The Great Grid Upgrade

Weston Marsh Substation A

Surface Water Drainage Strategy

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1. Introduction

1.1 Overview

1.1.1 This Surface Water Drainage Strategy (SWDS) has been prepared by WSP UK Ltd. (WSP) on behalf of National Grid Electricity Transmission plc (National Grid).

1.1.2 National Grid are proposing to undertake works to construct a new electricity substation, new sections of overhead line and modification of existing overhead lines west of the Spalding Tee Point in the Weston Marsh area, within the administrative boundary of South Holland District Council (SHDC) in Lincolnshire.

1.2 Summary of the Scheme

1.2.1 In totality, the Scheme consists of four components, each planned to be progressed via separate consenting routes. These are summarised in **Table 1.1** below.

Table 1.1 Components of the Scheme

Works Required	Consenting Regime
Construction of the new Air Insulated Substation (AIS) – 400kV Weston Marsh Substation A, associated landscaping and environmental mitigation works, drainage, highways and other associated works	Town and Country Planning Act 1990 (TCPA) (Ref 1) Component referred to as '**Substation Works'**
Construction of a new section of overhead line to connect the new substation into the existing 4ZM overhead line. Removal of a section of the existing 4ZM overhead line. Other associated works.	Section 37 of the Electricity Act 1989 (Ref 2) and deemed consent pursuant to section 90(2) of the Town and Country Planning Act 1990 Component referred to as '**4ZM Overhead Line Works**'
Construction of new sections of overhead line to connect the existing 2WS overhead line into the new substation. Removal of a section of the existing 2WS overhead line Other associated works	Section 37 of the Electricity Act 1989 and deemed consent pursuant to section 90(2) of the Town and Country Planning Act 1990 Component referred to as '**2WS Overhead Line Works**'
Reconductoring works required on the existing 4ZM overhead line Two spans of temporary overhead lines	The Town and Country Planning (General Permitted Development) (England) Order 2015 (Ref 3) and The Overhead Lines (Exemption) (England and Wales) Regulations 2009 (Ref 4) Component referred to as '**Exempt Overhead Line Works**'

1.2.2 The Substation Works will require consent from SHDC under the Town and Country Planning Act 1990.

1.2.3 The S37 2WS Overhead Line Works and S37 4ZM Overhead Line works (collectively referred to as the "S37 Overhead Line Works") will require consent from the Secretary of State for Energy Security and Net Zero under Section 37 of the Electricity Act 1989.

1.2.4 The Exempt Overhead Line Works constitute permitted development under Part 15 Class B of the General Permitted Development Order 2015 and The Overhead Lines (Exemption) (England and Wales) Regulations 2009.

1.2.5 The Scheme Site Boundary, which consists of the land required to construct and operate the Scheme in its entirety, is illustrated on **Figure 1** of this report. The Substation Works Site Boundary, which consists of the land required to construct and operate the Substation Works component of the Scheme, is also illustrated on **Figure 2**.

1.2.6 The Scheme in its totality is a standalone development to enable connection of the Outer Dowsing Offshore Wind Farm to the national electricity transmission system. Each component included in Table 1.1 above is required for the Scheme to fully function as part of the national electricity transmission system (NETS).

1.3 Purpose and Scope of this Report

1.3.1 The purpose of this report is to present how the surface water would be managed during the operation of the Substation Works, to demonstrate compliance with relevant national and local legislation and policy and industry standards. It has been undertaken in support of a full planning application to SHDC to request planning approval for the Substation Works component of the Scheme.

1.3.2 The S37 Overhead Line Works would result in a net increase in three pylons relative to the existing overhead lines. The new pylons do not require any permanent drainage and are therefore not considered further within this report. Similarly, the Exempt Overhead Line Works have been scoped out of any further consideration given these works relates to the reconductoring of existing overhead line only (including installation and removal of temporary pylons). Therefore, this SWDS is specifically focused on the Substation Works component of the Scheme.

1.3.3 The SWDS reviews relevant site-specific and public data, evaluates sustainable drainage options, assesses the current drainage regimes, estimates new impermeable areas and storage needs, and defines maintenance responsibilities. Exceedance overland flow routes were assessed to demonstrate the potential impacts on third-party landowners.

1.4 Proposed Development - The Substation Works

1.4.1 The proposed Weston Marsh Substation A is a key component of the network reinforcement required to facilitate the connection of the Outer Dowsing Offshore Wind Farm to the national electricity transmission system. Located to the north-west of the Spalding Tee-Point, the Weston Marsh Substation A Operational Compound (Substation Compound) would provide connection for 12 bays, associated buildings, lighting, security measures, landscaping, access and ancillary infrastructure, all contained within a secured compound.

1.4.2 AIS substations use air as the insulation medium for electrical equipment meaning that equipment is predominantly located outdoors. The total footprint of the Substation Compound is approximately ~~10.6~~8.4 hectares, inclusive of a five-metre buffer around the perimeter fence. The high voltage compound area~~substation itself~~ is approximately ~~530~~ 419.5 metres by 18~~5~~90 metres (circa ~~9.7~~7.8 hectares).

1.4.3 Associated uses within the permanent Substation Compound include:

1) an entrance area for buildings, parking and ancillary equipment near the compound entrance;
2) overhead line gantries up to 15m above finished site level and high-voltage plant area;
3) control and amenities building;
4) internal access roads, assumed to be constructed of hardstanding surfacing;
5) a diesel generator and backup generator storage area.

1.4.4 The compound platform is proposed to be constructed of 300mm free-draining sub-base gravel and lined with impermeable membrane. A minimum platform levels of 4.42m Above Ordnance Datum (AOD) have been recommended as an element of the flood risk mitigation strategy discussed further within the Flood Risk Assessment [document reference GWNC-WSP-SS50-XXXXXX-RPT-ES-000002]. Final platform level will be confirmed at detailed design stage to inform detailed drainage design.

1.4.5 Associated uses outside the compound include a permanent operational access road to the compound from Marsh Road; assumed to be constructed of hardstanding surfacing.

1.5 Limitations

1.5.1 WSP has prepared this report in accordance with the instructions of our client, National Grid, for their sole and specific use in relation to the above Scheme. Any third party using any information contained herein does so at their own risk and shall hold WSP harmless in all circumstances.

1.5.2 This report has been prepared with the reasonable skill and care expected of engineers practicing under similar circumstances. While reasonable checks have been undertaken on data sources and the accuracy of the information used, WSP accepts no liability in relation to the report should any data, information or condition has been incorrect, concealed, withheld, misrepresented, or otherwise not fully disclosed to WSP. In any event, WSP shall not be liable for any loss or damages arising under or in connection to the use of this report.

1.5.3 This SWDS has been undertaken for the operational phase of the Substation Works component of the Scheme only. Drainage requirements for the construction phase will be addressed separately within the final Construction Environmental Management Plan (CEMP).

1.5.4 Similarly, foul water management and fire water strategy are not covered within the scope of this report.

1.5.5 The findings presented in this report are based on the design information available at the time of the assessment and relate to the current proposals as outlined in the **Planning, Design and Access Statement** [GWNC-ARU-SS50-XXXXXX-RPT-CP-000002]. Should there be any material changes to the Substation Works design in the future, the findings of this report should be reviewed and updated accordingly. WSP accepts no liability for the accuracy or completeness of this information.

2. Legislative and Policy Framework

2.1 Overview

2.1.1 Legislation and national and local planning policy relevant to the Substation Works is described in the **Planning, Design and Access Statement** [document reference GWNC-ARU-SS50-XXXXXX-RPT-CP-000002]. Key legislation and policy specifically relevant to the Surface Water Drainage Strategy is summarised in the following sections.

2.2 Legislation and National Policy

2.2.1 Legislation, as well as national and local planning policy relevant to the Scheme and this report is described in further detail in the Planning, Design and Access Statement. Key legislation and policy relevant to the SWDS is summarised in this section.

2.2.2 The SWDS has been informed by and, where appropriate, makes reference to the following policy and guidance documents applicable to the proposed Substation Works:

1) National Planning Policy Framework (NPPF), Ministry of Housing, Communities & Local Government (December 2024, amended February 2025) (Ref 5);

   There is a presumption for the use of Sustainable Drainage Systems (SuDS) within any development, except in rare instances that it can be demonstrated that SuDS principles cannot be feasibly incorporated within a development, as agreed with the planning authority.

   Paragraph 164 of the NPPF states that:

   '[n]ew development should be planned for in ways that:

   a) avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through incorporating green infrastructure and sustainable drainage systems;

   Paragraph 181 of the NPPF states that:

   '[w]hen determining any planning applications, local planning authorities should ensure that flood risk is not increased elsewhere. Where appropriate, applications should be supported by a site-specific flood-risk assessment[1]. Development should only be allowed in areas at risk of flooding where, in the

[1] *'A site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use.'*

light of this assessment (and the sequential and exception tests, as applicable) it can be demonstrated that:

a) within the site, the most vulnerable development is located in areas of lowest flood risk, unless there are overriding reasons to prefer a different location;

b) the development is appropriately flood resistant and resilient such that, in the event of a flood, it could be quickly brought back into use without significant refurbishment;

c) it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate;

d) any residual risk can be safely managed; and

e) safe access and escape routes are included where appropriate, as part of an agreed emergency plan.'

Paragraph 182 of the NPPF states that:

'[a]pplications which could affect drainage on or around the site should incorporate sustainable drainage systems to control flow rates and reduce volumes of runoff, and which are proportionate to the nature and scale of the proposal. These should provide multifunctional benefits wherever possible, through facilitating improvements in water quality and biodiversity, as well as benefits for amenity. Sustainable drainage systems provided as part of proposals for major development should:

a) take account of advice from the Lead Local Flood Authority;

b) have appropriate proposed minimum operational standards; and

c) have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development.'

2) Planning Practice Guidance (PPG), Flood Risk and Coastal Change, Ministry of Housing, Communities & Local Government and Department for Levelling Up, Housing and Communities (2025) (Ref 6);

This guidance advises how to take account of and address the risks associated with flooding in the planning process.

Paragraph 034 of the PPG confirms that development proposals in areas at risk of flooding must be demonstrably safe over their full design life, stating that development should be '*safe for its lifetime taking account of the vulnerability of its users*' and must '*not increase flood risk elsewhere*'.

Paragraph 036 of the PPG states the wider sustainability benefits to the community. These are:

- *An overall reduction in flood risk to the wider community through the provision of, or financial contribution to, flood risk management infrastructure;*
- *The provision of multifunctional Sustainable Drainage Systems that integrate with green infrastructure, significantly exceeding National Planning Policy Framework policy requirements for Sustainable Drainage Systems;*

Paragraph 056 of the PPG states that:

'[w]here possible, preference should be given to multi-functional sustainable drainage systems, and to solutions that allow surface water to be discharged according to the following hierarchy of drainage options:

1. *into the ground (infiltration);*
2. *to a surface water body;*
3. *to a surface water sewer, highway drain, or another drainage system;*
4. *to a combined sewer.'*

Paragraph 079 of the PPG confirms that SuDS should be provided in all major developments, unless demonstrated to be inappropriate. It explains that SuDS are a key tool for managing surface water flood risk and should be given priority over conventional drainage solutions, particularly piped systems. Paragraph 079 states that SuDS are a policy expectation, rather than an optional feature.

3) National Standards for Sustainable Drainage Systems (SuDS), Department for Environment, Food and Rural Affairs (DEFRA) (2025) (Ref 7);

   The National Standards for SuDS set out mandatory national requirements for the design of surface water drainage systems for new development in England, including a drainage hierarchy and minimum standards for managing runoff quantity, water quality, amenity, biodiversity and long-term maintenance.

4) Environment Agency Flood Risk Assessments: Climate Change Allowances guidance (2022) (Ref 8);

   The guidance states the climate change allowances for peak rainfall intensity, and that different allowances apply depending on the type of flooding, development lifetime and climate epoch. The SWDS has been designed in accordance with the latest rainfall data, also ensuring the Substation Works are designed for future rainfall conditions. Further information is provided in 5 Climate Change Guidance.

5) Flood and Water Management Act (2010) (Ref 9);

   The SWDS has been developed in accordance with the FWMA 2010, ensuring that the Substation Works would not increase flood risk elsewhere. The Act introduces SuDS as the preferred approach for managing surface water runoff through Schedule 3.

6) Sustainable Drainage Systems Written Statement HCWS161 (2014) (Ref 10);

   HCWS161 states that the relevant Lead Local Flood Authority (LLFA) should act as a statutory consultee on surface water drainage proposals.

   It is expected that '*local planning policies and decisions on planning applications relating to major development - developments of 10 dwellings or more; or equivalent non-residential or mixed development (as set out in Article 2(1) of the Town and Country Planning (Development Management Procedure) (England) Order 2010) - to ensure that sustainable drainage systems for the management of run-off are put in place, unless demonstrated to be inappropriate.'*

7) The SuDS Manual (C753), CIRIA, (2015) (Ref 11);

The SuDS Manual is the UK best-practice guidance that explains how to design, assess, deliver and maintain SuDS effectively. The drainage hierarchy requires surface water to be managed as high up the hierarchy as reasonably practicable, prioritising rainwater reuse and infiltration before discharge to watercourses, surface water sewers, and only as a last resort to combined sewers. The drainage hierarchy supports the 4 pillars of SuDS: Water quantity, Water quality, Amenity and Biodiversity.

8) Building Regulations Approved Document H, Ministry of Housing, Communities and Local Government (2015) (Ref 12);

   This document provides statutory guidance for compliance with Part H of the Building Regulations, setting minimum standards for foul and surface water drainage, rainwater disposal, and the use of separate drainage systems to prevent flooding and pollution.

   Section 3 of the guidance provides information on surface water drainage.

9) Sewerage Sector Guidance Appendix C – Design and Construction Guidance (DCG) (v22, 2022) (Ref 13); and

   This guidance sets out the design and construction requirements for the detailed drainage design of drainage systems proposed for adoption by water companies. This document has been used alongside the SuDS Manual and National Standards for SuDS as the industry standards for drainage design.

10) Environment Agency Guidance - Pollution Prevention for Businesses (2016) (Ref 14).

    This guidance specifies the standards regarding pollution prevention required by the Environment Agency (EA).

2.3 Regional and Local Policy

2.3.1 Regional and local plans, policies and guidance relevant to this assessment are as follows:

1) Lincolnshire County Council (LCC) - Lincolnshire Development Roads and Sustainable Drainage Design Approach (2021) (Ref 15);

   This standard sets out the local standards and expectations for highway drainage and sustainable drainage systems to ensure new developments manage surface water safely, sustainably, and in accordance with national SuDS policy and Lincolnshire LLFA requirements.

2) LCC – Sustainable Drainage - Design and Evaluation Guide (2018) (Ref 16);

   This standard highlights the design principles which should be considered when assessing the SuDS requirements of development proposals. The Drainage Strategy requirements checklist has been followed as part of the drainage design.

3) South East Lincolnshire Local Plan 2011-2036 (2019) Policy 4: Approach to Flood Risk (Ref 17);

   The purpose of the Local Plan is to guide development and use of land in South East Lincolnshire from 1 April 2011 to 31 March 2036. Policy 4 specifically looks

at flood risk, ensuring that development proposals take proper account of flood risk issues, and that new development will be resilient to the potential consequences of flooding.

Key guidance is as follows:

'e. incorporates the use of Sustainable Drainage Systems (SuDS) (unless it is demonstrated that this is not technically feasible) and confirms how these will be maintained/managed for the lifetime of development (surface water connections to the public sewerage network will only be permitted in exceptional circumstances where it is demonstrated that there are no feasible alternatives);

f. demonstrates that the proposal will not increase risk elsewhere and that opportunities through layout, form of development and green infrastructure have been considered as a way of providing flood betterment and reducing flood risk overall.'

4) South Holland IDB Land Drainage Consent Policy: Discharge to Surface Water (Ref 188.2.19)Ref 18, Ref 17).

This policy sets out the requirements for surface water management and post-development runoff rates. The following paragraphs have been used to inform this strategy.

'Internal Drainage Boards (IDBs) have powers to regulate (consent and enforce against) third party activities affecting watercourses within their district. The Land Drainage Act 1991 and each Board's Byelaws require applicants to obtain the Board's prior written consent prior to undertaking certain types of activities within a Board's Drainage District. If the Board grant consent for proposed works, this is known as a 'Land Drainage Consent'.

'Consent may be issued subject to conditions as per Byelaw 25 of the Board's Byelaws. Conditions can cover technical requirements, legal requirements, environmental matters and the need for financial payments. All conditions specified as part of any consent must be met in their entirety before the Board's formal consent is deemed valid.'

Byelaw 3 is relevant to discharging surface water, whereby the discharge of surface water from an impermeable area requires consent. The policy specific to the discharge of surface water states *'[f]or systems serving impermeable areas greater than 0.25ha the proposed discharge rate should be no higher than 2/l/s/ha or annual average flood flow rate (QBar or QMed), whichever is higher. Exceptions may be allowable when it is evidenced that to achieve this rate would require a static flow control device (vortex flow control or fixed orifice plate) with an orifice smaller than 50mm in diameter (or 100mm where debris control is not possible). Systems with a static flow control devices with an orifice smaller than 100mm in diameter should be designed to prevent debris entering the flow control device.'*

3. Data Collection

3.1 Desk Study

3.1.1 This report draws upon a range of data sources, including:

1) Environment Agency Climate Change Allowances – Peak Rainfall Allowances (2026) (Ref 8);
2) Environment Agency Light Detection and Ranging (LiDAR) Digital Terrain Model (Ref 19);
3) Environment Agency Flood Map for Planning (Ref 20);
4) Environment Agency Risk of Flooding from Surface Water (RoFSW) (2025) (Ref 21).
5) British Geological Survey (BGS) - GeoIndex Onshore viewer (Ref 22);
6) BGS - Geology Viewer (Ref 23);
7) DEFRA - MAGIC Mapping (Ref 24);
8) Google Maps, Aerial Imagery (Ref 25);
9) Ordnance Survey Mapping (OSM) (Ref 26);
10) UK Centre for Ecology and Hydrology's Flood Estimation Handbook (FEH) Web Service (Ref 27);
11) National Grid's Technical Specifications: TS 2.10.00 Civil works, Structures (2016) (Ref 28);
12) National Grid's Technical Specifications: TS 2.10.01 Oil containment (2017) (Ref 29)
13) National Grid's Technical Specifications: TS 2.10.08 Roadworks and Surfacing (2021) (Ref 30)
14) National Grid's Technical Specifications: TS 2.10.09 Site Drainage (2017) (Ref 31);
15) National Grid's Technical Specifications: TS 3.10.02 Materials (2010) (Ref 32);
16) National Grid's Technical Specifications: TS 2.10.13 Flood Defences for Electricity Substations (2016) (Ref 33);
17) UK SuDS Tool - HR Wallingford SuDS UK - Greenfield Runoff Rate Estimation Tool (Ref 34); and
18) UK SuDS Tool - HR Wallingford SuDS UK - Surface Water Storage Volume Estimation Tool (Ref 35).

3.2 Site Survey

3.2.1 The following site survey outputs have informed this report:

1) WSP - Factual Ground Investigation Report (2025) (Ref 36), and
2) Centara Ltd – Utility and Topographical Survey (2025) (Appendix B).

