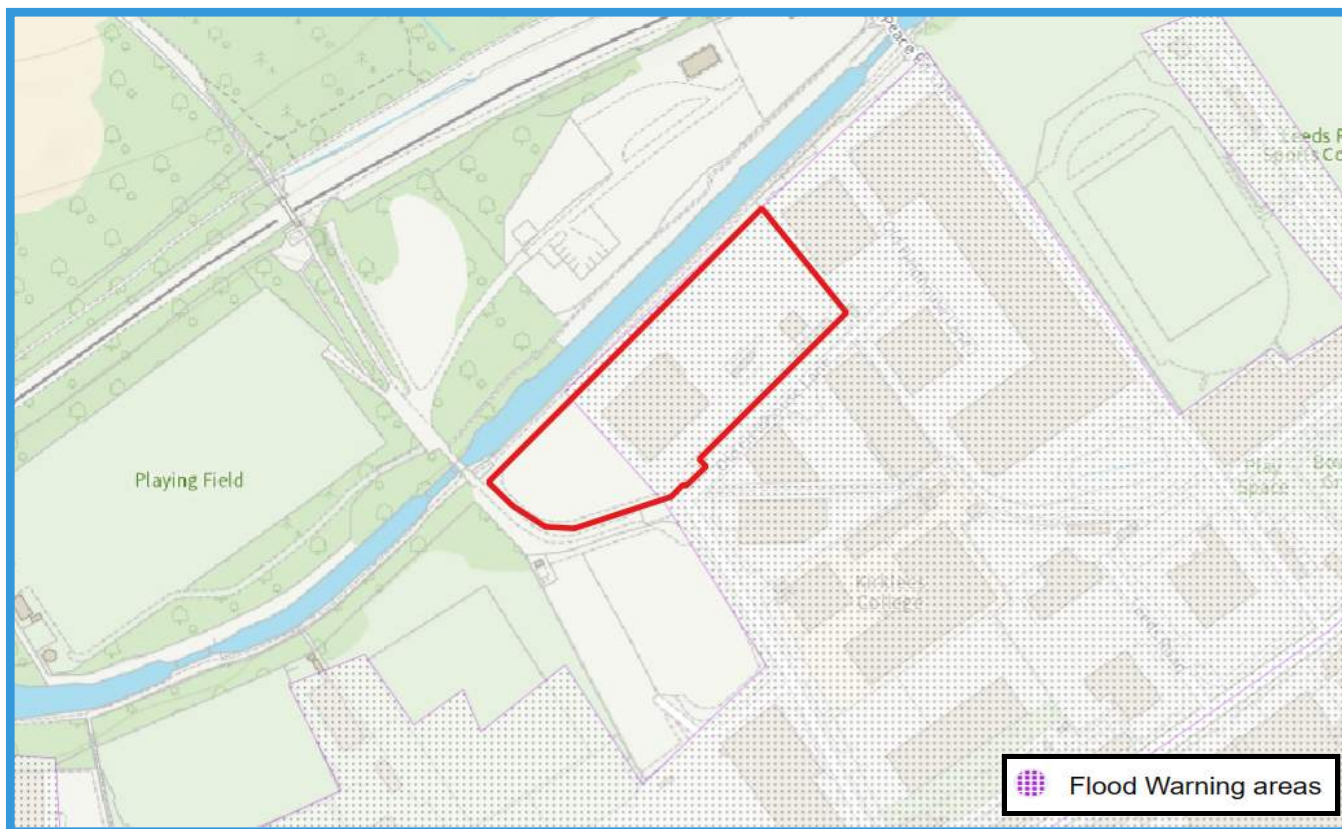
No Features found



GROUND WATER FLOOD RISK



FLOOD WARNING AREA



HISTORIC FLOOD MAP

