Connah's Quay Low Carbon Power

Outline Surface Water Drainage Strategy Report

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Prepared for:
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1. Introduction

1.1 Purpose of Report

1.1.1 AECOM has been appointed by Uniper UK Limited (hereafter referred to as the Applicant) to prepare an Outline Surface Water Drainage Strategy to support a Development Consent Order (DCO) application for the development of the Connah's Quay Low Carbon Power project (the Proposed Development) on land at and in the vicinity of the existing Connah's Quay Power Station site in Flintshire, North Wales.

1.1.2 The Outline Surface Water Drainage Strategy covered by this report is limited to the Main Development Area of the Proposed Development where the Connah's Quay Low Carbon Power (CQLCP) Abated Generating Station is proposed. A surface water drainage network and management system would be provided for the Main Development Area that would provide adequate interception, conveyance and treatment of surface water runoff from proposed impermeable areas.

1.1.3 The following areas within the Order limits are excluded from the Outline Surface Water Drainage Strategy:

- Accommodation Works Areas
- Proposed CO2 Connection Corridor
- Repurposed CO2 Connection Corridor
- Water Connection Corridor
- Electrical Connection Corridor
- Construction and Indicative Enhancement Area

1.1.4 Any permanent drainage works associated with the above areas would be limited to road drainage alterations (if required), which would be subject to Abnormal Indivisible Load routing analysis as required in the **Framework Construction Traffic Management Plan** (**EN010166/APP/6.6**). Therefore, in the absence of designs for these areas (Accommodation Works Areas), they are not covered by this report. Any permanent drainage works required within the Order limits (including the areas listed above) would be detailed in the future Surface Water Drainage Strategy which would be prepared pursuant to requirement 6 of the **Draft DCO** (**EN010166/APP/3.1**).

1.1.5 This Outline Surface Water Drainage Strategy does not cover the construction phase of the Proposed Development. The **Framework Construction Environmental Management Plan** (**CEMP**) (**EN010166/APP/6.5**) identifies the requirement for measures to manage surface water during construction to be detailed in the final CEMP(s)

1.2 Development Proposals

1.2.1 The Proposed Development would comprise up to two Combined Cycle Gas Turbines (CCGT) with Carbon Capture Plant (CCP) units (and supporting infrastructure) achieving a net electrical output capacity of more than 350 megawatts (MW; referred to as MWe for electrical output) and up to a likely maximum of 1,380 MWe (with CCP operational) onto the national electricity transmission network.

1.2.2 Through a carbon dioxide (CO_2) pipeline, comprising existing and new elements, the Proposed Development would make use of CO_2 transport and storage networks owned and operated by Liverpool Bay CCS Limited, currently under development as part of the HyNet Carbon Dioxide Pipeline project (referred to as the HyNet CO_2 Pipeline Project) that would transport CO_2 captured from existing and new industries in North Wales and North-West England, for offshore storage. The captured CO_2 would be permanently stored in depleted offshore gas reservoirs in Liverpool Bay.

1.2.3 As part of the Proposed Development, the existing Connah's Quay Power Station would remain in operation and its associated surface water drainage would remain fundamentally intact.

1.2.4 A description of the Proposed Development, including details of maximum parameters, is set out in **Chapter 4: The Proposed Development** (**EN010166/APP/6.2.4**). At this stage in the development, the design of the Proposed Development incorporates a necessary degree of flexibility to allow for ongoing design development.

1.2.5 The proposed site layout for the Main Development Area is presented as **Annex A** of this report.

1.3 Scope of Report

1.3.1 This report sets out the following information:

- Existing site conditions within and adjacent to the Main Development Area, including topography, geology, utilities, surface water drains and watercourses (Section 2).
- Local legislation and guidance, including feedback from consultations and engagements undertaken with Flintshire County Council (FCC) in relation to its role of operating as the Lead Local Flood Authority (LLFA) and SuDS Approval Body (SAB) (Section 3).
- Principles and examples of Sustainable Drainage Systems (SuDS) (Section 4).
- The proposed Outline Surface Water Drainage Strategy for the Main Development Area, with reference to outfalls, climate change allowances, tidal lock analysis, proposed discharge rates and volumes, attenuation requirements, SuDS, and maintenance requirements (Section 5).

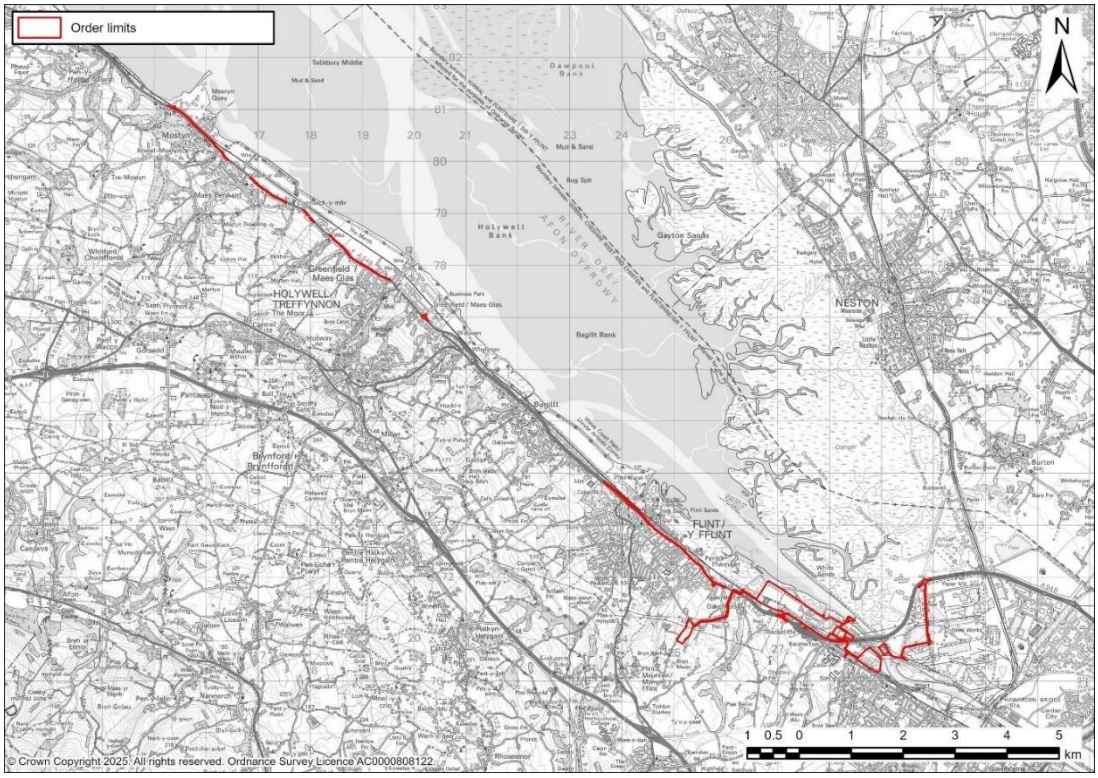
1.4 Site Location and Description

1.4.1 The existing Connah's Quay Power Station is located on the northern side of Connah's Quay (**Figure 13-1** (**EN010166/APP/6.3**), approximately 2 km south-east of Flint (post code CH6 5SJ). Historic mapping indicates that the Main Development Area consists of land that was previously lower-level marshland that has been reclaimed by land raising as part of the wider historic power station development.

1.4.2 The Proposed Development is wholly within the administrative area of FCC.

1.4.3 The Order limits, as shown in **Plate 1** of this report, encompass a total area of approximately 105 hectares (ha).

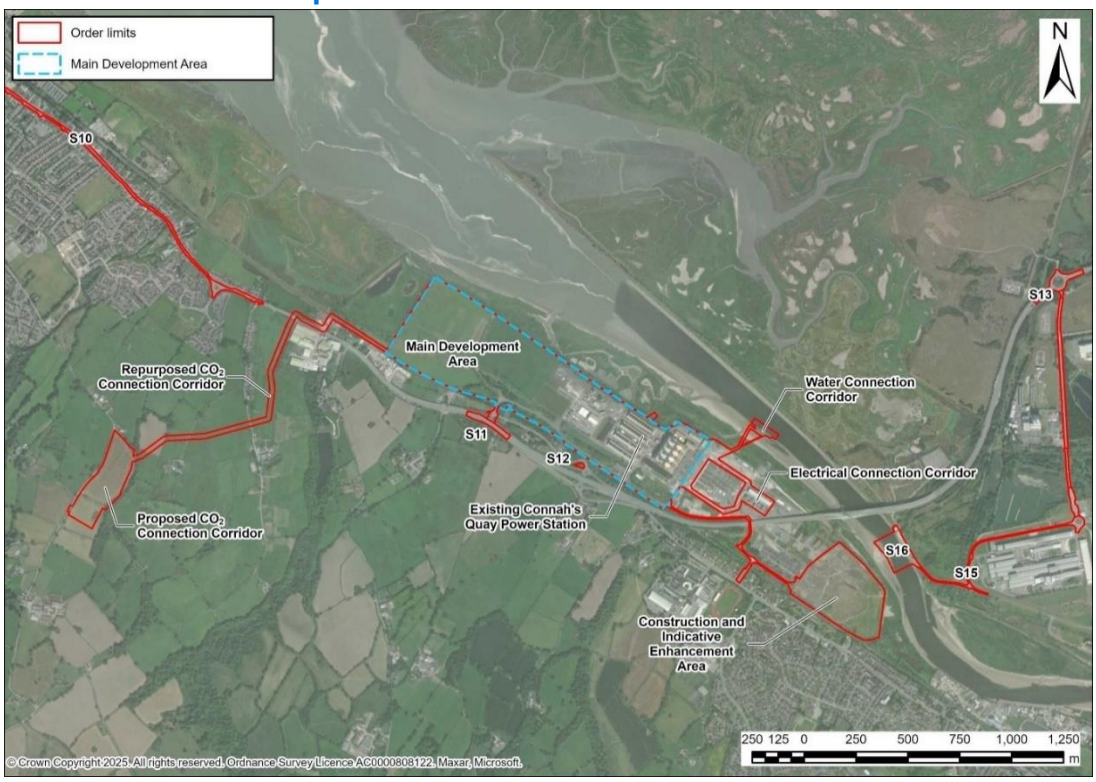
Plate 1: DCO Order limits



1.4.4 Around 86.12 ha of the Order limits is focused on the Construction and Operation Area, comprising the Main Development Area (**Plate 2**), construction areas and connection corridors necessary for the construction and operation of the Proposed Development. A further 18.78 ha of land is included for the Accommodation Works Areas, comprising areas of works required to facilitate the movement and temporary storage of Abnormal Indivisible Loads (AIL) during construction of the Proposed Development. As explained in Section 1.1 of this report, this report covers the Outline Surface Water Drainage Strategy for the Main Development Area only.

