ENVIRONMENT

Environmena Project Management UK Limited
Engine Lane
Grimethorpe
Drainage Statement

December 2024

Notice

All comments and proposals contained in this report, including any conclusions, are based on information available to BWB Consulting during investigations. The conclusions drawn by BWB Consulting could therefore differ if the information is found to be inaccurate or misleading. BWB Consulting accepts no liability should this be the case, nor if additional information exists or becomes available with respect to this scheme.

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(ii) The date on which the final report is delivered

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All Environment Agency mapping data used under special license. Data is current as of December 2024 and is subject to change.

The information presented, and conclusions drawn, are based on statistical data and are for guidance purposes only. The study provides no guarantee against flooding of the study site or elsewhere, nor of the absolute accuracy of water levels, flow rates and associated probabilities.

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Notice

1. INTRODUCTION

1.1 This Drainage Statement (DS) has been produced by BWB Consulting on behalf of Environmena Project Management UK Limited in respect of a site located at Engine Lane, Grimethorpe.

1.2 A Flood Risk Assessment (FRA) has been produced for the site (reference: ELG-BWB-ZZ-XX-RP-YE-0001_FRA) and this DS accompanies this overarching document.

1.3 This DS is intended to support a detailed planning application and as such the level of detail included is commensurate and subject to the nature of the proposals. The development proposals are for the construction of a temporary Solar Farm to include the installation of ground-mounted solar panels together with associated works, equipment and necessary infrastructure. A proposed site development plan is included as **Appendix 1**.

1.4 The site is formed of four parcels surrounding Engine Lane, located approximately 5.5km northeast of Barnsley town centre. The location of the individual parcels are illustrated within **Figure 1.1**, with contextual information provided within **Table 1.1**.

Table 1.1: Site Details

Site Name	Engine Lane
Location	Grimethorpe
NGR (approx.)	SE 40093 09393
Application Site Area (ha)	90.63 (approx.)
Development Type	Solar Farm
Anticipated Development Lifetime	40 Years
Lead Local Flood Authority	Barnsley Metropolitan Borough Council
Local Planning Authority	Barnsley Metropolitan Borough Council
Environment Agency Area	Yorkshire
Sewerage Undertaker	Yorkshire Water

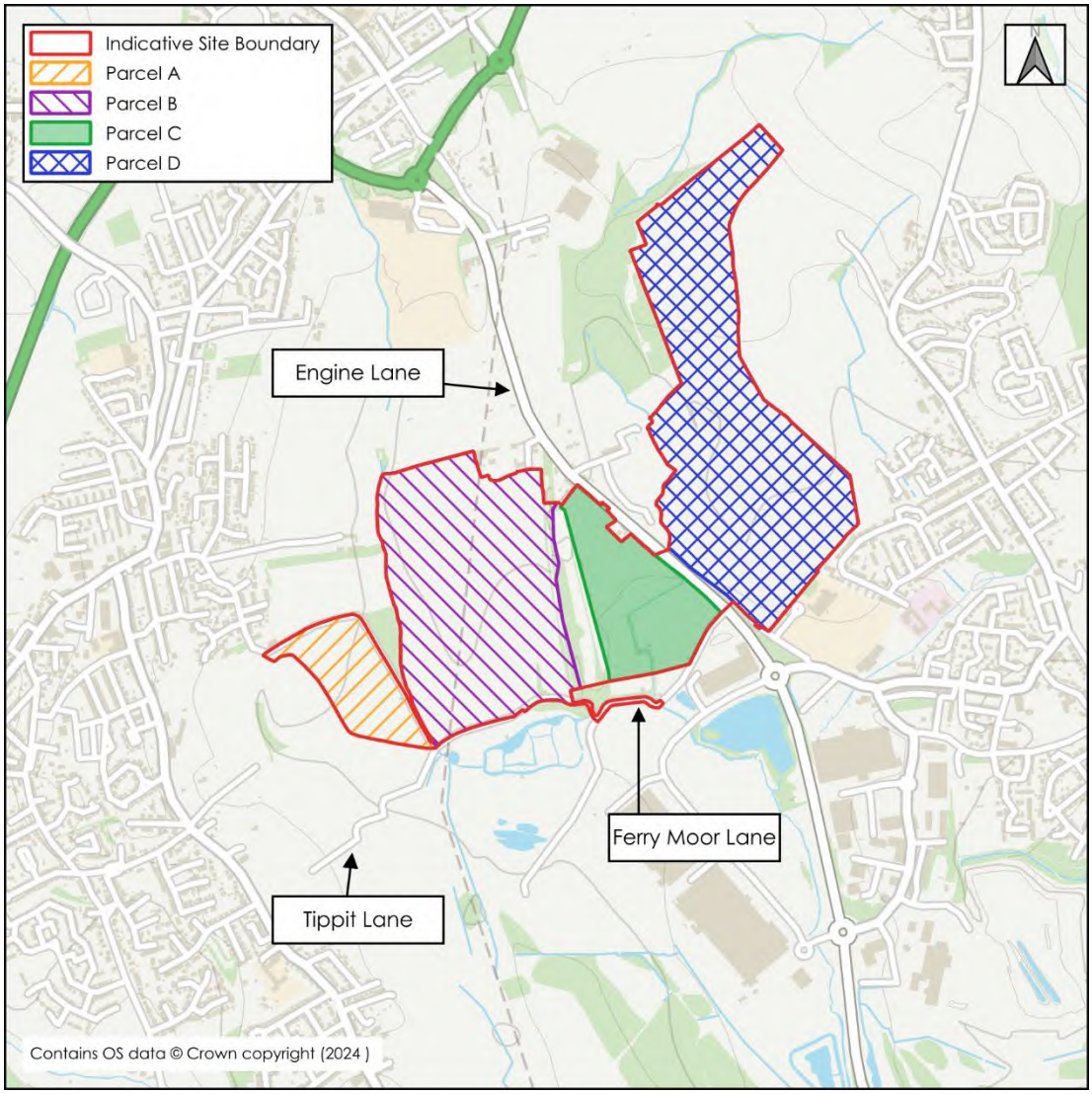

Figure 1.1: Site Location

Relevant Drainage Guidance

1.5 The 'South Yorkshire Interim Local Guidance for Sustainable Drainage Systems'[1] has been reviewed in the production of this DS.

1.6 Following a review of the guidance, there is no specific local guidance relating to solar farm development; therefore, the following research papers and guidance documents have been used to inform this DS:

- 'Hydrologic Response of Solar Farms'[2] (Cook and McCuen, 2013);
- 'Biodiversity Guidance for Solar Developments'[3] (BRE, 2014);

[1] South Yorkshire Interim Local Guidance for Sustainable Drainage Systems (Barnsley Metropolitan Borough Council, Doncaster Metropolitan Borough Council, Rotherham Metropolitan Borough Council, Sheffield City Council and the Environment Agency, June 2015)
[2] Hydrologic Response of Solar Farms, Journal of Hydrologic Engineering (Cook and McCuen, 2013)
[3] Biodiversity Guidance for Solar Development (BRE, 2014)

- 'Technical Information Note TIN101: Solar Parks: Maximising Environmental Benefits'[4] (Natural England, 2011);
- 'The Non-Statutory Technical Standards for Sustainable Drainage Systems (SuDS)'[5] (DEFRA, March 2015);
- The 'CIRIA C753 SuDS Manual'[6] (CIRIA, 2019);
- The National Planning Policy Framework (NPPF) Planning Practice Guidance (PPG) on Flood Risk and Coastal Change[7]; and
- Barnsley Metropolitan Borough Council Level 1 Strategic Flood Risk Assessment (SFRA)[8].

Peak Rainfall

1.7 Predicted future changes in peak rainfall intensity caused by climate change are provided by the EA[9], with a range of projections applied to River Basin District Management Catchments.

1.8 The site is located within the Don and Rother Management Catchment within the Humber River Basin District. **Table 1.2** identifies the relevant peak rainfall climate change allowances from this Management Catchment.

Table 1.2: Don and Rother Management Catchment Peak Rainfall Allowances

Don and Rother Management Catchment Allowance	Total Potential Change Anticipated for the '2050s' (Lifetime up to 2060)	Total Potential Change Anticipated for the '2070s' (2061 to 2125)
1 in 30-Year Rainfall Event		
Upper End	35%	35%
Central	20%	25%
1 in 100-Year Rainfall Event		
Upper End	40%	40%
Central	20%	25%

1.9 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.