4. Technical Consultations

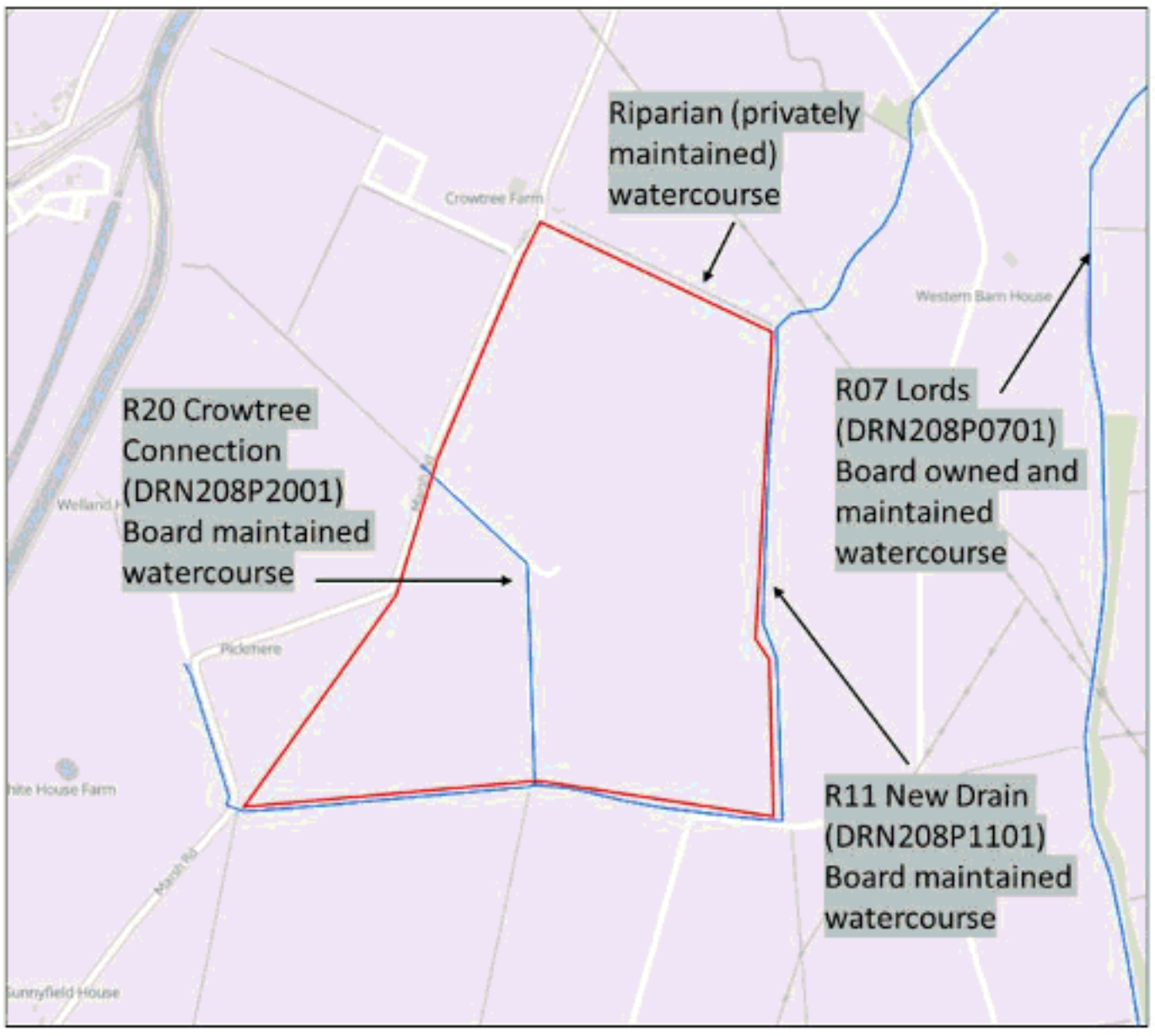
4.1.1 Public consultation on the Scheme took place in autumn 2025 and is summarised within the Statement of Community Involvement [document reference GWNC-CAV-ZZZZ-ZZZZZZ-RPT-PM-000001]. Bi-lateral consultation on technical matters has been undertaken with the relevant statutory organisations. A summary of that relevant to the SWDS has been provided in Table 4.1.

4.1.2 South Holland Internal Drainage Board (IDB) have provided a supporting site extents plan (‘*Image 1 – Site Location Plan*’) within their response, which describes the surrounding watercourses and features with respect to the site boundary at the time of consultations. The initial consultation on 3 November 2023 was for the site selection appraisal, so the red line boundary shown in *Image 1* does not reflect the Substation Works Site Boundary.

Table 4.1 Consultation summary

Stakeholder	Summary
South Holland IDB	Consultee response was received on 3 November 2023 whereby the IDB confirmed that the Site is located in the South Holland IDB. The email has been summarised below. The IDB highlighted the presence of the Board’s arterial watercourse, known as R20 Crowtree Connection (DRN208P2001), within the Site boundary. The Board’s arterial watercourse, known as R11 New Drain (DRN208P1101), is adjacent to the eastern and southern Site boundary. A high-priority watercourse, owned and maintained by the Board, known as R07 Lords (DRN208P0701), is located to the east of the Site. These watercourses are shown in Image 1. The IDB advised that the Site is somewhat protected by these arterial watercourses, which convey flows to the Main River[2] via several water level control structures. The nearest water control structures to the Site are Lords Pumping Station and Lords Sluice. The IDB also provided the Board’s infrastructure plan, which is shown in **Appendix A**. The IDB advised that the Site is protected by the Environment Agency’s Tidal Protection Banks. The IDB confirmed that there is a private (riparian) watercourse adjacent to the northern Site boundary. They advised on the government guidance explaining riparian responsibilities and the need for the maintenance of watercourses (Ref 37). It was also advised to confirm if there are any other riparian watercourses within or adjacent to the Site boundary.

[2] [A Main River is a statutory watercourse designated and managed by the Environment Agency for flood risk management purposes.]

Stakeholder	Summary
	Map/Plan:  *Image 1: Site Location Plan.* *Board's arterial watercourses shown in dark blue (privately maintained) watercourses in light blue (Ordnance Survey License Number 100029527, Crown Copyright 2023, all rights reserved).* Cross-sectional drawings of the two arterial watercourses were provided with further details given in Section 6.3. The Board advised on the specific Board's Byelaws that the Substation Works should comply with. This SWDS has been developed in line with these Byelaws. The IDB are not aware of any flooding at the Site location. Following consultations held between 27 March 2026 and 17 April 2026, the IDB has confirmed that the proposal to limit peak discharge rates from the Substation Works to the pre-development greenfield QBAR runoff rate described in Section 7.5 Standard 3: Management Of Extreme Rainfall and Flooding is acceptable in principle. The risk of blockage should be addressed during the detailed design stage. It was agreed that the final rates will be reviewed at detailed design, with careful consideration given to balancing strict rate control and blockage risk. Furthermore, the IDB has stated that it would not adopt any proposed surface water pumping stations and that they must be located at least 9 metres from arterial watercourses.
Anglian Water (AW)	AW provided sewer records dated 15 November 2024 which show that no public sewers are located in the vicinity of the Substation Works.

Stakeholder	Summary
Lincolnshire County Council (LLFA)	A virtual meeting took place on 10 March 2026, whereby the surface water drainage proposals were presented to the LLFA. During the presentation the main drainage principals were stated, including the proposal to limit peak discharge rates to the greenfield QBAR rate for all events up to and including the 1% (Annual Exceedance Probability (AEP) event plus a 40% allowance for climate change. The LLFA confirmed that the drainage strategy is as expected and that the approach is in line with SuDS principles. Final discharge rates are expected to be agreed with the South Holland IDB. The LLFA noted that higher discharge rate may be accepted by the IDB for the proposed pump system, which could have associated costs. The LLFA also confirmed that the pollution prevention strategy is in line with what would be expected by them and that it will also need to be in line with the Environment Agency requirements. The Environment Agency may need to consider pollution control and fire related risks. The LLFA are not aware of any historic flooding in the surrounding area. They confirmed that Section 19 flood investigations have been undertaken to assess any historic flooding in the SHDC administrative area.

5. Climate Change Guidance

5.1 Overview

5.1.1 The EA's guidance on climate change allowances provides up to date predictions on the changes in peak rainfall intensities that are expected to occur as a result of climate change.

5.1.2 The allowances are considered as part of this assessment to ensure that the Substation Works would remain safe and would not increase flood risk elsewhere over the intended design life, in accordance with the requirements of the NPPF. Paragraph 164, 181 and 182.

5.2 Peak Rainfall Intensity Allowances

5.2.1 The EA's climate change allowances for peak rainfall intensity (Ref 8) are used for the design of the surface water drainage infrastructure and for the assessment of surface water flood risk in small catchments with an area of less than five square kilometres.

5.2.2 The latest allowances for peak rainfall intensity for the Welland Management Catchment, in which the Substation Works are located, are summarised in **Table 5.1** and **Table 5.2**.

Table 5.1 Welland management catchment peak rainfall allowances (3.3%)

Period	Central	Upper
2050s	20%	35%
2070s	25%	35%

Table 5.2 Welland management catchment peak rainfall allowances (1%)

Period	Central	Upper
2050s	20%	40%
2070s	25%	40%

5.2.3 The design life of the Substation Works is assumed to be 75 years from 2030. The EA's climate change guidance advises that for developments with a lifetime beyond 2100, the upper end allowances for both the 3.3% and 1.0% Annual Exceedance Probability (AEP) events for the 2070s epoch or above (2061 to 2125) should be applied.

5.2.4 Therefore, a 40% climate change allowance is used to inform the development of the SWDS and has been added to the 1.0% AEP event in drainage simulations. Similarly, 35% has been added to the 3.3% AEP event in drainage simulations. These values also align with the LLFA requirement, as stated in the LCC SuDS Design & Evaluation Guide (Ref 16).

6. Site Setting

6.1 Site Location and Overview

6.1.1 The Substation Works Site Boundary (the Site) is illustrated on **Figure 1** and is approximately centred around National Grid Reference TF 29252 28836 (E: 529252, N: 328836). The Site is located approximately 7.4km north east of the town of Spalding, Lincolnshire. The nearest postcode is PE12 6HQ. The Site is irregular in shape, lies east of the River Welland and is predominantly surrounded by open agricultural land. The Substation Compound is located towards the northern extent of the Site, as illustrated on **Figure 2**.

6.1.2 A summary of the Site's general characteristics is presented in **Table 6.1**, informed by Google Maps aerial imagery (Ref 25), Ordnance Survey Mapping (Ref 26) and survey findings.

Table 6.1 General site characteristics

Characteristic		Description
Site Area		The Substation Works Site Boundary covers an approximate total area of approximately 89 ha, inclusive of temporary accesses and compounds required to facilitate construction and ecological mitigation areas. The Substation Compound itself covers an area of approximately ~~10.6~~8.4 ha. The Site includes sections of Stone Gate to facilitate highway improvements. Various sections of existing farm tracks are also included within the Site to facilitate access during operation for maintenance purposes.
Site's Main Features		The Site is comprised primarily of agricultural land, as such it is described as greenfield. Local waterbodies are present on-site.
Boundaries	North	The area surrounding the Site is predominantly agricultural land. Two residential properties are located on the northern site boundary. A farmstead (Crowtree Farm) is located approximately 650m to the north of the Substation Compound and includes a small campsite. A farmstead (Wellend House Farm) is located approximately 250m north of the Substation Compound.
	East	A farmstead (Western Barn House) located approximately 380m to the east of the Substation Compound.
	South	The town of Spalding is located approximately 7.4km southwest of the Site.
	West	The River Welland is located 950m to the north west of Substation Compound, flowing towards the north east.

6.2 Topography

6.2.1 A review of the EA's 1m LiDAR Digital Terrain Model (DTM) (2022) (Ref 19) indicated that ground levels at the Site range between approximately 3.5m and 3.7m AOD. Surrounding ground levels off Site are generally flat and do not vary significantly from those on Site. Topographic levels from the DTM are shown in **Figure 3**.

6.2.2 A Topographic Survey has been provided by Centara Ltd. for the areas of land surrounding the proposed Substation Compound and its access route. The survey outputs are shown in **Appendix B**.

Substation Compound

6.2.3 The existing levels within the Substation Compound are approximately 3.46mAOD at its centre. Levels of approximately 3.37mAOD are noted in the north east, and approximately 3.63mAOD in the south west. These values indicate that existing ground levels within the Substation Compound generally fall from south to north.

Land around the permanent access road

6.2.4 The proposed permanent access road is located to the north west of the Substation Compound, providing access to the substation from Marsh Road in the west. The existing levels where the access road is proposed are approximately 4.1mAOD at the proposed carpark and fall to 3.5mAOD to the west of the Site by the junction with Marsh Road. At the centre of the permanent access road, levels bounding the road are approximately 3.36mAOD to the north, and levels bounding the road to the south are approximately 3.38mAOD, indicating that the ground is generally flat, but there is a slight decrease in levels from south to north.

6.3 Hydrology

6.3.1 The Site is located to the east of the River Welland, an EA designated Main River and within its associated floodplain. This extent of the River Welland is tidally influenced, as such there are sluice structures which control fluvial flows in the channel. The Site is located at the downstream extent of the Sluice structures. A hydrology Plan is shown in **Figure 4**.

6.3.2 Another watercourse, Vernatt's Drain is located approximately 1.4km west of the Site and is managed by Welland and Deepings IDB. It is a key arterial drain, which connects to the River Welland. The River Welland then flows into the North Sea at the Wash, approximately 16km downstream of the Site.

6.3.3 There are multiple small watercourses and land drains within the vicinity of the Site, including R11 New Drain (DRN208P1101) which intersects the centre of the Substation Compound, and will be realigned as part of the Scheme. Another IDB watercourse runs along at the western extent of the Substation Compound and is referred to as R20 Crowtree Connection (DRN208P2001) by the IDB. These land drains are the responsibility of the South Holland IDB.

6.3.4 R07 Lords (DRN208P0701), another IDB watercourse, is approximately 700m east of the Substation Compound.

6.3.5 The EA Flood Map for Planning (Ref 20) indicates that the Site is mainly located in Flood Zone 3[3]. A small part of the Site is located in Flood Zone 2[4]. The main source of flooding is from the River Welland and the sea.

6.3.6 The EA Risk of Flooding from Surface Water mapping (Ref 21) indicates that the Site is predominantly at very low risk (less than 0.1% annual probability) of flooding from surface water, with some areas of high, medium and low risk associated with ponding rather than overland flow paths. As discussed in **Section 6.2**, the topography surrounding the Site is flat and level, which suggests a low probability of overland surface water flow paths being present. The permanent access road is predominantly at very low risk, with some areas of low and medium risk isolated ponding associated with localised topographical depressions. Marsh Road is shown to be at very low risk at the junction with the proposed permanent access road.

6.3.7 The Asset Information Management Services (AIMS) database of EA maintained flood defences, downloaded from the DEFRA Data Services Platform, indicates that there are tidal flood defences on the River Welland.

6.3.8 Further information on the risk of flooding posed to the Substation Works can be found in the Flood Risk Assessment which has been undertaken in support of the Scheme and is documented in a separate report [document reference GWNC-WSP-SS50-XXXXXX-RPT-ES-000002).

Internal Drainage Board Data

6.3.9 South Holland IDB have provided longitudinal cross-sections for the existing watercourses, namely R11 New Drain (DRN208P1101) and R20 Crowtree Drain (DRN208P2001). The drawings provided state that the survey grid has been derived from Global Positioning System (GPS) observations and related to Ordnance Survey National Grid (OSTN02), and that all levels relate to O.D.N (Ordnance Datum Newlyn) (OSGM02). The levels in the drawings are specified as 'Datum -2.00m ODM'.

R11 New Drain

6.3.10 Drawings provided for R11 New Drain (DRN208P1101) include longitudinal data with a chainage of 3547m, and 6 extracted cross-sections. Drawing 1 (R11-R00-01.pdf) and Drawing 2 (R11-R00-02.pdf) are provided in **Appendix A** as part of the information received through consultations. The longitudinal data is understood to provide levels between outfall of R11 New Drain (DRN208P1101) into R07 Lords (DRN208P0701), through the point where R20 Crowtree Connection (DRN208P2001) outfalls into R11 New Drain and up to an access crossing, which is understood to be located to the west of the Substation Compound, where R11 New Drain starts (refer to Board's infrastructure plan in **Appendix A**). Outfall into R07 Lords is located north east of the Substation Compound.

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[3] Flood Zone 3 - High Probability: Land with a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of sea flooding (>0.5%).

[4] Flood Zone 2 - Medium Probability: Land with between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% - 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% - 0.1%).

6.3.11 The longitudinal data indicate that water levels rise from +0.9m (+2.9mAOD) at the outfall into R07 Lords (chainage of 20m), to +2.22m (+4.22mAOD) at the most upstream extent (chainage of 3547m).

6.3.12 The six cross-sections are shown to be consistent and there are no significant changes to the channel bed throughout the longitudinal section. The existing bed level vary from +0.79m (+2.79mAOD) at the outfall into R07 Lords (chainage of 22m), to +1.63m (+3.63mAOD) at the most upstream recorded cross-section (chainage of 982m). This data indicates that the R11 New Drain watercourse drains towards R07 Lords.

6.3.13 The longitudinal data indicate that the watercourse depths vary from 2.96m at the outfall into R07 Lords to 2.10m north of the Substation Compound and 1.91m at the outfall of R20 Crowtree Connection to R11 New Drain, south of the Substation Compound.

R20 Crowtree Connection

6.3.14 Drawings provided for R20 Crowtree Connection (DRN208P2001) include longitudinal data with a chainage of 691m, and five extracted cross-sections. Drawing 1 (R20-R00-01.pdf) is provided in **Appendix A** as part of the information received through consultations. This data is understood to provide levels between the start of R20 Crowtree Connection (referenced as access crossing) and outfall of R20 Crowtree Connection into R11 New Drain.

6.3.15 The longitudinal data indicate that water levels rise from +2.18m (+4.18mAOD) at the outfall into R11 New Drain (chainage of 16m), to +2.22m (+4.22mAOD) at the most upstream extent (chainage of 691m).

6.3.16 The five cross-sections are shown to be consistent and there are no significant changes to the channel bed throughout the longitudinal section. The existing bed levels vary from +1.90m (+3.90mAOD) close to the outfall into R11 New Drain (chainage of 18m), to +1.91m (+3.91mAOD) at the most upstream recorded cross-section (chainage of 502m). This data indicates that the R20 Crowtree Connection watercourse drains towards R11 New Drain.

6.3.17 The longitudinal data indicate that the watercourse depths vary from 1.77m at the outfall into R11 New Drain to 1.85m at the most upstream point of R20 Crowtree Connection.

6.4 Geology and Hydrogeology

6.4.1 BGS mapping (Ref 23) shows the Site to be entirely underlain by Oxford Clay Formation (Mudstone), with the mapping also showing superficial deposits at the Site in the form of Tidal Flat Deposits (Clay and Silt).

6.4.2 The closest publicly available BGS boreholes (Ref 22) are located onsite and include TF22NE9 to the north east and TF22NE10 to the east. Both borehole records were produced in 1963 and show underlying layers of sand and silt. In borehole TF22NE9 groundwater was absent, in borehole TF22NE10 groundwater was recorded at 3 feet (0.91m) below ground level (BGL).

6.4.3 The Multi-Agency Geographic Information for the Countryside (Magic) Map (Ref 24), published by DEFRA indicates the bedrock and superficial deposits at the Site to be classified as unproductive. DEFRA's Magic Map indicates the Site is not located within a Source Protection Zone (SPZ).

Ground Investigation

Ground conditions

6.4.4 The Factual ground investigation report (Ref 36) was undertaken by WSP after being appointed by National Grid as Principal Contractor under CDM Regulations 2015 to plan, manage and monitor the ground investigation works. Geotechnical Engineering Limited (GEL) conducted the ground investigation between 28 January and 13 February 2025. Fieldwork included three boreholes (BH), three trial pits (TP) and three hand dug pits.

6.4.5 A borehole sample BH403 taken encountered various deposits of clayey fine sand, followed by sandy clayey silt, then silty fine sand, gravelly fine to coarse sand, peat, clay, gravel, gravelly clay and fractured grey mudstone to a depth of 30m. Groundwater was struck at 1.2m BGL. BH403 was undertaken within the Substation Works area.

6.4.6 A summary of the ground conditions encountered in BH403 is presented in **Table** 6.2.

Table 6.2 Summary of ground conditions

Stratum	**Top of Stratum (m bgl) [m AOD]**	**Base of Stratum (m bgl) [m AOD]**	**Thickness (m)**	**Typical Description(s)**
Topsoil	0.00 [3.50]	0.4 – 0.5 [3.05 – 3.15]	0.4 – 0.5	Firm greyish brown clayey silt with frequent rootlets.
Made Ground	0.00 [3.40]	0.4 [3.00]	0.4	Slightly gravelly clayey fine sand with frequent rootlets. Gravel is subangular medium and coarse brick and flint.
Tidal Flat Deposits	0.35 – 0.9 [1.75 – 2.25]	13.6 – 17.9 [-10.1 - - 14.35]	13.2 – 17.4	Generally silty fine sand. Occasional peat lenses (0.2m thick). Frequent shell fragments. and organic odour within lenses of dark silty sand. Where noted, gravel was described as 'fine to coarse flint'.
Glacial Till	13.6 – 17.9 [-10.1 - - 14.35]	24.9 – 26.8	8.9 – 11.3	Slightly sandy slightly gravelly clay, with medium chalk and flint cobble content. Increasing in stiffness with increasing depth,

Stratum	Top of Stratum (m bgl) [m AOD]	Base of Stratum (m bgl) [m AOD]	Thickness (m)	Typical Description(s)
		[-21.4 - - 23.25]		from firm to very stiff. Occasional partially decomposed wood fragments were noted within the first 0.4m-0.8m of the top of this stratum.
Mudstone (Oxford Clay Formation)	24.9 – 26.8 [-21.4 - - 23.25]	29.5 – 31 [-25.95 - - 27.5]	2.7 – 6.1	Extremely weak and very weak fractured dark grey mudstone with shell fragments and fracturing. Fractures are sub-horizontal very closely and closely rarely medium spaced and subvertical locally intersecting planar smooth and polished.