1.4.5 The Main Development Area, as shown in **Plate 2** of this report, is located on the southern bank of the Dee Estuary. It is bordered to the north, north-east and north-west by the Connah's Quay Nature Reserve, including marshland along the Dee Estuary, and to the east and south-east by the existing National Grid Electricity Transmission (NGET) 400 kV Substation, and to the south and south-west by the North Wales Main Line railway.

Plate 2: Main Development Area



1.4.6 The land use in the south-east of the Main Development Area is predominantly industrial, containing the existing Connah's Quay Power Station, with arable/grasslands surrounding the Proposed Development to the west, and marshland and the Dee Estuary located to the North.

2. Existing Site Conditions

2.1 Topography

2.1.1 The Main Development Area is located immediately south-west of the Dee Estuary. The Main Development Area is therefore indicative of its flat, low-lying coastal topography with typical ground levels ranging between approximately 6 to 8m Above Ordnance Datum (AOD).

2.1.2 A topographical survey was completed for the Main Development Area by Malcolm Hughes Chartered Land Surveyors in November 2024. The topographical survey drawings, which include existing contours, can be found in **Annex B** of this report.

2.2 Geology

2.2.1 Soils in the Main Development Area are mapped as Soilscape 21: *"Loamy and clayey soils of coastal flats with naturally high groundwater".*

2.2.2 The online BGS Geology Viewer map shows superficial deposits on the Main Development Area as *'Tidal Flat Deposits - Clay, silt and sand. Sedimentary superficial deposit formed between 11.8 thousand years ago and the present during the Quaternary period.'*

2.2.3 The bedrock geology of the Main Development Area is shown on the online BGS Geology Viewer map as follows:

- south-east area of Main Development Area: Pennine Lower Coal Measures Formation - Mudstone, siltstone and sandstone. Sedimentary bedrock formed between 319 and 318 million years ago during the Carboniferous period;
- central area of Main Development Area: Etruria Formation - Mudstone, sandstone and conglomerate. Sedimentary bedrock formed between 319 and 308 million years ago during the Carboniferous period; and
- north-west area of Main Development Area: Gwespyr Sandstone - Sandstone and argillaceous rocks, interbedded. Sedimentary bedrock formed between 320 and 318 million years ago during the Carboniferous period.

2.2.4 A preliminary ground investigation (GI) was undertaken in January-March 2025. Groundwater levels within the Main Development Area were monitored on three occasions following the GI (**Appendix 14-A: Geo-Environmental Desk Based Assessment** (**EN010166/APP/6.4**)). Table 9 within **Appendix 13-C: Flood Consequences Assessment (FCA)** (**EN010166/APP/6.4**) provides full details of depths and locations. In summary, the data indicates shallow groundwater present on the Main Development Area (0.13-3m below ground level). Overall, groundwater flow is to the north-east towards the River Dee.

2.3 Utilities

2.3.1 Being a brownfield site, there are various underground utilities located on the Main Development Area including, communication cables, fibre optical cables, drainage pipes, fuel services, electrical cables, gas pipes, cooling water pipes, potable water pipes, etc. A utilities survey was undertaken by Malcolm Hughes Chartered Land Surveyors and completed in April 2025. The utilities survey drawings are included as **Annex C** of this report.

2.4 Existing Watercourses

2.4.1 There are multiple watercourses within and around the Main Development Area, which flow towards the Dee Estuary, as shown on Sheet 2 of Figure 1 of **Chapter 13: Water Environment and Flood Risk** (**EN010166/APP/6.2.13**). Oakenholt Brook crosses the fields on the north-western (undeveloped) end of the Main Development Area, and Old Rockcliffe Brook crosses the existing Connah's Quay Power Station on the south-east end of the Main Development Area. For its length across the existing Connah's Quay Power Station, Old Rockcliffe Brook also receives flows from an unnamed watercourse and Kelsterton Brook. (The confluence of the three watercourses is located appproximately 35km beyond the south-western boundary of the Main Development Area.)

2.4.2 Oakenholt Brook and Old Rockcliffe Brook are both culverted across the Main Development Area, and are shown on the Existing Drainage Arrangement drawings included as **Annex D** of this report:

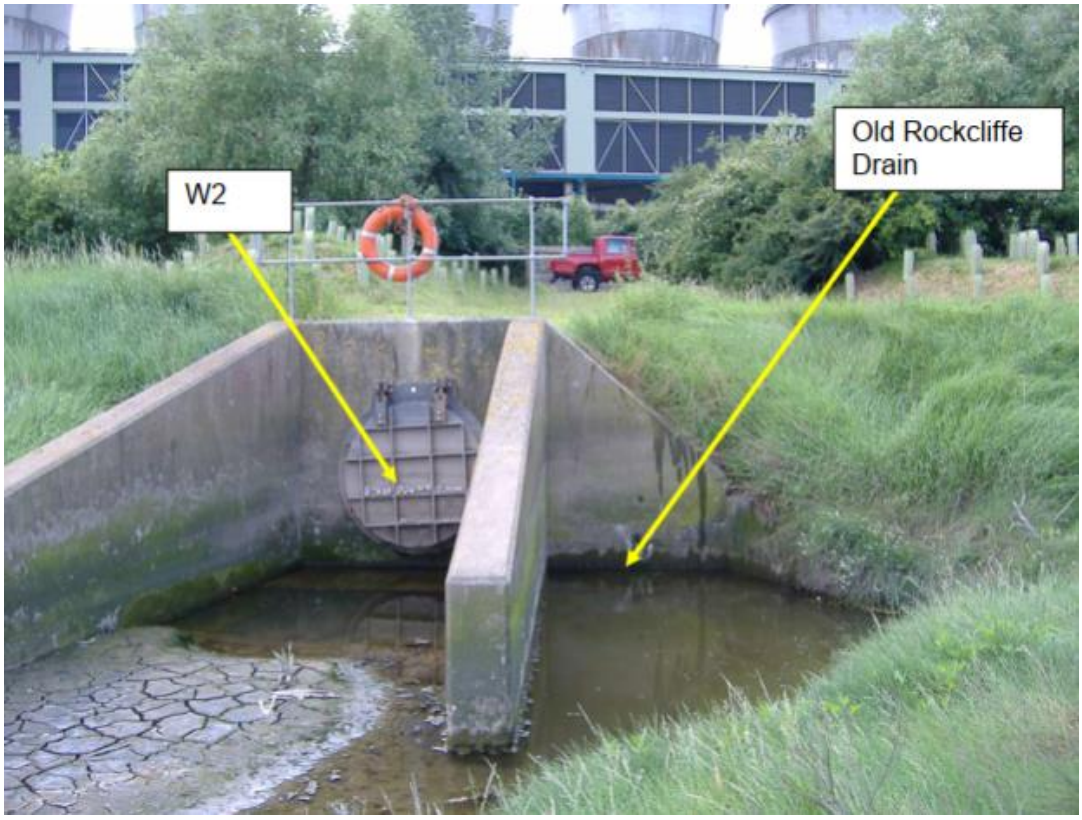
- Old Rockcliffe Brook culvert: The upstream end of the Old Rockcliffe Brook culvert is located approximately 9m beyond the south-western boundary of the Main Development Area. The culvert conveys flows along the north-west and north-east sides of the existing cooling towers, before returning to open watercourse via a headwall structure, prior to the watercourse's outfall across the marshland to the Dee Estuary. The utilities survey drawings (included as **Annex C** of this report) indicate that the Old Rockcliffe Brook culvert receives some surface water runoff from a limited area of the western side of the existing Connah's Quay Power Station site via some road gullies. The pipe size of the culvert at its outlet (i.e. at its downstream headwall) is nominally 900mm diameter and its invert level at the headwall is approximately 2.57m AOD; and
- Oakenholt Brook culvert: The Oakenholt Brook culvert conveys flows in a straight line across the undeveloped fields, before returning to open watercourse and discharging to the Dee Estuary beyond the Main Development Area boundary and adjacent access road. The topographical survey recorded an invert level of 2.18m AOD at the culvert outfall.

2.5 Existing Piped Surface Water Drainage

2.5.1 The drawings included as **Annex D** of this report show the existing surface water drainage arrangement within the Main Development Area and are based on the utilities survey included as **Annex C**. The drawings show a series of drains which direct runoff to Old Rockcliffe Brook, which flows across the adjacent marshland. As explained in Section 2.3 of this report, some runoff from the western side of the existing Connah's Quay Power Station is discharged into the Old Rockcliffe Brook culvert via gullies. Most of the runoff from the existing Connah's Quay Power Station is intercepted by a separate surface water network (referred to as W2). The W2 surface water network discharges into the Old Rockcliffe Brook via the same outfall headwall as the Old Rockcliffe Brook culvert. The pipe size of the W2 pipe at the outfall headwall is approximately 1200mm diameter and its invert level at the headwall is approximately 4.33m AOD. The existing outfall headwall, which has two pipes (one for the W2 outfall and one for the Old Rockcliffe Brook culvert outfall), is shown in **Plate 3** of this report. (The Old Rockcliffe Brook culvert outlet is submerged, as its invert level is approximately 1.8m below the invert level of the culvert.)