[4] TIN101: Solar Parks: Maximising Environmental Benefits (Natural England, 2011)
[5] Non-statutory technical standards for sustainable drainage systems (DEFRA, March 2015)
[6] The SUDS Manual C753 Version 6 (CIRIA, 2019)
[7] Flood Risk and Coastal Change Planning Practice Guidance, available from: https://www.gov.uk/guidance/flood-risk-and-coastal-change#sustainable-drainage-systems
[8] Barnsley Level 1 Strategic Flood Risk Assessment (JBA, September 2010)
[9] 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.

1.10 **Table 1.3** provides a summary of the EA's guidance on determining the appropriate allowance(s).

Table 1.3: Application of Appropriate Peak Rainfall Climate Change Allowances

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+
Urban Catchments Assess the flood risk at the 1 in 30-year and 1 in 100-year storm events with the respective allowance(s) applied.			
Rural Catchments <5km² Assess the flood risk at the 1 in 30-year and 1 in 100-year storm events with the respective central climate change allowances applied.			
Rural Catchments >5km²	Direct rainfall analysis is not appropriate, use flood flow estimation methods.		

**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

1.11 The proposed development is anticipated to have a lifespan up to 40 years. Therefore, the central allowance for the 2070s epoch has been applied to the peak rainfall intensity within the drainage calculations presented within this DS.

1.12 Thus, a climate change allowance of 25% has been applied to both the 1 in 30-year return period and 1 in 100-year return period for the attenuation calculations provided within this DS.

2. EXISTING CONDITIONS

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

- Parcel A and Parcel B are accessed via Ferry Moor Lane to the southern extent of the parcels.
- Parcel C and Parcel D are accessed via Engine Lane to the east and west of each parcel, respectively.

2.2 A topographical survey has been completed and is included as **Appendix 2**. 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. The topography of each land parcel is summarised in **Table 2.1**, the fall of each parcel is shown with EA Light Detection and Ranging (LiDAR) data. An extract of LiDAR mapping is included as **Figure 2.1** to provide context of the general topography of the site as a whole.

Table 2.1: 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

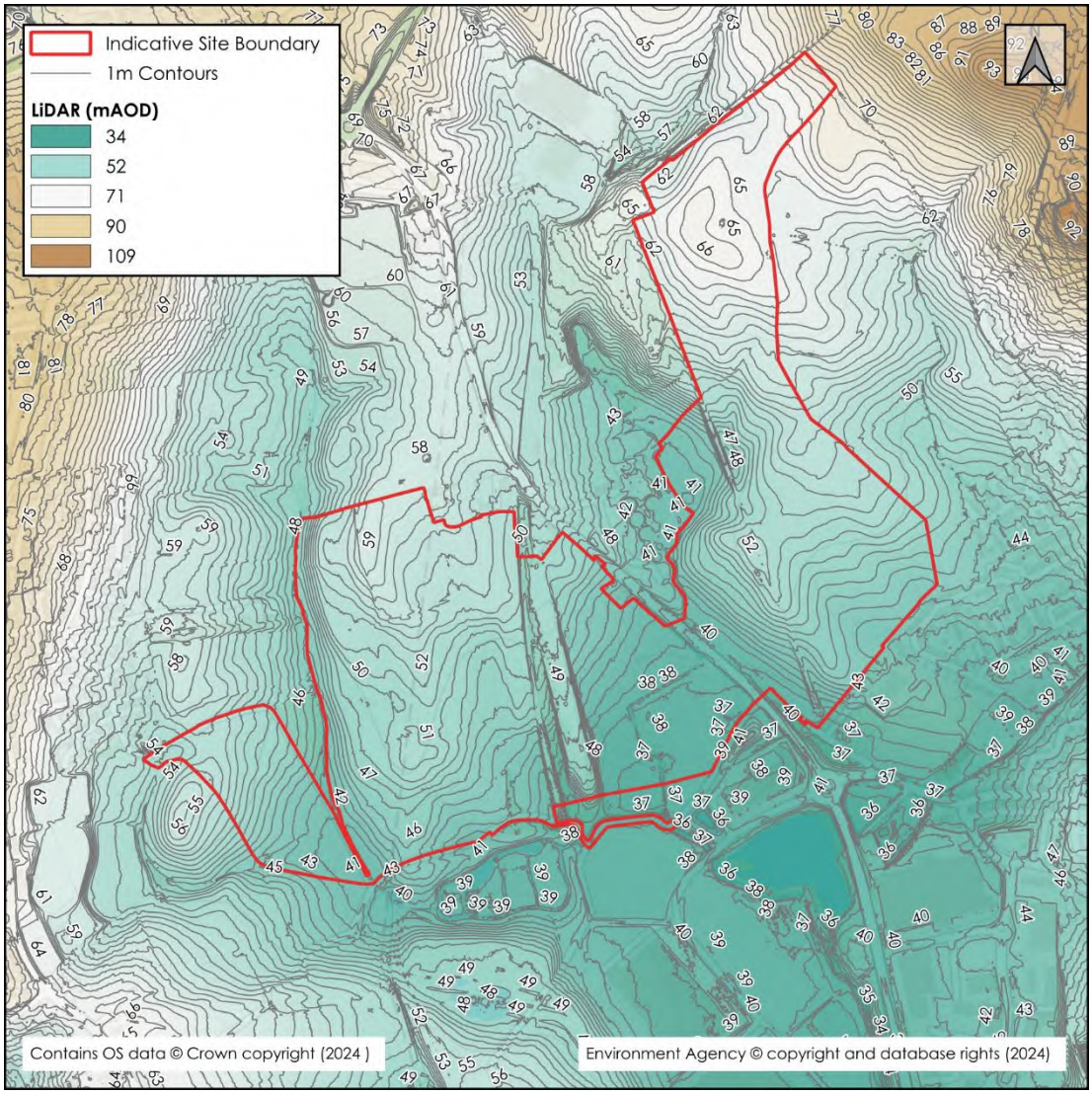

Figure 2.1: Site Topography

2.3 There is a network of Unnamed Ordinary Watercourses (UOWs) and field drains surrounding and within the site. These UOWs are shown in **Figure 2.2** for reference throughout this assessment.

Figure 2.2: Network of Drains and Ordinary Watercourses in the Site Vicinity

2.4 The topographical survey shows the UOWs and drains within the site to be shallow in nature, with a maximum depth of 1.2m and an average depth of approximately 0.6m.

2.5 The Barnsley Level 1 SFRA states that an easement of 8m must be maintained from all watercourses to allow for maintenance purposes.

2.6 British Geological Survey (BGS) mapping indicates that the site is underlain by several geology types. The arrangement of mapped geology across the site is presented on **Figure 2.3** and **Figure 2.4**.