Groundwater levels

6.4.7 Monthly groundwater and ground gas monitoring events have been undertaken in BH403 between March 2025 and February 2026 using a level logger. Shallowest groundwater level was recorded at 1.52m BGL on 13/03/2025 with an average level during the monitoring period of approximately 2.05m BGL.

6.4.8 The ground conditions outlined in this section (relatively shallow groundwater levels and silty sand/clay soils exhibiting low infiltration capacity) are not supportive of using infiltration into the ground as a main surface water disposal from the Substation Compound. This is further discussed in **Section 7.3**.

6.5 Current on-site drainage regime

6.5.1 Surface water runoff from the Site follows the natural topography and currently drains into local waterbodies, with R11 New Drain located within the east of the Substation Works, and R20 Crowtree Connection to the west of the Substation Works. These watercourses eventually discharge into the River Welland, located to the west of the Site.

6.5.2 To enable construction of the proposed Substation Works, a diversion of the R11 New Drain watercourse is required. It is currently proposed that the diversion will be routed along the eastern extents of the Weston Marsh Substation A to meet the R11 New Drain further downstream. Indicative route of the diversion is shown in Surface Water Drainage Layout drawing in **Appendix D**.

7. Proposed Surface Water Drainage Strategy

7.1 Methodology

7.1.1 In accordance with the National Standards for SuDS and Building Regulations Approved Document H, the SWMS has been developed in accordance with the SuDS hierarchy and aspires to achieve reductions in peak surface water runoff rates where practicable.

7.1.2 As set out in the NPPF paragraph 164 and paragraph 181 point c, a development should demonstrate that it incorporates sustainable drainage systems, unless there is clear evidence this would be inappropriate.

7.1.3 The SWDS has been developed in accordance with the Flood and Water Management Act 2010 (Ref 9) and the NPPF as above, ensuring that the Substation Works do not increase flood risk elsewhere. Consultation with the LLFA has been undertaken, and the SWDS incorporates sustainable drainage systems in line with national and local policy.

7.1.4 The SWDS has also been developed in accordance with the Department for Communities and Local Government (2014) House of Commons: Written Statement (HCWS161) regarding sustainable drainage systems (Ref 10).

7.1.5 The National Grid Technical Specification TS 2.10.13 Issue 2 Flood Defences for Electricity Substations (Ref 33) sets out minimum design criteria for new site drainage systems for the 1 in 30, 1 in 100 and 1 in 1000 year rainfall events over the lifetime of the development. In particular, it requires that:

1) For the 3.33% (1 in 30) AEP rainfall event, there should be no flooding on site;
2) For the 1% (1 in 100) AEP rainfall event, there should be no flooding on operational areas of the site;
3) For both, the 3.33% (1 in 30) AEP and the 1% (1 in 100) AEP events, the excess runoff that the drainage system cannot accommodate should not impact adjacent third party land;
4) For the 0.1% (1 in 1000) AEP rainfall event, standing water on the site should not affect critical equipment.

7.1.6 The SWDS in this section explains how surface water runoff from the Substation Works will be managed using sustainable drainage solutions in the design.

7.1.7 In line with the South East Lincolnshire Local Plan 2011-2036 Policy 4: Approach to Flood Risk (Ref 17), SuDS have been incorporated within the design of the Substation Works and required maintenance activities over the lifetime of the development have been specified.

7.1.8 Greenfield runoff rates were calculated for various scenarios including the 1% AEP event and it is proposed to limit runoff as close as possible to Greenfield QBAR rate for all events up to and including the 1% AEP event plus a 40% allowance for climate change. This is in line with the LCC LLFA requirement and in line with the South Holland IDB guidance (Ref 18), with no noted objection during pre-application consultation with either stakeholder.

7.1.9 Required attenuation volumes have been estimated for the 1% AEP plus climate change event along with an assessment of suitable SuDS elements to provide adequate water quality, water quantity, biodiversity and amenity benefits. FEH 2022 rainfall data (Ref 27) has been used in the attenuation volume estimations. Critical storm duration of up to 48 hours have been assessed to follow the industry standards, included in the SuDS Manual.

7.1.10 Drainage modelling was conducted using Causeway Flow software to evaluate the performance of the proposed drainage network under various scenarios including the 1% AEP event with an additional 40% allowance for climate change. This was used to present a conceptual surface water drainage layout for the Substation Compound and full model results are included at **Appendix C**.

7.1.11 A water quality assessment utilising the Simple Index Approach (SIA) has been undertaken in accordance with the SuDS Manual to determine the level of pre-treatment offered by the selected SuDS and advise on any additional mitigation measures that could be required as part of the wider pollution control strategy for the Substation Compound.

7.2 Standards for SuDS

7.2.1 It is essential for any new development that surface water is managed effectively to mitigate any flood risk on the Site as well as off the Site. The SWDS aims to focus on the efficient capture and management of surface water whilst ensuring compliance with the requirements and guidance noted in National Standards for SuDS (Ref 7) as follows:

1) Standard 1: Runoff Destinations;
2) Standard 2: Management of Everyday Rainfall (Interception);
3) Standard 3: Management of Extreme Rainfall And Flooding;
4) Standard 4: Water Quality;
5) Standard 5: Amenity;
6) Standard 6: Biodiversity; and
7) Standard 7: Design of Drainage for Construction, Operation, Maintenance, Decommissioning and Structural Integrity.

7.3 Standard 1: Runoff Destinations

Priority Hierarchy

7.3.1 **National SuDS Standard 1:** *'runoff destinations give criteria for prioritising the choice of final runoff destination. Runoff from any development shall be discharged to the following final destinations, in accordance with the below hierarchy of priority. Water should be discharged to as high a priority as possible, the maximum extent practicable. The suitability of these discharge options will be informed by a desk-based assessment, undertaken as part of this Surface Water Drainage Strategy. The hierarchy of options is as follows:*

1) *Priority 1: Collected for Non-Potable Use;*
2) *Priority 2: Infiltrated to Ground (Infiltration);*
3) *Priority 3: Discharged to an Above Ground Surface Water Body;*
4) *Priority 4: Discharged to a Surface Water Sewer, or another Piped Surface Water Drainage System;*
5) *Priority 5: Discharged to a Combined Sewer; and*
6) *It is necessary to identify the most appropriate method of controlling and discharging surface water. The five priority options of the hierarchy above have been reviewed below in terms of their feasibility for discharging water from the Proposed Development.'*

Priority 1: Collected for non-potable use

7.3.2 Under normal circumstances, the substation will be unmanned and operated remotely. Therefore, water reuse has been deemed unsuitable for this development, as low demands for water supply are anticipated.

Priority 2: Infiltrated to Ground

7.3.3 BGS (Ref 23) mapping shows the Substation Works to be entirely underlain by Oxford Clay Formation (Mudstone) and superficial deposits in the form of Tidal Flat Deposits (Clay and Silt). Mudstone, clay and silt have low infiltration potential.

7.3.4 As outlined in **Section 6.4,** the ground investigation undertaken at the Substation Compound (Ref 36), confirmed the presence of cohesive soils including silty sand and clay to over 20mBGL. Average groundwater levels were also noted at relatively shallow depths of 1.52mBGL.

7.3.5 Based on the recorded geology and hydrogeology, infiltration has been excluded as a primary method for surface water disposal. Subject to detailed design, the grassed swale can facilitate partial infiltration into the ground, where feasible.

Priority 3: Discharge to an above ground surface water body

7.3.6 Discharge to a surface water body is the next preferred method of surface water disposal. Therefore, directing surface water into the onsite R11 New Drain and R20 Crowtree Connection IDB watercourses is regarded as an appropriate disposal method for the proposed Substation Works, as it will replicate the Site's existing watershed.

Priority 4: Discharge to a surface water sewer, or another piped surface water drainage system and Priority 5: Discharge to a Combined Sewer

7.3.7 The option to discharge to a surface water body has been deemed as a feasible option, as discussed above.

7.3.8 There are no public surface water or combined water sewers in the vicinity of the proposed Substation Works, where a connection could be made, based on the Anglian Water records. Discharging into the public sewer is not regarded as a viable option, as it is considered a less preferable runoff destination within the established drainage hierarchy.

7.4 Standard 2: Management of Everyday Rainfall (Interception)

7.4.1 The National Standards for SuDS (Ref 7), paragraph 2.6 notes that '*Evidence shall be provided to demonstrate that the runoff from each positively drained surface, for at least 5mm of rainfall, is either collected for use, infiltrated into the ground, or else captured, conveyed and stored within SuDS features. These features shall naturally absorb or retain runoff and from these the runoff will be 'lost' to soils or the atmosphere and will not discharge off the Site.*'

7.4.2 As part of the proposed surface water drainage network, attenuation basins and a swale will be included. Both are designed to be grassed, which allows them to effectively intercept rainfall and promote evaporation. In addition, the substation platform, built with free-draining gravel, is likely to capture the first 5mm of rainfall, promoting evaporation.

7.4.3 The National Standards for SuDS also notes in paragraph 2.7 that *'(…) All permeable surfaces, whether lined or not, shall be assumed to comply provided there is no additional area drained to the permeable pavement.'* Permeable surfaces such as permeable paving are proposed to be utilised in the proposed car park; consequently, it is anticipated that interception of the initial 5mm of rainfall will be achieved in this part of the proposed Substation Works, meeting the criteria outlined in Standard 2.

7.4.4 Further details of the proposed drainage network, type of SuDS elements and their location are presented in Surface Water Drainage Layout drawing, presented in **Appendix D**.

7.4.5 Comprehensive calculations, in accordance with the National Standards for SuDS will be completed during the detailed design phase, when all final SuDS specifications are established. Nonetheless, it is anticipated that the range of SuDS incorporated within this drainage strategy will ensure an appropriate level of interception is achieved.

7.5 Standard 3: Management Of Extreme Rainfall and Flooding

Greenfield Runoff Rates

7.5.1 Pre-development runoff rates for the Site were determined using HR Wallingford SuDS UK greenfield runoff estimation tool (Ref 34) with FEH22 rainfall data (Ref 27) for a 1-hectare area as the reference. The corresponding runoff rates are listed in

7.5.2 **Table 7.1** below and can be found in Appendix D.

Table 7.1 Greenfield runoff rate estimates

Return Interval	Runoff Rate (l/s) per 1Ha
100% AEP (1 in 1 year)	0.8
50% AEP (1 in 2 year)	0.8
QBAR	**1.0**
3.33% AEP (1 in 30 year)	2.3
1% AEP (1 in 100 year)	3.4

Proposed Catchments

7.5.3 The SWDS considers that surface water generated by the Substation Works will be managed through the following proposed catchments:

1) Catchment A – eastern portion of the substation platform including internal roads;
2) Catchment B – western portion of the substation platform, including the welfare facility area and internal roads; and
3) Catchment C – access road to the substation.

7.5.4 The following assumptions have been made with respect to permeability of the proposed areas:

1) Access road – assumed as fully impermeable, as a conservative approach; and
2) Welfare facility area, including the buildings, car parking, internal road – assumed as fully impermeable, as a conservative approach.

7.5.5 The areas drained within each respective catchment are presented in **Table 7.2** below.

Table 7.2 Catchment areas

Catchment Ref.	Total Area (Ha)	Impermeable Area (Ha)
Catchment A	3.51	3.51
Catchment B	4.14	4.14
Catchment C	0.317	0.317
Total	7.97	7.97

Attenuation Volume Estimates

7.5.6 Initial Quick Storage Estimates (QSE) have been undertaken using the HR Wallingford SuDS UK surface water storage volume estimation tool (Ref 35) and FEH22 rainfall data (Ref 27) to determine the attenuation volumes required to limit peak discharge rates from the proposed Substation Works to QBAR. The required volumes of attenuation determined using the initial QSE calculations were subsequently confirmed through the development of a hydraulic model undertaken in Causeway Flow.

7.5.7 The following volumes presented in **Table 7.3** have been estimated assuming that runoff will be limited to as close as possible to greenfield QBAR rates.

Table 7.3 Proposed discharge rates and storage volume estimations

Catchment Ref.	Impermeable Area (Ha)	QBAR rate (l/s)	Proposed peak discharge rate (l/s)	QSE volume for 1% AEP +40CC (m^3)
Catchment A	3.51	3.51	3.4	5,124
Catchment B	4.14	4.14	3.9	6,036
Catchment C	0.317	0.317	1.0	398
Total	**7.97**	**7.97**	**8.3**	**11,558**

7.5.8 A minimum discharge rate of 1l/s from Catchment C has been proposed to limit the risk blockages in the proposed drainage network. The initial QSE along with the hydraulic model outputs for all storm events and durations tested can be found in Appendix C.

7.5.9 Storage for the 1% AEP event plus an allowance of 40% for climate change will be accommodated on-site within the granular sub-base gravel layer and a series of proposed SuDS features as summarised in **Table 7.4** below.

7.5.10 The key findings of the hydraulic modelling indicate that storage within the 300mm granular sub-base gravel layer would primarily be utilised during short-duration (high intensity, smaller volume) storm events. During these events, the system would surcharge and temporarily use the stone layer for storage. For longer duration storms (low intensity, higher volume), sustained rainfall result in flows being conveyed through the proposed pipe network directly to the flow-through basin, with minimal

effective storage provided by the granular sub-base. As a result, for some longer duration storm events during the 1% AEP with allowance for 40% climate change, the water depth required to be stored in the basins is approximately 1.2m and 1.3m for Attenuation Basin 1 and Attenuation Basin 2, respectively. Following the industry standards included in the SuDS Manual, the storm duration of 48 hours has been considered in estimating the maximum storage volume required on site.

7.5.11 As outlined in **Table 7.4** below, it is estimated that in total 12,748m^3 will be provided in the onsite SuDS to attenuate volumes to 1% AEP with allowance for climate change. Additional volume is also provided within the stone layer, which will be used primarily during the short duration storm events.

Table 7.4 Storage provision break-down

Catchment Ref.	QSE volume for 1% AEP+40CC (m^3)	Causeway Flow basin volume requirement for 1% AEP+40%CC (m^3)	Available in sub-base gravel (m^3)	Provided in SuDS (m^3)*
Catchment A	11,160	4,270	6,105	5,500
Catchment B		5,191		6,850
Catchment C	398	n/a	n/a	398
Total	11,558	n/a	6,105	12,748

- *This allocation reflects the design of the proposed drainage network and attenuation measures, which are intended to future-proof the development by accommodating sufficient storage volumes for potential substation upgrades in the future. The assumed future upgrade is that the substation will increase its size bidirectionally, resulting in larger areas being drained into the planned attenuation basins.

Proposed Sustainable Drainage System Elements

7.5.12 The drainage network and proposed SuDS elements are presented in a drawing in Appendix D and are also detailed below:

1) Catchment A will discharge via Attenuation Basin 1 into a diverted New Drain IDB watercourse (R11) proposed to run around the eastern part of the Site, subject to detailed design;

2) Catchment B will discharge via Attenuation Basin 2 into the IDB watercourse R20 towards the south west;

3) Catchment C will discharge via a roadside swale into the R20 watercourse via outfall from Attenuation Basin 2;

4) The substation platform and internal roads will be drained via a system of shallow filter drains containing a minimum 150 mm diameter perforated carrier pipe, subject to detailed design. Depth of the filter drains will vary with a minimum depth of approximately 800mm to Invert Level, if under drained filter trenches are used. Minimum gradient of 1 in 400 will be required to comply with the SuDS Manual (Ref 11). The filter drainage network will run into traditional drainage pipes where required to cross or run within the internal access roads;

5) Subject to detailed design, filter drains will have check dams with orifices along their lengths to maximise the amount of surface water storage within. The optimum location of these check dams will be subject to detail design to ensure there are no clashes and to minimise the risk of blockages; and

6) Subject to detailed design, the road swale will also have check dams to maximise the storage within it and control the flow downstream.

Attenuation Basins

7.5.13 The basins will be designed with a maximum slope gradient of 1 in 3 and 300mm freeboard for compliance with the SuDS Manual and ease of maintenance. Total depth and size of basins is subject to detailed design, cut and fill requirements and depths at the receiving waterbodies, which will dictate the invert level at the basin outfalls. It will also be dependent on the local ground water conditions and confirmation of additional measures to prevent groundwater ingress into the basin.

7.5.14 Pumped systems are expected to be necessary, due to the shallow depths of the receiving IDB watercourses. It is proposed that Type 1 package pumping stations are installed adjacent to the proposed attenuation basins to elevate the outfall invert levels to the level required by the conditions of the receiving watercourse.

7.5.15 The pumping stations will be designed in line with general standard details, such as those indicated in Figure D3 and Figure D4 of the DCG (Ref 13), following best practice, and may be subject to agreement with the IDB. It will likely need to be privately maintained, as IDB confirmed they would not adopt surface water pumping stations.

7.5.16 Mitigation relating to the risk of pump failures will be incorporated into the design and be in line with the DCG (Ref 13).

7.5.17 It is noted that DCG requires that pumping stations should be avoided wherever possible, and these may only be proposed when all gravity drainage options are demonstrably unachievable. This will be subject to the final levels across the substation platform and consequent detailed drainage design, secured via relevant planning condition.

7.5.18 DCG (Part C & D) requires sufficient emergency storage within the system or wet well to allow for pump failure response time. This storage requirement is central for managing:

1) power failure;

2) pump mechanical faults;

3) blockage or control system faults, and

4) preventing uncontrolled overflow.

7.5.19 The pumping station will be provided with a 24-hour access for maintenance and emergency response.

Swale

7.5.20 A swale is proposed along the access road to manage runoff arising from it and provide additional water quality benefits. The swale's design may be adjusted based on mitigation area requirements and could serve as a nature-based solution supporting broader project goals.

7.5.21 The swale can provide some of the required volume, with the assumption that the design includes check dams to maximise the storage capacity and slow down flow further downstream. Careful design will be required around any cable routes, noting that shallow channels are proposed to be approximately 500mm in depth, 3.5m wide and with a minimum slope gradient of 1 in 3, in line with the SuDS Manual.

Other SuDS

7.5.22 Permeable paving systems are proposed within the proposed car parking area to manage the flow at source and provide additional water quality benefits.

7.5.23 Subject to detailed design, additional storage features may be incorporated within the substation platform area. National Grid has a requirement that no open water surface features are present within their substation sites, therefore if required, underground storage SuDS will be utilised. Geocellular storage tanks, available in various configurations and depths, can provide up to 95% void space for efficient water retention.

Access for maintenance

7.5.24 All SuDS features and proprietary systems, including pumping stations, have been proposed with adequate access routes for long-time maintenance. The maintenance activities will be in line with the SuDS Manual maintenance schedule or specific manufacturer maintenance guidance and be undertaken by the National Grid or appointed maintenance contractor.

Residual Risk and Exceedance Flow

7.5.25 Drainage exceedance occurs when rainfall intensity exceeds the design capacity of the proposed drainage system. Underground systems cannot be economically or sustainably engineered to accommodate all extreme rainfall events; therefore, exceedance flows will occur during events greater than the 1% AEP event plus climate change allowance.

7.5.26 As the substation platform level is proposed to be flat, any exceedance flows will temporarily pond on the surface until capacity becomes available within the sub-base gravel platform and the piped drainage system. Final site levels, platform edges and external gradients will be shaped to ensure that both everyday runoff and exceedance flows are routed away from the buildings, sensitive infrastructure and access routes and are safely conveyed via overland flow pathways towards designated low-risk areas within the Site boundary. Overflow mechanisms will be confirmed during detailed design, including the exact locations where exceedance may occur during storm events greater than the 1% AEP event plus climate change allowance.

7.5.27 Indicative exceedance flow routes are shown in the Surface Water Drainage Layout in Appendix D.

7.6 Standard 4: Water Quality

Assessment of the pollution hazard level

7.6.1 The SuDS Manual (Ref 11) sets out a common approach to managing the quality of surface water runoff, referred to as Simple Index Approach (SIA). It describes risks posed by surface water runoff to the receiving environment as a function of:

1) The pollution hazard at a particular Site (i.e. the pollution source);
2) The effectiveness of SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels (i.e. the pollutant pathway); and
3) The sensitivity of the receiving environment (the environment receptor).

7.6.2 The SIA assesses the selected arrangements of SuDS components and corresponding treatment trains, provide a total pollution mitigation index at least equal to, or greater than, the pollution hazard index.

7.6.3 The proposed land uses that will require surface water drainage discharge to a watercourse are:

1) Access roads, internal roads and car parking areas;
2) Building roof surfaces;
3) Bunded areas surrounding diesel generator; and
4) Gravelled areas within the raised granular platform compounds.

7.6.4 Table 26.2 of the SuDS Manual assigns pollution hazard indices for different land use classifications (shown in Image 7.1 below).

Image 7.1 Table 26.2 of the SuDS Manual – Pollution hazard indices for different land use classifications (Source: CIRIA SuDS Manual C753)

TABLE 26.2 Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1]	High	0.8[2]	0.8[2]	0.9[2]

7.6.5 Within the Site, the new access road can be classed as “low traffic roads with infrequent change i.e. < 300 traffic movements/day” according to Image 7.1 above. This road is not anticipated to comprise of infrastructure or electrical components using oils or hydrocarbons. The pollution hazard level is classified as Low. Mitigation measures are required in accordance with the SuDS Manual.