2.5.2 At this coastal site, tide locking occurs when a high tide prevents the normal outflow of water from the system into Old Rockcliffe Brook (and the estuary). This happens because the outfall pipe is submerged by the tide (which has backed up along Old Rockcliffe Brook), creating a backwater effect. Essentially, the tide acts as a temporary dam, preventing the drainage of water from the land. The existing drainage drawings in **Annex D** of this report show an above ground attenuation zone which attenuates runoff and protects the existing site during tide lock scenarios.

Plate 3: Existing Surface Water Outfall Headwall



3. Legislation and Guidance

3.1 The Flood and Water Management Act 2010

3.1.1 The Flood and Water Management Act 2010 (FWMA) gives Welsh Ministers a strategic overview role for flood risk and gives local authorities responsibility for preparing and putting in place strategies for managing flood risk from groundwater, surface water and ordinary watercourses in their areas.

3.1.2 Under Schedule 3 of the FWMA, LLFAs were required to establish SuDS Approval Bodies (SABs). Schedule 3 of the FWMA was enacted in Wales and came into effect in January 2019, meaning that FCC are required to approve and adopt SuDS for new developments.

3.1.3 A SAB application would therefore be required (separate to the DCO application) to seek approval from the SAB (FCC) for drainage proposals, prior to construction.

3.2 Well-being of Future Generations Act (Wales) 2015

3.2.1 The Well-being of Future Generations (Wales) Act 2015 concerns the improvement of the social, economic, environmental and cultural well-being of Wales.

3.2.2 The Act gives a legally-binding common purpose – the 7 well-being goals – in the national government, local government, local health boards and other specified public bodies. It details the ways in which specified public bodies must work, and work together, to improve the well-being of Wales.

3.2.3 It makes the public bodies listed in the Act think more about the long-term, work better with people and communities and each other, look to prevent problems and take a more joined-up approach.

3.2.4 The Act's well-being goals are a:

- prosperous Wales
- resilient Wales

  healthier Wales
- more equal Wales
- Wales of cohesive communities
- Wales of vibrant culture and thriving Welsh language
- globally responsible Wales

3.2.5 The Act puts in place a 'sustainable development principle' which tells organisations how to go about meeting their duty under the Act.

3.2.6 Public bodies must ensure that when making decisions they take into account the impact the decision could have on people living in Wales in the future.

3.3 The Sustainable Drainage (Approval and Adoption Procedure) (Wales) Regulations 2018

3.3.1 The Sustainable Drainage (Approval and Adoption Procedure) (Wales) Regulations 2018 outline the process for approving and adopting SuDS in Wales, in accordance with Schedule 3 of the Flood and Water Management Act 2010. These regulations address how developers apply for approval of SuDS and how the approving bodies, typically local authorities, determine those applications and potentially adopt the systems.

3.4 Planning Policy Wales (PPW)

3.4.1 Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters which, together with PPW, provide the national planning policy framework for Wales.

3.4.2 Most new developments are required to incorporate sustainable drainage systems, which should be suitably designed to acceptable standards and take advice from the relevant authorities into account.

3.5 Technical Advice Note 15 (TAN 15)

3.5.1 TAN 15 (Development, flooding and coastal erosion) provides technical guidance which supplements the policies set out in PPW and Future Wales in relation to flooding and coastal erosion in Wales. It provides a framework within which the flood risks arising from rivers, the sea and surface water, and the risk of coastal erosion can be assessed. It also provides advice on the consequences of the risks and adapting to and living with flood risk. It does not take precedence over other TANs and should be considered alongside other planning policies.

3.5.2 TAN 15 states the following with regards to SAB approval:

3.5.3 "As the SuDS approval process is independent of the planning process, there is a risk of proposals complying with one regulatory system but not the other. A situation where a scheme receives planning permission but is refused SAB approval should be avoided wherever possible. To avoid this scenario, it is important to consider planning and SAB requirements in combination and to provide the information to decision makers in parallel. This can be best achieved by applying for both types of consents simultaneously, ensuring the planning application documentation provides full details of the proposed SuDS.

3.5.4 Simultaneous applications are advised as the best approach but it is not always feasible. Where planning permission is sought prior to SAB approval, the applicant will be expected to provide a Drainage Statement as part of the planning application. The Drainage Statement should outline how it is proposed to integrate SuDS into the scheme, to provide the planning authority with confidence the scheme incorporates SuDS appropriately and is subsequently likely to obtain SAB approval. The statement should not

generate additional cost or effort to applicants because the information it contains will be required for the subsequent SAB process."

3.5.5 This Outline Surface Water Drainage Strategy report serves as the 'Drainage Statement' referred to in the TAN 15 guidance. FCC's non-chargeable SAB Pre-Application Advice service is being utilised and an 'Application Form for Pre-Application Advice on SuDS on new developments' form, setting out high-level drainage principles, would be submitted to FCC prior to Examination.

3.6 Overarching National Policy Statement (NPS) for Energy (EN-1)

3.6.1 Document EN-1 (Ref 1) sets out the Government's policy for the development of nationally significant infrastructure projects (NSIPs) which must be authorised by a DCO.

3.6.2 Paragraph 5.8.15 of NPS EN-1 states the following with regards to drainage requirements for flood risk assessments:

- *consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of the project may affect drainage systems. Information should include:*

i. Describe the existing surface water drainage arrangements for the site.

ii. Set out (approximately) the existing rates and volumes of surface water run-off generated by the site. Detail the proposals for restricting discharge rates.

iii. Set out proposals for managing and discharging surface water from the site using sustainable drainage systems and accounting for the predicted impacts of climate change. If sustainable drainage systems have been rejected, present clear evidence of why their inclusion would be inappropriate.

iv. Demonstrate how the hierarchy of drainage options has been followed.

v. Explain and justify why the types of SuDS and method of discharge have been selected and why they are considered appropriate.

vi. Explain how sustainable drainage systems have been integrated with other aspects of the development such as open space or green infrastructure, so as to ensure an efficient use of the site.

vii. Describe the multifunctional benefits the sustainable drainage system will provide.

viii. Set out which opportunities to reduce the causes and impacts of flooding have been identified and included as part of the proposed sustainable drainage system.

ix. Explain how run-off from the completed development will be prevented from causing an impact elsewhere.

x. Explain how the sustainable drainage system has been designed to facilitate maintenance and, where relevant, adoption. Set out plans for ensuring an acceptable standard of operation and maintenance throughout the lifetime of the development.

3.6.3 Paragraph 5.8.27 of NPS EN-1 states that *"the surface water drainage arrangements for any project should, accounting for the predicted impacts of climate change throughout the development's lifetime, be such that the volumes and peak flow rates of surface water leaving the site are no greater than the rates prior to the proposed project, unless specific off-site arrangements are made and result in the same net effect".*

3.6.4 Paragraph 5.8.28 of NPS EN-1 states that it *"may be necessary to provide surface water storage and infiltration to limit and reduce both the peak rate of discharge from the site and the total volume discharged from the site. There may be circumstances where it is appropriate for infiltration facilities or attenuation storage to be provided outside the project site, if necessary through the use of a planning obligation"*.

3.7 BS 8533: Assessing and managing flood risk in development - Code of Practice

3.7.1 The British Standard 8533 (BS8533) was published by the British Standards Institution (BSI) in 2017. It aims to provide further details, guidance and recommendations to developers, planning authorities and flood risk managers in order to consider and identify the flood risk from all the potential sources of flooding and how to avoid, reduce and mitigate their likely impact in new or existing developments.

3.8 The SuDS Manual (C753)

3.8.1 Guidance on the use of SuDS is provided in The SuDS Manual (Ref 2). It states that:

- '*The philosophy of sustainable drainage systems is about maximising the benefits and minimising the negative impacts of surface water runoff from developed areas.*
- *The SuDS approach involves slowing down and reducing the quantity of surface water runoff from a developed area to manage downstream flood risk and reducing the risk of that runoff causing pollution. This is achieved by harvesting, infiltrating, slowing, storing, conveying and treating runoff on site and, where possible, on the surface rather than underground. Water then becomes a much more visible and tangible part of the built environment, which can be enjoyed by everyone*'.

3.9 Welsh Government's Statutory standards for sustainable drainage systems

3.9.1 This document (published in 2018) sets out the Welsh statutory standards for the design, construction, operation and maintenance of SuDS serving new developments in urban or rural areas of more than one dwelling or where the area covered by construction work equals or exceeds 100 metres squared. It provides information for designers, property developers, local authorities and other interested parties, such as sewerage undertakers and Natural Resources Wales (NRW). It also contains links to additional supporting information relating to SuDS.

3.10 North Wales SuDS Guidance

3.10.1 The enactment of Schedule 3 of the Flood and Water Management Act 2010 means sustainable drainage systems (SuDS) are now mandatory for most new developments in Wales and must be approved by the local SAB. The North Wales SuDS Guidance document provides developers with an overview of the processes and design requirements for obtaining SAB approval in North Wales, for the six local authority SABs in the North Wales Flood Risk Management Group (NWFRMG).

3.10.2 The guidance document is structured to follow the SAB application process and stages of design. It covers the legislation underpinning SuDS requirements and the steps involved in making a SAB application. The Welsh Government principles and standards which are measured against for SAB approval are summarised in the guidance document. A suggested design process for effective and compliant SuDS design is presented, along with recommendations for integrating SuDS into developments to maximise the likelihood of SAB approval.