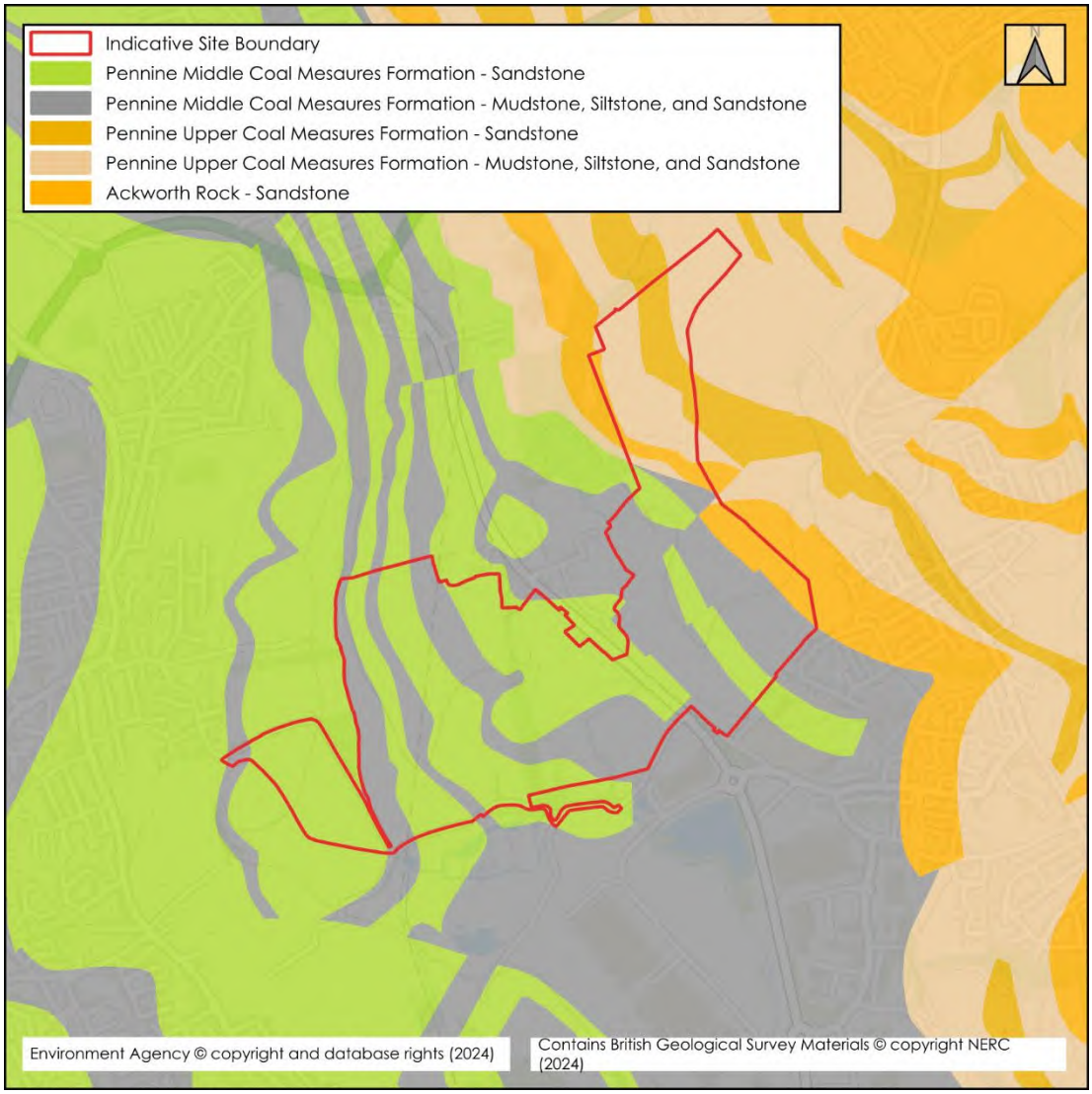

Figure 2.3: BGS Bedrock Geology Mapping

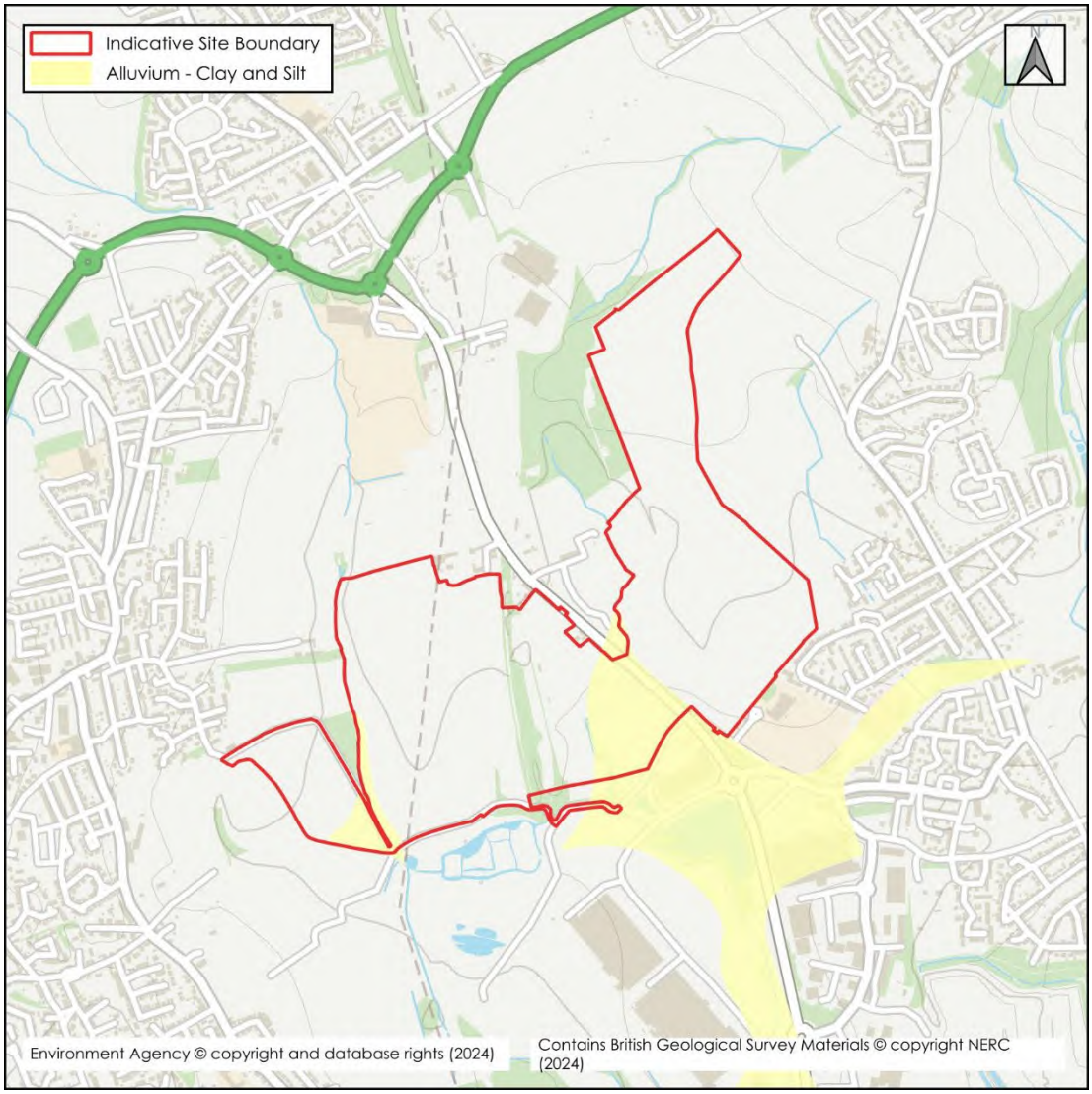

Figure 2.4: BGS Superficial Deposits Mapping

2.7 The application site is not located within a source protection zone, as defined by the EA.

2.8 Yorkshire Water Sewer Records (**Appendix 3**) indicate that no public sewerage infrastructure is present within any parcel of the site. Additionally, no evidence of private drainage infrastructure is found to be present on the topographical survey.

3. DRAINAGE PROPOSALS

Surface Water Drainage

Solar Farm Research

3.1 The proposed surface water drainage strategy is based upon research on 'Hydrologic Response of Solar Farms' (Cook and McCuen, 2013) and is supported by guidance published on 'Biodiversity Guidance for Solar Developments' (BRE, 2014) and 'Technical Information Note TIN101: Solar Parks: Maximising Environmental Benefits' (Natural England, 2011).

3.2 In summary, Cook and McCuen identify that the development of solar panels over a grassy field does not have a significant effect on the volume of runoff, the peak discharge, nor the time to peak. During the study, the runoff volume was found to increase slightly but not enough to require storm-water management facilities.

3.3 However, Cook and McCuen found that if the ground cover under the panels is gravel or bare ground, owing to design decisions or lack of maintenance, the peak discharge may increase significantly with storm water management needed. Additionally, the kinetic energy of water draining from the panels was found to be greater than that of typical rainfall, which increases the risk of erosion of soil at the base of panels.

3.4 Cook and McCuen recommend that the grass beneath the panels be well maintained or that a buffer strip (i.e., interception swale) be placed after the most downgradient row of panels, in order to maintain a drainage regime as close to existing conditions as possible.

3.5 BRE recognise that in most solar farms "*because panels are raised above the ground on posts, greater than 95% of a field utilised for solar farm development is still accessible for* plant *growth*". Therefore, it is considered that the majority of the site will remain as 'soft'/permeable surface post-development, with grassland around and underneath the solar arrays.

3.6 Natural England have stated in reference to solar developments that "*the key to avoiding increased run-off and soil into watercourses is to maintain soil permeability and vegetation cover. Permeable land surfaces underneath and between panels should be able to absorb rainfall as long as they are not compacted and there is some vegetation to bind the soil surface*".

3.7 Based on the above research, the proposed surface water drainage strategy for the proposed solar arrays should aim to minimise the compaction of soil during the construction and operation of the proposed development and incorporate a robust landscaping strategy to keep the areas beneath the panels as 'grassy' as possible during the lifetime of the development. These mitigation measures should be detailed within a Construction Environmental Management Plan (CEMP) and landscape strategy for the proposed development.

3.8 As an additional resilience measure, it is proposed that interception swales are constructed at the most downgradient row of panels to act as a form of mitigation and betterment, should the ground beneath the panels become patchy or bare during the lifetime of the development.

Construction and Operational Mitigation Measures

3.9 In order to minimise the compaction of soil during the construction phase, the temporary construction site compound should be positioned as close as possible to the site access to minimise the number of Heavy Goods Vehicles (HGVs) driving through the site.

3.10 It is recommended that during construction only light machinery is used to install the solar arrays and ancillary equipment where possible. Vehicle movements should be minimised, and low ground pressure vehicles are recommended during wet weather working.

3.11 If necessary, to alleviate the effects of any compaction during the construction process, any affected areas should be chisel ploughed or harrowed and seeded prior to the solar farm becoming active.

3.12 During the operation of the solar farm, maintenance of the panels will be infrequent, minimal and will only require light machinery. Therefore, the operation of the site is unlikely to significantly decrease the infiltration potential of the soil compared to its pre-development condition.

3.13 During the first few years of the solar farm becoming live, it is recommended that regular inspections of the planting and soil are undertaken to confirm that the grass is growing properly and is not bare or compacted. Any required remedial work should be completed as soon as possible.

Additional Resilience Mitigation Measures

3.14 Based on the mitigation proposed above, no formal surface water drainage system is necessary to manage the surface water flows emanating from the solar panels.

3.15 However, as an additional resilience measure, it is proposed to construct interception swales at the most downgradient row of solar panels to interrupt and slow potential channelised flows, enhance and promote the infiltration and interception capacity of the development, and help convey surface water over a greater surface area.

3.16 The location of the proposed swales is provided on the surface water drainage strategy provided as **Appendix 4**. Further details on the proposed swales are also provided further on within this section.

3.17 In the event of exceedance of the proposed swales, exceedance flows will follow the existing topography either into nearby UOWs/drains or off site onto third-party land. However, it should be noted that these exceedance flows will provide a degree of betterment on flooding on the existing scenario due to the introduction of swales and/or filter drains. The swales will provide a degree betterment by temporarily attenuating flows within the site and increasing the likelihood of surface water loss via residual infiltration and evapotranspiration.

Ancillary Equipment and Roads

3.18 Although the solar panel arrays can be managed without the need for formal surface water drainage management, the ancillary equipment and roads should be assessed for their impact on the surface water runoff rates and volumes post-development.

3.19 There are no proposed roads shown on the Proposed Planning Layout (**Appendix 1**). However, any new roads should be constructed using either Type 2 aggregate or permeable materials so that the roads do not have an adverse impact on post-development surface water runoff rates and volumes.

3.20 Based on a review of the Proposed Planning Layout (**Appendix 1**), it is anticipated that the impermeable footprint ancillary equipment associated with the development will cover approximately **907m²** (0.09ha), which is approximately 0.10% of the total proposed development area (90.63ha).

3.21 An assessment of the pre- and post-development runoff rates for the site (90.63ha) has been undertaken using the IH-124 method in MicroDrainage and are compared in **Table 3.1**, with supporting calculations provided in **Appendix 5**.

Table 3.1: Existing & Proposed Runoff Rates

Return Period (Yr.)	Existing Greenfield Runoff Rate (l/s)	Post-Development Unmitigated Runoff Rate (l/s)	Post-development Increase (%)
1	127.3	127.6	0.24
QBAR	148.0	148.3	0.20
30	260.2	260.6	0.15
30 + 25%*	338.0	338.6	0.18
100	307.9	308.4	0.16
100 + 25%*	400.0	400.6	0.15

* Calculated by multiplying Standard Annual Average Rainfall (SAAR) by 1.25 to simulate a 25% climate change uplift on rainfall intensity

3.22 As shown within **Table 3.1**, the post-development runoff rate, when factoring in the increased impermeable area from the ancillary equipment is anticipated to increase the QBAR rate by 0.3l/s (0.20%), the 1 in 100-year runoff rate by 0.5l/s (0.16%) and the 1 in 100-year plus 25% climate change by 0.6l/s (0.15%). Therefore, the impact of developing the site is considered to have a negligible impact on the existing runoff rate.

3.23 An assessment of the impacts the proposed ancillary equipment will have on the 1 in 100-year 6-hour runoff volume post-development has been undertaken. The pre- and post-development runoff volumes are compared in **Table 3.2**, with the supporting calculations provided within **Appendix 6**.

3.24 As the proposed development area is greenfield, the existing runoff volume has been calculated using MicroDrainage to be approximately **7,742m³**.

3.25 The runoff volume from the new impermeable area (i.e., 0.09ha) associated with the ancillary equipment has been calculated using an average rainfall intensity of 10.278mm/hr as calculated using Flood Studies Report (FSR) rainfall data within Micro Drainage, and multiplied by the impermeable area, as described within **Figure 3.1**. The 100-year, 6-hour rainfall profile is presented within **Appendix 6**.

Av. Rainfall (m/hr) x 6 (hours) x Impermeable Area (m²) = Runoff Volume (m³)

0.010278 x 6 x 907 = 56m³

Figure 3.1: 1 in 100-Year, 6 Hour Runoff Volume

3.26 As shown in **Figure 3.1**, the runoff volume from the newly introduced impermeable area is approximately 56m³. The runoff volume from the remaining permeable portion of the proposed development area (90.54ha) has been calculated using MicroDrainage to be circa 7,733m³. As a result, the total post-development runoff volume is calculated to be 7,789m³.

Table 3.2: Runoff Volume Comparison

Existing Volume (m^3)	Proposed Volume (m^3)		Difference (m^3)
	Permeable	Impermeable	
7,741	7,733	56	+48

3.27 As shown within **Table 3.2,** the introduction of the ancillary equipment will result in an increase in surface water runoff volume during the 1 in 100-year 6-hour event of approximately 48m^3. This is an increase of approximately 0.6% on the existing conditions within the site.

3.28 It is anticipated that any increase in surface water runoff volume leaving the site will be intercepted within the interception swales located across the site.

Interception Swales

3.29 The dimensions of the interception swales may vary; however, it is recommended that the interception swales will have 1:4 internal side slopes with a maximum design water depth of 300mm. The material excavated to install the swales will be applied to the downstream edge of the features to create an earth bund. A typical cross section of the proposed interception swales is shown as **Figure 3.2**.

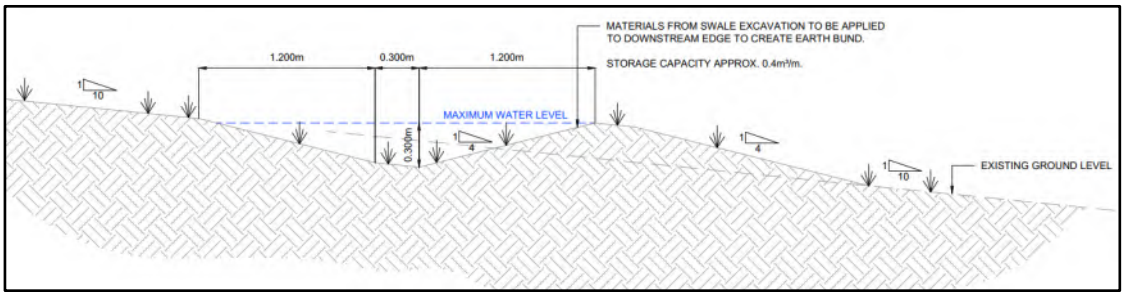

Figure 3.2: Typical Interception Swale Section

3.30 Based on the recommended dimensions of the interception swales, it is anticipated that the storage capacity of the swales is approximately 0.4m^3/m.

3.31 The inclusion of the swales within the development will act to provide a betterment to the existing surface water runoff rate and volume that will leave the site onto surrounding land and the surrounding UOWs/drains post-development.

3.32 The inclusion of the interception swales across the development will also act as a mitigation measure to reduce the likelihood of any pollution incidents leaving the site. As the risk of pollution incidents is more likely to occur during the construction phase as opposed to the operation of the site, it is recommended that the swales are constructed early on during the construction phase and silt fences are utilised on the swales during the entire construction phase.

3.33 The swales should be maintained throughout the lifetime of the development to reduce the risk of the features becoming less effective due to silt accumulation, litter accumulation or vegetation issues.

3.34 The final operation and maintenance plan should be developed during the construction design stage prior to the development becoming live; however, a basic maintenance schedule based off guidance provided within the CIRIA SuDS Manual[10] is provided within **Section 4**.

Foul Water Drainage

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

[10] The SuDS Manual C753 -Version 6 (CIRIA, 2019)

4. MAINTENANCE

4.1 The SuDS Manual maintenance schedule for swales, is shown in **Table 4.1**.

Table 4.1: The SuDS Manual Typical Maintenance Schedule for Swales

Maintenance Schedule	Typical Frequency	Required Action
Regular Maintenance	Monthly	• Inspect inlets, outlets and overflows for blockages, and clear if required.
	Monthly (or as required)	• Remove litter and debris; and • Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours.
	Monthly (during growing season), or as required	• Cut grass – to retain grass height within specified design range.
	Monthly for first year then as required	• Manage other vegetation and remove nuisance plants.
	Monthly for 6 months, quarterly for 2 years, then half yearly	• Inspect vegetation coverage.
	Half yearly	• Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies.
Occasional Maintenance	As required or if bare soil is exposed over > 10% of the swale treatment area	• Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required.
Remedial Action	As required	• Repair erosion or other damage by re-turfing or reseeding; • Relevel uneven surfaces and reinstate design levels; • Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface; • Remove and dispose of oils or petrol residues using safe standard practices.

4.2 The Client will own and operate the proposed development. The Client has its own in-house maintenance division who will be responsible for undertaking all of the maintenance works within the site, including the maintenance activities listed within **Table 4.1**.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 This DS has been written in accordance with the latest relevant local and national guidance and the latest accepted research on solar farm developments.

5.2 This DS is intended to be read in conjunction with the accompanying FRA (reference: ELG-BWB-ZZ-XX-RP-YE-0001_FRA).

5.3 The findings of this DS are that the proposed solar development will have a negligible impact on the post-development surface water runoff rates and volumes.

5.4 Although the proposed development will have a negligible impact on the surface water runoff regime, it is proposed that resilience measures in the form of interception swales will be utilised within the development to mitigate against the potential risk of surface water runoff rates and volumes increasing as a result of the development.

5.5 The Client's in house site maintenance division will undertake the required maintenance of the proposed interception swales for the lifespan of the development. General best practice maintenance activities and schedules are provided within this report.

Appendix 1 – Proposed Planning Layout

N

Legend

- Landlord Boundary
- Site Boundary
- Perimeter Fence
- Customer Substation
- Site Access
- Transformer Station
- PV Array
- Screening
- T-Boot

New pylon to be installed to connect to existing 132kV network

33kV/132kV Compound including Customer Transformer and DNO Circuit Breaker

0 50 100 200m

REVISION	DESCRIPTION	BY	DATE
G	Updated using General Layout RevZA	CC	19/11/2024
F	Updated using General Layout RevZ	CC	31/10/2024
E	Updated using General Layout RevY	CC	18/09/2024
D	Updated using General Layout RevW	CC	15/08/2024
C	Updated using General Layout RevS	CC	18/12/2023
B	Updated using General Layout RevR	CC	22/11/2023
A	Created using General Layout RevQ	CC	05/10/2023

Site Address
Engine Lane
Grimethorpe
Barnsley
S72 7BN

Project: Grimethorpe

Title: Planning Layout

ENVIROMENA

Number: P007033-11-PlanningLayout

Type: Site Layout

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Scale	Sheet	Revision
1:2500	1 OF 1	G
Drawn	Checked	Approved
CC	CC	CC

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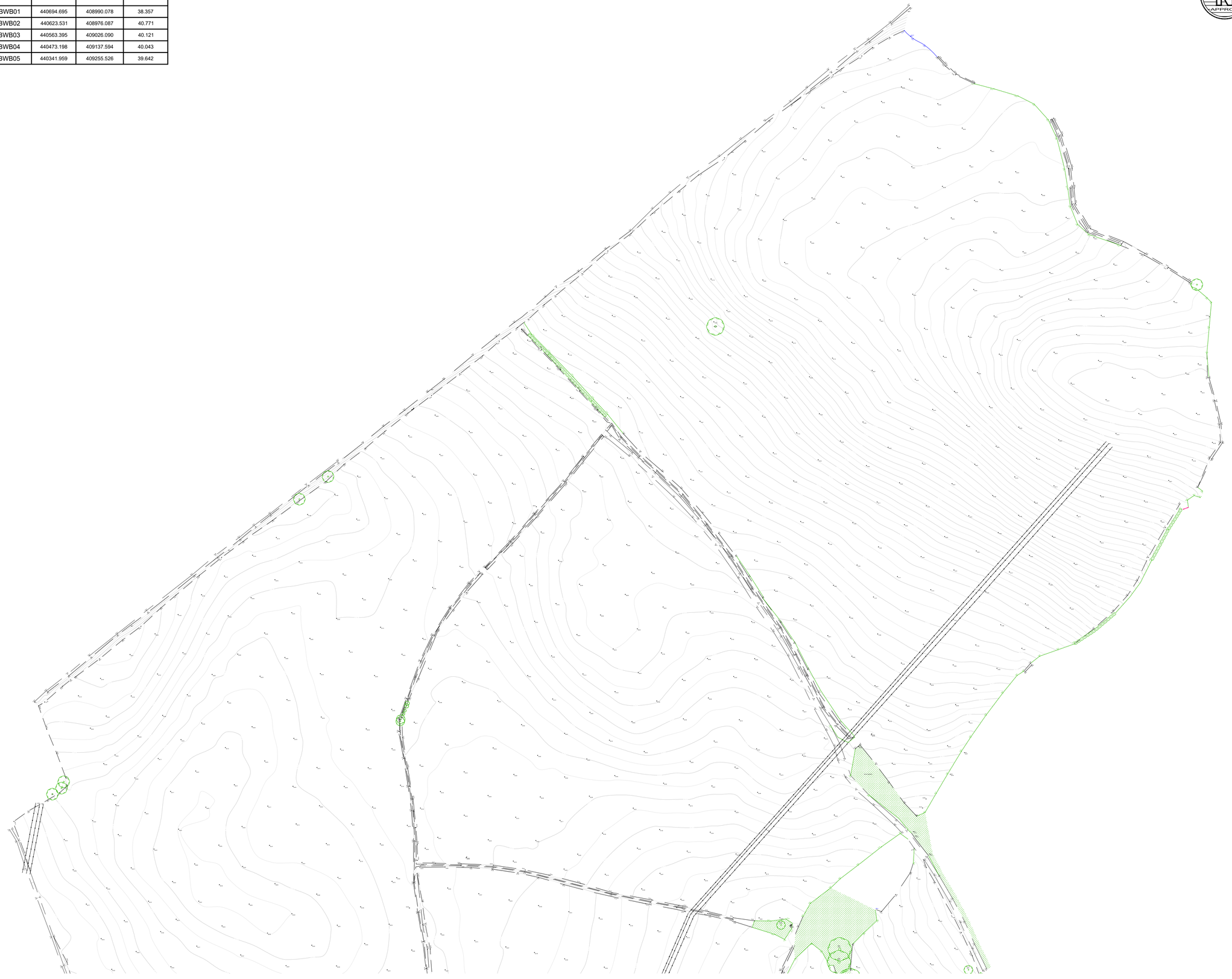
Appendix 2 – Topographical Survey

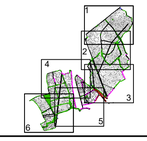
Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	440694.695	408990.078	38.357
BWB02	440623.531	408976.087	40.771
BWB03	440563.395	409026.090	40.121
BWB04	440473.198	409137.594	40.043
BWB05	440341.959	409255.526	39.642



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

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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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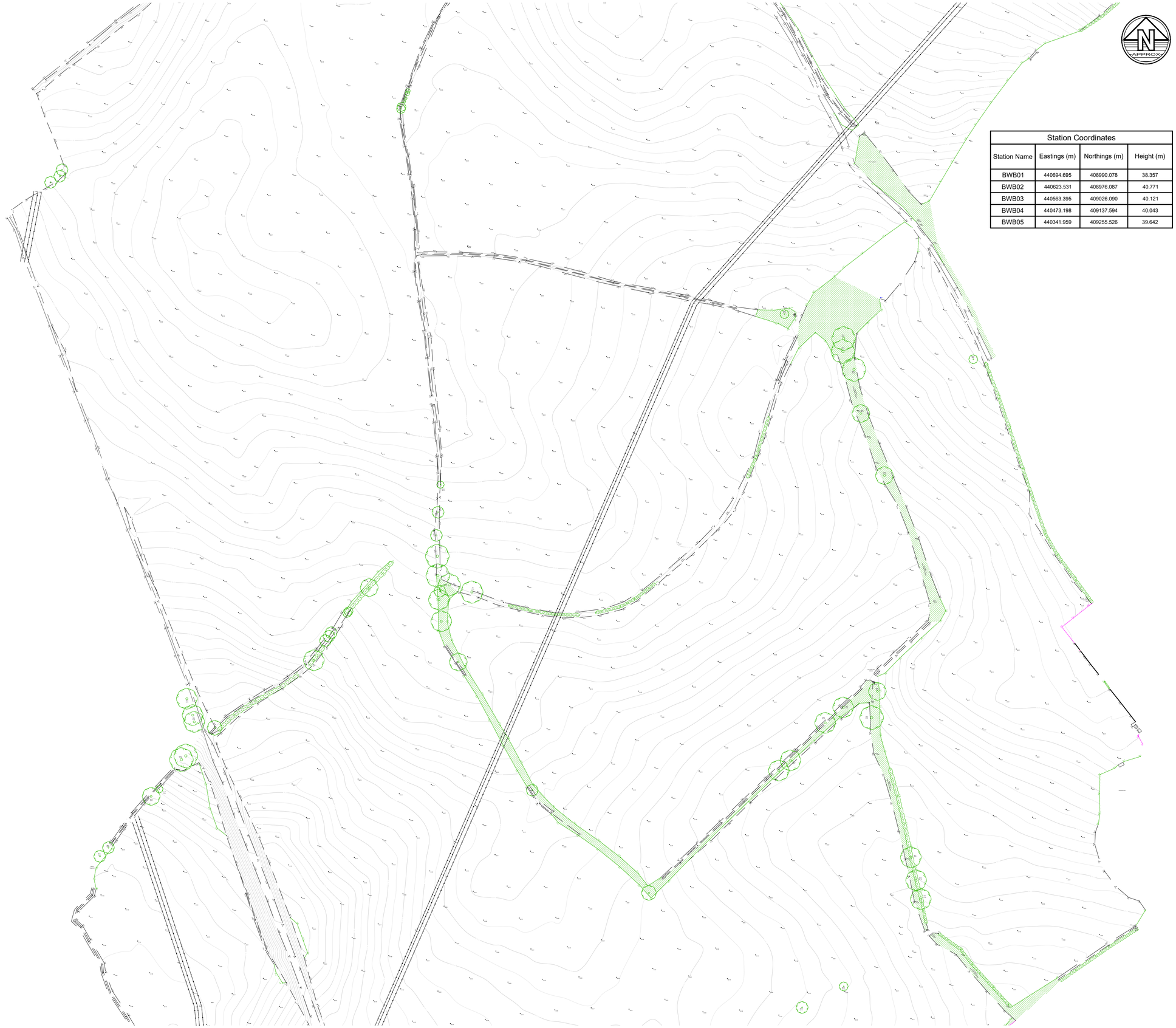

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	440694.695	408990.078	38.357
BWB02	440623.531	408976.087	40.771
BWB03	440563.395	409026.090	40.121
BWB04	440473.198	409137.594	40.043
BWB05	440341.959	409255.526	39.642

Notes

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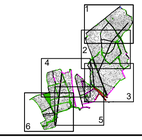
7. All manhole data is collected from ground level therefore discrepancies may occur. More accurate data is only achievable via confined space entry.
8. OS license number: 100022432

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
- 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
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- 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
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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 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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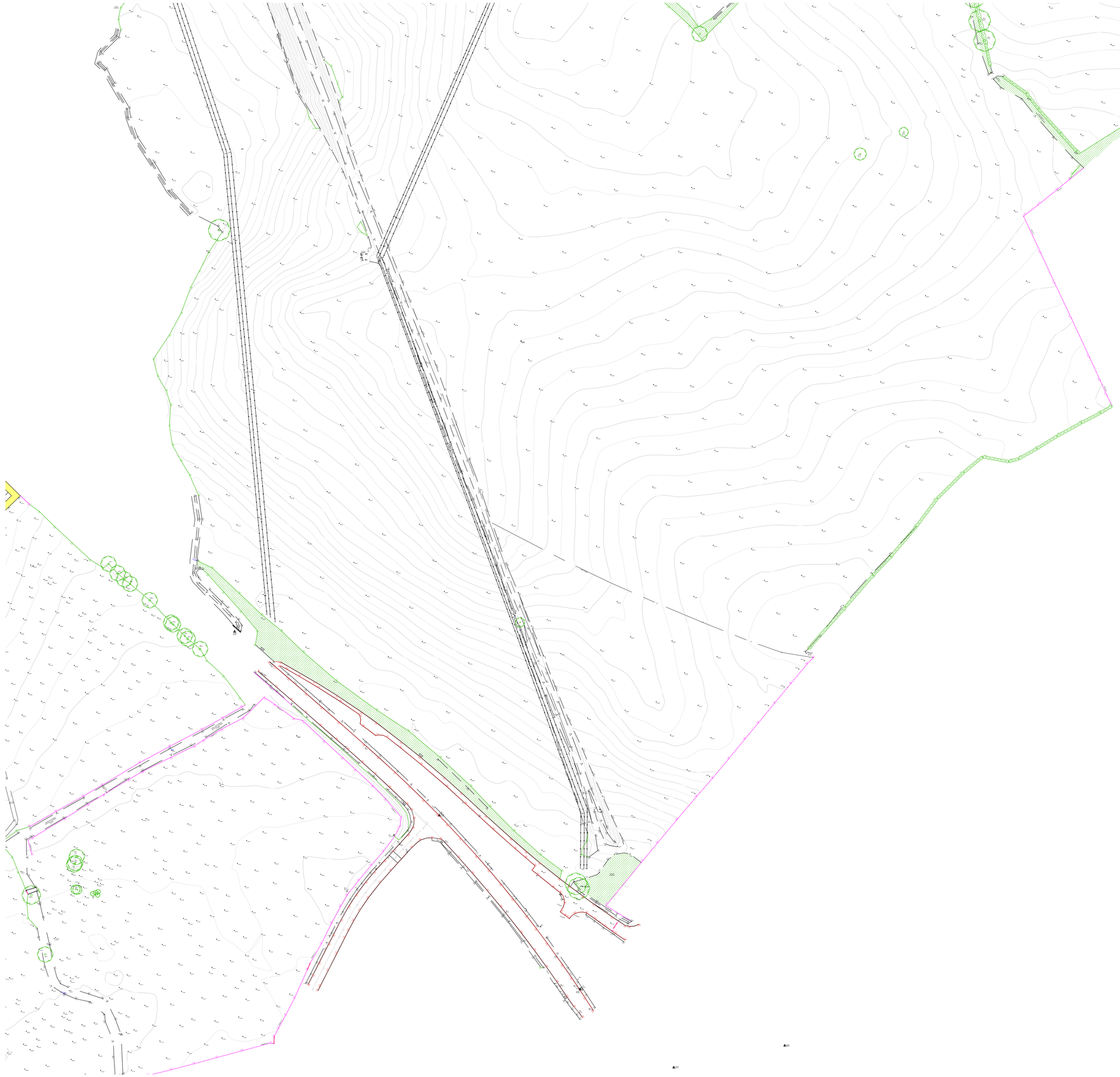

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	440694.695	408990.078	38.357
BWB02	440623.531	408976.087	40.771
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BWB04	440473.198	409137.594	40.043
BWB05	440341.959	409255.526	39.642

Notes

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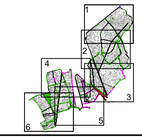
7. All manhole data is collected from ground level therefore discrepancies may occur. More accurate data is only achievable via confined space entry.
8. OS license number: 100022432

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
- 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

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BS	Bus Stop	FEL	Fence Electric	Mkr	Service Marker
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CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
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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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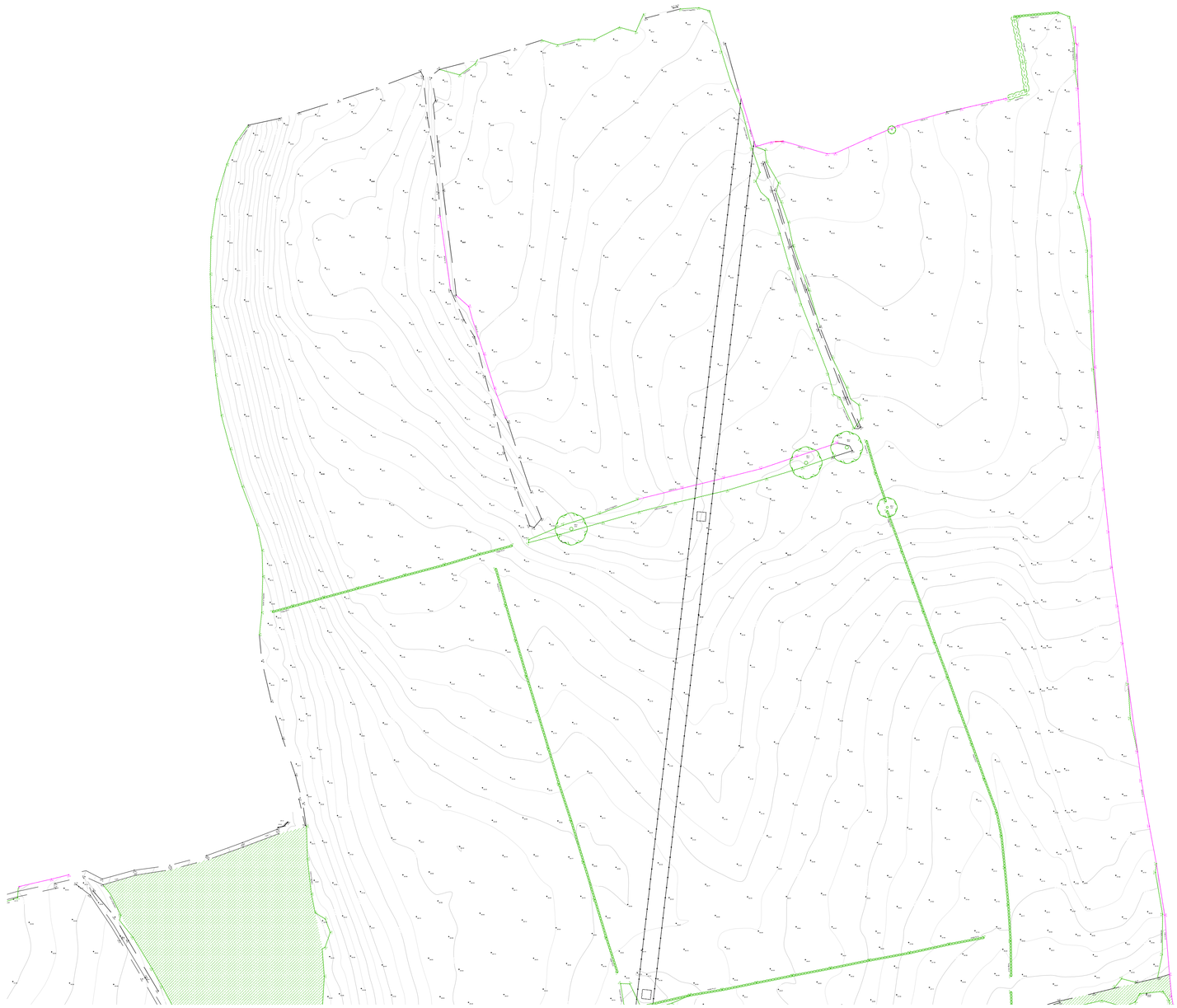
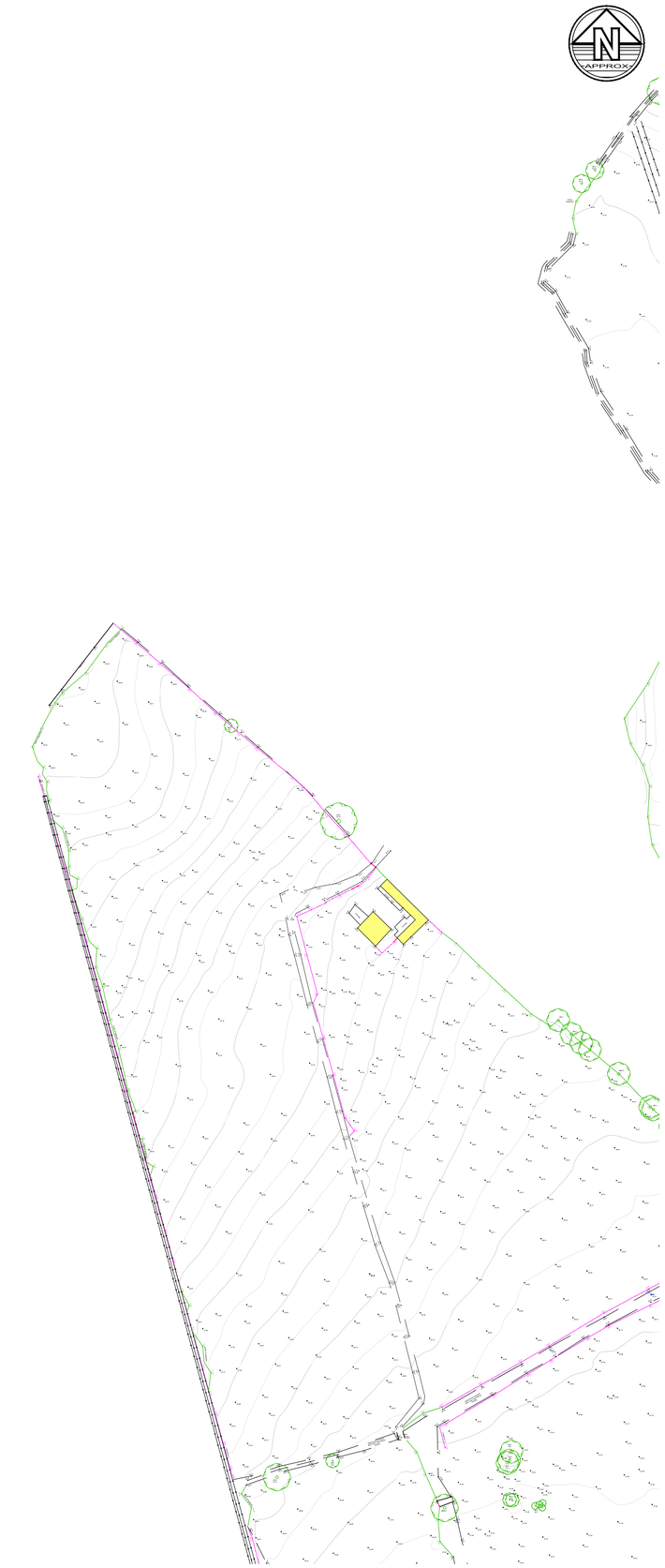
Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	440694.695	408990.078	38.357
BWB02	440623.531	408976.087	40.771
BWB03	440563.395	409026.090	40.121
BWB04	440473.198	409137.594	40.043
BWB05	440341.959	409255.526	39.642





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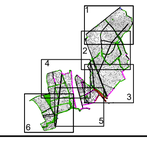
8. OS license number: 100022432

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
BO	Bollard	FCL	Fence Chain Link	MH	Manhole
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ER	Earth Rod	IC	Inspection Chamber	WL	Water Level
FH	Fire Hydrant	IFL	Internal Floor Level	WM	Water Meter
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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Client

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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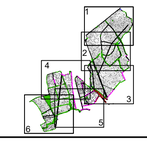
Key Plan



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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Client

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
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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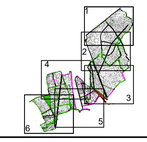
Key Plan



Legend

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- Surveyed Buildings
- Building
- Wall
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- Top of Kerb
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Rev	Date	Details of issue / revision	Drw	Rev
P2	19.01.23	Additional Area Added	SR	DH

Issues & Revisions

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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 3 – Yorkshire Water Sewer Records

YORKSHIRE WATER
PROTECTION OF MAINS AND SERVICES

1. The position of Yorkshire Water Services Ltd (YWS) apparatus shown on the existing mains record drawing(s) indicates the ***general*** position and nature of our apparatus and the accuracy of this information cannot be guaranteed. Any damage to YWS apparatus as a result of your works may have serious consequences and you will be held responsible for all costs incurred. Prior to commencing major works, the exact location of apparatus must be determined on site, if necessary by excavating trial holes. The actual position of such apparatus and that of service pipes which have not been indicated must be established on site by contacting the Customer Helpline on 0845 124 24 24 for both water and sewerage.

2. The public sewer and water network is lawfully retained in its existing position and the sewerage and water undertaker is entitled to have it remain so without any disturbance. The provisions of section 159 of the Water Industry Act 1991 provides that the undertaker may "inspect, maintain, adjust, repair or alter" the network. Those rights are given to enable the undertaker to perform its statutory duties. Any development of the land or any other action that unacceptably hindered the exercise of those rights would be unlawful. The provisions contained in Section 185 of the Water Industry Act 1991 state that where it is reasonable to do so, a person may require the water supply undertaker to alter or remove a pipe where it is necessary to enable that person to carry out a proposed change of use of the land. The provisions contained in Section 185 also require the person making the request to pay the full cost of carrying out the necessary works.

3. Ground levels over existing YWS apparatus are to be maintained. Sewers in highways will ***generally*** be laid to give 1200mm of cover from finished ground level working to kerb races, other permanent identification of the limits of the road or to an agreed line and level. Substantial increases or decreases to this 1200mm depth of cover will result in the sewer being re-laid at your expense. Water mains and services will ***generally*** be laid with a minimum of 750mm depth of cover however some mains and services usually those installed over 50 years ago may have less ground cover.

4. If surface levels are to be decreased / increased significantly the effects on existing water supply apparatus will be carefully considered and if any alterations are necessary, the costs of the alterations will be recharged to you in full. Outlets on fire hydrants must be no more than 300mm below the new levels and all surface boxes must be adjusted as part of the scheme.

5. To enable future repair works to be carried out without hindrance; any pipe, cable, duct, etc. installed parallel to a water main or service pipe should not be installed directly over or within 300mm of a water main or service pipe or 1000mm of a waste water asset. Where a pipe, cable, duct, etc. crosses a main or service it should preferably cross perpendicular or at an angle of no less than 45o and with a minimum clearance of 150mm. These requirements apply to activities within an existing highway and are relevant to the installation of pipes, cables, ducts, etc. up to and including 250mm in diameter *(see illustration below)*. Necessary protection measures for installations greater than 250mm in diameter and/or in private land will need to be agreed on an individual basis. Installations within a new development site must comply with the National Joint Utilities Group publication Volume 2: NJUG Guidelines On The Positioning Of Underground Utilities Apparatus For New Development Sites.

6. All excavation works near to YW apparatus should be by hand digging only.

7. Backfilling with a suitable material to a minimum 300mm above YW apparatus is required.

8. Adequate support must be provided where any works pass under YW apparatus.

9. Jointing chambers, lighting columns and other structures must be installed in such a way that future repair or maintenance works to YW apparatus will not be hindered.

10. Apparatus such as; railings, sign posts, etc. must not be placed in such a way that they prevent access to or full operation of controlling valves, hydrants or similar apparatus. YWS surface boxes must not be covered or buried. Any adjustment, alteration or replacement of manhole covers must be agreed on site prior to the commencement of the works with a YWS Inspector who may be contacted via our Call Centre on 0845 124 24 24.

11. Explosives shall not be used within 100 metres of any Yorkshire Water Services apparatus or installations.

12. Vibrating plant should not be used directly over any apparatus. Movement or operation by vehicles or heavy plant is not to be permitted in the immediate vicinity of YWS plant or apparatus unless there has been prior consultation and, if necessary, adequate protection provided without cost to YWS.

13. ***Under no circumstances*** should thrust boring or similar trenchless techniques commence until the actual position of the Company's mains/services along the proposed route have been confirmed by trial holes.

14. Any alterations to the highway should be notified following the procedures outlined in the New Road and Street Works Act 1991 Code of Practice; Measures Necessary Where Apparatus Is Affected By Major Works (Diversionary Works).

15. You will be held responsible for any damage or loss to YWS apparatus during and after completion of work, caused by yourselves, your servant or agent. Any damage caused or observed to YWS plant or apparatus should be immediately reported to YWS. Should YW incur any costs as a result of non-compliance with the above, all costs will be rechargeable in full.

16. You should ensure that nothing is done on the site to prejudice the safety or operation of YWS employees, plant or apparatus.

17. In accordance with the New Roads and Street Works Act 1991, Chapter 22, Part 3, Section 80. The location of any identified YW asset "*which is not marked, or is wrongly marked, on the records made available*" should be communicated back to Yorkshire Water. The location of the apparatus should be identified on copies of the supplied plans which should be returned to Yorkshire Water (Asset Records Team) with photographic supporting evidence where possible.

18. The Government has decided that responsibility for private sewers serving two or more properties and lateral drains (the section of pipe beyond the boundary of a single property, connecting it to the public sewer) will be transferred to the water companies on Oct 1 2011.

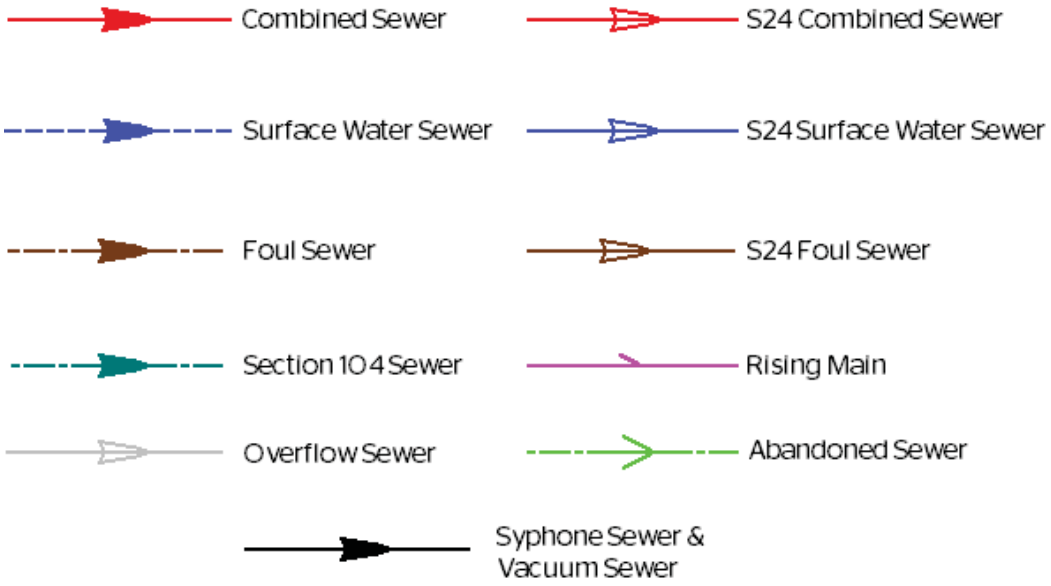
Private pumping stations will also transfer during the period 1 October 2011 – 1 Oct 2016. Records of these assets may not yet be shown on the existing mains record drawing(s). If you encounter any of these assets you must inform Yorkshire Water Services Ltd (YWS).

19. Please note that the information supplied on the enclosed plans is reproduced from Ordnance Survey material with the permission of the Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office, © Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Licence Number 1000019559.

20. This information is for guidance only and the position and depth of any YW apparatus is approximate only. Likewise, the nature and condition of any YW apparatus cannot be guaranteed. YW has no responsibility for recording the locations of privately owned apparatus. As of 1 October 2011, there may be some lateral drains and/or public sewers which are not documented on YW records but may still be present. For the avoidance of doubt, this information is not a substitute for appropriate professional and/or legal advice. YW accepts no responsibility for any inaccuracy or omissions in this information. The actual position of YW apparatus must be determined on site by excavating trail holes by hand. YW requires a minimum of two working days' written notice of the intention to excavate any trial holes before any excavation can be undertaken. If there are any queries in this respect please contact Yorkshire Water on 0845 124 24 24.

Property Identfier

Sewer Legend



Please note that the direction of flow arrows may not always appear depending on the scale of the map.

Water Legend