7.6.6 Due to the industrial character and activities associated with the Scheme, the proposed substation area has been deemed an “industrial site” based on Image 7.1. The pollution hazard level from ‘industrial sites’ is classified as High. Mitigation measures are required in accordance with the SuDS Manual. Additionally, the sites with High pollution hazard to the environment may require environmental licence or permit.

7.6.7 Table 7.5 below provides a summary of the pollution hazard indices given for different parts of the Proposed Development.

Table 7.5 Proposed development pollution hazard indices (from SuDS Manual C753)

Reference	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
New Access Road	Low	0.5	0.4	0.4
Proposed Substation	High	0.8	0.8	0.9

7.6.8 **Table 26.3** of the SuDS Manual gives the mitigation indices that refer to performance in pollutant removal by different treatment options / SuDS features. Those are outlined in Image 7.2 below.

Image 7.2 Indicative SuDS mitigation indices for discharges to surface water (Source: CIRIA SuDS Manual C753)

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters

	Mitigation indices[1]		
Type of SuDS component	**TSS**	**Metals**	**Hydrocarbons**
Filter strip	0.4	0.4	0.5
Filter drain	0.4[2]	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond[4]	0.7[3]	0.7	0.5
Wetland	0.8[3]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Notes

1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.

2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.

7.6.9 The SIA has been used to inform this SWDS and is presented in the tables below. The mitigation indices stated in Table 26.3 of the SuDS Manual are halved for any interventions after the primary SuDS element, as required by the SuDS Manual. Considerations for additional pollution control required for the diesel generator proposed within the welfare area are outlined further in this section.

New Access Road

7.6.10 The new access road is classed as **Low** pollution hazard level, the following treatment train is proposed:

Table 7.6 Treatment train for Low hazard areas

SuDS Component	TSS	Metals	Hydrocarbons
Swale	0.5	0.6	0.6
Total	0.5	0.6	0.6
Sufficient Mitigation?	Yes	Yes	Yes

7.6.11 The total mitigation indices required for the Low hazard areas are 0.5, 0.4, 0.4 for the TSS, Metals and Hydrocarbons respectively. The assessment above shows that the use of a swale will be sufficient to meet the requirement for adequate pollution mitigation across the new access road (Image 7.1, Image 7.2).

Proposed Substation

7.6.12 For the proposed substation area, classed as **High** pollution hazard level, the following treatment train is proposed:

Table 7.7 Treatment train for High hazard areas

SuDS Component	TSS	Metals	Hydrocarbons
Filter Drain	0.4	0.4	0.4
Detention Basin	0.25	0.25	0.3
Total	**0.65**	**0.65**	**0.7**
Sufficient Mitigation?	**Additional mitigation required**	**Additional mitigation required**	**Additional mitigation required**

7.6.13 The total mitigation indices required for the High pollution hazard areas are 0.8, 0.8, 0.9 for the TSS, Metals, and Hydrocarbons respectively. The assessment above shows that additional pollution prevention measures are required for the proposed substation (Image 7.1, Image 7.2).

Additional pollution prevention measures

7.6.14 Additional pollution prevention measures will be implemented in line with the National Grid technical specification TS 2.10.01 – Oil Containment (Ref 15) and in accordance with DEFRA and EA Guidance ‘Pollution Prevention for Businesses’ (Ref 14).

7.6.15 In line with the TS 2.10.01, any “Oil Retaining Areas” within the proposed Substation Compound will require pollution prevention measures to collect and control potentially contaminated surface water runoff. Across the Substation Works a diesel generator will form part of the “Oil Retaining Areas”.

7.6.16 The type of diesel generator will be confirmed at detailed design. As a conservative approach a diesel generator sited in a reinforced concrete bund has been assumed. It is proposed to be equipped with a water control system in the form of an intelligent sump pump (bund water control unit, or similar) to pump the clean rainwater into the surface water drainage network through a class 1 full retention oil separator.

7.6.17 The oil separator is proposed to be fitted with a high-level alarm. The sump pump will be provided with a two-level alarm system. A low-level alarm to indicate the presence of oil (which might be due to a localized spill) and a second higher level one to shut the engine down in the event of a failure and a significant release of oil.

7.6.18 In such events, contaminated water from the bund will be safely disposed of off-site. Additionally, penstocks and sampling chambers will be installed along the network to allow manual shut off and access for water quality monitoring.

7.6.19 The pollution prevention system is proposed to include the following key elements:

1) Oil separators;
2) Shutdown system in form of Penstock Valves located upstream and downstream to each oil separator;
3) Sampling chamber placed immediately downstream of every oil separator and at, or before the final discharge point to the watercourse; and
4) Sump or a tank downstream of every oil separator.

7.6.20 The proposed substation platform should be designed, where reasonably practicable, to limit the egress of water from potential high-pollution hotspots, such as bunded areas. Additionally, the materials used for the construction of the granular platform should be in line with the National Grid technical specifications TS 3.10.02 – Materials (Ref 32). The use of impermeable liner beneath the gravel surfaced areas will additionally provide protection to the sensitive groundwater aquifers beneath the site.

7.6.21 Emergency measures for spillages, blockages and emergency shut down should be in line with the National Grid TS 2.10.01 – Oil Containment and with DEFRA and EA Guidance 'Pollution Prevention for Businesses' (Ref 14).

7.6.22 Implementing the additional measures outlined above will enhance the level of treatment identified by the assessment undertaken in this section using the SIA by delivering even higher pollution control performance from the proposed drainage system.

7.6.23 An oily water drainage system along with the bund feature and oil separator are presented in the Surface Water Drainage Layout in **Appendix D**.

7.6.24 In summary, the SuDS features incorporated into the Substation Works, together with their demonstrated capability for pollution mitigation and supplementary pollution control measures specific to the diesel generator, will collectively ensure the protection of receiving waterbodies from any negative impacts associated with the Proposed Development.

7.7 Standards 5-6: Biodiversity And Amenity

7.7.1 This section evaluates whether the proposed SuDS features can deliver biodiversity and amenity benefits.

7.7.2 By embedding multifunctional SuDS within the landscape, the design will provide opportunities for ecological enhancement, supporting pollinators and other wildlife while contributing to the site's natural character and ecological resilience.

7.7.3 The SuDS related biodiversity areas will be developed in conjunction with ecologists and landscape architects at the detailed design stage.

7.7.4 Given that land required permanently for the Substation Works will be privately owned, access will be limited exclusively to employees during operational and maintenance activities. The grassed attenuation basin and swale will provide some amenity benefits, but not to the wider public.

7.8 Standard 7: Design of Drainage for Construction, Operation, Maintenance, Decommissioning and Structural Integrity

7.8.1 Regular inspection and maintenance are required to ensure the effective long-term operation of SuDS and the drainage network, including filter drains, pipework, chambers and associated flow control components. These requirements are detailed in the SuDS Manual C753 (Ref 11) and DCG Part C (Surface Water Drainage Systems) (Ref 13). A SuDS maintenance inspection checklist in accordance with the SuDS Manual is provided in **Appendix E**.

7.8.2 The operation and maintenance of the oil containment system, including oil separators, penstock valves, sumps and tanks, sampling chambers etc. will follow the NG's TS 2.10.01 - Oil Containment manual (Ref 15) and the manufacturer's instructions.

7.8.3 The surface water drainage network and any SuDS features will be maintained by a private management company appointed by National Grid. Further details will be confirmed at the detailed design stage. Maintenance activities will be made available in the site-specific Operation and Maintenance (O&M) Manual to ensure adequate maintenance is provided during its lifetime.

7.8.4 The surface water pumping station will also be under private ownership and maintained throughout the lifespan of the development. Comprehensive operational and maintenance procedures will be detailed in the site-specific O&M Manual, which will be enforced throughout operation of the Substation Compound.

7.8.5 Access provision for maintenance will be made available at all times during operational phase of the Substation Compound. The current drainage layout and wider masterplan allow for provision of adequate access for SuDS maintenance.

Maintenance requirements for detention basins

7.8.6 The general maintenance obligations associated with attenuation basins are included in **Table 22.1** of the SuDS Manual. An overview of this is shown in Image 7.3 below. They include regular activities, such as removal of litter/debris, grass cutting, managing vegetation, inspection of inlets, outlets, banksides as well as silt removal. Occasional maintenance includes re-seeding, sediment removal. Remedial activities should include damage and structural repairs.

Image 7.3 Operation and maintenance requirements for detention basins (Source: CIRIA SuDS Manual C753)

TABLE 22.1 Operation and maintenance requirements for detention basins

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in Chapter 23)
Occasional maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

Maintenance requirements for swales

7.8.7 The general maintenance obligations associated with swales are included in Table 17.1 of the SuDS Manual (Ref 11). An overview of this is shown in Image 7.4. They include regular surface inspections for silting, removal of litter and managing vegetation and the inspection of inlets, outlets and overflows for silting/blockages.

Image 7.4 Operation and maintenance requirements for swales (Source: CIRIA SuDS Manual C753)

TABLE 17.1 Operation and maintenance requirements for swales

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

Maintenance requirements for filter drains

7.8.8 The general maintenance obligations associated with filter drains are included in Table 16.1 of the SuDS Manual. An overview of this is shown in Table 7.5 below. They include regular inspections for the removal of litter/debris from the drained surface, access chamber and pre-treatment devices. Inspection/removal of surface, inlets/outlets, control systems, pre-treatment devices for blockages/siltation.

Image 7.5 Operation and maintenance requirements for filter drains (Source: CIRIA SuDS Manual C753)

TABLE 16.1 Operation and maintenance requirements for filter drains

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required

Maintenance requirements for proprietary treatment systems

7.8.9 The general maintenance obligations associated with proprietary treatment systems (e.g. oil separators, penstock valves, flow controls) are included in Table 14.2 of the SuDS Manual. An overview of this is shown in Image 7.6 below. They include routine inspections for the removal of litter/debris, sediment, oil, grease and floatables as well as the change of filter media. Also, the maintenance activities should be in line with the manufacturer's recommendations.

Image 7.6 Operation and maintenance requirements for proprietary treatment systems (Source: CIRIA SuDS Manual C753)

TABLE 14.2 An example of operation and maintenance requirements for a proprietary treatment system

Maintenance schedule	Required action	Typical frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

7.8.10 Regular testing of penstock closure and alarm systems shall be incorporated into the maintenance schedule.

General maintenance of drainage network elements

7.8.11 Pipes and pipework

1) Routine inspection to identify blockages, siltation, root ingress, structural defects or misconnections;
2) Cleaning of pipework using water jetting or vacuum techniques where silt or debris accumulation is observed;
3) Removal of obstructions to maintain hydraulic capacity and prevent surcharging;
4) Repair or replacement of damaged pipe sections where defects are identified; and
5) Verification that gradients, joints and connections remain intact and operational.

7.8.12 Manholes and inspection chambers

1) Visual inspection from ground level to check for debris, sediment buildup, standing water or signs of surcharge;
2) Inspection of covers, frames and locking mechanisms to ensure safe and secure access;
3) Cleaning of chambers where sediment accumulation is identified (by competent contractors);
4) Monitoring for structural damage, infiltration or leakage; and
5) Confined space entry avoided unless undertaken by suitably qualified personnel.

7.8.13 Catch pits / catchpits / silt traps

1) Regular inspection for accumulation of silt, debris, oils or floating material;
2) Emptying and cleaning using vacuumation or jetting to maintain sediment storage capacity;
3) Reinstatement of silt buckets or sumps following cleaning;
4) Increased inspection frequency following heavy rainfall events; and
5) Safe disposal of removed material in accordance with waste regulations.

7.8.14 Gullies, channels and surface drainage features

1) Removal of debris, litter and leaf fall from inlets and gratings;
2) Flushing or jetting of gullies and channels to prevent blockage
3) Inspection of gratings, joints and concrete surrounds for damage or misalignment;
4) Repair or replacement of damaged components as required; and
5) Monitoring for evidence of ponding or reduced conveyance.

7.8.15 Flow control devices and attenuation controls

1) Routine inspection to ensure devices are free from silt, debris and obstructions;
2) Cleaning of flow control units to maintain design discharge rates;
3) Inspection of chambers housing flow controls for sediment accumulation; and
4) Repair or replacement of damaged or malfunctioning components.

7.8.16 Free-draining gravel sub-base layers used for surface water storage should be periodically checked for siltation and remedial activities may be required to maintain their storing capability.

7.8.17 All SuDS components will be designed to withstand loads, environmental conditions and operational stresses without failure. The detailed design will ensure that robust materials are used, and that adequate protection against erosion, settlement, blockage and climate-change-driven stresses is provided.

General maintenance of surface water pumping station

7.8.18 Subject to detailed design and the type of pumping station required, the maintenance activities and frequencies will adhere to the requirements of DCG Part D or the specific manufacturer's maintenance schedule.

7.8.19 Provision will be made for safe, 24-hours access to facilitate maintenance and emergency interventions. Adequate space will be allocated for pump lifting, tanker access and generator connection as necessary.

7.8.20 The O&M manual for the substation will include detailed inspection schedules, step-by-step servicing procedures and a checklist for contractors to ensure all maintenance tasks are performed to the required standard.

8. Conclusion and Recommendations

8.1 Conclusion

8.1.1 Post development there will be an increase in the impermeable area on site. This may increase the risk of surface water flooding to the site and elsewhere. To mitigate this risk, a SWDS has been prepared in accordance with local, regional and national guidance in relation to flood risk and drainage.

8.1.2 This SWDS provides an overview of the proposed surface water management for the permanent Substation Works, including the proposed Weston Marsh Substation A operational compound and associated ancillary works.

8.1.3 An assessment of surface water disposal hierarchy has been undertaken in line with the National Standards for SuDS (Ref 7) and LCC Design and Evaluation Guide (Ref 16). Given the impermeable ground conditions and relatively shallow groundwater levels, infiltration into the ground as a primary method of surface water disposal has been deemed unfeasible.

8.1.4 Outfall into the local waterbodies network is proposed as the most feasible option of surface water disposal. Surface water runoff from the Substation Works will be limited as close as possible to greenfield QBAR runoff rate, in accordance with the National Standards for SuDS and LCC Design and Evaluation Guide.

8.1.5 This will be achieved by the provision of on-site attenuation of surface water flows prior to discharge into local waterbodies. This SWDS demonstrates that the on-site attenuation will accommodate volumes up to the 1% AEP event, including a 40% allowance for climate change. Final size and depths of the proposed SuDS features will be confirmed at detailed design stage and be subject of cut and fill requirements on site.

8.1.6 The indicative SWDS layout shown in **Appendix D** considers that the use of pumped systems may need to be required, given shallow conditions at the receiving waterbodies. The use of pumping stations will be confirmed at the detailed design. Access arrangement have been considered for the proposed pumping stations and SuDS features for maintenance. Subject to detailed design, peak discharge rates may be dictated by the minimum flow requirement of the pump.

8.1.7 The SWDS demonstrates compliance with paragraphs 181 and 182 of the NPPF (Ref 5). The exceedance flows will be managed within the site boundary and will not pose flood risk outside of the site boundary.

8.1.8 SuDS features will be incorporated in compliance with the NPPF, National Standards for SuDS (Ref 7) and LCC Design and Evaluation Guide (Ref 16). The SuDS will manage both water quality and quantity across the development, ensuring adequate surface water flood mitigation on site whilst also preventing flood risk and pollution impacts elsewhere. These features will also support the wider biodiversity goals and blend within the surrounding environment.

8.1.9 This SWDS is subject to approvals from the LCC LLFA and South Holland IDB's and subject to land drainage consents for connection into the IDB watercourse network (Ref 18).

8.2 Recommendations

8.2.1 The following key recommendations have been made:

1) A full detailed design of the surface water network shall be developed at the detailed design stage, as secured via planning condition and incorporating the outcomes of the updated hydraulic modelling and final substation platform geometry;

2) Final site levels, platform edges and external gradients shall be shaped to ensure both everyday runoff and exceedance flows are conveyed safely within the site boundary, using controlled overland flow paths aligned to the drainage strategy. Overland flows must be directed away from the substation buildings, access road low points, and any sensitive electrical infrastructure, and routed towards designated low-risk areas within the site boundary;

3) Access road levels must be set in accordance with the FRA hydraulic modelling to achieve a minimum standard of protection against the 1% AEP with allowance for climate change;

4) A pumped surface water drainage system is considered to be required for Catchments A and B, where surface water runoff can drain by gravity into the pump sump, but a gravity discharge route is unavailable downstream, due to shallow depth at the receiving waterbodies. The pumped arrangement should be designed with emergency storage, as required, back-up power provision and appropriate control philosophy to ensure resilience during extreme rainfall events and maintain compliance with the hydraulic performance requirements of the drainage strategy;

5) Where the substation platform is raised above the surrounding ground, perimeter bunding shall also be incorporated to prevent the risk of lateral flow from the granular sub-base onto the surrounding landscape. These measures should be incorporated into the final platform design.

6) Groundwater ingress risk shall be evaluated once final excavation depths, drainage invert levels and cable trench routes are confirmed. Where the drainage network may sit below the local water table, mitigation such as pipe bedding adjustment, sealed manhole chambers, or groundwater cut-off measures shall be incorporated to prevent surcharge or dilution of treatment components;

7) The substation design must ensure that all potentially contaminative infrastructure and elements of equipment are contained or bunded to prevent the risk of contamination to the local groundwaters and surface water bodies. No contaminants should be allowed to enter the granular sub-base platform layers;

8) The surface water drainage system including pumping stations shall be maintained as the best practice in accordance with the DCG Part C (Surface Water Drainage Systems), DCG Part D (Pumping Stations) (Ref 13), the SuDS Manual C753 (Ref 11) and the relevant National Grid's technical specification (Ref 28 to Ref 33). Pumping station should also be maintained in line with

manufacturer's recommendations. Maintenance plans shall be included in the O&M Manual for the substation and access for maintenance be provided at all times; and

9) Operation and maintenance of all oil containment measures—including oil separators, penstocks, shut-off valves, sumps, tanks, sampling chambers, and alarms—shall comply with National Grid TS 2.10.01 (Oil Containment) (Ref 29) and relevant manufacturer requirements. Regular testing of penstock closure and alarm systems shall be incorporated into the maintenance schedule.

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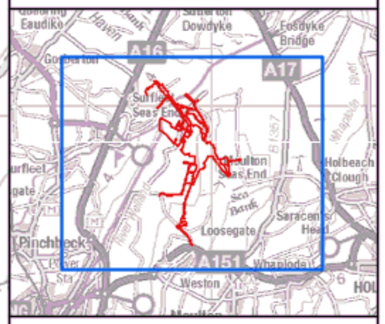
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Figures

Figure 1 Scheme Site Boundary

N

LEGEND



Legend

- Scheme Site Boundary
- Substation Works Site Boundary
- S37 OHL Works Site Boundary
- Exempt Overhead Line Works Site Boundary
- S37 - 4ZM - OHL Works Site Boundary
- S37 - 2WS - OHL Works Site Boundary

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0 250 500 750 1,000
Meters

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A	06/05/2026	First Issue	MM	DF	AM

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Purpose: WATER ENVIRONMENT

Scheme: PROPOSED ELECTRICITY SUBSTATION AND OVERHEAD LINE WORKS AT WESTON MARSH

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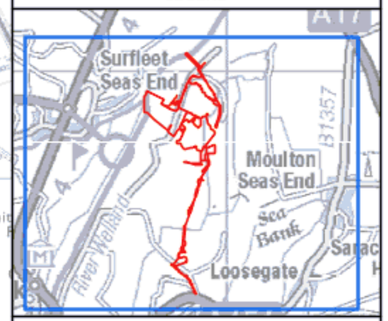
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Figure 2 Substation Works Site Location

LEGEND



Legend

- TCPA Substation Works Site Boundary
- Substation
- Substation Access

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Document Title: FIGURE 2 SUBSTATION WORKS SITE LOCATION

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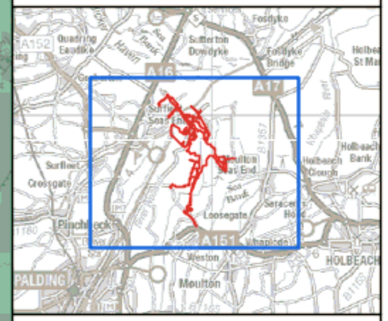
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Figure 3 Scheme Topography

N

LEGEND



Legend

- Scheme Site Boundary
- Substation

OS Terrain 50

- < -0.125
- -0.124 - 1.25
- 1.251 - 2.5
- 2.501 - 3.75
- 3.751 - 5.125

Rev	Date	Description	GIS	Chk	App
A	06/05/2026	First Issue	MM	DF	AM

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Purpose: WATER ENVIRONMENT

Scheme: PROPOSED ELECTRICITY SUBSTATION AND OVERHEAD LINE WORKS AT WESTON MARSH

Document Title: FIGURE 3 TOPOGRAPHY

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Figure 4 Hydrology Plan

N

Farm

Peter Sea Dike

Dike

Ppg Sta

Surfleet Pump Drain

Latham Lode Seas End

Old Beach Drain East

Surfleet Bank

Sea Bank

Vernatt's Bridge

N.T.L. Sluice

Reservoir

Vernatts Drain

Welland House Farm

Pickmere

South Bank

White House Farm

Nursery

Elder

School House

Marsh Road

Crowtree Farm

Bottom Yard

R20 Crowtree Connection

Weston Marsh

R11 New Drain

Top Yard

R07 Lords

Lord's Drain

R01 Ben Dyke

Drainorum

30

29

28

4

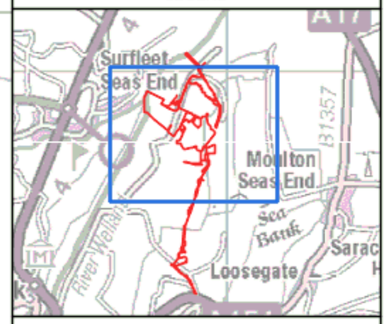
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LEGEND



Legend

- Substation Works Site Boundary
- Substation
- Statutory Main River Map

IBD Watercourses and Drains

- Welland and Deeping Drains
- South Holland Drains

Rev	Date	Description	GIS	Chk	App
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Purpose: WATER ENVIRONMENT

Scheme: PROPOSED ELECTRICITY SUBSTATION AND OVERHEAD LINE WORKS AT WESTON MARSH

Document Title: FIGURE 4 HYDROLOGY PLAN

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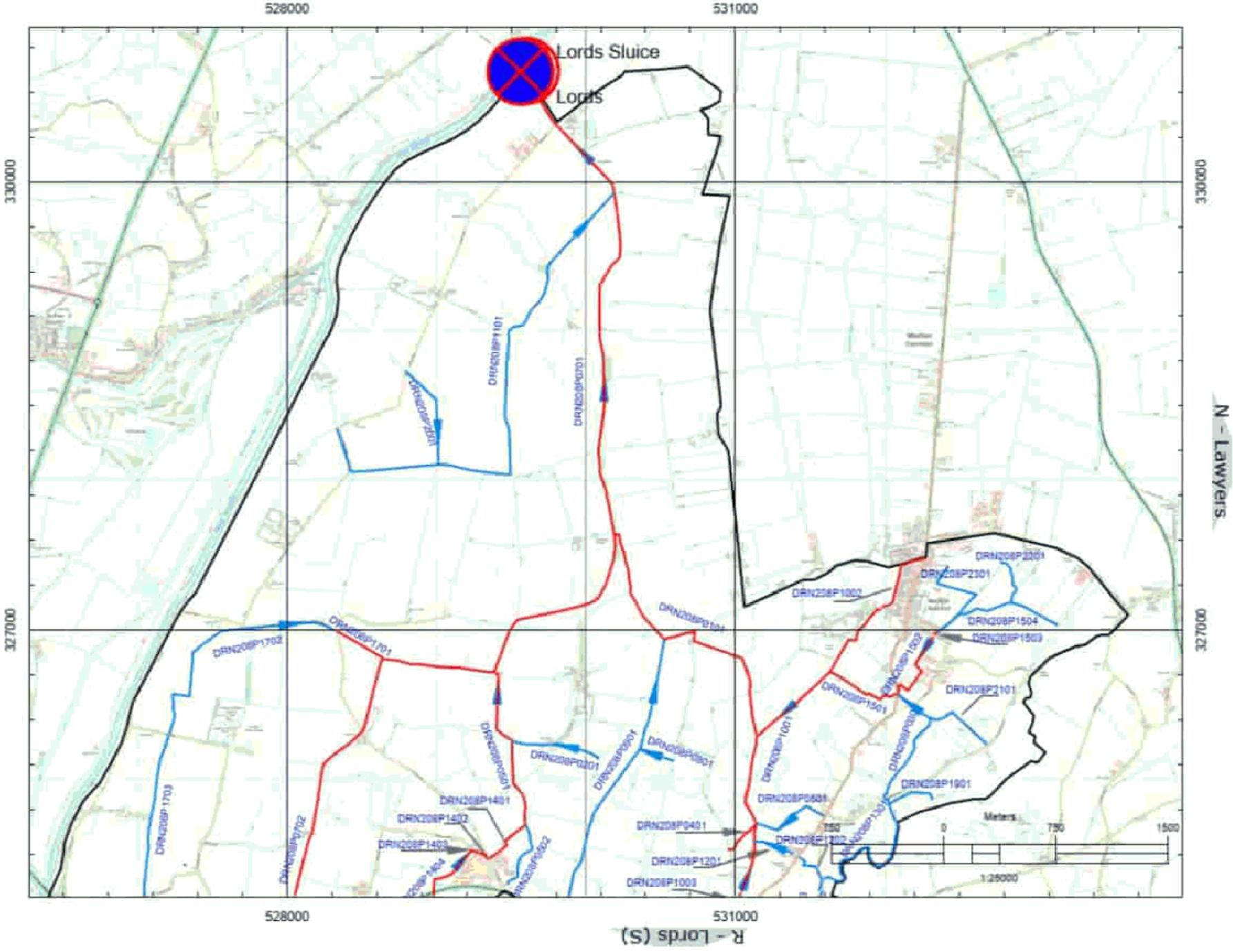
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Appendices

Appendix A Internal Drainage Board Plans

Q - Wragg Marsh



R - Lords (S)

N - Lawyers

Lords (N)

South Holland Drainage Board

LEGEND

- Catchment Boundary
- High Priority Watercourse
- IDB Ordinary Watercourse
- High Priority Pipeline
- Ordinary Pipeline
- Water Control Structure
- Pumping Station
- Inland Sluice
- Tidal Sluice

KEY MAP



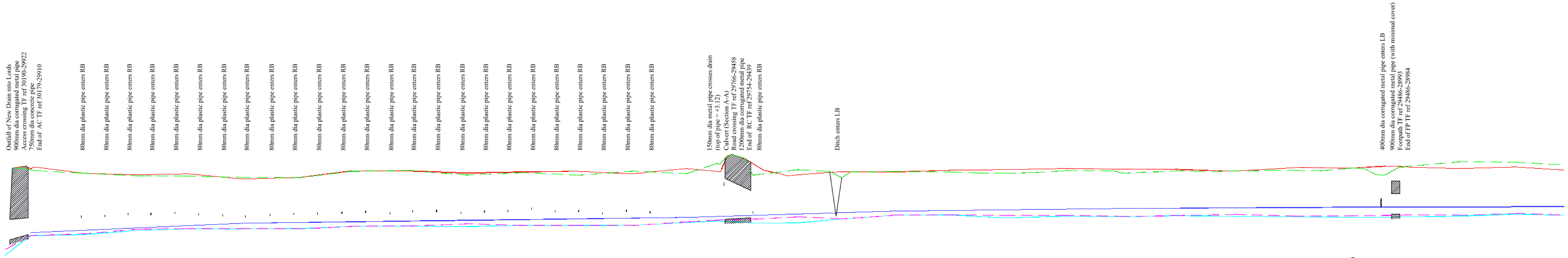
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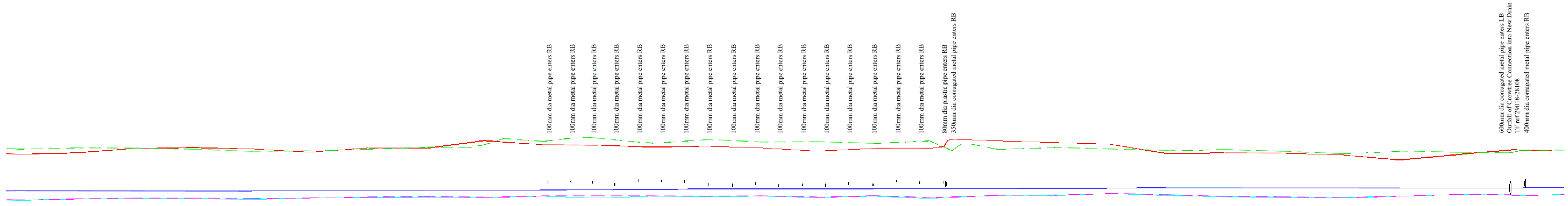


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Vt.Scale 1:100
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CS1 at +22m; CS2 at +209m; CS3 at +405m; CS4 at +598m; CS5 at +780m; CS6 at +982m; CS7 at +1182m

Band	Values
Chainage	+4, +20, +67, +88, +108, +128, +149, +170, +191, +211, +233, +253, +274, +296, +304, +316, +338, +358, +379, +400, +421, +441, +452, +462, +483, +504, +524, +545, +566, +598, +632, +655, +695, +730, +780, +832, +879, +930, +982, +1028, +1078, +1135, +1182, +1208, +1217, +1224, +1277, +1327
Left Bank	+3.75 +3.66 +3.64, +3.52, +3.41, +3.40, +3.34, +3.33, +3.61, +3.65, +3.46, +3.56, +3.44, +3.62, +3.51, +3.97 +3.93 +4.23 +4.35, +4.20 +3.45, +3.69, +3.60 +3.35 +3.58, +3.60, +3.58, +3.53, +3.53, +3.56, +3.64, +3.63 +3.54, +3.63, +3.60, +3.63, +3.65, +3.64, +3.64, +3.76, +3.73 +3.46 +3.44 +3.51 +3.63 +3.63 +3.80 +3.77 +3.82, +4.04, +4.00
Right Bank	+3.84 +3.71 +3.80, +3.53, +3.44, +3.50, +3.27, +3.34, +3.62, +3.63, +3.53, +3.57, +3.61, +3.50, +3.72, +3.59 +3.72 +4.27, +4.15 +3.87 +3.65, +3.55 +3.51, +3.41, +3.46, +3.59, +3.57, +3.65, +3.68, +3.73, +3.70, +3.69, +3.62, +3.77, +3.74, +3.83 +3.83 +3.83 +3.79, +3.72, +3.79
Silt Level	+0.18, +0.79, +0.87, +1.07, +1.09, +1.09, +1.08, +1.19, +1.21, +1.31, +1.23, +1.23, +1.23, +1.39, +1.48, +1.51, +1.61, +1.52, +1.68, +1.69, +1.67, +1.67, +1.63, +1.67, +1.72, +1.63, +1.65, +1.69, +1.69, +1.76
Bed Level	-0.07, +0.78, +0.83, +1.00, +1.08, +1.07, +1.08, +1.19, +1.20, +1.17, +1.23, +1.23, +1.23, +1.36, +1.43, +1.33, +1.34, +1.51, +1.67, +1.68, +1.56, +1.63, +1.61, +1.66, +1.62, +1.61, +1.58, +1.60, +1.64, +1.73
Invert Level	+0.58, +0.82, +1.57, +1.60, +1.68, +1.69, +1.75, +1.68, +1.62, +1.58, +1.64, +1.70, +1.71, +1.74, +1.79, +1.71, +1.81, +1.82, +1.74, +1.80, +1.82, +1.93, +1.82, +1.82, +1.72, +1.83, +1.77, +3.12 +1.50, +1.56 +1.77, +1.63, +2.01 +1.72 +1.73
Water Level	+0.90, +1.33, +1.46, +1.58, +1.86, +1.97, +2.03
Design Level	

Continues



CS8 at +1379m; CS9 at +1580m; CS10 at +1779m; CS11 at +1970m; CS12 at +2162m; CS13 at +2365m; CS14 at +2565m

Band	Values
Chainage	+1378, +1428, +1479, +1530, +1580, +1631, +1680, +1731, +1779, +1834, +1854, +1873, +1892, +1912, +1924, +1932, +1952, +1972, +1993, +2013 +2018, +2033, +2053, +2065 +2073, +2092, +2114, +2134, +2154 +2162, +2176, +2221, +2269, +2317, +2365, +2415, +2464, +2516, +2566, +2615, +2661, +2674
Left Bank	+3.86, +3.90, +3.89, +3.84, +3.75, +3.77, +3.85, +3.93, +3.91, +4.04, +4.31, +4.18, +4.32, +4.35 +4.31, +4.11, +4.26, +4.15, +4.17, +4.10, +4.21, +3.80 +4.07 +4.08, +3.84, +3.92, +3.85, +3.79, +3.83, +3.76, +3.65, +3.76, +3.71, +3.69 +3.73 +3.79
Right Bank	+3.62, +3.68, +3.87, +3.91, +3.85, +3.71, +3.89, +3.88, +4.21, +4.03, +4.01, +3.93, +3.96, +3.89, +3.76, +3.88, +3.88 +3.91 +3.96 +4.21 +4.26, +4.20, +4.13, +4.05, +3.66, +3.68, +3.67, +3.59, +3.38, +3.61, +3.82
Silt Level	+1.66, +1.71, +1.74, +1.74, +1.73, +1.76, +1.79, +1.81, +1.78, +1.84, +1.83, +1.83, +1.82, +1.83, +1.79, +1.84, +1.77, +1.86, +1.87, +1.94, +1.88, +1.81, +1.79, +1.76, +1.83, +1.90, +1.88 +1.85
Bed Level	+1.65, +1.71, +1.73, +1.73, +1.69, +1.75, +1.76, +1.77, +1.77, +1.82, +1.75, +1.82, +1.80, +1.83, +1.78, +1.83, +1.72, +1.86, +1.85, +1.94, +1.85, +1.80, +1.78, +1.76, +1.82, +1.89, +1.87 +1.85
Invert Level	+2.37, +2.41, +2.38, +2.29, +2.45, +2.41, +2.40, +2.29, +2.25, +2.31, +2.23, +2.27, +2.25, +2.33, +2.26, +2.42, +2.35, +2.38 +2.20, +1.88, +2.16
Water Level	+2.06, +2.04, +2.08, +2.13, +2.14, +2.18, +2.17
Design Level	

Continues

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E enquiries@tolethorpe.net
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CLIENT
South Holland Internal Drainage Board
Marsh Reeves
Foxes Lowe Road
Holbeach,Spalding
Lincolnshire PE12 7PA
T 01406 421708
E info@wlma.org.uk

Survey Control

The survey grid has been derived from GPS observations and related to Ordnance Survey National Grid (OSTN02). All levels relate to O.D.N. (OSGM02).

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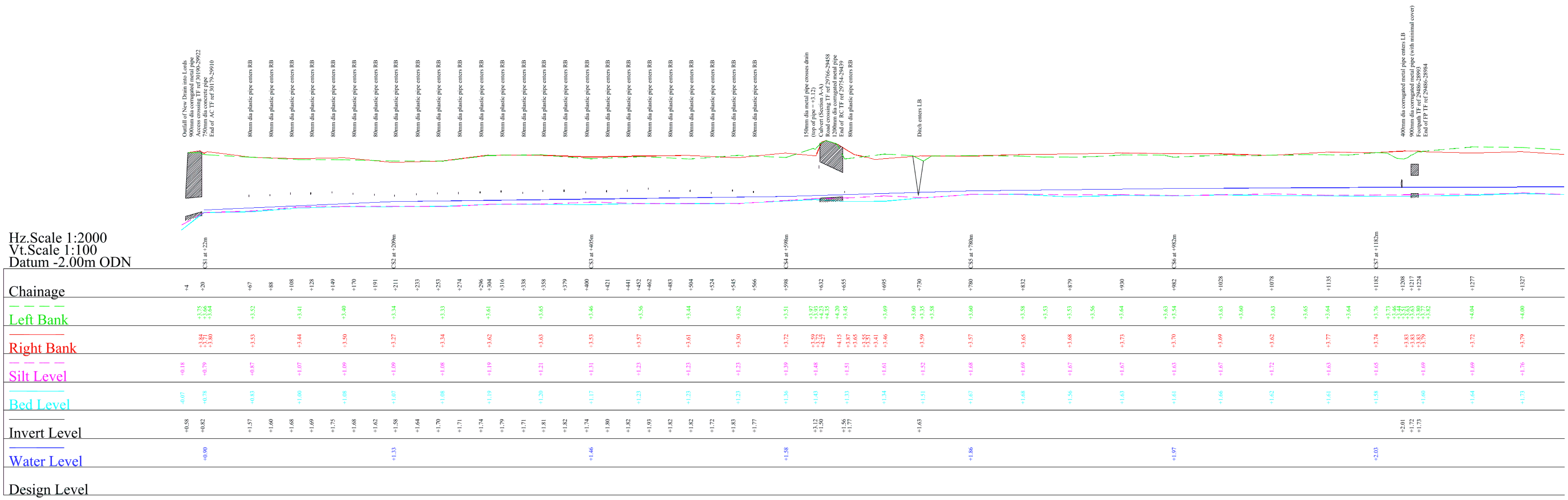
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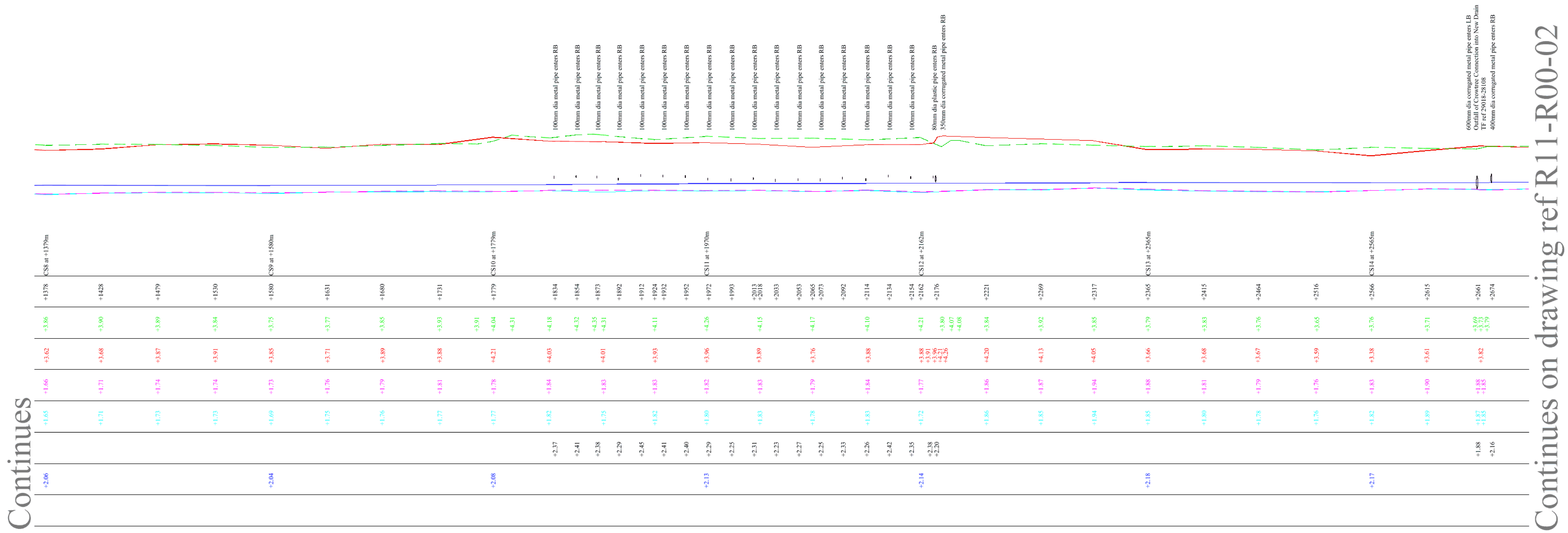
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Continues on drawing ref R11-R00-02

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South Holland Internal Drainage Board
Marsh Reeves
Foxes Lowe Road
Holbeach,Spalding
Lincolnshire PE12 7PA
T 01406 421708
E info@wlma.org.uk

Survey Control

The survey grid has been derived from GPS observations and related to Ordnance Survey National Grid (OSTN02). All levels relate to O.D.N. (OSGM02).

PROJECT

Catchment R
Longitudinal Sections

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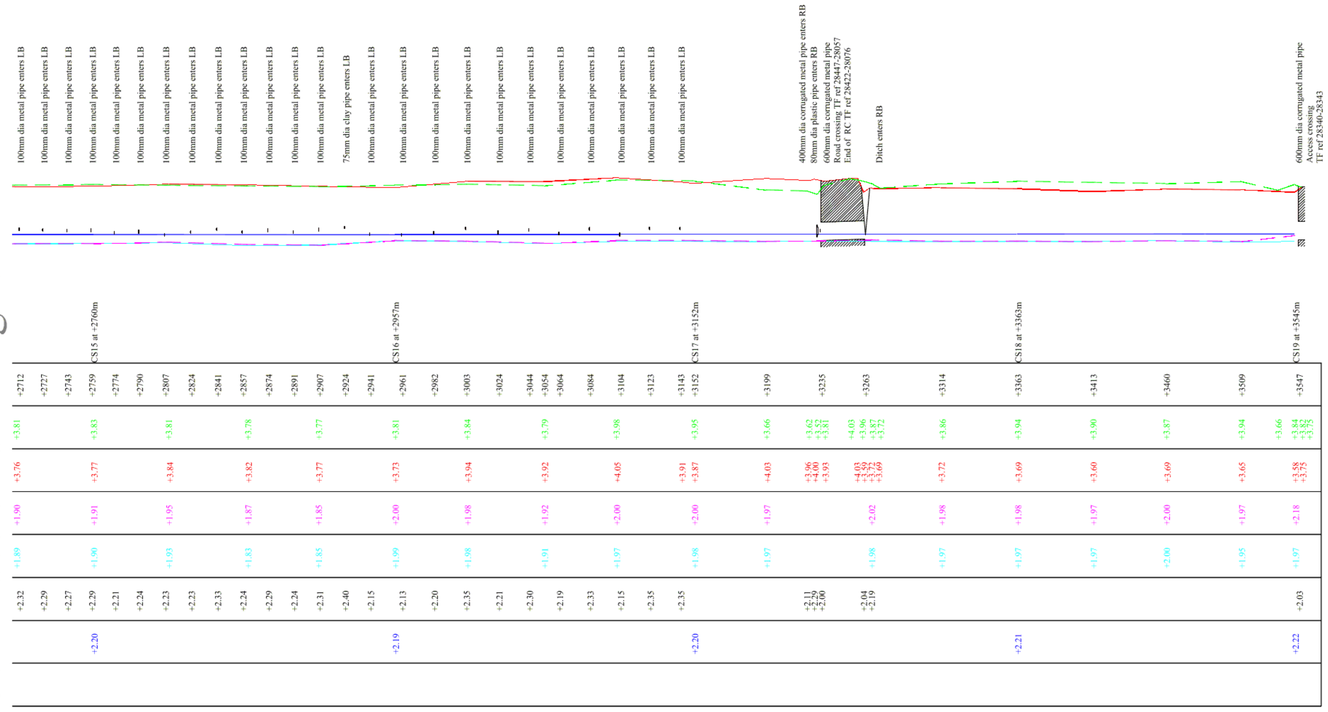
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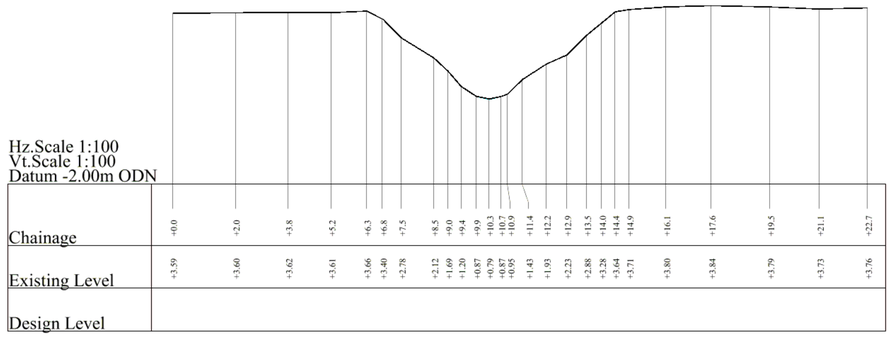
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04/03/2013	LMB

Drawing Scale

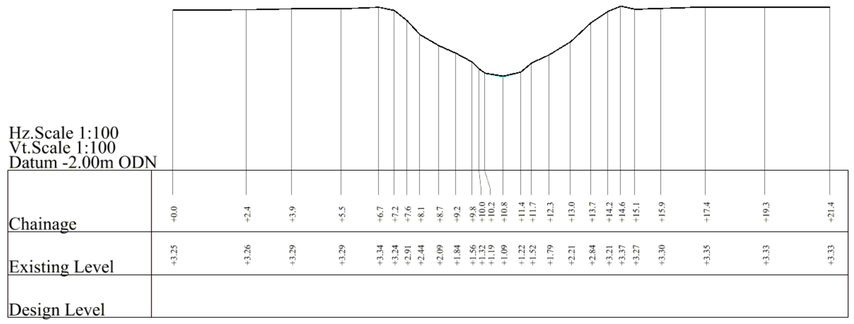
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Horizontal 1:2000
Cross Section 1:100 @A1

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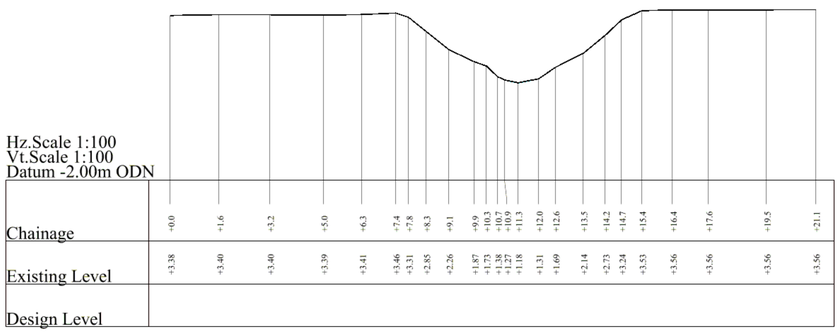




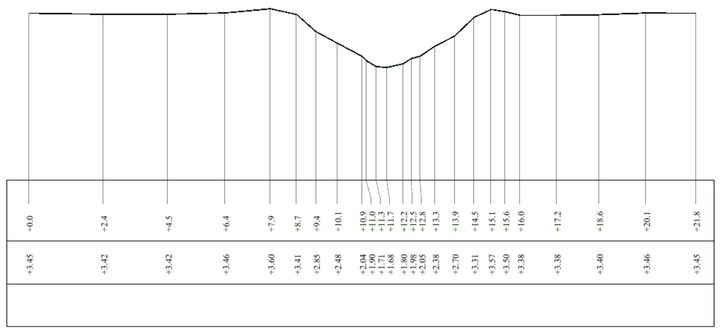
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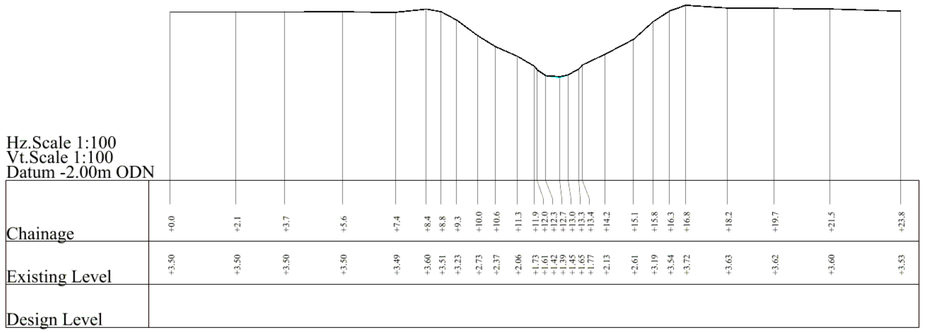
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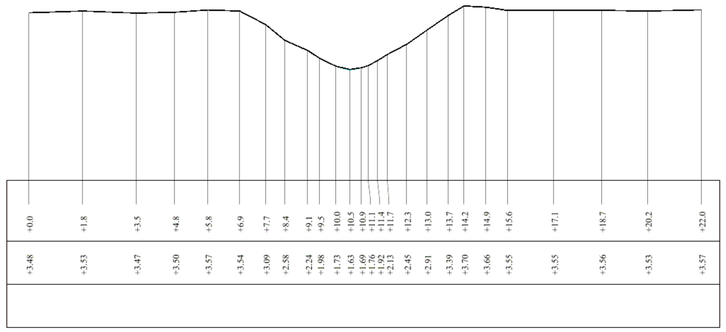
CS no. 3 at 405m



CS no. 5 at 780m



CS no. 4 at 598m



CS no. 6 at 982m

TOLETHORPE

Surveying • Engineering • Environmental

T.W. Barker Ltd.
Hall Farm Cottages
Little Casterton, Stamford
Lincolnshire PE9 4BE
M 07736 009237
E enquiries@tolethorpe.net

www.tolethorpe.net

CLIENT

South Holland
Internal Drainage Board

Marsh Reeves
Foxes Lowe Road
Holbeach,Spalding
Lincolnshire PE12 7PA
T 01406 421708
E info@wlma.org.uk

Survey Control

The survey grid has been derived from GPS observations and related to Ordnance Survey National Grid (OSTN02). All levels relate to O.D.N. (OSGM02).

PROJECT

Catchment R
Longitudinal and Cross Sections

TITLE

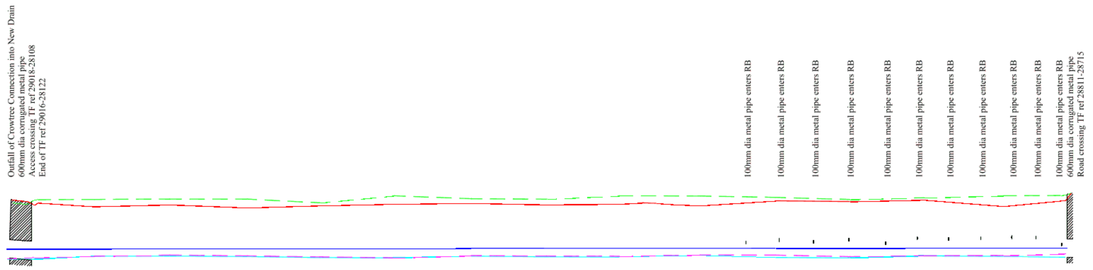
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DRAWING NO.	*REV*
R11-R00-02	R00
DATE	*DRAWN BY*
04/03/2013	LMB

Drawing Scale

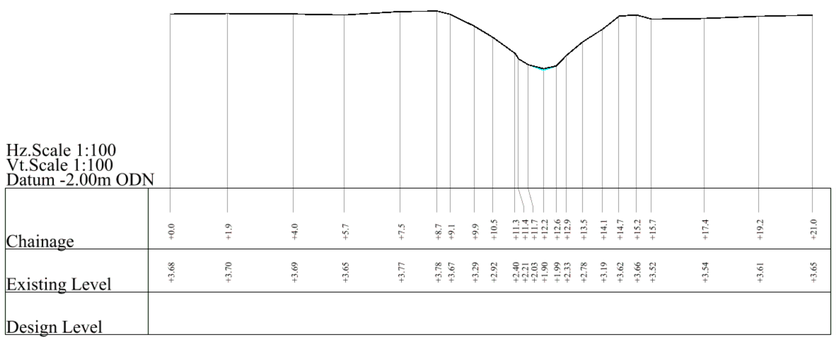
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Horizontal 1:2000

Cross Section 1:100 @A1



Hz.Scale 1:2000
Vt.Scale 1:100
Datum -2.00m ODN

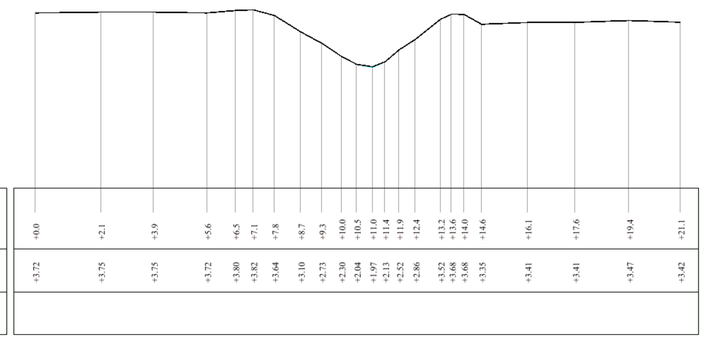
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Left Bank	+3.69	+3.68 +3.70 +3.79	+3.80	+3.81	+3.81	+3.69	+3.92	+3.82	+3.81	+3.92	+3.91		+3.87		+3.80		+3.86		+3.92			+3.93 +3.92 +3.82
Right Bank	+3.79	+3.74 +3.72 +3.69	+3.57	+3.63	+3.53	+3.60	+3.65	+3.68	+3.63	+3.65 +3.69 +3.67 +3.64	+3.60		+3.75		+3.73		+3.78		+3.58			+3.76 +3.76 +3.70
Silt Level	+1.85	+1.90	+1.95	+1.98	+1.96	+1.92	+1.89	+1.97	+1.95	+1.95	+1.99		+1.88		+1.93		+1.96		+1.97			+2.03
Bed Level	+1.85	+1.85	+1.95	+1.95	+1.94	+1.90	+1.89	+1.95	+1.93	+1.92	+1.97		+1.90		+1.89		+1.96		+1.94			+1.91
Invert Level	+1.88	+1.83										+2.34	+2.42	+2.37	+2.44	+2.32	+2.48	+2.46	+2.48	+2.52	+2.51	+2.28 +1.91
Water Level		+2.18			+2.19			+2.21					+2.21									+2.22
Design Level																						



Hz.Scale 1:100
Vt.Scale 1:100
Datum -2.00m ODN

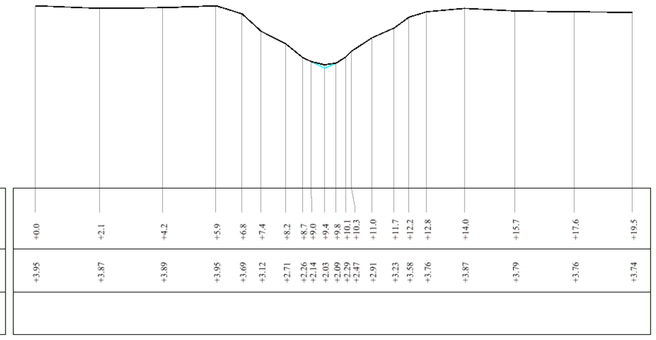
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Existing Level	+3.68	+3.70	+3.69	+3.65	+3.77	+3.78	+3.67	+3.29	+2.92	+2.40	+2.21	+2.03	+1.90	+1.99	+2.33	+2.78	+3.19	+3.62	+3.66	+3.52	+3.54	+3.61	+3.65
Design Level																							

CS no. 1 at 18m



Chainage	+0.0	+2.1	+3.9	+5.6	+6.5	+7.1	+7.8	+8.7	+9.3	+10.0	+10.5	+11.0	+11.4	+11.9	+12.4	+13.2	+13.6	+14.0	+14.6	+16.1	+17.6	+19.4	+21.1
Existing Level	+3.72	+3.75	+3.75	+3.72	+3.80	+3.82	+3.64	+3.10	+2.73	+2.50	+2.04	+1.97	+2.13	+2.52	+2.86	+3.52	+3.68	+3.60	+3.35	+3.41	+3.41	+3.47	+3.42
Design Level																							

CS no. 3 at 303m



Chainage	+0.0	+2.1	+4.2	+5.9	+6.8	+7.4	+8.2	+8.7	+9.0	+9.4	+9.8	+10.1	+10.3	+11.0	+11.7	+12.2	+12.8	+14.0	+15.7	+17.6	+19.5
Existing Level	+3.95	+3.87	+3.89	+3.95	+3.69	+3.12	+2.71	+2.26	+2.14	+2.03	+2.09	+2.29	+2.47	+2.91	+3.23	+3.58	+3.76	+3.87	+3.79	+3.76	+3.74
Design Level																					

CS no. 5 at 691m

Hz.Scale 1:100
Vt.Scale 1:100
Datum -2.00m ODN

Chainage	+0.0	+2.0	+3.5	+5.1	+6.2	+7.1	+7.9	+8.8	+9.3	+9.7	+9.9	+10.4	+10.9	+11.3	+12.0	+12.5	+13.0	+13.4	+13.8	+15.3	+16.8	+18.1	+19.6
Existing Level	+3.72	+3.73	+3.77	+3.78	+3.81	+3.65	+3.17	+2.73	+2.35	+2.12	+2.00	+1.96	+2.08	+2.59	+2.91	+3.31	+3.53	+3.57	+3.30	+3.42	+3.37	+3.40	+3.40
Design Level																							

CS no. 2 at 157m

Chainage	+0.0	+2.1	+3.2	+4.6	+5.9	+7.2	+7.8	+8.5	+9.1	+9.9	+10.4	+10.5	+10.7	+11.3	+11.6	+12.1	+12.7	+13.4	+14.1	+14.6	+15.7	+17.4	+19.1	+20.7	+22.2
Existing Level	+3.52	+3.44	+3.72	+3.73	+3.79	+3.82	+3.87	+3.52	+3.02	+2.66	+2.31	+2.15	+2.04	+1.91	+1.98	+2.35	+2.71	+3.11	+3.61	+3.76	+3.75	+3.70	+3.69	+3.69	+3.66
Design Level																									

CS no. 4 at 502m

TOLETHORPE

Surveying • Engineering • Environmental

T.W. Barker Ltd.
Hall Farm Cottages
Little Casterton, Stamford
Lincolnshire PE9 4BE
M 07736 009237
E enquiries@tolethorpe.net

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CLIENT

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Survey Control

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PROJECT

Catchment R
Longitudinal and Cross Sections

TITLE

Crowtree Connection

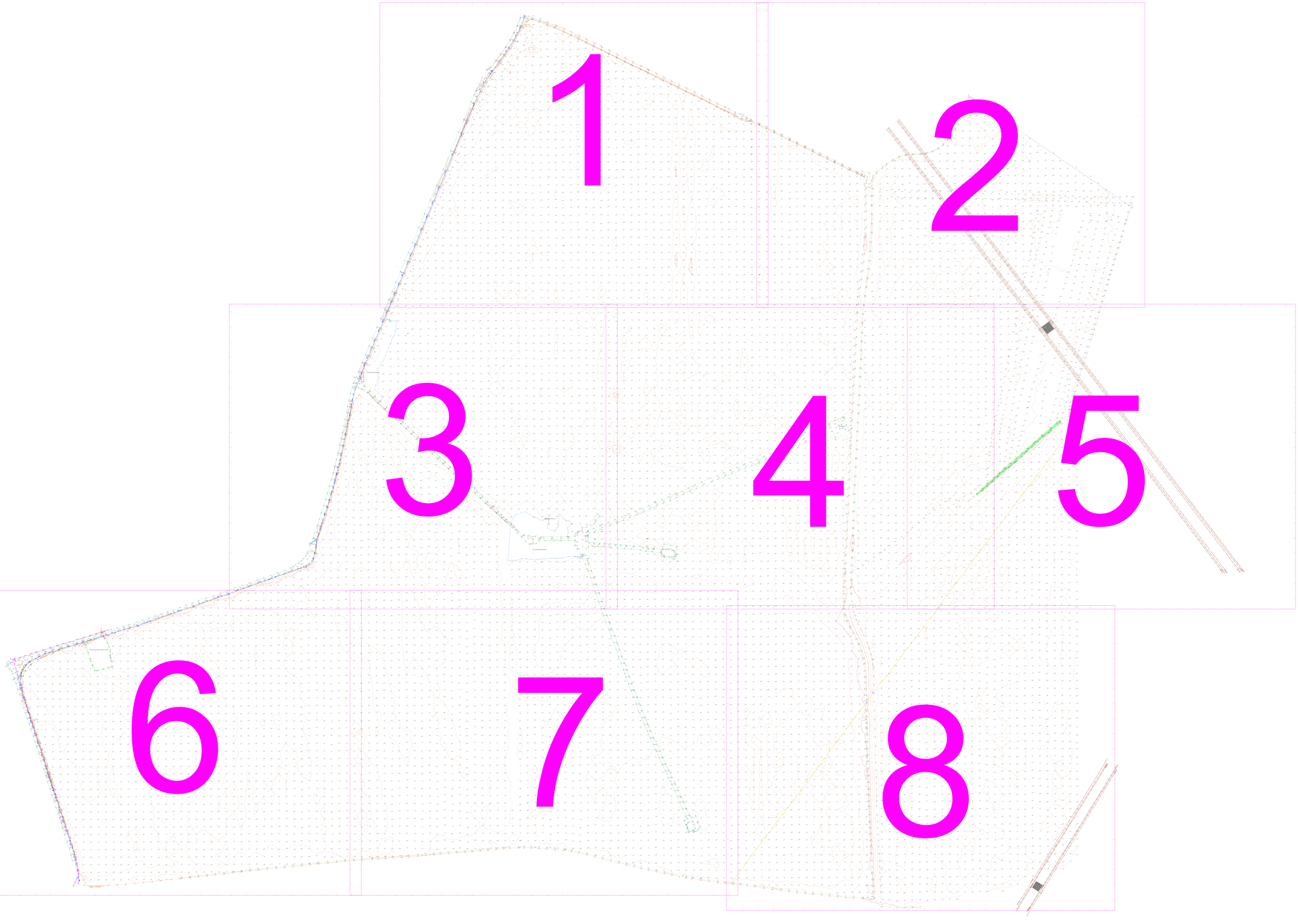
DRAWING NO.	*REV*
R20-R00-01	R00
DATE	*DRAWN BY*
04/03/2013	LMB

Drawing Scale

Longitudinal Section Vertical 1:100
Horizontal 1:2000

Cross Section 1:100 @A1

Appendix B Site Information



N

GRID: OS NATIONAL GRID
Using the OS GPS Network and applying OSTN15 Transformation

DATUM: OS LEVEL DATUM
Using the OS GPS Network and applying OSGM15 National Geoid Model to obtain local area corrections.

Topographic Legend

- Bottom of Bank
- Top of Banking
- Building
- Building Canopy
- Concrete Base
- Contour Major
- Contour Minor
- Fences
- General
- Kerb Bottom
- Kerb Drop
- Kerb Top
- OH Comms
- OH Electric
- Railway Line
- Road Centre
- Road Markings
- SC Hard:Hard
- SC Hard:Soft
- SC Soft:Soft
- Steps
- Tree Canopy
- Vegetation
- Visible Trench
- Walls
- Water Edge

Topographic Abbreviations

AV	Air Valve	PB	Pedestrian Beacon
BH	Borehole	PBox	Post Box
BO(IL)	Bollard (Illuminated)	PGR	Pedestrian Guard Rail
BS	Bus Stop	PM	Parking Meter
Cab	Cabinet	PO	Post
CL=	Cover Level	RE	Rodding Eye
COL	Column	RS(IL)	Road Sign (Illuminated)
Conc	Concrete	RWP	Rain Water Pipe
DC	Drainage Channel	SP(IL)	Sign Post (Illuminated)
DFBin	Dog Foul Bin	SPCam	Speed Camera
DP	Down Pipe	ST	Stop Tap
EP	Electricity Pole	SV	Sluice Valve
ER	Earth Rod	SVP	Soil Vent Pipe
FFL=	Finished Floor Level	TBox	Telephone Box
FH	Fire Hydrant	TL	Traffic Light
FP	Flag Pole	TOF=	Top of Fence Level
GP	Gate Post	TOW=	Top of Wall Level
GV	Gas Valve	TP	Telecoms Pole
GY	Gully	VP	Vent Pipe
IC	Inspection Cover	WB	Waste Bin
KO	Kerb Outlet	WB=	Window Bottom Level
LP	Lamp Post	WM	Water Meter
MH	Manhole	WO	Wash Out
Mkr	Marker	WT=	Window Top Level
MP	Marker Post	WV	Water Valve
MW	Monitoring Well		

Utility Legend

- Air Line
- Alarm Cable
- BT Cable
- CATV Cable
- Chamber Extent
- Comms Cable
- CWD Sewer
- Earth Wire/Tape
- Electric Cable
- Fibre Optic Cable
- Fuel Line
- FWD Sewer
- Gas Pipe
- Band of Cables
- Empty Service Duct
- SWD Sewer
- Survey Extents
- Heating Pipe
- HV Electric Cable
- Kingston Comms
- Oil Pipe
- Rising Main
- Traffic Control
- Unknown Utility
- Vent Pipe
- Water
- GPR Detection
- Assumed Route
- Records Route
- Drainage Backdrop /Cable Riser

Utility Abbreviations

CP	Cathodic Protection	LoS	Loss of Signal
Cut	Disconnected Utility	MDPE	Middle Density PE
DI	Ductile Iron	SI	Spun Iron
DoB	Depth of Bottom	TLC	Traffic Light Control
DoC	Depth of Cover	UDI	Unreliable Depth Info
ED	Empty Duct		Unplasticised
EoT	End of Trace	uPVC	Polyvinyl Chloride
PE	Polyethylene	UTR	Unable to Raise
HDPE	High Density PE	UTT	Unable to Trace
	VC	Vitrified Clay	

Manufacturer Stated Depths

Detected Using Electromagnetic Location Methods
e.g. Any metallic pipe/cable. Accuracy ± 2.5% of depth reading.

Detected Using Electromagnetic Location Methods
eg. Using a Sonde to locate drainage pipework
Accuracy ± 2.5% of depth reading.

Detected Using Ground Penetrating Radar
e.g. A plastic pipe or service not located by other means.
Accuracy depends on ground conditions.

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

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If this drawing and any associated drawings should be used in relation to works, we advise that the users of this information follow the principles detailed by the Health and Safety Executive guidance directive HS(G) 47, "Avoiding Danger from Underground Services". Further details of this directive are available at www.hse.gov.uk <http://www.hse.gov.uk/>

Notes

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Rev.	Date	Comments

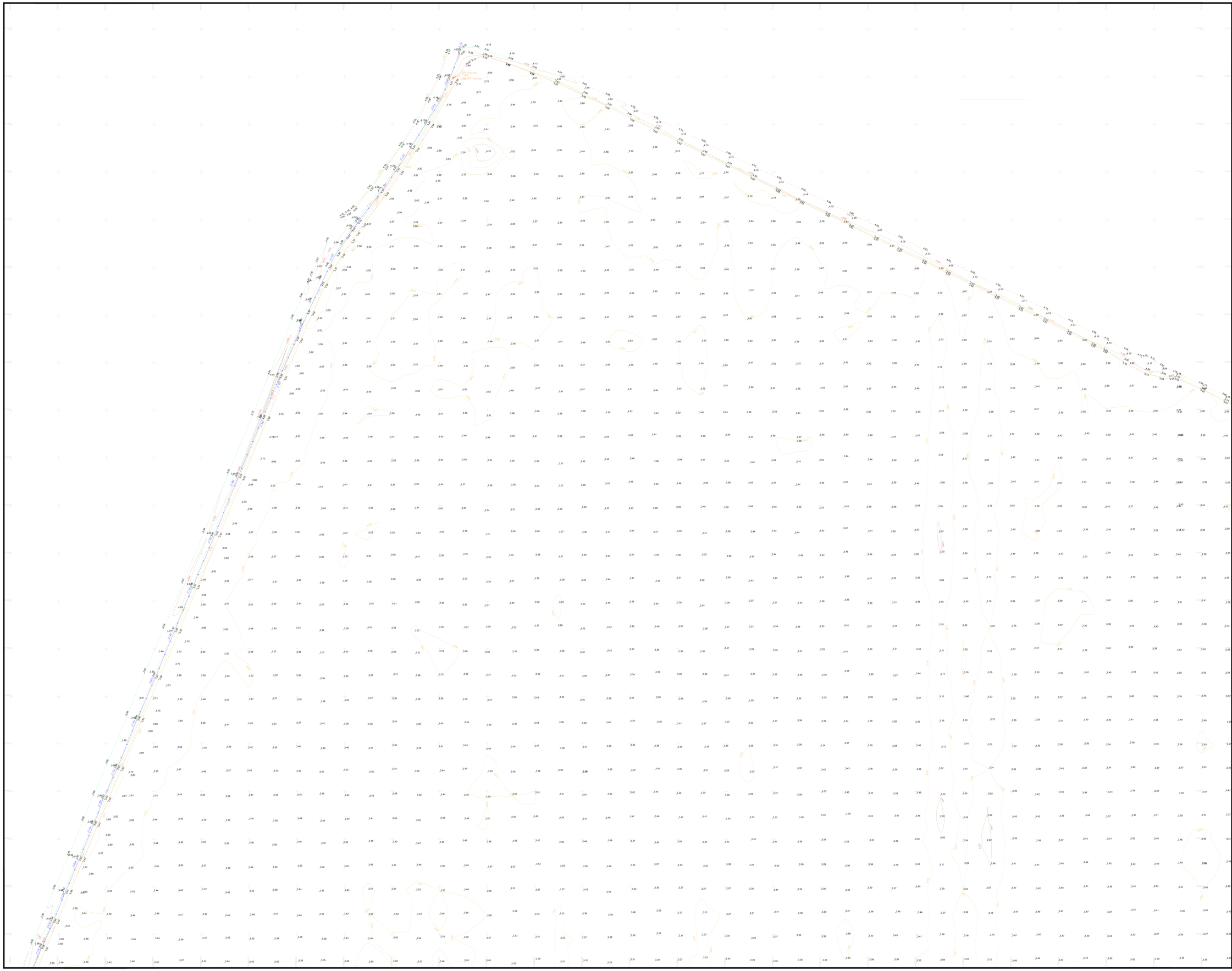
Client	WSP
Site Location:	MARSH ROAD SCHOOL HOUSE, WESTON CP SOUTH HOLLAND PE12 6HH
Purpose of Drawing	UTILITY MAPPING SURVEY PRESENTED ON A TOPOGRAPHICAL SURVEY

Surveyed:	JB MH RB AC JB	Drawn:	JB
Checked:	DH	Authorised:	NB
Date:	20/01/25	Scale:	1:500@A0

1 10 20 30

Office 10, Ripley Drive,
Normanton Business Park,
Wakefield,
WF6 1QT.
info@centara-ltd.com

Project No	109265	Revision Status	00
Sheet Number:		Layout Key	



N

Topographic Legend

- Bottom of Bank
- Top of Banking
- Building
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- Concrete Base
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MH	Manhole	WO	Wash Out
Mkr	Marker	WT=	Window Top Level
MP	Marker Post	WV	Water Valve
	MW Monitoring Well		

Utility Legend

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- Alarm Cable
- BT Cable
- CATV Cable
- Chamber Extent
- Comms Cable
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- Earth Wire/Tape
- Electric Cable
- Fibre Optic Cable
- Fuel Line
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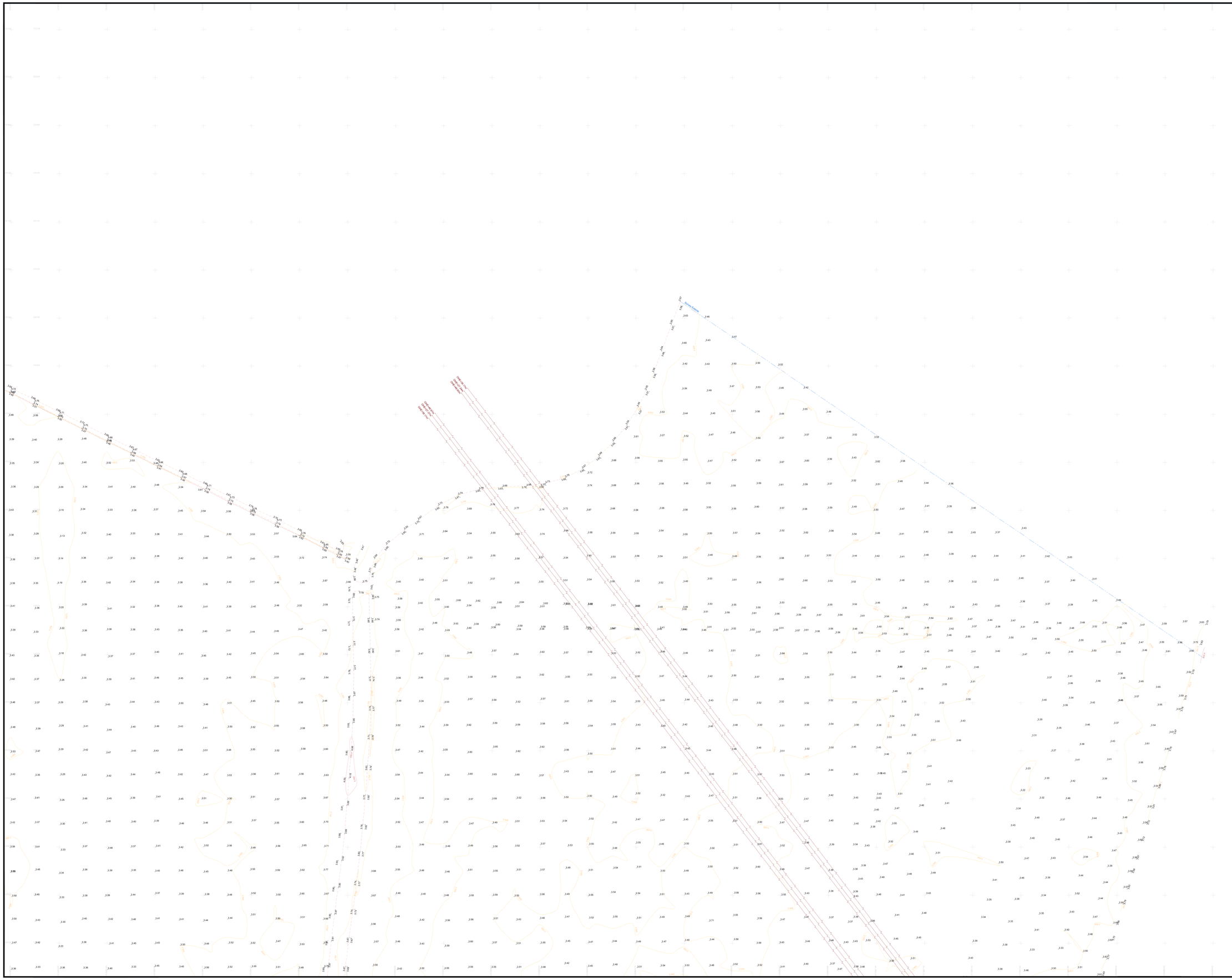
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Site Location:	MARSH ROAD SCHOOL HOUSE, WESTON CP SOUTH HOLLAND PE12 6HH
Purpose of Drawing	UTILITY MAPPING SURVEY PRESENTED ON A TOPOGRAPHICAL SURVEY

Surveyed:	JB MH RB AC JB	Drawn:	JB
Checked:	DH	Authorised:	NB
Date:	20/01/25	Scale:	1:500@A0

1 10 20 30

Office 10, Ripley Drive,
Normanton Business Park,
Wakefield,
WF6 1QT.
info@centara-ltd.com

Project No	109265	Revision Status	00
Sheet Number:		1 OF 8	



N

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Using the OS GPS Network and applying OSTN15 Transformation

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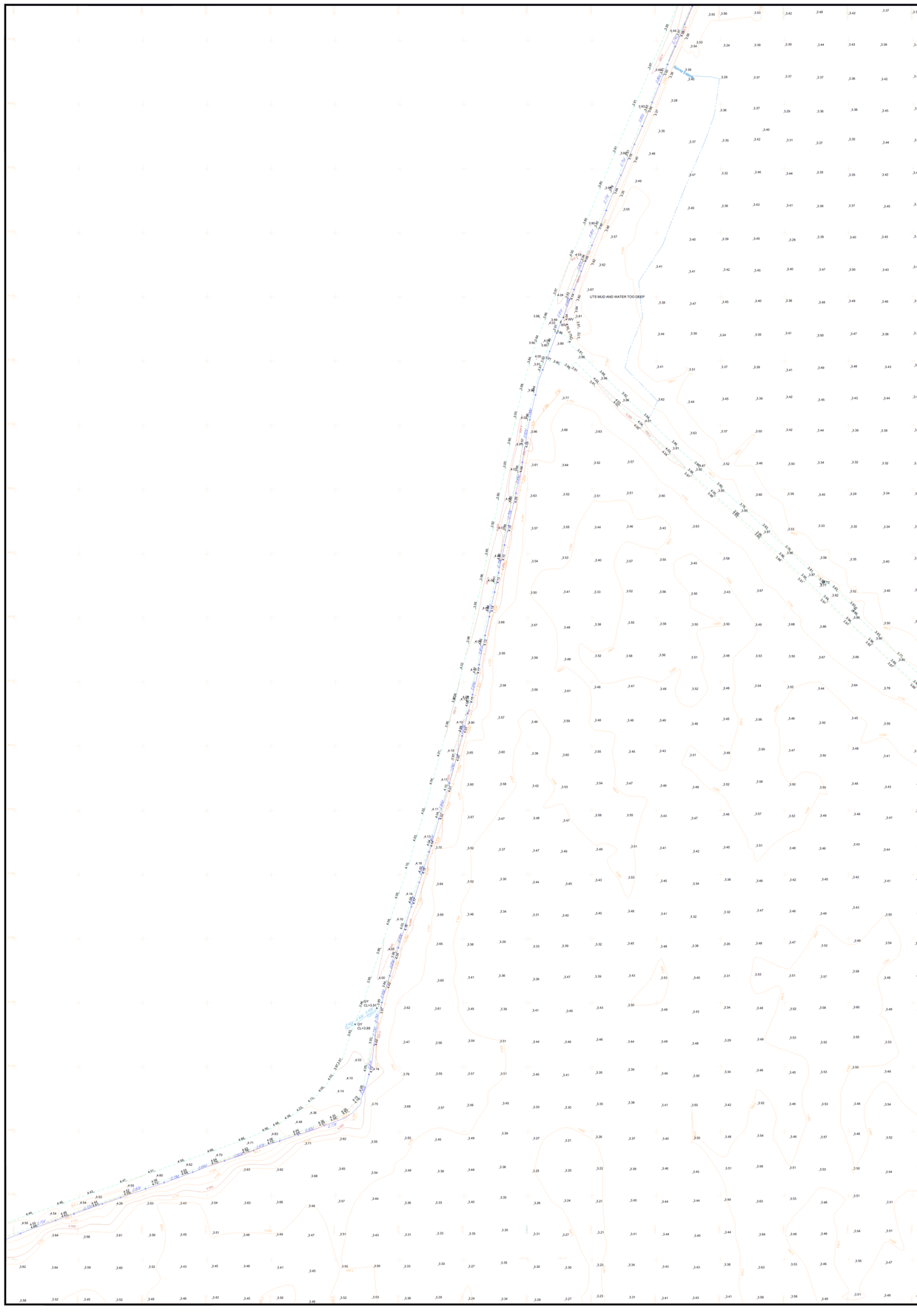
Client	WSP
Site Location:	MARSH ROAD SCHOOL HOUSE, WESTON CP SOUTH HOLLAND PE12 6HH
Purpose of Drawing	UTILITY MAPPING SURVEY PRESENTED ON A TOPOGRAPHICAL SURVEY

Surveyed:	JB MH RB AC JB	Drawn:	JB
Checked:	DH	Authorised:	NB
Date:	20/01/25	Scale:	1:500@A0

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Normanton Business Park,
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info@centara-ltd.com

Project No	109265	Revision Status	00
Sheet Number:		2 OF 8	



N

GRID: OS NATIONAL GRID
Using the OS GPS Network and applying OSTN15 Transformation

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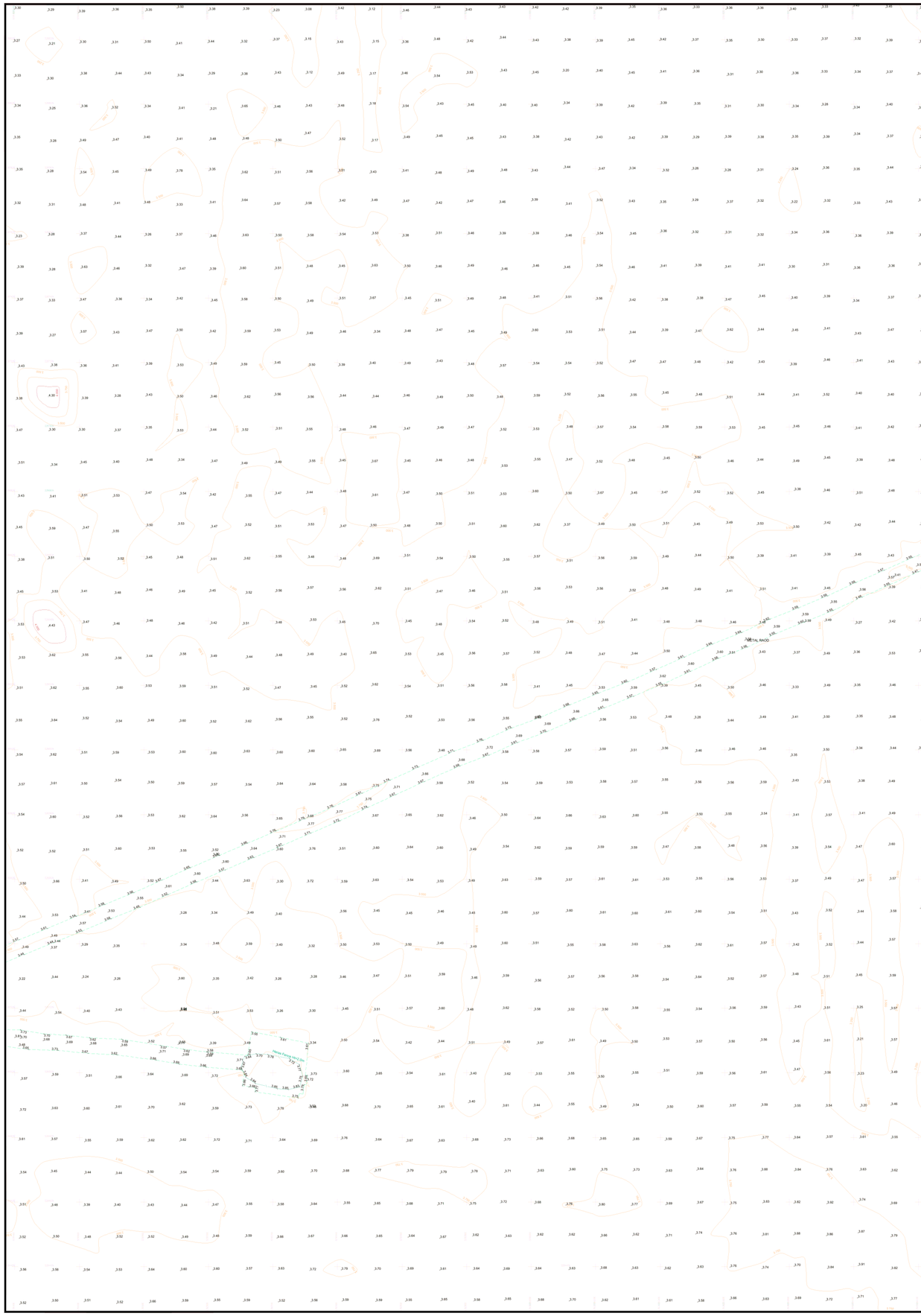
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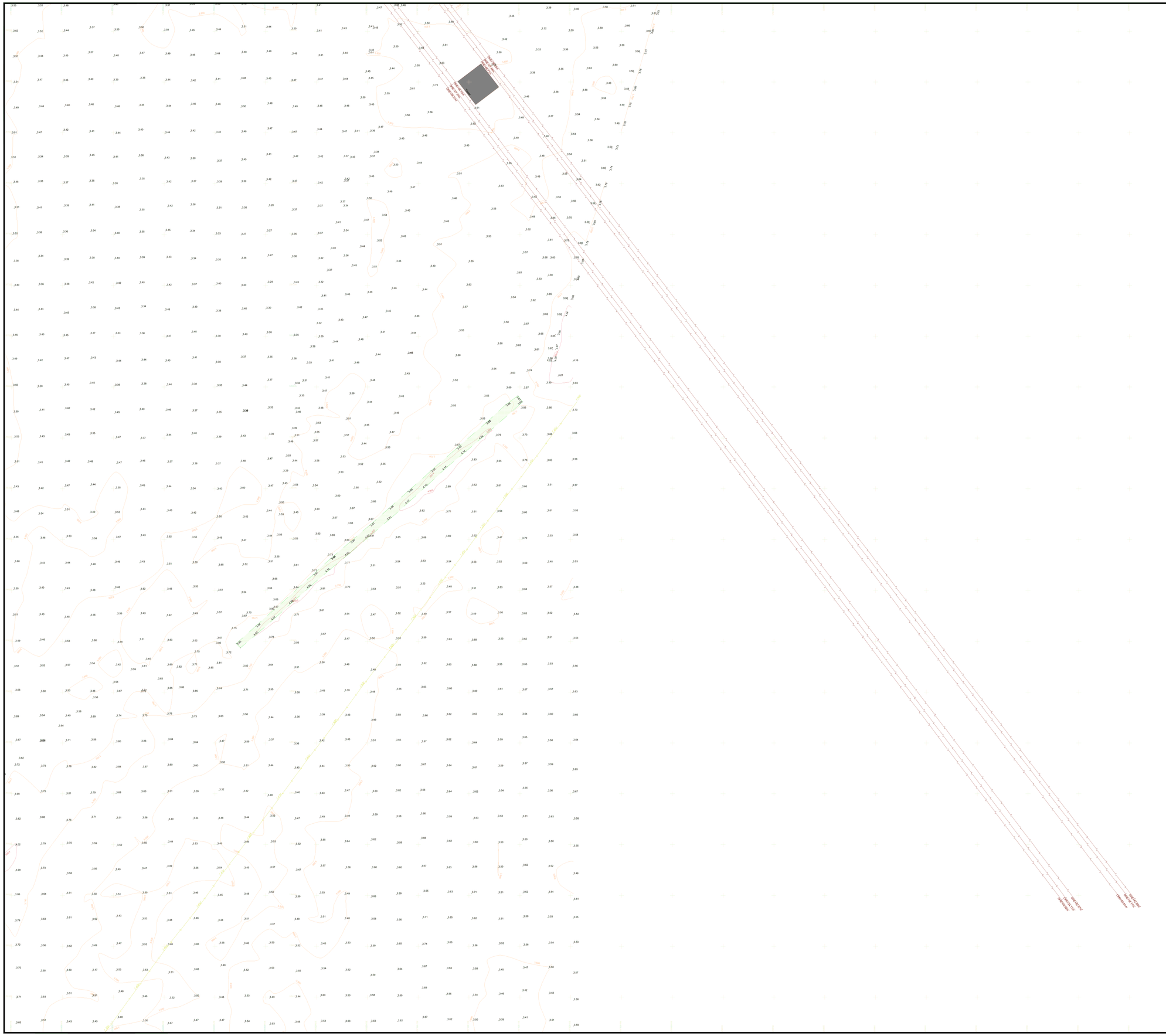
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Project No	109265	Revision Status	00
Sheet Number:		4 OF 8	



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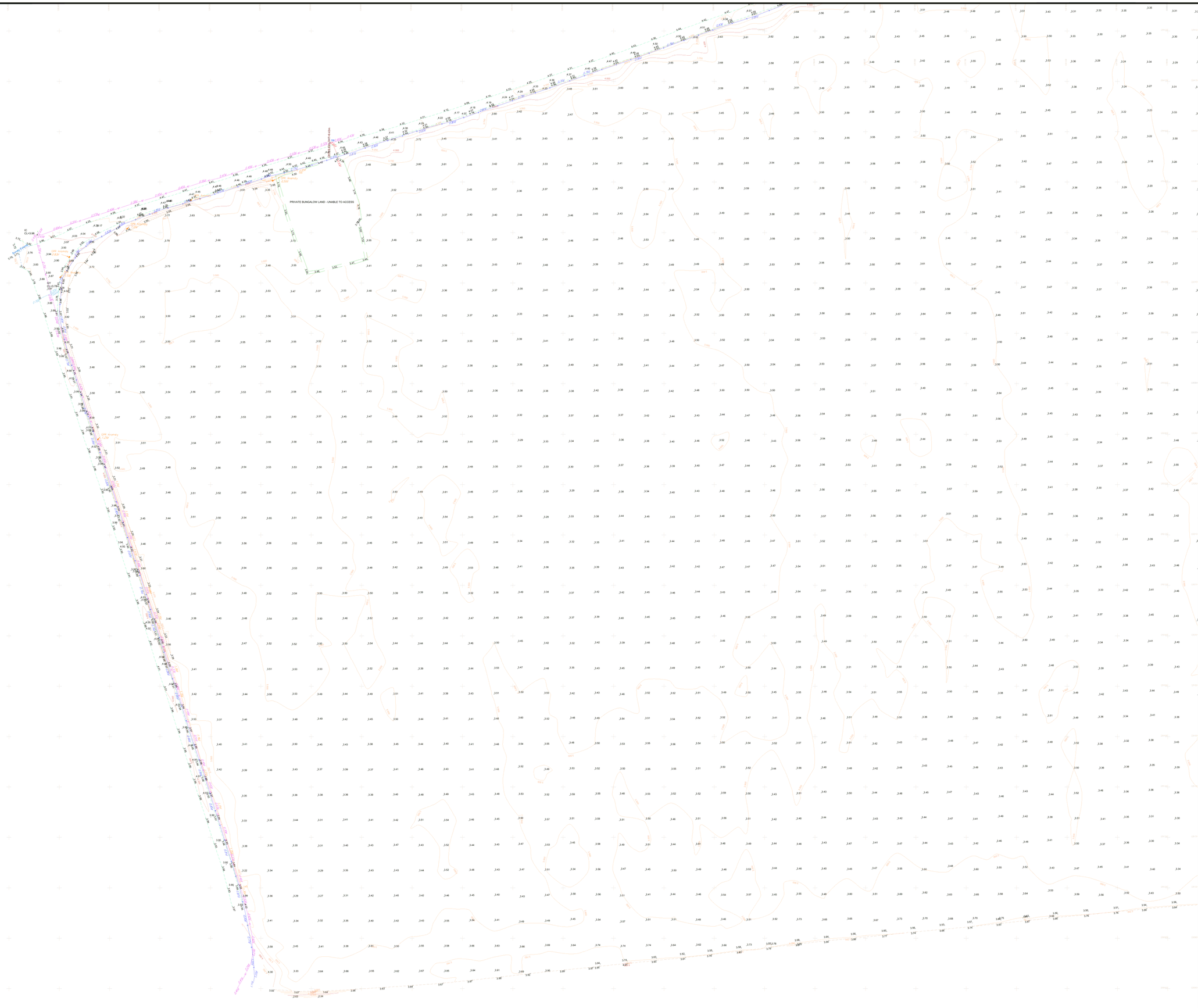
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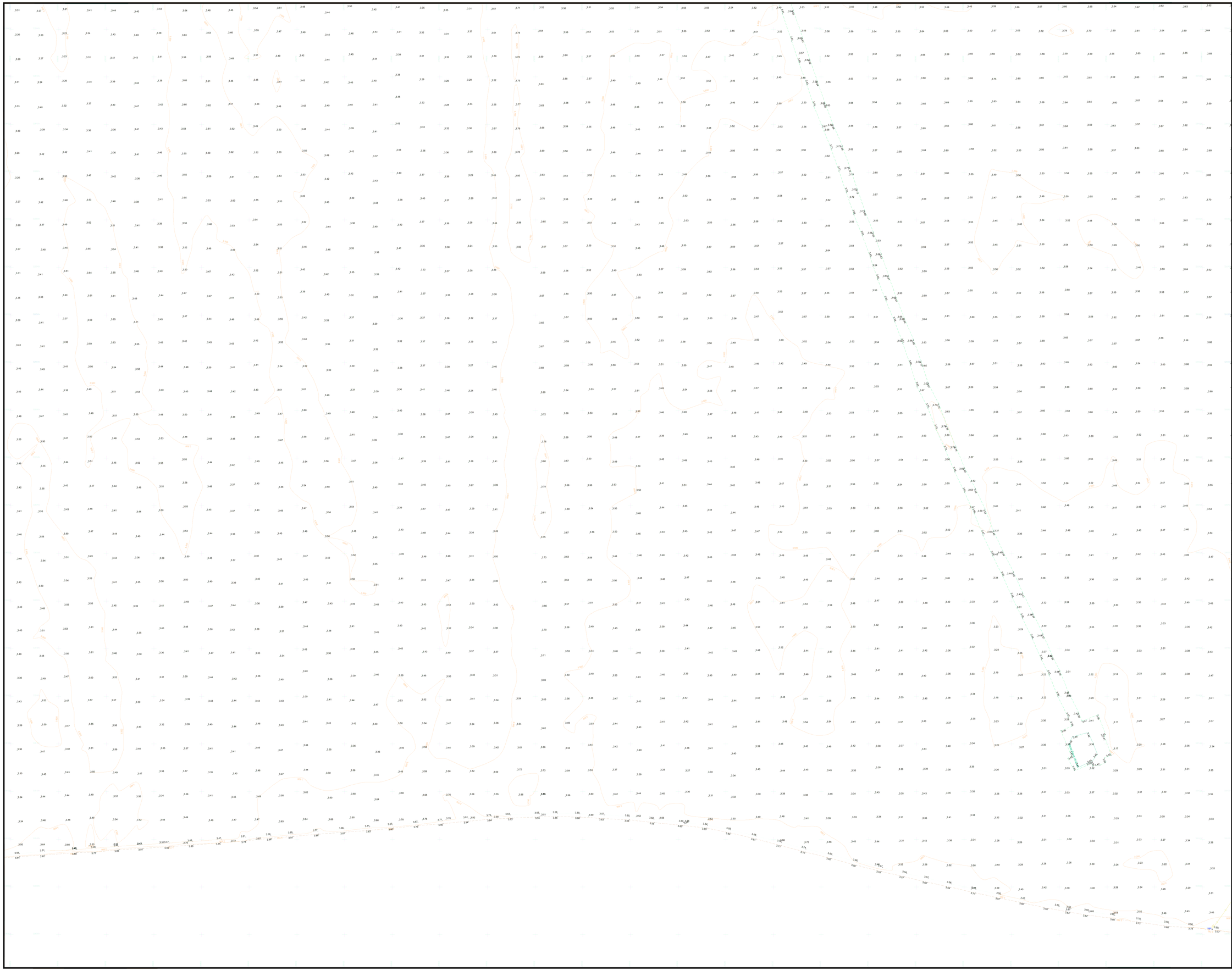
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DC	Drainage Channel	SP(IL)	Sign Post (Illuminated)
DFBin	Dog Foul Bin	SPCam	Speed Camera
DP	Down Pipe	ST	Stop Tap
EP	Electricity Pole	SV	Sluice Valve
ER	Earth Rod	SVP	Soil Vent Pipe
FFL=	Finished Floor Level	TBox	Telephone Box
FH	Fire Hydrant	TL	Traffic Light
FP	Flag Pole	TOF=	Top of Fence Level
GP	Gate Post	TOW=	Top of Wall Level
GV	Gas Valve	TP	Telecoms Pole
GY	Gully	VP	Vent Pipe
IC	Inspection Cover	WB	Waste Bin
KO	Kerb Outlet	WB=	Window Bottom Level
LP	Lamp Post	WM	Water Meter
MH	Manhole	WO	Wash Out
Mkr	Marker	WT=	Window Top Level
MP	Marker Post	WV	Water Valve
MW	Monitoring Well		

Utility Legend

- Air Line
- Alarm Cable
- BT Cable
- CATV Cable
- Chamber Extent
- Comms Cable
- CWD Sewer
- Earth Wire/Tape
- Electric Cable
- Fibre Optic Cable
- Fuel Line
- FWD Sewer
- Gas Pipe
- Band of Cables
- Empty Service Duct
- SWD Sewer
- Survey Extents
- Heating Pipe
- HV Electric Cable
- Kingston Comms
- Oil Pipe
- Rising Main
- Traffic Control
- Unknown Utility
- Vent Pipe
- Water
- GPR Detection
- Assumed Route
- Records Route
- Drainage
- Backdrop
- /Cable Riser

Utility Abbreviations

CP	Cathodic Protection	LoS	Loss of Signal
Cut	Disconnected Utility	MDPE	Middle Density PE
DI	Ductile Iron	SI	Spun Iron
DoB	Depth to Bottom	TLC	Traffic Light Control
DoC	Depth of Cover	UDI	Unreliable Depth Info
ED	Empty Duct		Unplasticised
EoT	End of Trace	uPVC	Polyvinyl Chloride
PE	Polyethylene	UTR	Unable to Raise
HDPE	High Density PE	UTT	Unable to Trace
		VC	Vitrified Clay

Manufacturer Stated Depths

Detected Using Electromagnetic Location Methods
e.g. Any metallic pipe/cable. Accuracy ± 2.5% of depth reading.

Detected Using Electromagnetic Location Methods
eg. Using a Sonde to locate drainage pipework
Accuracy ± 2.5% of depth reading.

Detected Using Ground Penetrating Radar
e.g. A plastic pipe or service not located by other means.
Accuracy depends on ground conditions.

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Notes

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Rev.	Date	Comments

Client	WSP
Site Location:	MARSH ROAD SCHOOL HOUSE, WESTON CP SOUTH HOLLAND PE12 6HH
Purpose of Drawing	UTILITY MAPPING SURVEY PRESENTED ON A TOPOGRAPHICAL SURVEY

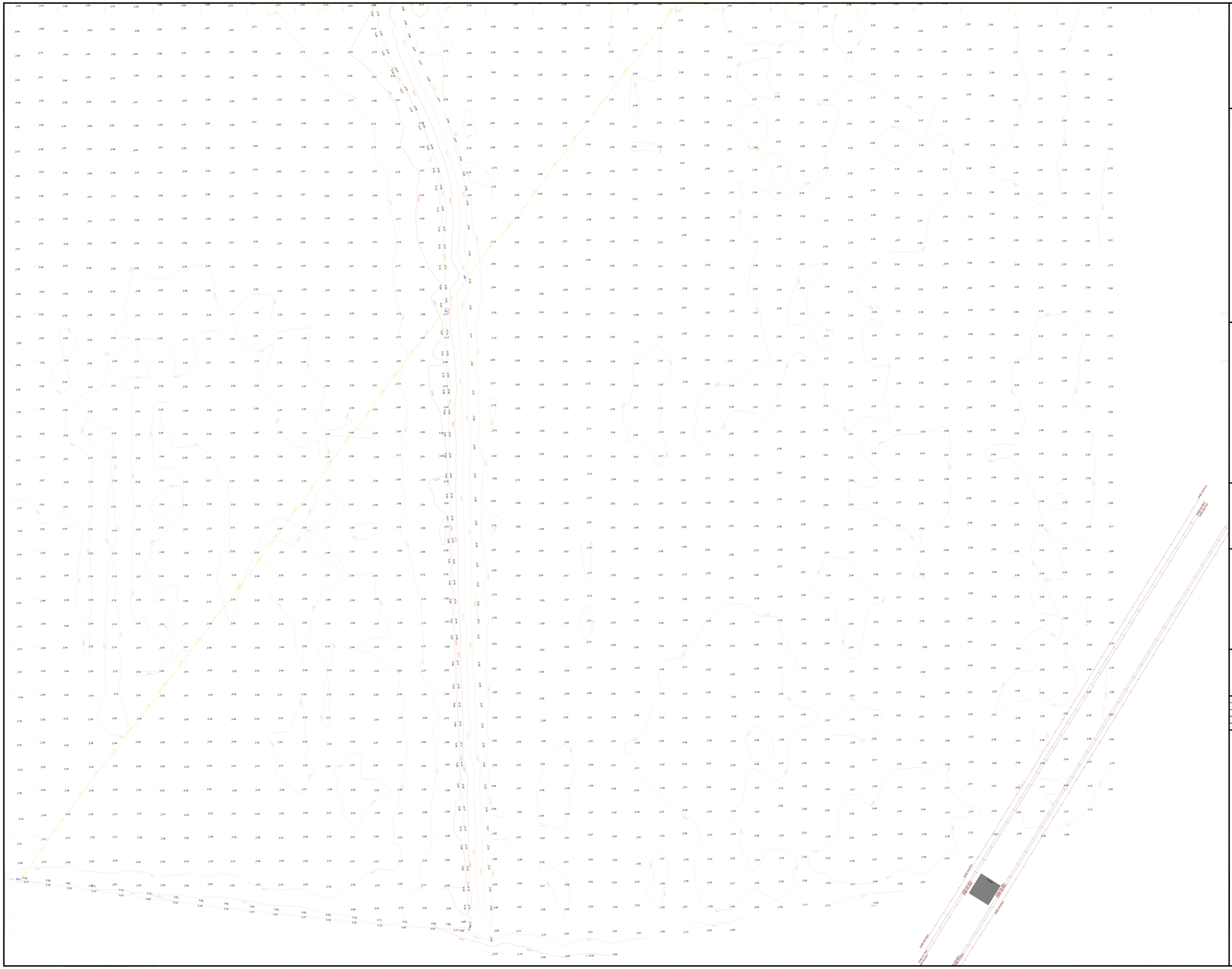
Surveyed:	JB MH RB AC JB	Drawn:	JB
Checked:	DH	Authorised:	NB
Date:	20/01/25	Scale:	1:500@A0

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centara

Office 10, Ripley Drive,
Normanton Business Park,
Wakefield,
WF6 1QT.
info@centara-ltd.com

Project No	109265	Revision Status	00
Sheet Number:		7 OF 8	



Topographic Legend

- Bottom of Bank
- Top of Banking
- Building
- Building Canopy
- Concrete Base
- Contour Major
- Contour Minor
- Fences
- General
- Kerb Bottom
- Kerb Drop
- Kerb Top
- OH Comms
- OH Electric
- Railway Line
- Road Centre
- Road Markings
- SC Hard:Hard
- SC Hard:Soft
- SC Soft:Soft
- Steps
- Tree Canopy
- Vegetation
- Visible Trench
- Walls
- Water Edge

Topographic Abbreviations

AV	Air Valve	PB	Pedestrian Beacon
BH	Borehole	PBox	Post Box
BO(IL)	Bollard (Illuminated)	PGR	Pedestrian Guard Rail
BS	Bus Stop	PM	Parking Meter
Cab	Cabinet	PO	Post
CL=	Cover Level	RE	Rodding Eye
COL	Column	RS(IL)	Road Sign (Illuminated)
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Office 10, Ripley Drive,
Normanton Business Park,
Wakefield,
WF6 1QT.
info@centara-ltd.com

Project No	109265	Revision Status	00
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National Grid plc
National Grid House,
Warwick Technology Park,
Gallows Hill, Warwick.
CV34 6DA United Kingdom

Registered in England and Wales
No. 4031152
nationalgrid.com