3.11 Flintshire County Council SuDS Application Guidance

3.11.1 This document provides guidance for Pre-Application Advice and Full Application Approval of SuDS on new developments in Flintshire in accordance with The Sustainable Drainage (Approval and Adoption Procedure) (Wales) Regulations 2018.

3.12 Pre-App Consultations with SAB

3.12.1 To inform the Outline Surface Water Drainage Strategy for the Main Development Area, FCC's Flood and Coastal Erosion Risk Manager has been consulted to agree drainage principles. Meeting notes for the two SAB meetings (held in June 2024 and April 2025) are included as **Annex E** of this report.

3.13 Consultations with Natural Resources Wales

3.13.1 NRW have also been consulted (by email), and they have confirmed that no consent is needed from them for the discharging of surface water from the Main Development Area (given that surface water would be discharged to an ordinary watercourse), however, NRW confirmed that "*the construction of the infrastructure required to discharge surface water is likely to require a flood risk activity environmental permit (FRAP) for any outfalls, headwalls etc*." NRW's main concern is ensuring that all surface water discharges are free of contamination and therefore do not pose a pollution issue for any receiving watercourse. NRW has noted that any discharges should not cause any discolouration or scouring, and attenuation may provide an extra precaution against pollution and scour. A copy of the email correspondence with NRW is included as **Annex F** to this report.

3.14 Sewerage Sector Guidance

3.14.1 The Sewerage Sector Guidance published in June 2022 provides developers with information relating to the design and construction of sewers to adoptable standards to assist in the preparation of the submission to a Sewerage Undertaker prior to entering an adoption agreement under Section 104 of the Water Industry Act 1991.

3.14.2 Whilst sewers on the Main Development Area are unlikely to be adopted by the sewerage undertaker, the Sewerage Sector Guidance has been considered and applied to the Outline Surface Water Drainage Strategy, as it is considered best practice guidance for piped networks.

4. Sustainable Drainage Systems (SuDS)

4.1 SuDS Objectives

4.1.1 Surface water drainage systems developed in line with the concepts of sustainable development are collectively referred to as Sustainable Drainage Systems (SuDS). These systems are designed both to manage the environmental risks resulting from urban runoff and to contribute wherever possible to environmental enhancement. SuDS techniques should be utilised wherever possible to manage surface water runoff from new developments.

4.1.2 SuDS objectives are to *"minimise the adverse effects from the development on the quantity and quality of the runoff and maximise amenity and biodiversity opportunities."* (Ref 1).

4.1.3 Sufficient space must be allowed for SuDS features to appear as natural features and not be constrained by the development into inadequate, unattractive areas. Working with nature can ensure that SuDS are in-keeping with their setting, minimising management requirements and costs.

4.1.4 The following documents are relevant to the design of SuDS features:

- Planning for SuDS – making it happen (CIRIA C687);
- Site handbook for the construction of SUDS (CIRIA C698, 2007);
- Guidance on the Construction of SuDS (CIRIA C768, 2017);
- The SuDS Manual (CIRIA C753, 2015);
- Designing for exceedance in urban drainage: Good practice (CIRIA C635, 2006);
- Health and Safety Principles for SuDS (CIRIA RP992/17);
- Welsh Government's Sustainable Drainage (SuDS) Statutory Guidance (came into effect on January 7, 2019);
- TAN 15: Development, flooding and coastal erosion (first published July 2004, last updated March 2025); and
- North Wales SuDS Guide March 2025 rev 3.

4.2 The SuDS Management Train

4.2.1 The 'management train approach' has been central to the development of the Outline Surface Water Drainage Strategy for the Main Development Area. The main objective is treatment and control of runoff as near to the source as possible protecting downstream habitats and further enhancing the amenity value of the Main Development Area. This concept uses a hierarchy of drainage techniques (the SuDS Hierarchy) to incrementally reduce pollution, manage flow rates and volumes of stormwater discharge from the Main Development Area, and is as follows:

- **Prevention** - the use of good site design and housekeeping measures to prevent runoff and pollution and includes the use of rainwater reuse/harvesting;
- **Source Control** - control of runoff at source or as close to source as possible (e.g. soakaways, green roofs, trees, lined/unlined pervious pavements);
- **Site Control** - management of water in a local area and can include detention basins, large infiltration devices, below ground storage/attenuation; and
- **Regional Control** - management of water from a site or various sites and can include wetlands and balancing ponds.

4.3 Potential SuDS Site Constraints

4.3.1 The proposed SuDS types, positioning and sizes are indicative at this stage and would be further developed at design stage, as part of the Surface Water Drainage Strategy which would be prepared pursuant to requirement 6 of the **Draft DCO** (**EN010166/APP/3.1**), in order to integrate with the final proposed site layout. In addition to main constraints relating to plant and structures, other items that would be considered in the detailed surface water drainage strategy include internal road layouts, air and gas duct corridors, firewater mains, ancillary equipment, bunded areas, utility layouts, stand-off requirements, easements, wayleaves, and the areas around the perimeter identified for bunding and screening of the Main Development Area.

4.4 SuDS Design Philosophy

4.4.1 The SuDS techniques proposed for the Main Development Area have been selected based on site-specific conditions, the layout of the Proposed Development and relevant drainage requirements.

4.4.2 An attenuation tank is proposed to provide the main surface water storage capacity within the Main Development Area. For the purposes of evaluation, the provisional design includes a single attenuation tank. When the design is developed, the proposed surface water network and site layout may require from multiple attenuation tanks. Bioretention, landscaped channels, swales, filter drains, free-draining gravel margins, and/or pervious pavement would be considered to provide a means of slowing the runoff rate and treatment of the surface water by filtration, settlement and bio-degradation.

4.4.3 Details regarding the provisional proposed SuDS systems for the Main Development Area are given in The SuDS Manual (Ref 2) and are briefly described in the following sections of this report. Care would be taken at the detailed design stage to ensure that the proposed systems are effective. Details would be provided in the Surface Water Drainage Strategy which would be prepared pursuant to requirement 6 of the **Draft DCO** (**EN010166/APP/3.1**).

4.5 SuDS Techniques

Bioretention

4.5.1 Bioretention areas, also referred to as bioretention filters, are surface runoff controls that capture and treat stormwater runoff from frequent rainfall events. Excess runoff from extreme events is passed forward to other drainage facilities. The surface runoff is treated using soils and vegetation in shallow basins or landscaped areas to remove pollutants. The filtered runoff is then collected and returned to the conveyance system. Part of the runoff volume would be removed through evaporation and plant transpiration. Suitable flow routes or overflows are required to convey water in excess of the design volumes to appropriate receiving drainage systems safely.

4.5.2 Due to their nature, bioretention areas can be integrated into external areas within the Main Development Area and are suited to fitting around parking bays without excessive land-take. They allow small areas of soft landscaping to be incorporated into what could otherwise be a hard-landscaped site.

4.5.3 Engineered tree trenches constructed with the so-called "Stockholm system" can contribute to storm water management by providing water retention to the surface runoff from adjacent paved areas, and water treatment. Tree pits also provide amenity and biodiversity benefits.

4.5.4 The construction of Stockholm tree pits involves the use of structural soil formed by large stone aggregate material (Ref 3). Subsequent layers of planting soil and structural soil in the pits create good conditions for the trees' growth and the associated void volume constitutes available storage of the incoming runoff. The pits can be constructed with additional concrete boxes to provide support to the paved surface. A conventional gully pot with perforated base can allow the water to enter the system, at the same time serving as an aeration inlet (Ref 4).

Pervious pavements

4.5.5 Pervious pavements provide a surfacing suitable for pedestrian and/or vehicular traffic that allows rainwater to infiltrate through the surface and into the underlying layers, where water is temporarily stored before infiltration to the ground, reuse or release to a drainage system. If groundwater levels are high, or if there is contamination potential, an impermeable liner would be required with eventual connection onto the drainage system.

4.5.6 Pervious pavements can be made of porous material or constructed as a permeable surface as described below:

- Porous pavements infiltrate water across their entire surface material, e.g. porous concrete and porous asphalt; and

- Permeable pavements are formed of material that is itself impervious. However, the materials are laid to allow surface water to infiltrate through the joints or voids between the blocks into the underlying pavement structure, intercepting surface water runoff and providing a pollutant treatment medium prior to discharge to the downstream system. Treatment processes that occur within the surface structure, the subsurface matrix and the geotextile layers include; filtration, adsorption, biodegradation and sedimentation. Examples include gravel pavements, reinforced grass pavements and block paving. **Plate 4** of this report shows typical reinforced grass paving and block paving arrangements.

Plate 4: Typical Permeable Paving Arrangements

Filter Drains

4.5.7 A filter drain is a trench lined with a geotextile and filled with gravel into which runoff water is led, either directly from the drained surface or via a pipe system. **Plate 5** of this report shows a typical filter drain.

4.5.8 The gravel in the filter drain provides some filtering of the runoff, trapping sediment, organic matter and oil residues that can be broken down by bacterial action through time. The runoff rate is reduced, and storage is also provided. Stored water can also pass through the geotextile membrane (to infiltrate into the ground) and some filter drains need not lead to a drainage system at all.

4.5.9 Filter drains are used on a variety of developments, including industrial sites.

4.5.10 Good maintenance of filter drains is key to avoid the high cost of replacing filter material should blockages occur.

Plate 5: Typical Filter Drain

Channels and Swales

4.5.11 Vegetated channels or landscaped depressions would drain water off impermeable areas. Rainwater runs through the vegetation alongside the channel which slows and filters the flow. They are designed to convey water but can also provide the benefits of detention and treatment of runoff. For swales to be effective on steep sites, check dams or pools are required to reduce the velocity of concentrated stormwater flows, increase attenuation and promote deposition of suspended solids. They can help to create a variety of damp or wet habitats supporting a range of native wetland plants and grasses.

4.5.12 **Plate 6** of this report shows some typical swale arrangements.

4.5.13 Channels and swales can be incorporated into road verges to provide a landscape function as well as a drainage function. In such locations they are likely to be dominated by fine-grass species and regularly mown.

Plate 6: Typical Swale Arrangements

5. Outline Surface Water Drainage Strategy

5.1 Existing Drainage Regime

5.1.1 The Main Development Area is characterised by flat, low-lying coastal topography. The topographical survey (**Annex B** of this report) indicates that runoff from the undeveloped (field) areas flows towards low points in central and southern areas of the fields, and towards vegetation along field boundaries. Where runoff is directed towards low spots, it is assumed to infiltrate to ground.

5.1.2 On the existing Connah's Quay Power Station site, surface water runoff is captured and conveyed by a gravity surface water system (W2) which has an unrestricted discharge to Old Rockcliffe Brook. The pipe size at the existing outfall headwall is nominally 1200mm diameter and it is understood that an open concrete channel protects the existing Connah's Quay Power Station during tide lock scenarios. (Please refer to paragraph 2.5.1 of this report for explanation of tide lock.)

5.1.3 The following two drawings have been prepared to show the existing drainage networks, which are included as **Annex D** of this report:

- CONQ-ACM-XX-XX-DR-CE-000100 Existing Drainage Layout sheet 1 of 2; and
- CONQ-ACM-XX-XX-DR-CE-000101 Existing Drainage Layout sheet 2 of 2.

5.2 Proposed Development

5.2.1 The provisional development proposals (for the Main Development Area) are shown on the Site Layout Plan, presented as **Annex A** of this report.

5.2.2 As part of the Proposed Development, the existing Connah's Quay Power Station would remain in operation and its associated surface water drainage would remain fundamentally intact. The extent of existing drainage to become defunct, remediated or capped would be determined at detailed design stage. Adjacent to the existing facilities, the Proposed Development would include up to two combined cycle turbine plants, up to two carbon dioxide capture plants, associated infrastructure, natural gas reception facility, carbon dioxide interface facility, administration, control room and stores. The remainder of the Main Development Area would be reinstated and managed in accordance with the **Outline Landscaping and Ecology Management Plan** (**LEMP**) (**EN010166/APP/6.9**).

5.3 Proposed Outfall

5.3.1 Following the SuDS Hierarchy, the disposal of surface water from new developments should be considered by means of soakaways as the primary method. If this is not practical, discharge should be to the closest watercourse or land drain. Discharging surface water to public sewers is a last resort if discharging to soakaways and watercourses is unachievable.

5.3.2 At the Main Development Area, discharging surface water runoff to soakaways is an option which would be considered during detailed design (following soakaway testing which is scheduled as part of future ground investigation works). In the absence of soakaway test results, it has been assumed that all surface water runoff would be drained to a watercourse, which is the next option in the discharge hierarchy.

5.3.3 As explained in Section 2.3, the nearest watercourses are Old Rockcliffe Brook and Oakenholt Brook. The Oakenholt Brook culvert passes through the Main Development Area and has been considered as a surface water outfall. However, a single discharge to Old Rockcliffe Brook is currently proposed, alongside the existing surface water outfall (referred to as W2) and the Old Rockcliffe Brook culvert outfall, as shown in **Plate 7** of this report. An outfall to Oakenholt Brook has been discounted at this stage because a single outfall solution minimises the potential loss of qualifying habitat features (including mud flats and saltmarsh) of the Dee Estuary / Aber Dyfrdwy SAC.

5.3.4 It is not considered practical to use the existing surface water network associated with the existing Connah's Quay Power Station and so a new outfall is proposed, which could be formed via a new headwall alongside the existing headwall, or a rebuild of the existing headwall to accommodate an additional outlet. Based on the likely surface water runoff volumes, the pipe size for the new outfall would be approximately 1200mm diameter. Outfall details would be confirmed in the detailed Surface Water Drainage Strategy which would be prepared pursuant to requirement 6 of the **Draft DCO** (**EN010166/APP/3.1**).

Plate 7: Proposed outfall location

5.4 Firewater Strategy and Areas of Potential Contamination

5.4.1 The firewater strategy for the Main Development Area has not yet been developed and the areas of potential surface water contamination (e.g. impermeable areas surrounding a chemical storage tank) have not been finalised. Some of these areas may not be discharged to the new surface water network, and may instead be directed to a new on-site water treatment facility or the existing purge pond, subject to testing.

5.4.2 If firewater runoff and/or runoff from potentially contaminated areas is to be directed to the new surface water network, isolation techniques (which may include bunding and penstocks) would be required to contain potentially contaminated runoff and prevent it from entering the surface water network prior to testing. Uncontaminated runoff would be released by opening the penstocks (to allow runoff to enter the drainage network), and contaminated runoff would be removed for treatment elsewhere. The surface water drainage strategy for firewater and potential contamination areas would be developed in consultation with NRW and FCC post-DCO consent and would be detailed in the Surface Water Drainage Strategy to be prepared pursuant to requirement 6 of the **Draft DCO** (**EN010166/APP/3.1**).

5.5 Climate Change Allowances

5.5.1 To assess the performance of the proposed surface water network, provisional hydraulic modelling has been undertaken using Flood Studies Report (FSR) rainfall data, including for appropriate climate change allowances. A range of climate change factors have been applied to the hydraulic calculations (20%, 30% and 40%) in accordance with the Welsh climate change allowances guidance "Flood Consequence Assessments", dated September 2011. On the basis that the design life of the proposed infrastructure is limited to 30 years, the proposed attenuation could be sized for the 20% climate change allowance, which is the current upper estimate

value for projection between 2040-2069 as per **Table 1** of this report. At detailed design stage (post-DCO consent), relevant climate change guidance and project programmes would be reviewed to ensure appropriate climate change allowances are applied and appropriate sensitivity testing is undertaken. The application of climate change allowances would be set out in the Surface Water Drainage Strategy to be prepared pursuant to requirement 6 of the **Draft DCO** (**EN010166/APP/3.1).**

Table 1: Climate change allowances, taken from Welsh climate change allowances guidance "Flood Consequence Assessments", dated September 2011

Applies across all of Wales	Total potential change anticipated for 2020s (2015-2039)	Total potential change anticipated for 2050s (2040-2069)	Total potential change anticipated for 2080s (2070-2115)
Upper estimate	10%	20%	40%
Central estimate	5%	10%	20%

5.6 Proposed Discharge Rates and Velocities

5.6.1 On the basis that surface water is proposed to be discharged to an ordinary watercourse, the surface water discharge rate is regulated by FCC as the SAB.

5.6.2 An unrestricted discharge to Old Rockcliffe Brook has been agreed in principle with the Flood and Coastal Erosion Risk Manager at FCC at a meeting held in June 2025. Meeting notes are included in **Annex E** of this report.

5.6.3 Like the existing surface water system, the proposed surface water network would need to protect the Main Development Area during tide lock scenarios, given its outfall would be submerged during high tides. An analysis of the tide lock scenario has been undertaken based on flood modelling completed for the 1 in 200-year Annual Exceedance Probability (AEP) with allowance for tidal climate change up to the year 2074. (The flood modelling has been completed to inform the Flood Consequences Assessment **Appendix 13-C: FCA** (**EN010166/APP/6.4**).) The (provisional) modelled surface water drainage network is shown on the Outline Surface Water Drainage Strategy General Arrangement drawing ref. CQLCP-ACM-XX-XX-DR-D-10-0501 included as **Annex G** of this report, and the calculations are included as **Annex H** of this report.

5.6.4 For the purposes of developing the provisional layout and model, the Main Development Area has been split into three primary catchments. The catchment analysis is deemed suitable for provisional modelling only, as it is subject to layout and usage change as the design develops.

5.6.5 The (provisional) proposed surface water network is based on a worst-case scenario whereby cover levels have been assumed to be set at existing

levels confirmed by the topographical survey. If levels on the Main Development Area are proposed to be raised for flood protection purposes, the proposed Outline Surface Water Drainage Strategy and hydraulic modelling would need to be revisited. Any proposed land raising would offer an opportunity to increase cover depths and/or steepen pipe gradients, which may help to limit potential flooding at upstream ends of the network. However, the downstream lengths of pipework near the outfall would still be constrained by existing levels.

5.6.6 The provisional model is also based on a worst-case scenario with regard to potential surface water runoff volume in that surface water runoff from the entire Main Development Area catchment is assumed to be captured by the new network. In reality, some areas of the Main Development Area may require additional pollution prevention measures to mitigate the higher risk of contamination, and therefore may be drained by other means e.g. tankered off site or directed to the on-site treatment facility.

5.6.7 The provisional layout and model are based on providing flood protection to the Main Development Area up to and including the 1 in 30 year AEP event, during free draining scenarios. This aligns with the standard design requirement for sewers being offered for adoption and is considered appropriate for the Proposed Development.

5.6.8 Whilst 20% is the current design allowance for climate change, a range of climate change factors have been tested in the provisional modelling. A matrix is included on the Outline Surface Water Drainage Strategy General Arrangement drawing in **Annex G** of this report to summarise the provisional modelling results for various return periods and climate change allowances.

5.6.9 The drawing matrix demonstrates that whilst a tank size of 2,000m^3 may ensure no flooding during the 1 in 30 year AEP free draining event, with 20% allowance for increases in rainfall intensity due to climate change, a larger attenuation volume may be required to accommodate higher climate change allowances and tide locking scenarios. Future design work to inform the Surface Water Drainage Strategy to be prepared pursuant to requirement 6 of the **Draft DCO** (**EN010166/APP/3.1)**, would include the following:

- Application of the Simple Index Approach set out in The SuDS Manual (Ref 2), to confirm types and locations of SuDS features and to ensure sufficient treatment of surface water runoff from the Main Development Area.
- Detailed hydraulic modelling using latest Flood Estimation Handbook (FEH) rainfall data.
- Assessment of observed tidal data.
- Consultation with NRW to confirm which return periods would be subject to the tide lock analysis.
- Review of current climate change guidance and project programmes to ensure appropriate climate change allowances are applied to the detailed design and appropriate sensitivity testing is undertaken.
- Review of soakaway test results to inform SuDS design.

- Rationalisation of the surface water drainage network and tank size, considering that some runoff may be infiltrated to ground and/or attenuated by SuDS features across the Main Development Area, and/or directed elsewhere.

Table 2 of this report shows the approximate discharge rates and velocities anticipated from the new surface water network for the free draining scenarios, based on a 40% climate change allowance (which is the most conservative allowance based on current guidance). Whilst flow rates are high, the velocities are not considered high enough to cause scour erosion around the outfall to Old Rockcliffe Brook.

Table 2: Approximate discharge rates and velocities from new surface water network for free draining scenarios

Return Period	Discharge Rate (l/s)	Velocity (m/s)
1 in 1	420 l/s	0.9
1 in 30 + 40% Climate Change	875 l/s	1.1
1 in 100 + 40% Climate Change	1,047 l/s	1.2

5.7 SuDS Selection

5.7.1 Initial interception and attenuation would be provided by SuDS measures. Positions and extents of SuDS features shown on the Outline Surface Water Drainage Strategy General Arrangement drawing included as **Annex G** of this report are indicative and subject to change as detailed design is progressed post-consent. The SuDS approach would be confirmed and explained in the future Surface Water Drainage Strategy which would be prepared pursuant to requirement 6 of the **Draft DCO** (**EN010166/APP/3.1**). Pervious paving across the parking areas could be included, to allow for intercepting and treating runoff from adjacent areas. Filter drains or swales could provide initial treatment of road and/or building drainage. The drainage network could include oil interceptors and/or downstream defenders within each catchment to remove oils, suspended solids and sediment bound hydrocarbons, as necessary based on the development layout.

5.7.2 At detailed design stage, the reuse of attenuated surface water volumes in site related processes shall also be considered.

5.8 Outline Surface Water Drainage Strategy

5.8.1 The Main Development Area comprises both field and industrial areas. The Main Development Area has been assessed to determine the proposed flow rates and velocities which would discharge to the open watercourse length of Old Rockcliffe Brook which crosses the adjacent marshland (and ultimately discharges to the Dee Estuary). A new outfall would be formed directly to the Old Rockcliffe Brook alongside the surface water outfall currently serving the existing Connah's Quay Power Station and the Old Rockcliffe Brook culvert outfall, on the southeastern extent of the Main Development Area. Unrestricted flow rates to the Old Rockcliffe Brook have been permitted by the SAB.

5.8.2 The following percentage impermeability factors have been applied in assessing the runoff values for proposed contributing areas:

- 100% typically for buildings and structures;
- 100% typically for roads;
- 50% for external areas; and
- 90% for areas of the existing Connah's Quay Power Station which are proposed to be redeveloped.

5.8.3 Surface water runoff from the Main Development Area would be collected through a series of SuDS features (e.g. localised filter drains, swales, tree pits and/or permeable pavements) which would provide initial interception and treatment of runoff. The provisional attenuation strategy is to use grassed swale features and an attenuation tank (or tanks). These would contain the majority of surface water volumes from design storms during tidal lock conditions, with more extreme events being permitted to overtop and floodwater routed away from infrastructure.

5.8.4 The Oakenholt Brook culvert would need to be diverted if development around it cannot be avoided. During the SAB meeting in April 2025, it was noted that the LLFA would be unlikely to approve a build over proposal and a diversion proposal would be more sensible. An asset levels and condition (i.e. CCTV) survey of the culvert would be undertaken and the results would be set out in the Surface Water Drainage Strategy which would be prepared pursuant to requirement 6 of the **Draft DCO** (**EN010166/APP/3.1**). If the Oakenholt Brook culvert is proposed to be diverted, a simple catchment assessment would be undertaken to demonstrate no adverse impact. The SAB also noted that the LLFA & NRW would support daylighting (i.e. de-culverting) the Oakenholt Brook culvert along any diversion route if possible. The topographical survey indicates that the culvert is very deep (over 5m), meaning an open watercourse would need to be of significant width, and thus is unlikely to be achievable within the Main Development Area. Any proposed diversion of the Oakenholt Brook culvert would therefore be a piped diversion.

5.8.5 Some of the existing surface water drainage network (which discharges to the existing surface water network outfall, referred to as W2) would be affected by the proposed works. The extent of existing drainage to become defunct, remediated or capped shall be determined at detailed design stage.

5.8.6 A surface water drainage scheme has been developed in accordance with these principles and is shown on the Outline Surface Water Drainage Strategy General Arrangement drawing ref. CQLCP-ACM-XX-XX-DR-D-10-0501 included in **Annex G** of this report.

5.9 Adoption and Maintenance

5.9.1 The surface water drainage system is likely to remain a standalone private network, whereby none of the piped or SuDS features would be offered (to the sewerage undertaker or the SAB) for adoption. The operation and maintenance would be the responsibility of the site owner.

5.9.2 As the riparian owner of the two culverted watercourses which cross the Main Development Area, the landowner would remain responsible for maintaining them by clearing blockages which may impede the flow of water or cause flooding.

5.9.3 Maintenance of the drainage system and its components shall be undertaken in accordance with the maintenance management plan and appropriate schedules. These details are to be included in the Surface Water Drainage Strategy to be prepared pursuant to requirement 6 of the **Draft DCO** (**EN010166/APP/3.1**). This information would be made available in the CDM Health & Safety file.

5.9.4 Typical maintenance tasks associated with SuDS features are indicated in **Plate 8** of this report.

Plate 8: Typical SuDS components operation and maintenance activities (Ref 2)

Operation and maintenance activity	SuDS component												
	Pond	Wetland	Detention basin	Infiltration basin	Soakaway	Infiltration trench	Filter drain	Modular storage	Pervious pavement	Swale/bioretention/ trees	Filter strip	Green roofs	Proprietary treatment systems
Regular maintenance													
Inspection	■	■	■	■	■	■	■	■	■	■	■	■	■
Litter and debris removal	■	■	■	■	□	■	■	□	■	■	■		□
Grass cutting	■	■	■	■	□	■	■	□	□	■	■		
Weed and invasive plant control	□	□	□	□		□	□		□		□	■	
Shrub management (including pruning)	□	□	□	□					□	□	□		
Shoreline vegetation management	■	■	□										
Aquatic vegetation management	■	■	□										
Occasional maintenance													
Sediment management[1]	■	■	■	■	■	■	■	■	■	■	■		■
Vegetation replacement	□	□	□	□						□	□	■	
Vacuum sweeping and brushing									■				
Remedial maintenance													
Structure rehabilitation /repair	□	□	□	□	□	□	□	□	□	□	□	□	
Infiltration surface reconditioning				□	□	□	□		□	□	□		

Key

■ will be required

□ may be required

Notes

1 Sediment should be collected and managed in pre-treatment systems, upstream of the main device.

6. Conclusions

6.1.1 This report sets out the Outline Surface Water Drainage Strategy proposed for the Main Development Area of the Proposed Development during operation.

6.1.2 Details of the existing surface water drainage network and watercourses have been obtained. The two following ordinary watercourses are culverted across the Main Development Area:

- Old Rockfliffe Brook is culverted across the existing Connah's Quay Power Station, up to the existing headwall structure located at the south-east end of the Main Development Area. From here it returns to an open channel, prior to discharging across the Connah's Quay Nature Reserve and into the Dee Estuary. The pipe size at the culvert outlet (i.e. at the headwall) is nominally 900mm diameter.
- Oakenholt Brook is culverted across the fields on the north-western end of the Main Development Area and underneath the existing access road. It returns to an open channel on the north-east side of the access road (via a headwall beyond the Order limits), prior to discharging across the Connah's Quay Nature Reserve and into the Dee Estuary.

6.1.3 The Main Development Area is characterised by flat, low-lying coastal topography. The topographical survey (**Annex B** of this report) indicates that runoff from the undeveloped (field) areas flows towards low points in central and southern areas of the fields, and towards vegetation along field boundaries. Where runoff is directed towards low spots, it is assumed to infiltrate to ground.

6.1.4 On the existing Connah's Quay Power Station area, surface water runoff is captured and conveyed by a gravity system which has an unrestricted discharge to Old Rockcliffe Brook. The pipe size at the existing outfall headwall is nominally 1200mm diameter. A utilities survey has been undertaken to identify the existing drainage network which is shown on the following drawings included as **Annex D** of this report:

- CONQ-ACM-XX-XX-DR-CE-000100 Existing Drainage Layout sheet 1 of 2; and
- CONQ-ACM-XX-XX-DR-CE-000101 Existing Drainage Layout sheet 2 of 2.

6.1.5 The Outline Surface Water Drainage Strategy for the Main Development Area has been developed with reference to applicable legislation, regulations, guidance and good industry practice.

6.1.6 Runoff from the Main Development Area is proposed to be discharged to Old Rockcliffe Brook at the south-eastern extent of the Main Development Area. A new outfall would be formed directly to the watercourse alongside the surface water outfall currently serving the existing Connah's Quay Power Station and the Old Rockcliffe Brook culvert outfall. Unrestricted flow rates to the watercourse have been permitted by the SAB.

6.1.7 An Outline Surface Water Drainage Strategy General Arrangement has been developed in accordance with the principles set out in this report and is shown on drawing ref. CQLCP-ACM-XX-XX-DR-D-10-0501 included as **Annex G** of this report.

6.1.8 Like the existing surface water system for the power station, the proposed surface water network would need to protect the Main Development Area during tide lock scenarios, given its outfall would be submerged during high tides. An analysis of the tide lock scenario has been undertaken based on flood modelling completed for the 1 in 200-year AEP with allowance for tidal climate change up to the year 2074. (The flood modelling has been completed to inform the Flood Consequences Assessment **Appendix 13-C: FCA** (**EN010166/APP/6.4**).)

6.1.9 To assess the performance of the proposed surface water network, provisional hydraulic modelling has been undertaken using FSR rainfall data, including for appropriate climate change allowances and tide lock analysis. A range of climate change allowances have been applied to the hydraulic calculations (20%, 30% and 40%) in accordance with the Welsh climate change allowances guidance "Flood Consequence Assessments", dated September 2011. The drawing included as **Annex G** of this report includes a matrix which demonstrates that a tank size of 2,000m^3 may ensure no flooding during the 1 in 30 year AEP free draining event, with a 20% allowance for increases in rainfall intensity due to climate change, but a larger attenuation volume may be required to accommodate higher climate change allowances and tide locking scenarios. At detailed design stage (post-DCO consent), detailed hydraulic modelling would be undertaken using the latest FEH rainfall data, and climate change guidance and project programmes would be reviewed to ensure appropriate climate change allowances are applied and appropriate sensitivity testing is undertaken. Observed tidal data would be reviewed and assessed to understand actual tide levels and durations, and consultations would be undertaken with NRW to confirm which return periods would be subject to the tide lock analysis.

6.1.10 Surface water runoff from the Main Development Area would be collected through a series of SuDS features (e.g. localised filter drains, swales, tree pits and/or pervious pavements) which would provide initial interception, potential infiltration, and treatment of runoff. The provisional attenuation strategy is to use grassed swale features and an attenuation tank (or tanks), and the provisional hydraulic modelling did not allow for any infiltration to ground. SuDS features and a tank (or tanks) would contain the majority of design storms during tidal lock conditions, with more extreme events being permitted to overtop and floodwater routed away from infrastructure. Types, positions and extents of SuDS features shown on the drawing in **Annex G** of this report are indicative and subject to change as detailed design is progressed post-DCO consent. The final SuDS strategy would be based on the Simple Index Approach set out in The SuDS Manual (Ref 2) to ensure sufficient treatment of surface water runoff from the Main Development Area. Soakaway testing would be undertaken as part of future ground investigation works, and the results would be reviewed to inform the SuDS design. The SuDS strategy would be confirmed and explained in the future Surface Water Drainage Strategy which would be prepared pursuant to requirement 6 of the **Draft DCO** (**EN010166/APP/3.1**).

6.1.11 The firewater strategy for the Main Development Area has not yet been developed and the areas of potential surface water contamination (e.g. impermeable areas surrounding a chemical storage tank) have not been finalised. Some of these areas may not be discharged to the new surface water network, and may instead be directed to a new on-site water treatment facility or the existing purge pond, subject to testing.

6.1.12 If firewater runoff and/or runoff from potentially contaminated areas is to be directed to the new surface water network, isolation techniques (which may include bunding and penstocks) would be required to contain potentially contaminated runoff and prevent it from entering the surface water network prior to testing. Uncontaminated runoff would be released by opening the penstocks (to allow runoff to enter the drainage network), and contaminated runoff would be removed for treatment elsewhere. The surface water drainage strategy for firewater and potential contamination areas would be developed in consultation with NRW and FCC post-DCO consent and would be detailed in the Surface Water Drainage Strategy to be prepared pursuant to requirement 6 of the **Draft DCO** (**EN010166/APP/3.1**).

6.1.13 The Oakenholt Brook culvert would need to be diverted if development around it cannot be avoided. During a SAB meeting in April 2025, it was noted that the LLFA would be unlikely to approve a build over proposal and a diversion proposal would be more sensible. An asset levels and condition (i.e. CCTV) survey of the culvert would be undertaken and the results would be set out in the Surface Water Drainage Strategy prepared pursuant to requirement 6 of the **Draft DCO** (**EN010166/APP/3.1**). If the Oakenholt Brook culvert is proposed to be diverted, a simple catchment assessment would be undertaken to demonstrate no adverse impact. The SAB also noted that the LLFA & NRW would support daylighting (i.e. de-culverting) the Oakenholt Brook culvert along any diversion route if possible. The topographical survey indicates that the culvert is very deep (over 5m), meaning an open watercourse would need to be of significant width, and thus is unlikely to be achievable within the Main Development Area. Any proposed diversion of the Oakenholt Brook culvert would therefore be a piped diversion.

6.1.14 The surface water drainage system is likely to remain a standalone private network, whereby the operation and maintenance would be the responsibility of the site owner.

References

Ref 1. Department for Energy Security & Net Zero (2023). Overarching National Policy Statement for energy (EN-1). Available at: https://www.gov.uk/government/publications/overarching-national-policy-statement-for-energy-en-1 (accessed 01/08/2025)

Ref 2. CIRIA (2015). The SuDS Manual (C753).

Ref 3. CIRIA (2017). Guidance on the construction of SuDS (C768)

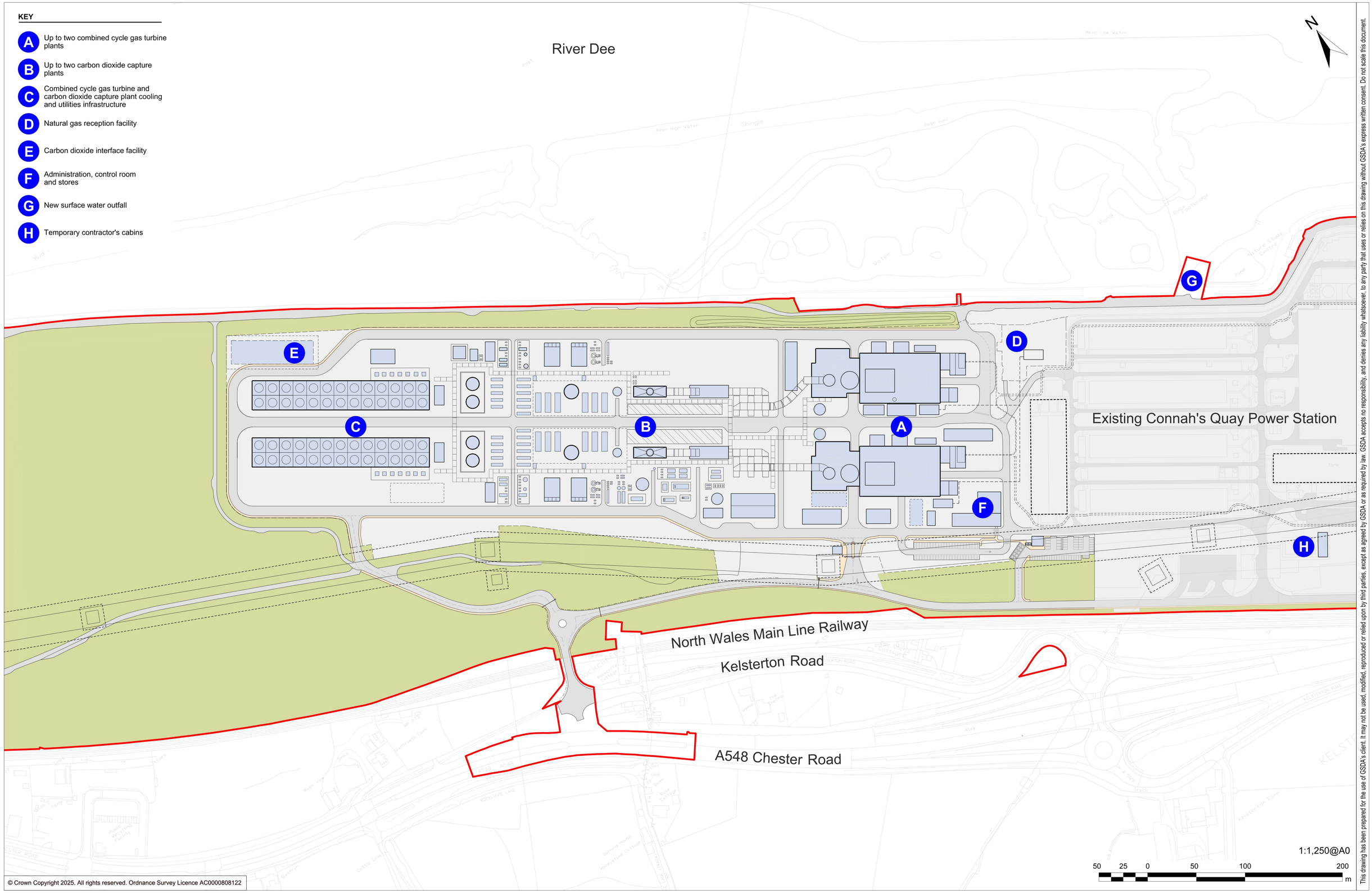
Ref 4. B. M. Alvem and B. Embrén (2014). Trees and Stormwater Management – The Stockholm solution.

Annex A: Proposed Site Layout

Revision: P00 Drawn: CRB Approved: GS Date 2025-06-27

KEY

- **A** Up to two combined cycle gas turbine plants
- **B** Up to two carbon dioxide capture plants
- **C** Combined cycle gas turbine and carbon dioxide capture plant cooling and utilities infrastructure
- **D** Natural gas reception facility
- **E** Carbon dioxide interface facility
- **F** Administration, control room and stores
- **G** New surface water outfall
- **H** Temporary contractor's cabins



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GENERAL NOTES

1. ALL DIMENSIONS IN METRES UNLESS STATED OTHERWISE.
2. DO NOT SCALE FROM THIS DRAWING USE ONLY PRINTED DIMENSIONS.
3. THE PROPOSED WORKS SHOWN ARE INDICATIVE ONLY AND WILL BE SUBJECT TO CHANGE AS PART OF DETAILED DESIGN DEVELOPMENT. ANY CHANGES WILL BE LIMITED TO BEING WITHIN THE ORDER LIMITS AND ANY OTHER CONSTRAINTS INCLUDED IN THE DEVELOPMENT CONSENT ORDER.
4. THESE PLANS SHOULD BE READ IN CONJUNCTION WITH SCHEDULES 4 TO 7 (INCLUSIVE) OF THE DEVELOPMENT CONSENT ORDER.

LEGEND

- Order Limits
- For details of retained and proposed landscape, refer to indicative landscape and biodiversity plan : EN010166/APP/2.15.

ISSUE/REVISION

I/R	DATE	DESCRIPTION
00	27/06/2025	FIRST ISSUE

PROJECT NUMBER
60717119

ISSUE PURPOSE
DCO Application

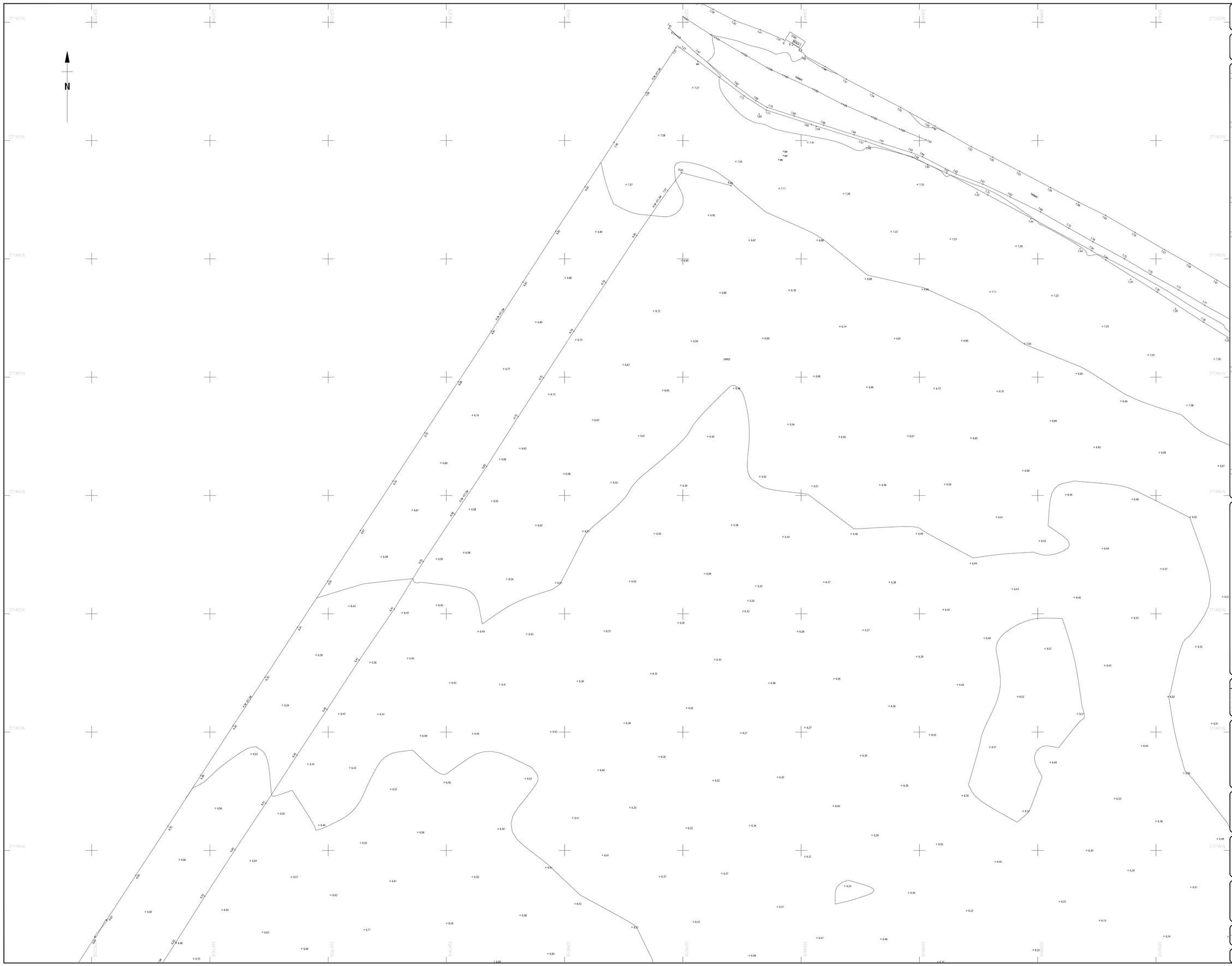
DATE
July 2025

SHEET TITLE
Indicative / Not for Approval (Drawing 1 of 1)
Site Layout - Main Development Area

LEGISLATION REFERENCE
APFP Regulations 5(2)(q)

DOCUMENT REFERENCE NUMBER
EN010166/APP/7.8

Annex B: Topographical Survey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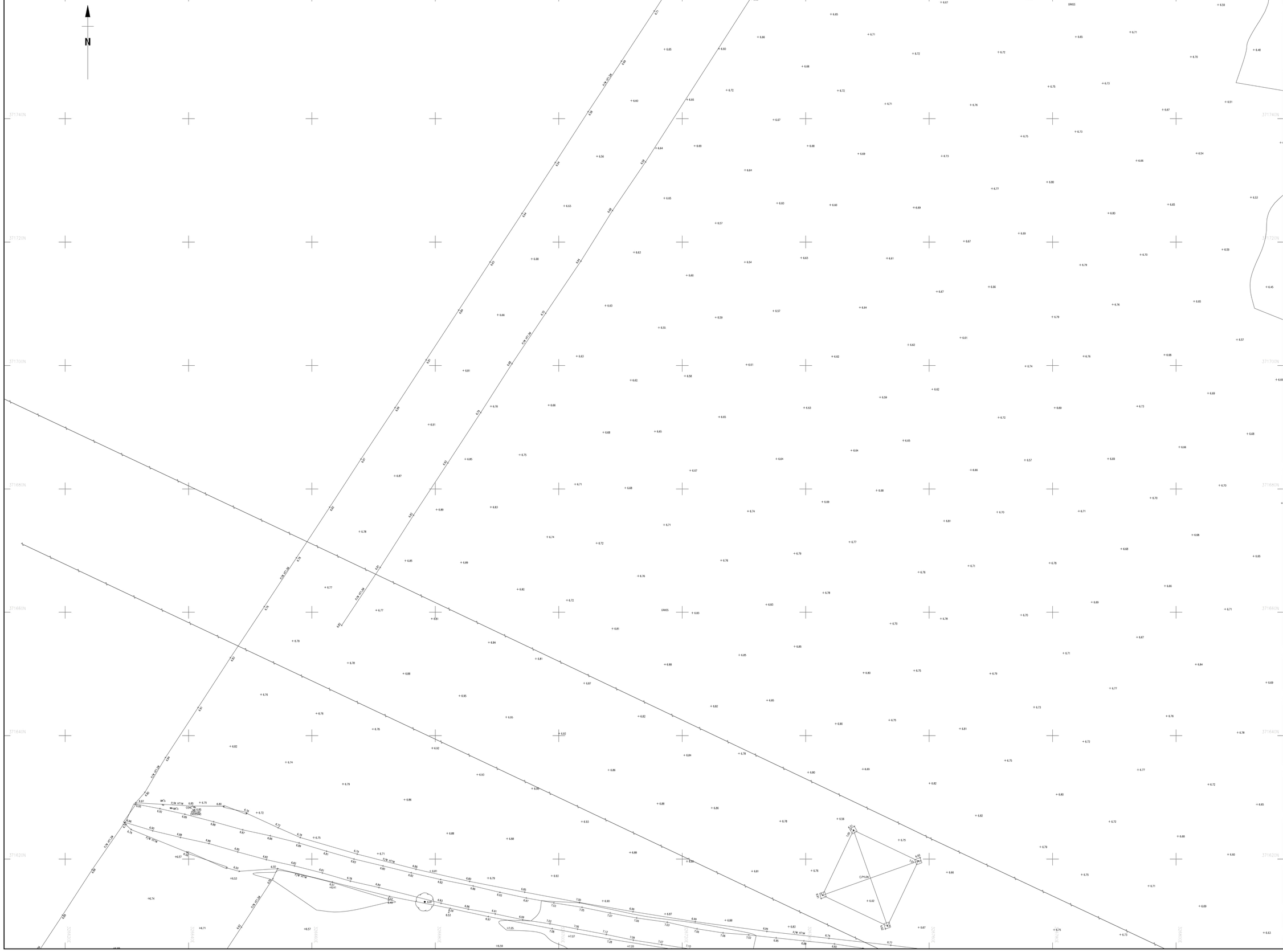


Survey Notes

Grid: National Grid, converted using OSTN15

Levels: Ordnance Datum converted using OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building
Building Open Sided
Ruin (RUIN)
Pineapple
Wall with Height (Wall Ht 1.5m)
Retaining Wall (R/W)

FENCE STYLES AND DESCRIPTIONS

Close Boarded C/B
Corrugated Iron C/I
Chestnut Paling C/P
Chainlink C/L
Handrail H/R
Interwoven WH
Iron Railings I/R
Lattice L/T
Miscellaneous Misc
Palisade PAL
Post & Chain P/C
Post & