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ENVIRONMENT

Enviromena Project Management UK Limited
Engine Lane
Grimethorpe
Flood Risk Assessment

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Notice

EXECUTIVE SUMMARY

This Flood Risk Assessment (FRA) has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance (PPG). It has been produced on behalf of Enviromena Project Management UK Limited in respect of a planning application for the proposed construction of a temporary solar farm together with associated works, equipment and necessary infrastructure. The site consists of four land parcels located in the vicinity of Engine Lane, Grimethorpe, Barnsley.

This report demonstrates that the proposed development is at an acceptable level of flood risk, subject to the recommended flood mitigation strategies being implemented.

The site ownership boundary contains four individual parcels, referred to as Parcel A, B, C and D for the purposes of this report. This report has been prepared by assessing the risk of flooding from all sources at each individual parcel, where applicable.

The majority of the site is located within Flood Zone 1 which is land at low risk of flooding. Parcel A and B's access road is shown to be partially located within Flood Zone 2 attributed to a tributary of the River Dearne; however, there is no development proposed at this location, simply the preservation of existing access/egress routes. The other nearest extent of Flood Zone 2 is immediately south of Parcel D and is also attributed to a tributary of the River Dearne. Both of these Flood Zone 2 extents have been defined by a historical flood extent.

A network of ordinary watercourses and drainage features are located within and surround the site. In the absence of detailed hydraulic model information, pluvial extents and depths from the Environment Agency's (EA) Risk of Flooding from Surface Water (RoFSW) dataset have been assessed as a proxy. This dataset is considered conservative due to limitations associated with the modelling approach whereby structures (such bridges, culverts and weirs) are not represented. Surface water is subsequently shown to impound behind raised roads such as Engine Lane and Ferry Moor Lane, where water would otherwise be culverted through.

All parcels are shown to be largely at very low risk of surface water flooding with localised areas of low to high risk of surface water ponding within each parcel where topographic levels are lowest. The majority of this ponding, however, is likely overestimated due to the modelling limitations previously outlined. The proposed development is not anticipated to have an adverse impact on surface water runoff rates as rainfall will run off the solar panels and infiltrate into the ground.

It is also recommended that the associated ancillary equipment is raised 150mm above external ground levels to mitigate the risk of flooding. External levels adjacent to the ancillary equipment should be profiled away from the equipment to provide further mitigation. The solar panels are designed to be waterproof and raised 600mm above the surrounding ground level. Where proposed panels are situated in topographical low points and are shown to be at a high risk of surface water flooding, it is recommended that the lower edge of the solar arrays are raised a minimum of a 150mm above the 1 in 100-year surface water flood level.

Due to the geology underlying the site and the presence of nearby historical groundwater strikes, the site is considered to be at medium risk of groundwater flooding. Should groundwater be encountered during construction, a groundwater specialist should be appointed, and

appropriate dewatering procedures should be employed as necessary. Foundation types used for solar panels should be designed with appropriate consideration of the onsite groundwater levels.

In compliance with the requirements of NPPF, and subject to the mitigation measures proposed, the development could proceed without being subject to significant flood risk. Moreover, the development will not increase flood risk to the wider catchment area subject to suitable management of surface water runoff discharging from the site.

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1. INTRODUCTION

1.1 This Flood Risk Assessment (FRA) has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance (PPG). The FRA has been produced on behalf of Enviromena Project Management UK Limited in respect of a planning application for the proposed construction of a temporary solar farm together with associated works, equipment and necessary infrastructure. The site consists of four land parcels located in the vicinity of Engine Lane, Grimethorpe, Barnsley.

1.2 This FRA is intended to support a detailed planning application, the level of detail included is commensurate and subject to the nature of the proposals at the planning stage. Summary information is included as **Table 1.1**.

Table 1.1: Site Summary

Site Name	Engine Lane
Location	Grimethorpe, Barnsley
NGR (approx.)	SE 40093 09393
Application Site Area (ha)	90.63 (approx.)
Development Type	Solar farm
Flood Zone Classification	Flood Zone 1
NPPF Vulnerability	Essential infrastructure
Anticipated Development Lifetime	Up to 40 years
Environment Agency Office	Yorkshire
Lead Local Flood Authority	Barnsley Metropolitan Borough Council
Local Planning Authority	Barnsley Metropolitan Borough Council

Sources of Data

i. Topographical Survey by BWB Consulting, reference NFW-BWB-00-01-DR-G-0001.

ii. Planning Layout by Enviromena Project Management Ltd (reference: P007033-11-PlanningLayout).

iii. OS Explorer Series mapping

iv. 2022 1m spatial resolution Environment Agency (EA) Light Detection and Ranging (LiDAR) data

v. Barnsley Metropolitan Borough Council Strategic Flood Risk Assessment

vi. Barnsley Metropolitan Borough Council Preliminary Flood Risk Assessment

vii. Barnsley Local Plan

viii. Yorkshire Water Sewer Records

ix. British Geological Survey Drift & Geology Maps

Existing Site

1.3 The site boundary contains greenfield land located north and west of the village of Grimethorpe, situated within the metropolitan borough of Barnsley. The wider site is formed of four parcels within the vicinity of Engine Lane, located approximately 5.5km northeast of Barnsley town centre. The site is bound by Engine Lane through the centre, and Tippit Lane and Ferry Moor Lane to the south. The surrounding area comprises of existing residential developments and farmland.

1.4 The site boundary and the individual development parcels which make up the site are illustrated within **Figure 1.1.**

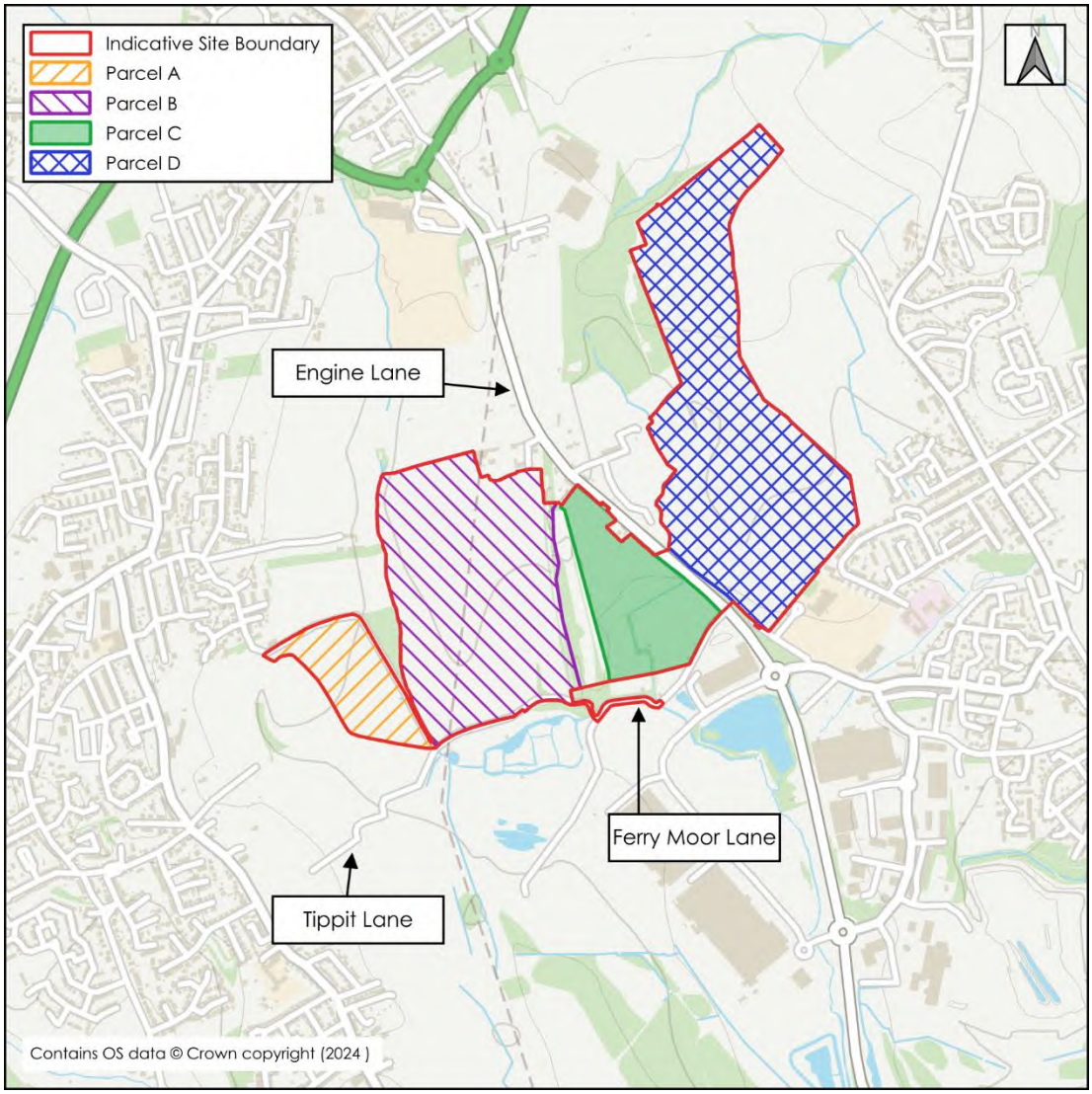


Figure 1.1: Site Location

1.5 A topographical survey has been completed and is included as **Appendix 1**.

1.6 The survey shows that the general wider site falls from north to south. Each parcel is comprised of smaller areas which each fall in different directions respectively. Each land parcel is summarised in **Table 1.2**, the fall of each parcel is shown with EA Light Detection and Ranging (LiDAR) data. An extract of LiDAR mapping is included as **Figure 1.2**.

Table 1.2: Site Topographic Levels

Parcel	General Fall of Land	High Point (mAOD)	Low Point (mAOD)
A	North to south	54.3	41.3
B	North to south	59.4	41.2
C	North to south	50.6	36.6
D	Northeast to southwest	70.6	38.1

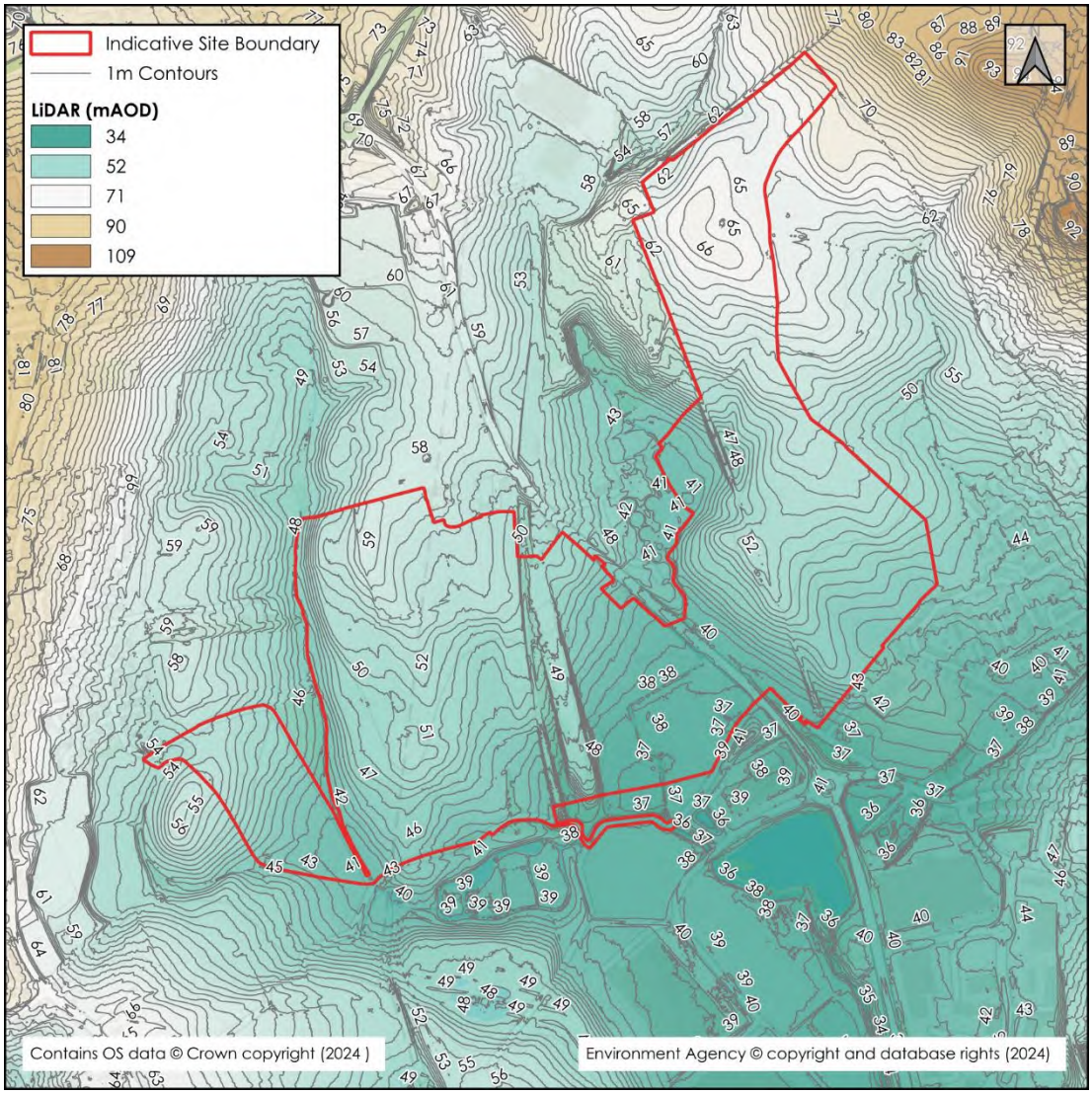


Figure 1.2: Site Topography

1.7 The current site comprises greenfield land consisting of arable farmland. The main access and egress route to each parcel of land is outlined below:

- Parcels A and B are accessed via Ferry Moor Lane to the south of the site.
- Parcel C and D are accessed via Engine Lane to the east and west of each respective parcel.

Proposed Development

1.8 The proposed development is for the construction of a temporary Solar Farm, including the installation of ground-mounted solar panels together with associated works, equipment, and necessary infrastructure.

1.9 It is proposed to install a fence around each parcel of the site. The proposed site layout is included as **Appendix 2**.

2. FLOOD RISK PLANNING POLICY & GUIDANCE

National Planning Policy Framework

2.1 The NPPF[1] sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. PPG is also available online[2].

2.2 The PPG sets out the vulnerability to flooding of different land uses. It encourages development to be located in areas of lower flood risk where possible and stresses the importance of preventing increases in flood risk off site to the wider catchment area.

2.3 The PPG also states that alternative sources of flooding, other than fluvial (river flooding), should be considered when preparing an FRA.

2.4 The PPG includes a series of tables that define Flood Zones (Table 1), the flood risk vulnerability classification of development land uses (Table 2) and 'compatibility' of development within the defined Flood Zones (Table 3). Table 2 and Table 3 are recreated within **Appendix 3** of this report for reference.

2.5 This FRA is written in accordance with the NPPF and the PPG.

Flood Map for Planning

2.6 With particular reference to planning and development, the Flood Map for Planning identifies Flood Zones in accordance with Table 1 of the PPG. Further details on the Flood Zone classifications are outlined in **Table 2.1**.

Table 2.1: Flood Zone Classifications

Flood Zone	Description
Flood Zone 1 (Low Probability)	Land having less than a 1 in 1000 annual probability of river or sea flooding (<0.1% Annual Exceedance Probability). All land outside of Flood Zone 2 and 3.
Flood Zone 2 (Medium Probability)	Land having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1% AEP); or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1% AEP).
Flood Zone 3a (High Probability)	Land having a 1 in 100 or greater annual probability of river flooding (>1% AEP); or land having a 1 in 200 or greater annual probability of flooding from the sea (>0.5% AEP). This is represented by "Flood Zone 3" on the Flood Map for Planning.
Flood Zone 3b (The Functional Floodplain)	Flood Zone 3b (The Functional Floodplain) is defined as land where water must flow or be stored in times of flood. This is not identified or separately distinguished from Zone 3a on the Flood Map for Planning.

[1] Revised National Planning Policy Framework, Ministry of Housing, Communities & Local Government, amended December 2024
[2] Planning Practice Guidance: https://www.gov.uk/government/collections/planning-practice-guidance, amended February 2024

2.7 The majority of the site is shown to be located within Flood Zone 1, as shown in **Figure 2.1**. Parcel A and B's access road is shown to be partially located within Flood Zone 2, attributed to a tributary of the River Dearne. The other closest Flood Zone extent is located at the southern boundary of Parcel D, also attributed to a tributary of the River Dearne. The River Dearne is the closest EA Main River, located approximately 1.8km south of the site.

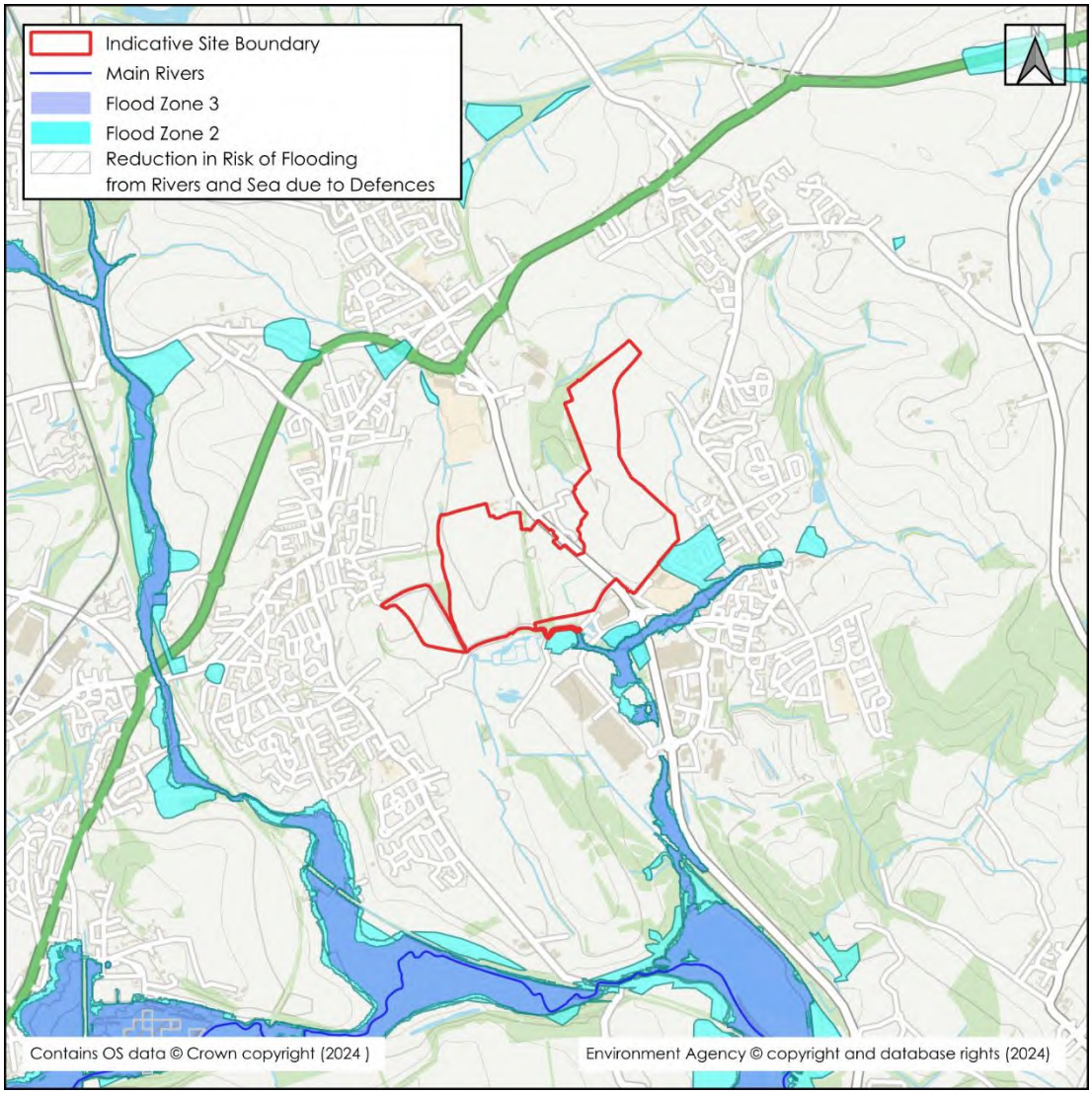


Figure 2.1: Flood Map for Planning

The Design Flood

2.8 The PPG identifies that new developments should be designed to provide adequate flood risk management, mitigation, and resilience against the 'design flood' for their lifetime.

2.9 This is a flood event of a given annual flood probability, which is generally taken as fluvial (river) and surface water (pluvial) flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year), or tidal flooding with a 0.5% annual probability (1 in 200

chance each year), against which the suitability of a proposed development is assessed and mitigation measures, if any, are designed.

Climate Change

Peak River Flow

2.10 Predicted future changes in peak river flows caused by climate change are provided by the EA[3], with a range of projections applied to regionalised 'River Basin Districts', which are further subdivided into Management Catchments.

2.11 The site falls within the Don and Rother Management Catchment of the Humber River Basin District. **Table 2.2** identifies the relevant peak river flow climate change allowances from this Management Catchment.

Table 2.2: Peak River Flow Climate Change Allowances for the Don and Rother Management Catchment within the Humber River Basin District

Allowance Category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2125)
Upper End	25%	36%	60%
Higher Central	15%	21%	38%
Central	11%	15%	28%

2.12 When determining the appropriate allowance for use in an FRA the Flood Zone classification, flood risk vulnerability and the anticipated lifespan of the development should be considered. **Table 2.3** provides a matrix summarising the EA's guidance on determining the appropriate allowance(s).

Table 2.3: Application of Appropriate Peak River Flow Climate Change Allowances

Flood Zone	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
1	Use the central allowance where a location may fall within Flood Zone 2 or 3 in the future.				
2	Use the higher central allowance	Use the central allowance			
3a	Use the higher central allowance	Development should not be permitted	Use the central allowance		

[3] Environment Agency, Flood risk assessments: climate change allowances: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances. Last Accessed December 2024.

Flood Zone	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
3b	Use the higher central allowance	Development should not be permitted			Use the central allowance
If development is considered appropriate by the local authority when not in accordance with Flood Zone vulnerability categories, then it would be appropriate to use the higher central allowance.					

2.13 The site is located entirely within Flood Zone 1, the proposed development is classified as 'Essential Infrastructure' and has an anticipated lifespan of up to 40 years.

2.14 Future flood mapping appended within the Barnsley Level 1 Strategic Flood Risk Assessment[4] (SFRA) shows the site is located outside of the modelled 1 in 100-year +22% climate change flood scenario. An extract of the mapping is included as **Appendix 4**.

2.15 This mapping however does not include the watercourses in the area surrounding the site and may not provide an accurate representation of future flood risk. Therefore, taking a conservative approach, the Central allowance for the '2050s' epoch should be considered.

2.16 Therefore, to ensure the development is designed adequately for its lifetime an allowance of 15% should be considered as part of the assessment.

Peak Rainfall

2.17 Predicted future changes in peak rainfall intensity caused by climate change are provided by the EA[5], with a range of projections applied to River Basin District Management Catchments.

2.18 The site falls within the Don and Rother Management Catchment. **Table 2.4** identifies the relevant peak rainfall climate change allowances from this Management Catchment.

Table 2.4: Peak Rainfall Climate Change Allowances for the Don and Rother Management Catchment

Allowance Category	Total potential change anticipated for the '2050s' epoch (2022 to 2060)		Total potential change anticipated for the '2070s' epoch (2061 to 2125)	
	1 in 30-Year	1 in 100-Year	1 in 30-Year	1 in 100-Year
Upper End	35%	40%	35%	40%
Central	20%	20%	25%	25%

[4] Strategic Flood Risk Assessment (JBA Consulting, September 2010)
[5] Environment Agency, Flood risk assessments: climate change allowances: Environment Agency, Flood risk assessments: climate change allowances: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances. Last Accessed December 2024.

2.19 The future increase in rainfall will need to be considered when designing a development to ensure its drainage system is sufficient for its lifetime and that it does not increase flood risk elsewhere. When determining the appropriate allowance(s) the anticipated lifespan of the development should be considered. **Table 2.5** provides a summary of the EA's guidance on determining the appropriate allowance(s).

Table 2.5: Application of Appropriate Peak Rainfall Climate Change Allowances – new Development Drainage Design

Area Assessed	Anticipated Development Life Span		
	up to 2060	between 2061 and 2100	up to or beyond 2100*
Development Sites^ Assess the 1 in 30-year and 1 in 100-year storm events with the respective climate change allowance(s) applied. Development to be designed so that with the climate change allowance applied to the 1 in 100-year storm: • there is no increase in flood risk elsewhere • the development will be safe from surface water flooding	Use the Central Allowance for the 2050s	Use the Central Allowance for the 2070s+	Use the Upper End Allowance for the 2070s+

**Includes all residential developments*
^the Lead Local Flood Authority may have local standards that also need to be considered.
+unless the 2050s allowance is greater

2.20 The development site has an anticipated lifespan of up to 40 years. Therefore, the Central allowance for the '2070s' epoch will need to be considered in the design of the associated drainage infrastructure.

Strategic Flood Risk Assessment

2.21 An SFRA is a study carried out by one or more local planning authorities to assess the risk to an area from flooding from all sources, now and in the future.

2.22 The Barnsley Level 1 SFRA has been reviewed in the production of this FRA. The SFRA provides information specific to the site location in the form of fluvial, surface water and groundwater flood risk mapping, as well as records of historical flooding. It also includes flood risk policy and guidance for the area. Information from the Level 1 SFRA will be referenced within **Section 3** where applicable.

2.23 The SFRA references historical flooding occurring within the Dearne Valley in 1807, 1875, 1886, 1947, 2000, and 2007. However, none of these are reported to have impacted the site location.

Preliminary Flood Risk Assessment

2.24 A Preliminary Flood Risk Assessment (PFRA) is an assessment of floods that have taken place in the past and floods that could take place in the future. It generally considers flooding from surface water runoff, groundwater and ordinary watercourses, and is prepared by the Lead Local Flood Authorities (LLFAs).

2.25 The Barnsley Metropolitan Borough Council PFRA[6] considers flooding from surface water runoff, groundwater, ordinary watercourses and canals. It also references the historical river flooding which occurred in the local area in the 1950s, 1960s, and 1970s. However, no historical instances of flooding at the site are referenced. Information from the PFRA will be referenced within **Section 3** where applicable.

2.26 The Barnsley Metropolitan Borough Council PFRA Addendum[7] provides an update to the 2011 PFRA. However, it is reported that there are no changes to past flood risk since the 2011 assessment.

Local Flood Risk Management Strategy

2.27 A Local Flood Risk Management Strategy (LFRMS) is prepared by an LLFA to help understand and manage flood risk at a local level.

2.28 The LFRMS aims to ensure that the knowledge of local flood risk issues is communicated effectively so that they can be better managed. The LFRMS also aims to promote sustainable development and environmental protection.

2.29 The Barnsley Metropolitan Borough Council LFRMS[8] has been reviewed and will be referenced within this report where applicable.

River Basin Flood Risk Management Plan

2.30 Flood Risk Management Plans (FRMPs) explain the risk of flooding from rivers, the sea, surface water, groundwater and reservoirs. FRMPs set out how risk management authorities will work with communities to manage flood and coastal risk. Risk management authorities include the EA, Natural Resources Wales, local councils, internal drainage boards, Highways England and LLFAs.

2.31 The first FRMPs were published in March 2016 and subsequently updated in December 2022. They describe actions to manage flood risk across England between 2021 to 2027.

2.32 The site is located within the Humber River Basin District, and the Humber River Basin District FRMP[9] has been reviewed. However, there are no relevant site scale objectives which relate to the site location.

[6] Preliminary Flood Risk Assessment (Barnsley Metropolitan Borough Council, July 2011)
[7] Preliminary Flood Risk Assessment Addendum (Barnsley Metropolitan Borough Council, December 2017)
[8] Local Flood Risk Management Strategy (Barnsley Metropolitan Borough Council, September 2017)
[9] Humber River Basin District Flood Risk Management Plan 2021 to 2027 (Environment Agency, December 2022)

Local Plan

2.33 The Barnsley Local Plan[10] has been reviewed in the production of this FRA. The Local Plan sets out the key elements of the planning framework for Barnsley, and the approach to its long term physical development goals.

2.34 The Local Plan outlines the core policies to deliver their goals. Key policies are summarised below:

Policy CC1: Climate Change

2.35 The council will seek to reduce the causes of and adapt to the future impacts of climate change by:

- Locating and designing development to reduce the risk of flooding.
- Promoting the use of Sustainable Drainage Systems (SuDS)

Policy CC3: Flood Risk

2.36 The council will accept developments in which the extent and impact of flooding will be reduced by:

- Not permitting new development where it would be at an unacceptable risk of flooding from any sources of flooding, or would give rise to flooding elsewhere.
- Ensuring that in the Functional Floodplain (Flood Zone 3b), only water compatible development or essential infrastructure will be allowed.
- Development proposals over 0.4 hectares in Flood Zone 1 will demonstrate how the proposal will make a positive contribution to reducing or managing flood risk.
- Development on greenfield sites to maintain or reduce existing run-off rates requiring development proposals to use SuDS.

Policy CC4: Sustainable Drainage Systems

2.37 All major development will be expected to use SuDS to manage surface water drainage, unless it can be demonstrated that all types of SuDS are inappropriate.

[10] Barnsley Local Plan (Barnsley Metropolitan Borough Council, January 2019)

3. POTENTIAL SOURCES OF FLOOD RISK

3.1 Flooding can occur from a variety of sources, or combination of sources, which may be natural or artificial. **Table 3.1** below identifies the potential sources of flood risk to the site in its current condition, and the impacts which the development could have in the wider catchment, prior to mitigation. These are discussed in greater detail in the forthcoming section. The mitigation measures proposed to address flood risk issues and ensure the development is appropriate for its location are discussed within **Section 4**.

Table 3.1: Pre-Mitigation Sources of Flood Risk

Flood Source	Potential Risk				Description
	High	Medium	Low	None	
Fluvial (Main Rivers)			X		The majority of the site is located in Flood Zone 1, which is land at low risk of fluvial flooding.
Fluvial (Ordinary Watercourses)		X			The majority of the site is located outside of pluvial flood extents. Some localised areas of low to high risk surface water ponding are predicted to occur behind raised infrastructure where the surface water modelling does not represent in-channel structures.
Pluvial Runoff			X		The site is shown to be at an overall low risk of pluvial flooding.
Canals			X		The Barnsley Canal is located approximately 2.3km northwest of the site.
Groundwater		X			The site is at a medium risk of groundwater flooding, due to the underlying geology and groundwater found near the site.
Reservoirs and waterbodies				X	The site is shown to fall outside of the area at risk of all reservoir failure extents.
Sewers			X		There are no sewers located within the site. There is a potential residual risk posed to Parcel D by the sewerage treatment works located on the western site boundary.

Flood Source	Potential Risk				Description
	High	Medium	Low	None	
Effect of Development on Wider Catchment			X		Given the nature of the proposed development there is a negligible risk of impedance of flood routes and/or displacement of floodplains from the solar arrays. It is recommended that associated ancillary equipment is located outside of surface water flood extents.
Effect of Development on Wider Catchment			X		The nature of the proposed development will have a negligible impact on the surface water runoff and volume regime within each parcel.

Fluvial Flood Risk

3.2 Flooding from watercourses occurs when flows exceed the capacity of the channel, or where a restrictive structure is encountered, which leads to water overtopping the banks into the floodplain. This process can be exacerbated when debris is mobilised by high flows and accumulates at structures.

Main Rivers

3.3 As shown in **Figure 2.1**, the majority of the site is located within Flood Zone 1, which is land at low risk of fluvial flooding. The nearest EA Main River to the site is the River Dearne, located approximately 1.5km south of the nearest site boundary. Flood defences are present on the banks of the River Dearne, with a standard of protection for up to a 1 in 30-year return period.

3.4 Parcel A and B's access road is shown to be partially located within Flood Zone 2, however, there is no development proposed at this location, simply the preservation of existing access/egress routes. The other closest flood extent is located at the southern boundary of Parcel D, attributed to a tributary of the River Dearne. EA LiDAR data shows that Parcel D is situated approximately 4m above the tributary, with levels falling towards the watercourse.

3.5 Climate change scenario mapping appended to the Barnsley Level 1 SFRA shows the site to be located outside of all fluvial flood extents during the 1 in 100-year +22% climate change scenario. An extract of mapping is included as **Appendix 4**. The mapping shows the tributary to the south of parcel D to remain in-channel during the climate change scenario. Flood Zone 2 mapping appended to the SFRA also shows the tributary to remain in-channel during this event, therefore, the Flood Map for Planning may show a misrepresentation of the risk at the site.

3.6 Overall, the site is considered to be at low risk of flooding from Main Rivers.

Ordinary Watercourses

3.7 A network of Unnamed Ordinary Watercourses (UOWs) and drainage features are located within and surrounding the site, the watercourses are shown in **Figure 3.1**. The topographical survey shows the ditches within the site are shallow in nature, with a maximum depth of 1.2m and an average depth of 0.6m. The Barnsley Level 1 SFRA states that there is a known issue of flooding regarding ordinary watercourses due to them having limited channel capacity.

Figure 3.1: Network of Drains and Ordinary Watercourses in Site Vicinity

3.8 In the absence of detailed hydraulic model information, pluvial extents and depths from the EA's Risk of Flooding from Surface Water (RoFSW) mapping dataset have been assessed as a proxy. RoFSW mapping and depth mapping during the 1 in 100-year event are included as **Figure 3.2** and **Figure 3.3**.

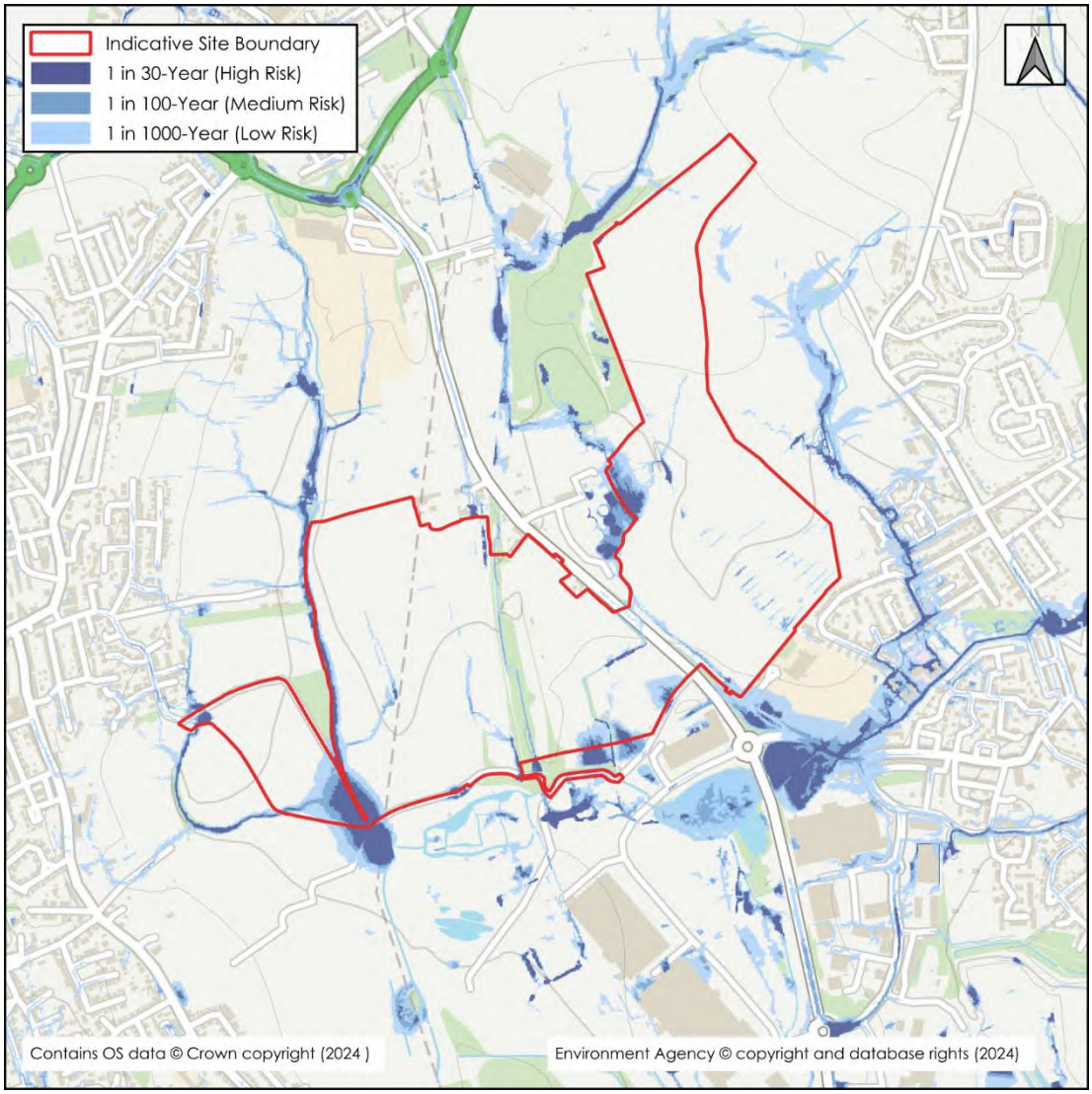


Figure 3.2: Risk of Flooding from Surface Water Mapping

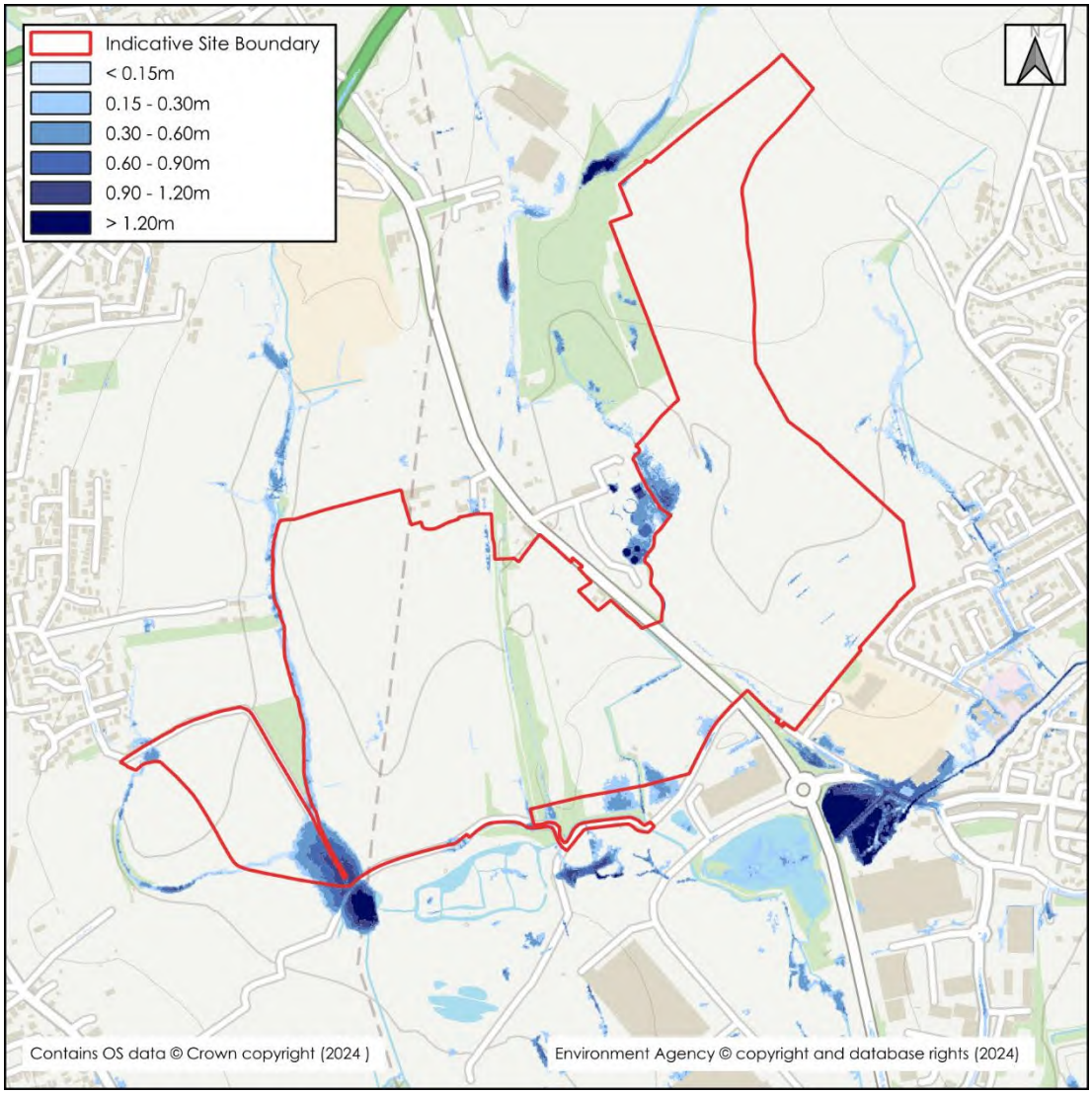


Figure 3.3: Surface Water Flood Depths Mapping for the 1 in 100-year Event

3.9 The surface water flood map shows the site is at an overall medium risk of flooding attributed to the UOWs, with pluvial flow routes shown to align with most watercourses. This dataset however is considered conservative due to limitations associated with the modelling approach whereby structures (such as bridges, culverts and weirs) are not represented.

Parcel A and B

3.10 Parcel A and B are shown to be at a medium to high risk of flooding, with a large area of high risk surface water ponding shown at the southern site boundary attributed to a topographical low point within the parcels. The topographical survey shows the presence of a 450mm diameter culvert at the southern parcel boundary where flows are shown to come out of bank.

3.11 The area of high risk surface water ponding is shown to flood to depths of up to 1.2m during the 1 in 100-year event.

Parcel C

3.12 Parcel C is shown to be at low to medium risk of flooding, with most of the parcel located outside of pluvial flood extents and flows within the UOW through the site being constrained to the channel. An area of low to high risk ponding is seen at the southern parcel boundary associated with a topographical low point within the parcel where the watercourse exceeds its channel capacity. The topographical survey shows the presence of a 600mm diameter culvert at the southern parcel boundary where flows are shown to come out of bank.

3.13 The areas of low to high risk ponding are shown to flood the parcel with depths of up to 0.6m during the 1 in 100-year event.

Parcel D

3.14 Parcel D is shown to be at an overall low risk of flooding, with most of the parcel located outside of pluvial flood extents. The UOW which flows along the western site boundary is shown to pose little risk, with most flows being constrained to the channel. An area of low to high risk pluvial ponding is shown at the western parcel boundary, attributed to topographical low point within the parcel in close proximity to a sewerage treatment works. The topographical survey shows the presence of a culvert at the western parcel boundary where flows are shown to come out of bank; however, no dimensions of the culvert are provided.

Summary

3.15 The risk shown to each parcel may be overrepresented due to the nature of the mapping whereby structures (bridges, culverts and weirs) are not represented. Surface water is subsequently shown to impound behind raised roads such as Engine Lane, Tippit Lane, and Ferry Moor Lane, where water would otherwise be conveyed through via a culvert.

3.16 When considering the future impacts of climate change on the flows within the UOWs, it is expected that there will be an increase in the floodplain extents and depths. However, it is expected that large portions of each parcel will be unaffected by any potential flooding from these watercourses.

3.17 Overall, the site is considered to be at a medium risk of flooding attributed to UOWs. However, this risk may be overrepresented in areas where culverted watercourses are located within each parcel. Mitigation measures to reduce the potential risk of flooding are outlined in **Section 4**.

Historical Flooding

3.18 The EA Historical Flood Map shows one previous recorded flood outline to have impacted Parcel A and B's access road. This occurred in February 2020 during storm Ciara and is attributed to the tributary of the River Dearne exceeding its channel capacity.

3.19 Six other previous recoded flood outlines are located near the site, with the nearest previous recorded flood outline located at the southern boundary of Parcel D. An extract of mapping is included as **Figure 3.4**.

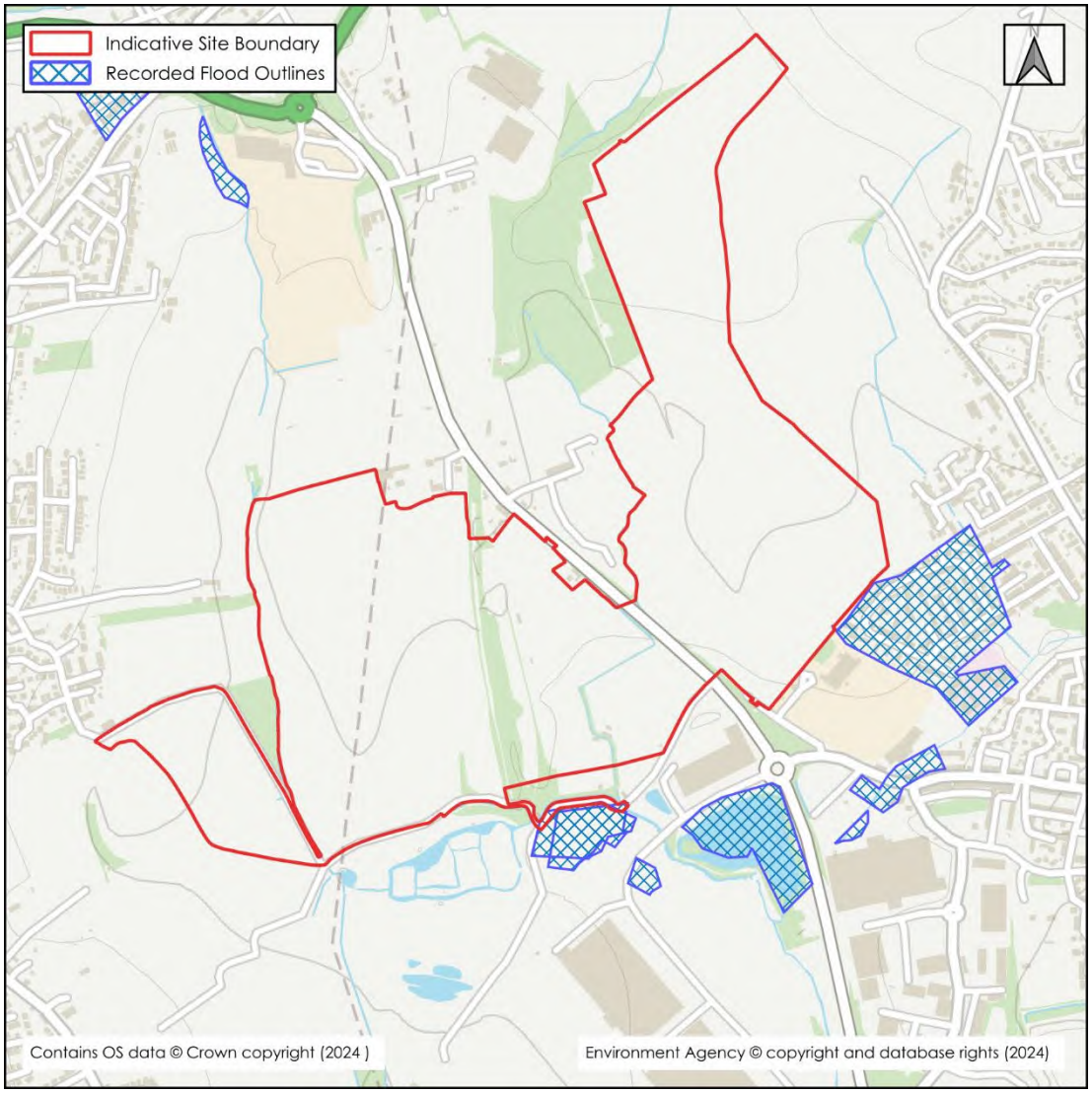


Figure 3.4: Historical Flood Map

3.20 The historical flood event which impacted land south of Parcel D occurred in June 2007 and is attributed to the tributary of the River Dearne. However, the cause of flooding is not reported. June 2007 is reported within the Barnsley Level 1 SFRA where major flooding occurred within the Dearne Valley. The 'Historical Flood Events' map appended to the SFRA confirms there are no previously recorded flood events which have impacted the site.

3.21 The Barnsley Metropolitan Borough Council PFRA and LFRMS do not report any historical fluvial flood events which have impacted the site. The PFRA reports that flooding in 2007 was attributed to a 10-day sustained rainfall event which caused extensive flooding across the borough.

Pluvial Flood Risk

3.22 Pluvial flooding can occur during prolonged or intense storm events when the infiltration potential of soils, or the capacity of drainage infrastructure is overwhelmed leading to the accumulation of surface water and the generation of overland flow routes.

3.23 RoFSW mapping has been collated and published by the EA, this shows the potential flooding which could occur when rainwater does not drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead. An extract from the mapping is included as **Figure 3.3**.

3.24 The mapping shows that the site is at an overall low risk of pluvial flooding, with the majority of each land parcel located outside of pluvial flood extents, with small, isolated area of low risk ponding. There are some low to high areas of surface water ponding within each parcel that are attributed to the UOWs within the site and surrounding area; the risk is considered to be fluvial in origin and assessed within the 'Fluvial Flood Risk' section.

3.25 The Barnsley Metropolitan Borough Council PFRA and LFRMS report two previous surface water flood events which occurred in January 2008 and July 2012 caused by periods of intense storms and rainfall, however, neither event impacted the site area.

3.26 Overall, outside of isolated areas where high risk pluvial ponding is seen attributed to the UOWs, the wider site is considered to be at low risk of pluvial flooding.

Flood Risk from Canals

3.27 The Canal and River Trust (CRT) generally maintains canal levels using reservoirs, feeders and boreholes and manages water levels by transferring it within the canal system.

3.28 Water in a canal is typically maintained at predetermined levels by control weirs. When rainfall or other water enters the canal, the water level rises and flows out over the weir. If the level continues rising it will reach the level of the storm weirs. The control weirs and storm weirs are normally designed to take the water that legally enters the canal under normal conditions. However, it is possible for unexpected water to enter the canal or for the weirs to become obstructed. In such instances the increased water levels could result in water overtopping the towpath and flowing onto the surrounding land.

3.29 Flooding can also occur where a canal is impounded above surrounding ground levels and the retaining structure fails.

3.30 The nearest functioning canal to the site is the Sheffield and South Yorkshire Navigation Canal, located approximately 12.5km southeast of the site. The closed Barnsley Canal is located approximately 2.3km northwest of the site. EA LiDAR data shows the site is elevated approximately 1m above the Barnsley Canal.

3.31 The Barnsley Level 1 SFRA states that the Barnsley Canal is proposed to be restored and realigned in the future, however, this process is still ongoing. The SFRA reports one previous flood incident associated with the canal due to the canal overtopping in 1861

near Royston, located approximately 4km northwest of the site; however, an exact location of flooding is not provided.

3.32 The Barnsley Metropolitan Borough Council PFRA states that the Barnsley Canal poses future flood risk. However, if a breach event was to occur in the future, due to the distance between the site and the canal and the intervening topography, the canal is not expected to pose flood risk to the site as flows would be conveyed in a south-easterly direction.

3.33 The canal is maintained by Barnsley Metropolitan Borough and British Waterways who have ultimate responsibility for the safety of their canal assets. Based on the safety legislation in place and the maintenance and repair responsibilities of these authorities, the actual probability of a significant failure is considered to be low. Therefore, the risk of flooding at the site from this source is also considered to be low.

Groundwater Flood Risk

3.34 Groundwater flooding occurs when the water table rises above ground elevations. It is most likely to happen in low lying areas underlain by permeable geology. This is most common on regional scale chalk aquifers, but there may also be a risk on sandstone and limestone aquifers or on thick deposits of sands and gravels underlain by less permeable strata such as that in a river valley.

3.35 The British Geological Survey (BGS) mapping shows the site is underlain by multiple different geology types and superficial deposits, these are summarised in **Table 3.2** and shown in **Figure 3.5** and **Figure 3.6**.

3.36 The EA designates both the bedrock and superficial geology within the site to be a Secondary A Aquifer. These comprise permeable layers that can support local water supplies and may form an important source of base flow to rivers.

Table 3.2: Geological Classifications

Parcel	BGS Bedrock	BGS Superficial Deposits	Bedrock Aquifer Type	Superficial Deposit Aquifer Type
A, B and C	• Pennine Middle Coal Measures (Sandstone) • Pennine Middle Coal Measures (Mudstone, Siltstone, and Sandstone)	Alluvium (Clay and Silt)	Secondary A	Secondary A
D	• Pennine Middle Coal Measures (Sandstone) • Pennine Middle Coal Measures (Mudstone, Siltstone, and Sandstone) • Pennine Upper Coal Measures (Sandstone) • Pennine Upper Coal Measures (Mudstone, Siltstone, and Sandstone) • Ackworth Rock (Sandstone)	-	Secondary A	-

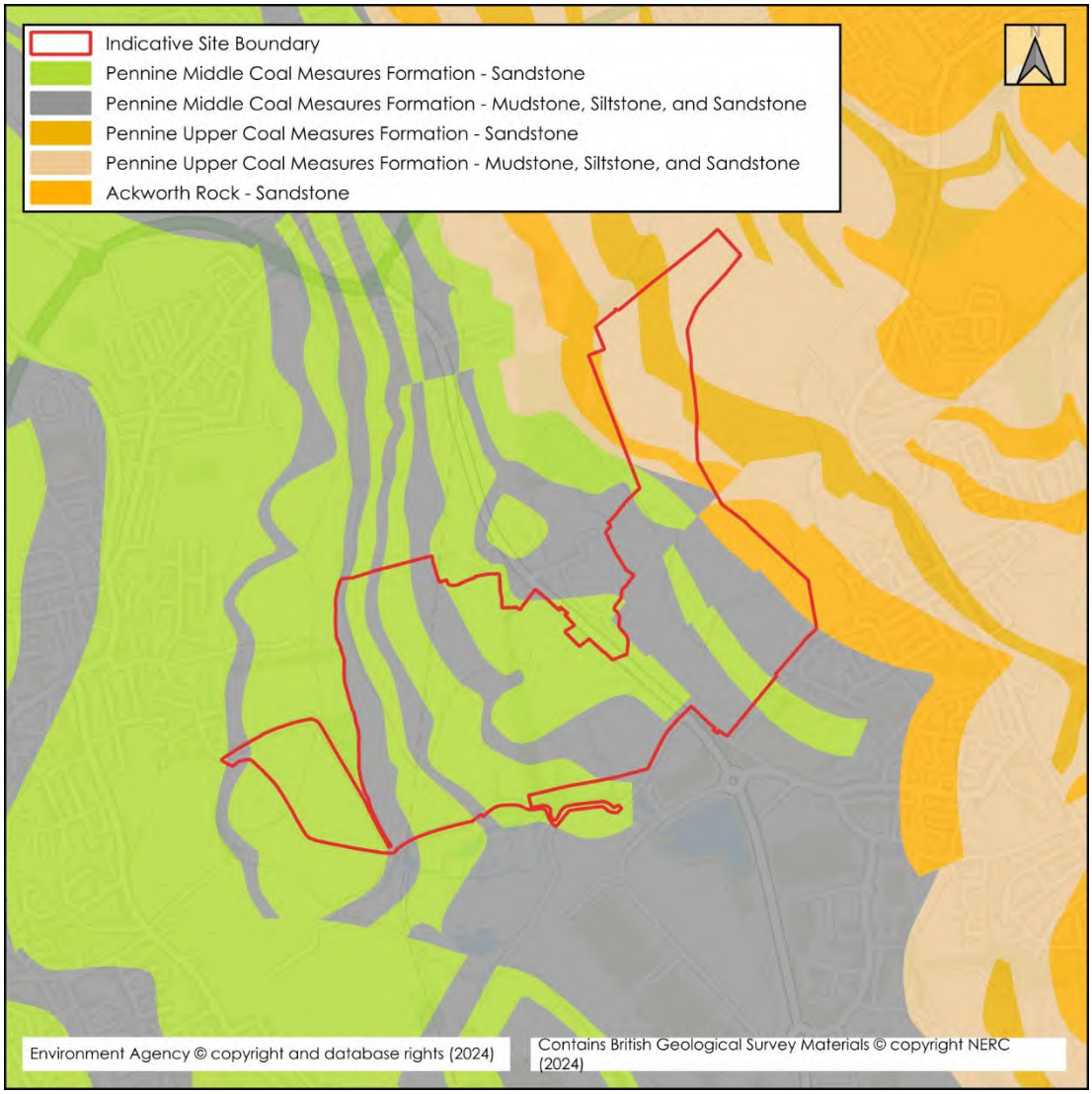


Figure 3.5: BGS Bedrock Map

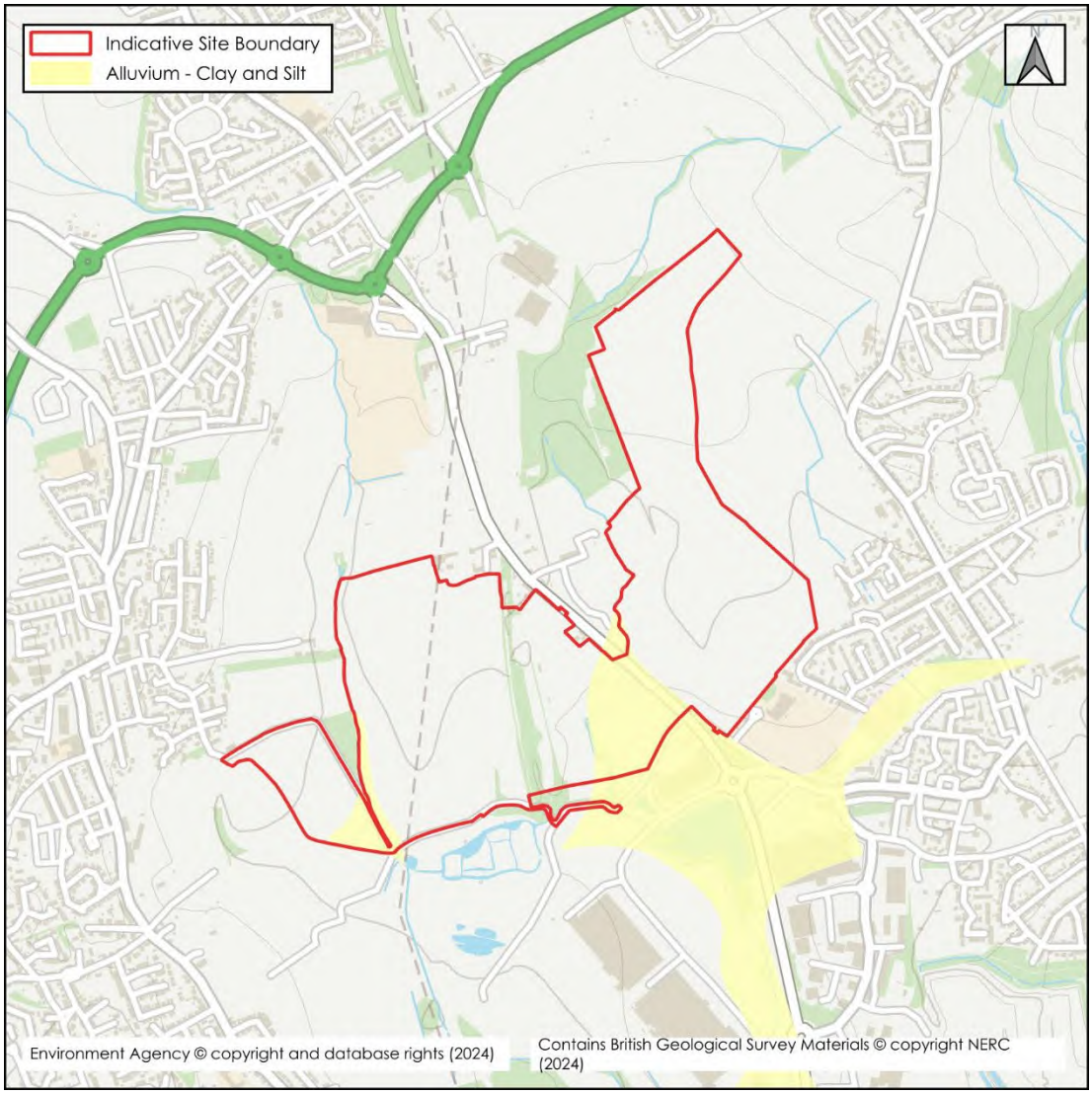


Figure 3.6: BGS Superficial Deposits Map

3.37 Neither the Barnsley Metropolitan Borough Council PFRA, LFRMS, or Barnsley Level 1 SFRA report any historical groundwater flood event which have impacted the site. The PFRA notes that groundwater rebound is not believed to be an issue within the borough.

3.38 The BGS holds historical records of borehole samples across the UK which include measurements of groundwater levels taken during the sample. These are measurements taken at one point in space and time and are not a substitute for a long-term record of groundwater levels. However, they can provide an indication of historical groundwater levels that could potentially be experienced.

3.39 There are no borehole logs located within the site. However, numerous borehole logs are located to the south of the site and are underlain by Pennine Middle Coal Measures. The nearest logs to the site have been assessed, including logs SE30NE202, SE40NW200, SE40NW201, SE40NW202, SE40NW253, SE40NW318, SE40NW319, and SE40NW320, all located approximately 20-40m south of the site.

3.40 Five logs taken between 1980-1981 report groundwater strikes, with recorded depths of 0.7m Below Ground Level (bgl) (SE30NE202), 3.3mbgl (SE40NW200), 1.8mbgl (SE40NW202), 3.2mbgl (SE40NW253), and 3.0mbgl (SE40NW318 and SE40NW320).

3.41 Overall, based on the geology classification and the presence of groundwater found near the site, the site is considered to be at medium risk of groundwater flooding. Therefore, further mitigation will be required as discussed in **Section 4**.

Flood Risk from Reservoirs & Large Waterbodies

3.42 Flooding can occur from large waterbodies or reservoirs if they are impounded above the surrounding ground levels or are used to retain water in times of flood. Although unlikely, reservoirs and large waterbodies could overtop or breach leading to rapid inundation of the downstream floodplain.

3.43 To help identify this risk, reservoir failure flood risk mapping has been prepared and included as **Figure 3.7**, this shows the largest area that might be flooded if a reservoir were to fail and release the water it holds. The map displays a worst-case scenario and is only intended as a guide.

3.44 There are two flooding scenarios shown on the reservoir flood maps: a 'dry-day' and a 'wet-day'. The 'dry-day' scenario predicts the flooding that would occur if the dam or reservoir failed when rivers are at normal levels. The 'wet-day' scenario predicts how much worse the flooding might be if a river is already experiencing an extreme flood.

3.45 The mapping shows the site is located outside of all reservoir failure extents during the 'dry-day' and 'wet-day' scenarios. The nearest extent is located approximately 800m southwest of the site attributed to Bretton Lakes, located approximately 11.7km northwest of the site.

3.46 Due to the distance between the site and Bretton Lake's nearest failure extents, the risk posed to the site from reservoirs and large waterbodies is considered to be negligible.

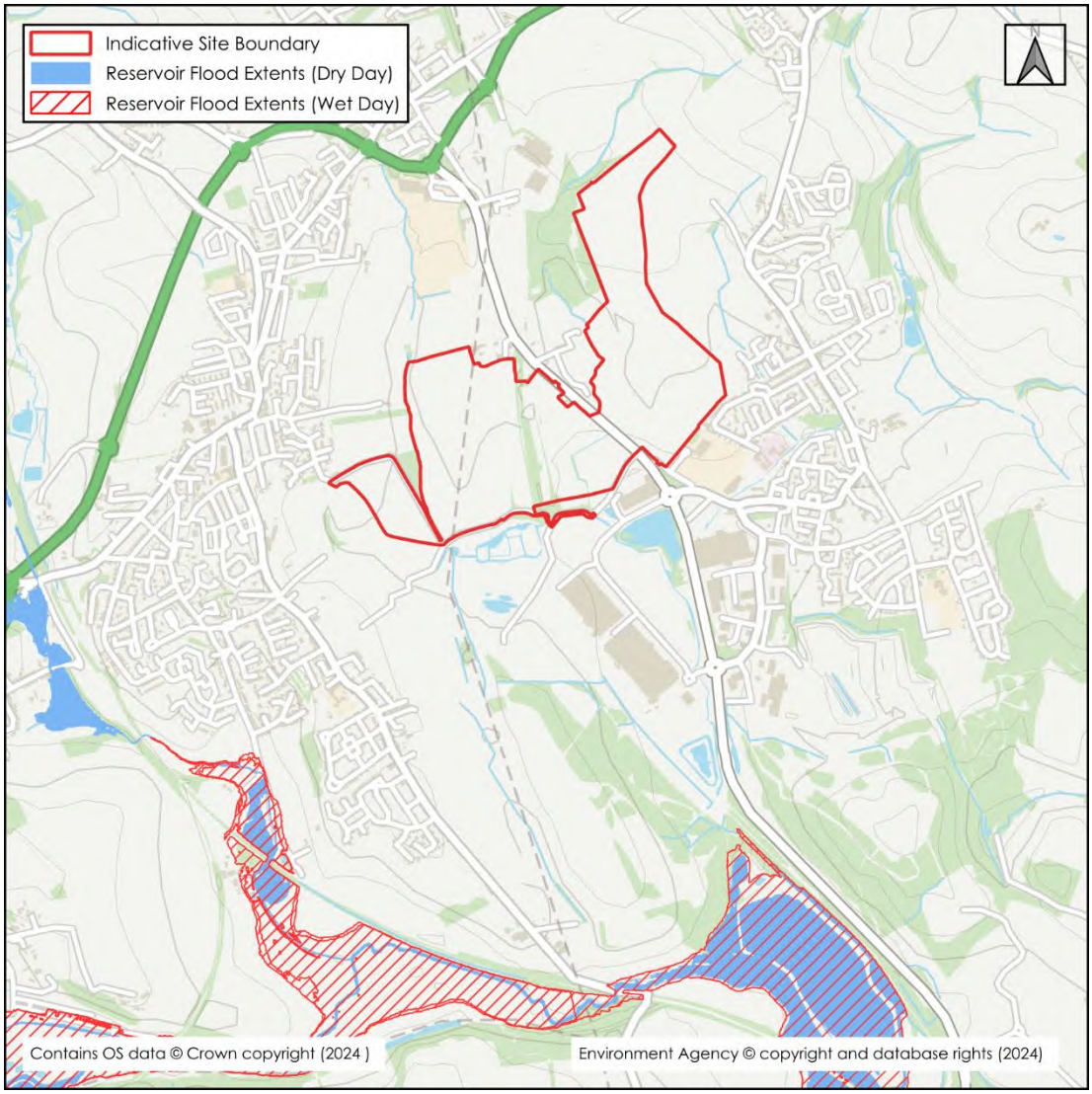


Figure 3.7: Reservoir Failure Flood Risk Map

Flood Risk from Sewers

3.47 Sewer flooding can occur when the capacity of the infrastructure is exceeded by excessive flows, or as a result of a reduction in capacity due to collapse or blockage, or if the downstream system becomes surcharged. This can lead to the sewers flooding onto the surrounding ground via manholes and gullies, which can generate overland flows.

3.48 The local sewerage undertaker is Yorkshire Water, a copy of their asset plans is included as **Appendix 5**.

3.49 The records show that there are no public sewers located within any parcel of the site. A 450mm and a 150mm diameter public surface water sewer is located to the north of Parcels A and B which outfall to the UOW located on Parcel B's western site boundary.

3.50 A 300mm diameter public combined water sewer is located within Engine Lane and outfalls to a sewerage treatment works located on the western boundary of Parcel D.

3.51 A public foul water and combined sewer network is located within the residential area to the west of parcel A, with assets ranging from 100mm to 525mm in diameter.

3.52 In the event of exceedance of the foul and combined sewers to the west of Parcel A, flood flows would be conveyed away from the site in a southerly direction, following the general topography.

3.53 In the event of exceedance of the combined sewer within Engine Lane, flows would be conveyed in a southerly direction towards Parcel C. The sewerage treatment works located on the western boundary of Parcel D may pose some residual risk if an exceedance event were to occur.

3.54 Yorkshire Water provide data on sewer flooding from their databases within the Barnsley Level 1 SFRA and Barnsley Metropolitan Borough Council PFRA. The DG5 database shows there have been 11 previously recorded incidents of flooding within the Borough. The 'Record of Sewer Floods (DG5 Map)' appended to the PFRA shows there have been no previously recorded incidents which have impacted the site or the surrounding area.

3.55 Overall, based on the assets located near the site is considered to be at low risk of sewer flooding. There is a potential residual risk posed to the development by the sewerage treatment works, appropriate mitigation measures are discussed in **Section 4**.

Effect of Development on Wider Catchment

Displacement of Floodplain and Impedance of Flood Flows

3.56 The proposed solar panels are designed such that at their lowest point they are raised 600mm above existing ground levels, with the slant of the panel being such that the upper edge is raised further above the ground. Solar panels located within topographical low points have the potential to displace floodplain if not sufficiently raised. Appropriate mitigation is discussed in **Section 4**.

Development Land Use/Drainage Considerations

3.57 The runoff regime will not be significantly impacted as a result of the proposed development. The surface water drainage considerations and mitigation have been assessed in more detail within an accompanying Drainage Statement (reference: ELG-BWB-ZZ-XX-RP-CD-0001).

3.58 The proposed development will result in a negligible increase in impermeable surfaces, therefore causing a nominal increase in runoff rates and volumes. Appropriate mitigation measures to manage the residual risks are outlined in the accompanying Drainage Strategy.

4. FLOOD RISK MITIGATION

4.1 **Section 3** has identified the sources of flooding which could potentially pose a risk to the site and the proposed development. This section of the FRA sets out the mitigation measures which are to be incorporated within the proposed development to address and reduce the risk of flooding to within acceptable levels.

Sequential Arrangement

4.2 All proposed development is sequentially located within Flood Zone 1.

4.3 It is recommended that any proposed structures which are not raised, such as associated ancillary equipment (e.g. batteries, transformer blocks etc), are located outside of surface water flood extents at the site.

Exception Test

4.4 The requirement to undertake an Exception Test is based upon the vulnerability of the proposed development and Flood Zone status as outlined in **Table 4.1**, extracted from the NPPF.

Table 4.1: Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood risk vulnerability classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test Required	✓	✓
	Zone 3a	Exception Test Required^	✓	×	Exception Test Required	✓
	Zone 3b Functional Floodplain	Exception Test Required*	✓*	×	×	×

^ 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 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, and not impede water flows and not increase flood risk elsewhere.

4.5 As the proposed development is classified as 'Essential Infrastructure' and is primarily located within Flood Zone 1, the development is considered to be suitable without the need for an exception test.

Surface Water Flood Risk

4.6 The site is considered to be at medium risk of flooding attributed to the ordinary watercourse network that is located within and surrounding the site according to the EA RoFSW mapping.

4.7 As stated within the Barnsley Level 1 SFRA, an 8m easement should be applied from the top of bank of all watercourses for maintenance access. This will remove some solar panels from areas at the greatest risk of flooding from the ordinary watercourse network.

4.8 The solar panels are designed to be waterproof and raised 600mm above the surrounding ground level. The panels can remain operational during times of flood and can therefore be considered flood-resilient in their design.

4.9 Where proposed panels are situated in topographical low points and are shown to be at a high risk of surface water flooding, the 600mm separation between ground and lower edge may not be sufficient to raise the panels above flood levels. As the RoFSW mapping provides a conservative representation of flood risk, it is recommended that the lower edge of the solar arrays are raised a minimum of a 150mm above the 1 in 100-year surface water flood level.

Groundwater Flood Risk

4.10 Based on the geological classifications and presence of groundwater found near the site, the site is considered to be at a medium risk of groundwater flooding.

4.11 Should groundwater be encountered during construction of the solar development, a groundwater specialist should be appointed, and appropriate dewatering procedures should be employed as necessary.

4.12 Foundation types used for solar panels should be designed with appropriate consideration of the onsite groundwater levels.

Sewer Flood Risk

4.13 The residual risk posed to the site by the assets surrounding the site and the sewerage treatment works should be mitigated by Yorkshire Water who have maintenance responsibilities associated with their assets. Appropriate inspection and repair should be applied by Yorkshire Water if blockages and exceedance events occur in order to limit potential future failure of the system which may lead to flooding. However, given the nature of the development this is not expected to cause any significant issues.

Watercourse Easements

4.14 In line with the Barnsley Level 1 SFRA, an 8m easement should be applied from the top of bank of all watercourses for maintenance access.

Flood Water Displacement and Flow Impedance

4.15 It is proposed that the solar panels will be raised upon a steel frame 600mm or greater above the surrounding ground level.

4.16 It is recommended that the ancillary equipment associated with the solar development are located in areas predicted to remain unaffected by surface water flood risk. To mitigate against the residual risk of overland flows, equipment should be raised a minimum of 150mm above surrounding ground levels.

4.17 External levels adjacent to the ancillary equipment should be profiled away from the equipment to provide further mitigation against the residual risk of flooding.

4.18 Any proposed fencing around the perimeter of the proposed development should be designed such that water can flow freely through the fence where possible, particularly within areas where surface water impoundment is predicted. Any fencing should therefore be routinely inspected and maintained if a flood event occurs, especially to prevent the accumulation of debris.

4.19 Due to the raised nature of the solar panels and the sequential siting of the associated ancillary equipment, it is anticipated that any displacement of the floodplain or impedance of flood flows would be deemed negligible.

Safe Access and Egress

4.20 All access and egress routes, with the exception of parcel A and B, are located in Flood Zone 1 and are at low risk of pluvial flooding.

4.21 In the event of flooding of Parcel A and B's access route, safe access can be achieved via Tippit Lane to the southwest. Therefore, safe access and egress can be achieved for all parcels.

Surface Water Drainage

4.22 The runoff regime will not be significantly impacted as a result of the proposed development.

4.23 An assessment of the surface water drainage regime has been undertaken in a Surface Water Drainage Strategy (reference: ELG-BWB-ZZ-XX-RP-CD-0001) which accompanies this FRA.

4.24 No foul water flows will be produced as a result of the proposed development. Therefore, no foul water drainage provision is required.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 This FRA has been prepared in accordance with requirements set out in the NPPF and the associated PPG. The FRA has been produced on behalf of Enviromena Project Management UK Limited in respect of a planning application for the proposed construction of a temporary solar farm together with associated works, equipment and necessary infrastructure. The site consists of four land parcels located in the vicinity of Engine Lane, Grimethorpe, Barnsley.

5.2 This FRA is intended to support a detailed planning application, the level of detail included is commensurate and subject to the nature of the proposals at the planning stage.

5.3 This report demonstrates that the proposed development is at an acceptable level of flood risk, subject to the recommended flood mitigation strategies being implemented. The identified risks and mitigation measures are summarised within **Table 5.1**:

Table 5.1: Summary of Flood Risk Assessment

Flood Source	Risk & Proposed Mitigation Measures
Fluvial (Main Rivers)	The majority of the site is located within Flood Zone 1 which is land at low risk of flooding. Parcel A and B's access road is shown to be partially located within Flood Zone 2, however, there is no development proposed at this location, simply the preservation of existing access/egress routes. The other nearest extent of Flood Zone 2 is immediately south of Parcel D and is attributed to a tributary of the River Dearne. Climate change scenario mapping appended to the Barnsley Level 1 SFRA shows the site to be located outside of all fluvial flood extents during the 1 in 100-year +22% climate change scenario. The mapping shows the tributary to the south of Parcel D to remain in-channel during the climate change scenario. Flood Zone 2 mapping appended to the SFRA also shows the tributary to remain in-channel during this event, therefore, the Flood Map for Planning may show a misrepresentation of the risk at the site.
Fluvial (Ordinary Watercourses)	A network of ordinary watercourses and drainage features are located within and surrounding the site. The majority of the site is located outside of the 1 in 1000-year surface water extents, however there are topographic low points within each parcel where surface water ponding is predicted to occur. The risk shown to each parcel may be overrepresented due to the nature of the mapping whereby structures (bridges, culverts and weirs) are not represented. Surface water is subsequently shown to impound behind raised roads such as Engine Lane, Tippit Lane, and Ferry Moor Lane, where water would otherwise be culverted through. It is recommended that the ancillary equipment associated with the solar development is sequentially located in an area outside of surface water risk. To offer further mitigation, equipment should be raised a minimum of 150mm above the external ground levels. External levels adjacent to the ancillary equipment should also be profiled away from the equipment to encourage overland flows away from it. The solar panels are designed to be waterproof and raised 600mm above the surrounding ground level. Where proposed panels are situated in

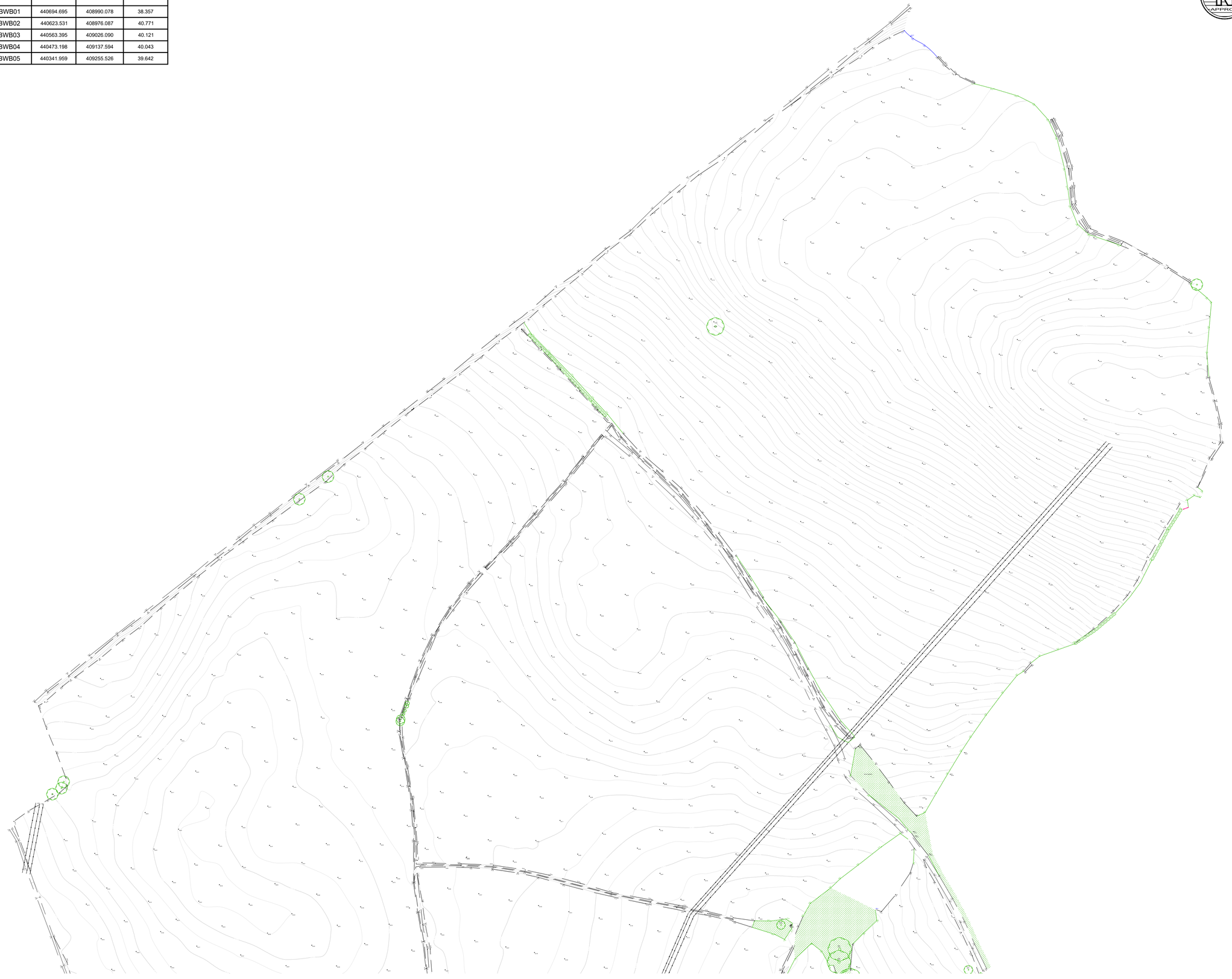
	topographical low points and are shown to be at a high risk of surface water flooding, it is recommended that the lower edge of the solar arrays are raised a minimum of a 150mm above the 1 in 100-year surface water flood level.
Groundwater	Due to the geology underlaying the site, and presence of groundwater found near the site, the site is considered to be at medium risk of groundwater flooding. Should groundwater be encountered during construction, a groundwater specialist should be appointed, and appropriate dewatering procedures should be employed as necessary. Foundation types used for solar panels should be designed with appropriate consideration of the onsite groundwater levels.
Other sources	The site has been assessed against other sources of flood risk including canals, pluvial, reservoirs and large waterbodies, and sewers. None of these are considered to form a barrier to development at the site.
Impact of the Development	The proposed solar units are to be raised approximately 600mm or greater above surrounding ground levels with overland flows allowed to run freely beneath them. It is therefore anticipated that any displacement of flood water or impedance of flow routes within the site would be negligible. The solar arrays are not anticipated to have an adverse impact on the surface water runoff rate and volume, providing the recommended mitigation measures are followed. The impermeable area associated with the ancillary equipment is anticipated to have a negligible impact on the surface water runoff rate and volumes post-development.
This summary should be read in conjunction with BWB's full report. It reflects an assessment of the Site based on information received by BWB at the time of production.	

5.4 In compliance with the requirements of NPPF, and subject to the mitigation measures proposed, the development could proceed without being subject to significant flood risk. Moreover, the development will not increase flood risk to the wider catchment area subject to suitable management of surface water runoff discharging from the site.

APPENDICES

Appendix 1: Topographical Survey

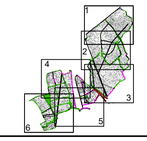
Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	440694.695	408990.078	38.357
BWB02	440623.531	408976.087	40.771
BWB03	440563.395	409026.090	40.121
BWB04	440473.198	409137.594	40.043
BWB05	440341.959	409255.526	39.642



Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in metres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. No scale factor has been applied to this survey, therefore the os coordinates are to be treated as arbitrary. Please refer to survey station information below for on site control establishment.
6. All coordinates and height data relate to OSGB36(15). Control stations are coordinated by means of GPS receiving real time corrections via OS smart net.
7. All manhole data is collected from ground level therefore discrepancies may occur. More accurate data is only achievable via confined space entry.
8. OS license number: 100022432

Key Plan



Legend

- OS Buildings
- Surveyed Buildings
- Building
- Wall
- Kerb Channel Line
- Top of Kerb
- Edge of Surface
- Top of Bank
- Bottom of Bank
- Canopy / Overhang
- Line Marking
- Centre Line
- Watercourse Centre Line
- Barrier
- Fence
- Gate
- Overhead Powerline
- Overhead Utilities
- Contour Lines
- Inspection Chamber
- Flow direction and pipe diameter (0.25 / 1)
- Station and Name (BH 1)
- Monitoring Borehole
- Tree / Bush / Sapling
- Area of Vegetation/ Extent of Tree Canopy
- Hedge
- Body of Water
- Body of Water from OS
- Spot Level (*50.00)
- Assumed Surface Water Drainage Line
- Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
BO	Bollard	FCL	Fence Chain Link	MH	Manhole
BS	Bus Stop	FEL	Fence Electric	Mkr	Service Marker
BT	British Telecom	FMP	Fence Metal Panel	PB	Post Box
C	Crest	FMR	Fence Metal Railing	PT	Post
CL	Cover Level	FOB	Fence Open Board	RE	Rodding Eye
CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
		FSP	Fence Steel Palisade	ST	Stop Tap
CCTV	Security Camera	FWM	Fence Wire Mesh	SV	Stop Valve
CTV	Cable TV	FFL	Finished Floor Level	TCB	Telephone Call Box
DC	Drainage Channel	FP	Flagpole	THL	Threshold Level
		Gas	Gas	TL	Traffic Light
DK	Drop Kerb	GV	Gas Valve	TP	Telegraph Post
DP	Down Pipe	GY	Gully	TS	Traffic Signal
Elec	Electric	Ht	Height	UTS	Unable to Survey
EP	Electricity Post	IC	Inspection Chamber	WL	Water Level
ER	Earth Rod	IFL	Internal Floor Level	WM	Water Meter
FH	Fire Hydrant	IL	Invert Level (as a reduced level)	WO	Wash Out
FL	Floodlight				

Rev	Date	Details of issue / revision	Drw	Rev
P2	19.01.23	Additional Area Added	DS	SS

Issues & Revisions

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Client

Enviromena Project Management UK Limited

Project Title

Engine Lane, Grimethorpe

Drawing Title

Existing Site Plan Sheet 1 of 6

Drawn:	D.Smith		Reviewed:	S.Shreeves	
BWB Ref:	221749	Date:	13.12.22	Scale@A1:	1:1250

Drawing Status

Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-00-01-DR-G-0001	S2	P2

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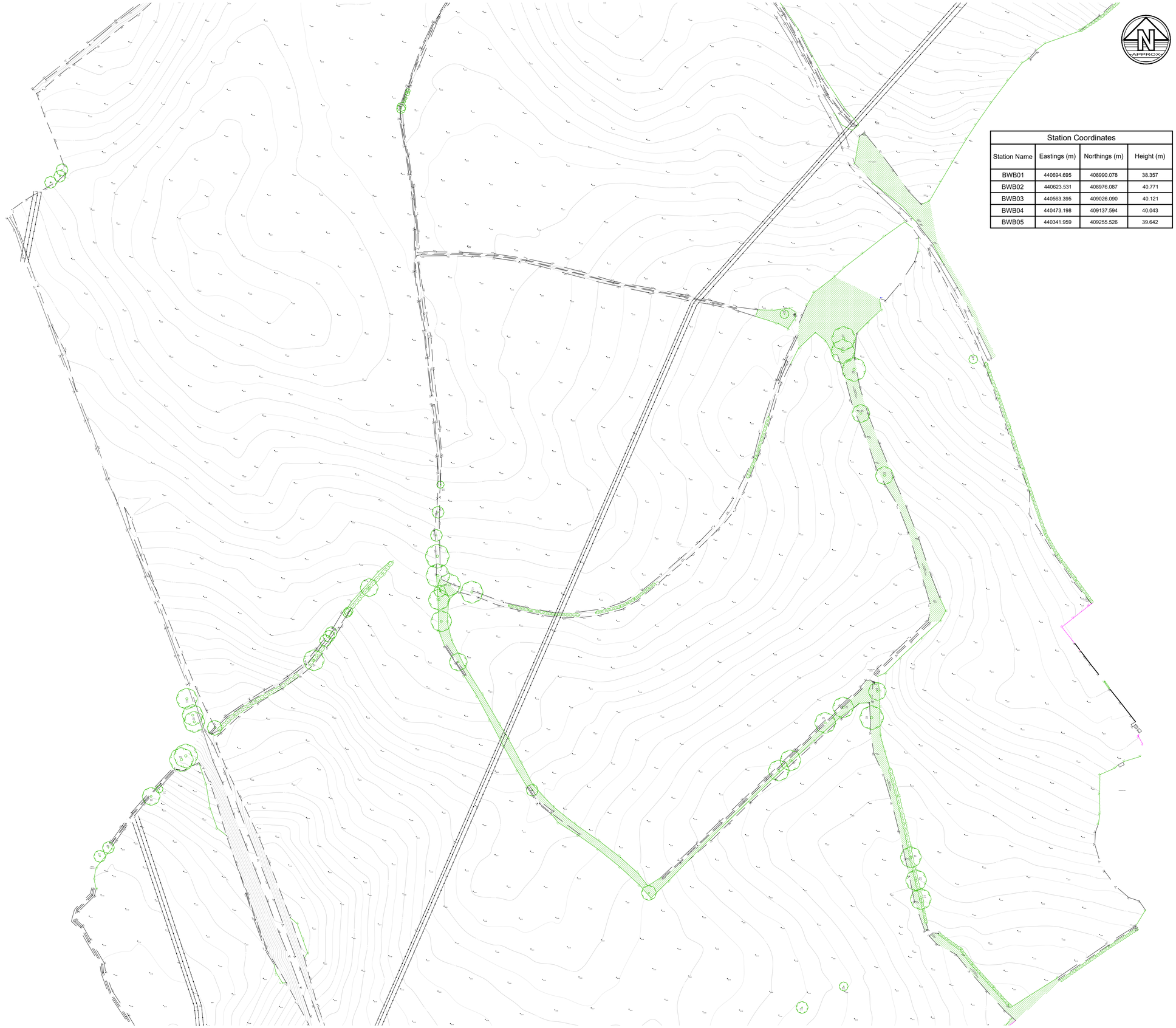

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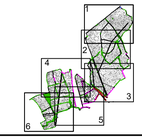
Key Plan



Legend

- OS Buildings
- Surveyed Buildings
- Building
- Wall
- Kerb Channel Line
- Top of Kerb
- Edge of Surface
- Top of Bank
- Bottom of Bank
- Canopy / Overhang
- Line Marking
- Centre Line
- Watercourse Centre Line
- Barrier
- Fence
- Gate
- Overhead Powerline
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- Contour Lines
- Inspection Chamber
- Flow direction and pipe diameter (0.25 / 1)
- Station and Name (BH 1)
- Monitoring Borehole
- Tree / Bush / Sapling
- Area of Vegetation/ Extent of Tree Canopy
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- Body of Water
- Body of Water from OS
- Spot Level (50.00)
- Assumed Surface Water Drainage Line
- Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
BO	Bollard	FCL	Fence Chain Link	MH	Manhole
BS	Bus Stop	FEL	Fence Electric	Mkr	Service Marker
BT	British Telecom	FMP	Fence Metal Panel	PB	Post Box
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FL	Floodlight	IL	Invert Level (as a reduced level)	WO	Wash Out

Rev	Date	Details of issue / revision	Drw	Rev
P2	19.01.23	Additional Area Added	DS	SS

Issues & Revisions

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Client

Enviromena Project Management UK Limited

Project Title

Engine Lane, Grimethorpe

Drawing Title

Existing Site Plan Sheet 2 of 6

Drawn:	D.Smith		Reviewed:	S.Shreeves
BWB Ref:	221749	Date:	13.12.22	Scale@A1: 1:1250

Drawing Status

Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-00-02-DR-G-0001	S2	P2

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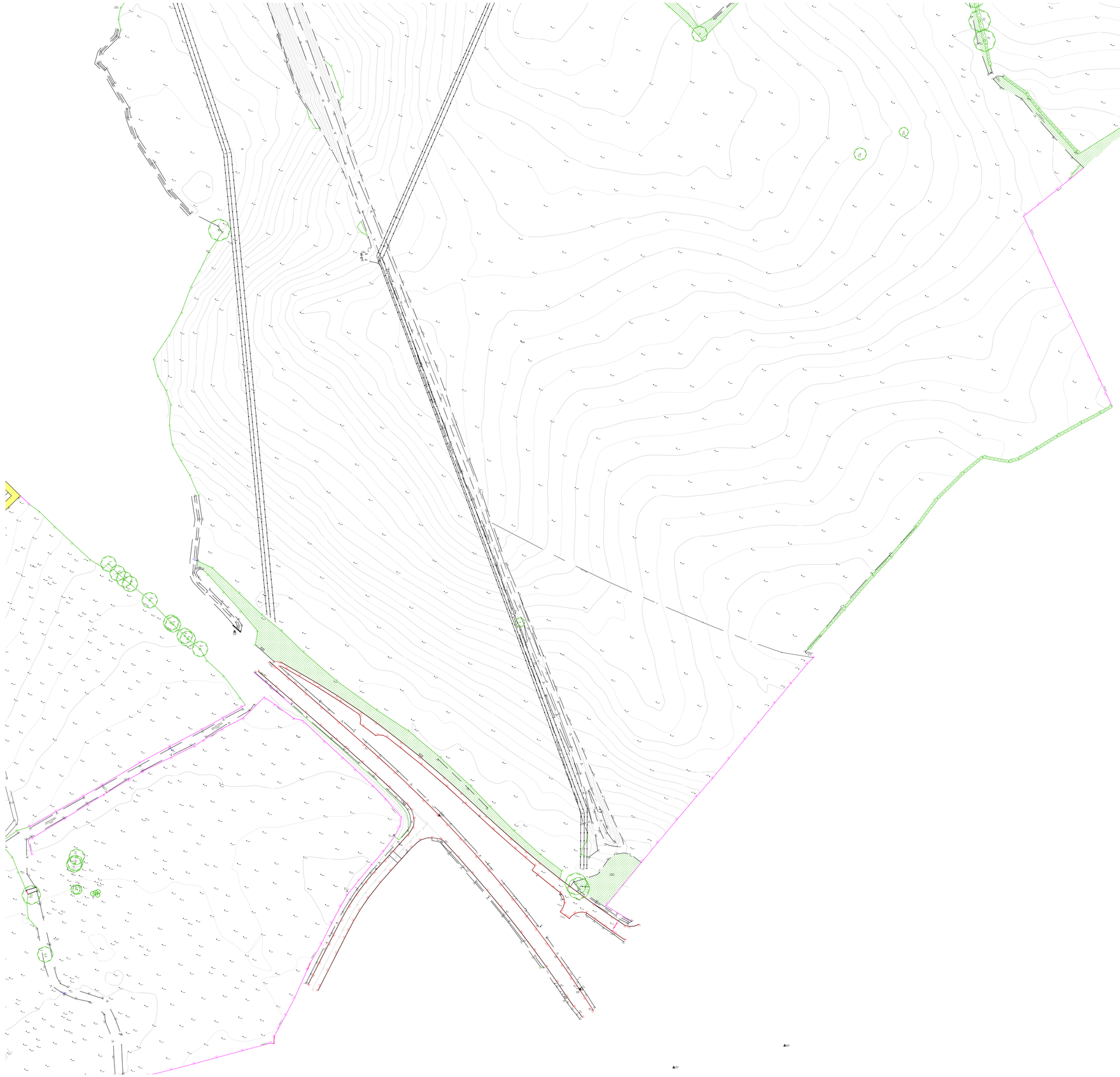

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	440694.695	408990.078	38.357
BWB02	440623.531	408976.087	40.771
BWB03	440563.395	409026.090	40.121
BWB04	440473.198	409137.594	40.043
BWB05	440341.959	409255.526	39.642

Notes

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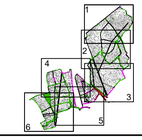
7. All manhole data is collected from ground level therefore discrepancies may occur. More accurate data is only achievable via confined space entry.
8. OS license number: 100022432

Key Plan



Legend

- OS Buildings
- Surveyed Buildings
- Building
- Wall
- Kerb Channel Line
- Top of Kerb
- Edge of Surface
- Top of Bank
- Bottom of Bank
- Canopy / Overhang
- Line Marking
- Centre Line
- Watercourse Centre Line
- Barrier
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- Gate
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- Flow direction and pipe diameter (0.25 / 1)
- Station and Name (BH 1)
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- Area of Vegetation/ Extent of Tree Canopy
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- Spot Level (*50.00)
- Assumed Surface Water Drainage Line
- Surface Water Drainage Line

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BT	British Telecom	FMP	Fence Metal Panel	PB	Post Box
C	Crest	FMR	Fence Metal Railing	PT	Post
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CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
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FH	Fire Hydrant	IL	Invert Level (as a reduced level)	WO	Wash Out
FL	Floodlight				

Rev	Date	Details of issue / revision	Drw	Rev
P2	19.01.23	Additional Area Added	DS	SS

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Client

Enviromena Project Management UK Limited

Project Title

Engine Lane, Grimethorpe

Drawing Title

Existing Site Plan Sheet 3 of 6

Drawn:	D.Smith		Reviewed:	S.Shreeves	
BWB Ref:	221749	Date:	13.12.22	Scale@A1:	1:1250

Drawing Status

Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-00-03-DR-G-0001	**S2**	**P2**

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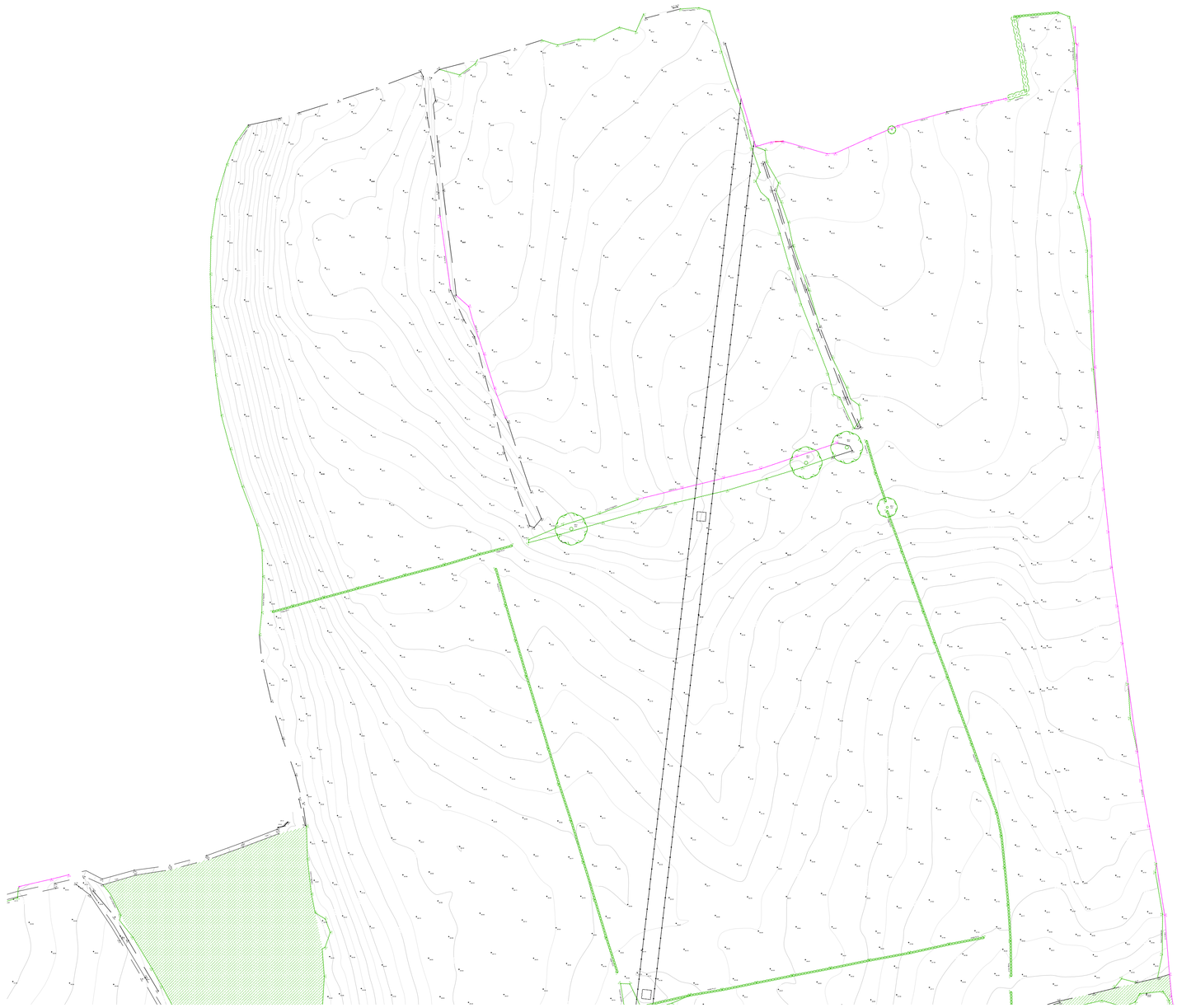
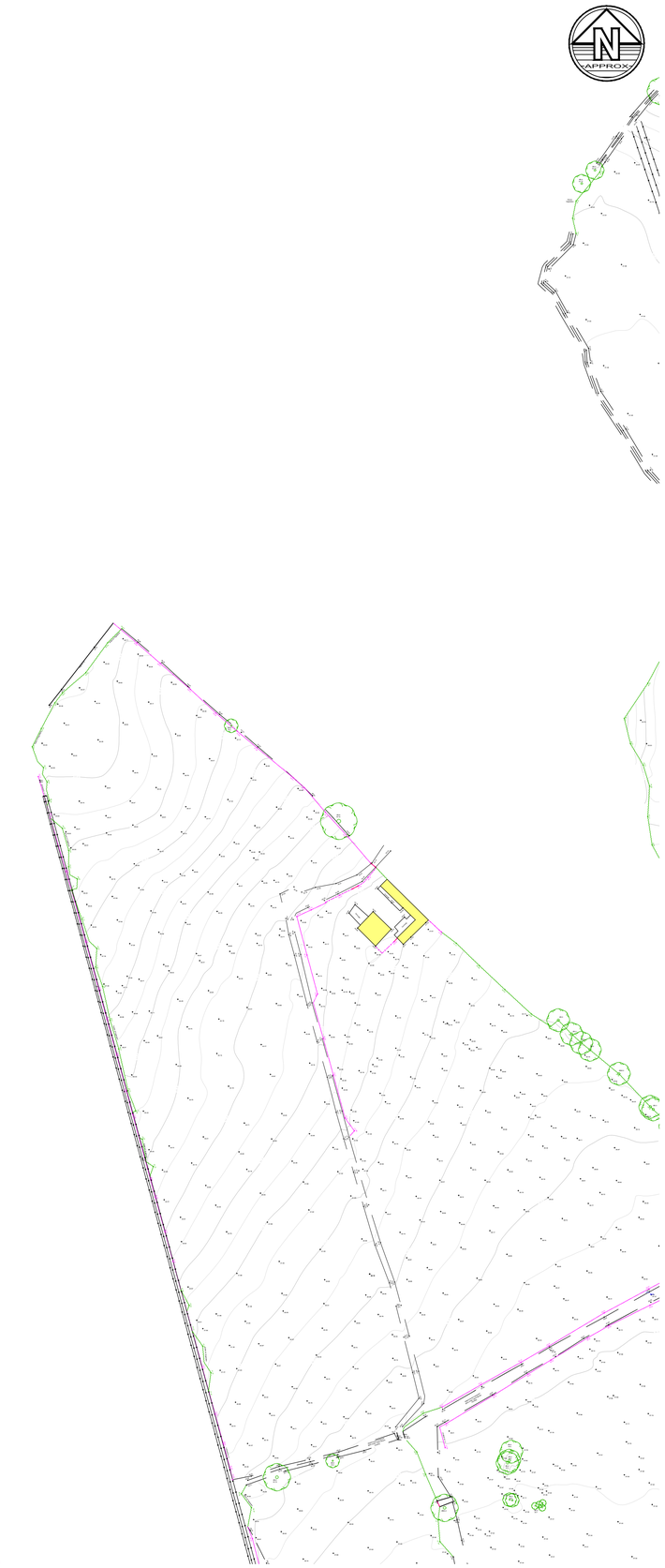
Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	440694.695	408990.078	38.357
BWB02	440623.531	408976.087	40.771
BWB03	440563.395	409026.090	40.121
BWB04	440473.198	409137.594	40.043
BWB05	440341.959	409255.526	39.642





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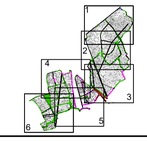
8. OS license number: 100022432

Key Plan



Legend

- OS Buildings
- Surveyed Buildings
- Building
- Wall
- Kerb Channel Line
- Top of Kerb
- Edge of Surface
- Top of Bank
- Bottom of Bank
- Canopy / Overhang
- Line Marking
- Centre Line
- Watercourse Centre Line
- Barrier
- Fence
- Gate
- Overhead Powerline
- Overhead Utilities
- Contour Lines
- Inspection Chamber
- Flow direction and pipe diameter (0.25 / 1)
- Station and Name (BH 1)
- Monitoring Borehole
- Tree / Bush / Sapling
- Area of Vegetation/ Extent of Tree Canopy
- Hedge
- Body of Water
- Body of Water from OS
- Spot Level (*50.00)
- Assumed Surface Water Drainage Line
- Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
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FL	Floodlight	IL	Invert Level (as a reduced level)	WO	Wash Out

Rev	Date	Details of issue / revision	Drw	Rev
P2	19.01.23	Additional Area Added	DS	SS

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Enviromena Project Management UK Limited

Project Title

Engine Lane, Grimethorpe

Drawing Title

Existing Site Plan Sheet 4 of 6

Drawn:	D.Smith		Reviewed:	S.Shreeves	
BWB Ref:	221749	Date:	13.12.22	Scale@A1:	1:1250

Drawing Status

Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-00-04-DR-G-0001	S2	P2

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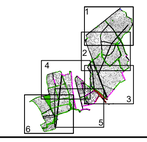

Legend

OS Buildings	Contour Lines
Surveyed Buildings	Inspection Chamber
Building	Flow direction and pipe diameter (0.25, 1)
Wall	Station and Name (BH 1)
Kerb Channel Line	Monitoring Borehole
Top of Kerb	Tree / Bush / Sapling
Edge of Surface	Area of Vegetation/ Extent of Tree Canopy
Top of Bank	Hedge
Bottom of Bank	Body of Water
Canopy / Overhang	Body of Water from OS
Line Marking	Spot Level (*50.00)
Centre Line	Assumed Surface Water Drainage Line
Watercourse Centre Line	Surface Water Drainage Line
Barrier	
Fence	
Gate	
Overhead Powerline	
Overhead Utilities	

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
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Rev	Date	Details of issue / revision	Drw	Rev
P2	19.01.23	Additional Areas Added	DS	SS

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Enviromena Project Management UK Limited

Project Title

Engine Lane, Grimethorpe

Drawing Title

Existing Site Plan Sheet 5 of 6

Drawn:	D.Smith		Reviewed:	S.Shreeves	
BWB Ref:	221749	Date:	13.12.22	Scale@A1:	1:1250

Drawing Status

Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-00-05-DR-G-0001	S2	P2

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	440694.695	408990.078	38.357
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BWB03	440563.395	409026.090	40.121
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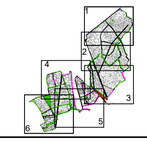

Legend

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Rev	Date	Details of issue / revision	Drw	Rev
P2	19.01.23	Additional Area Added	SR	DH

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Client

Enviromena Project Management UK Limited

Project Title

Engine Lane, Grimethorpe

Drawing Title

Existing Site Plan Sheet 6 of 6

Drawn:	D.Smith		Reviewed:	S.Shreeves	
BWB Ref:	221749	Date:	13.12.22	Scale@A1:	1:1250

Drawing Status

Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-00-06-DR-G-0001	**S2**	**P2**

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Appendix 2: Proposed Site Layout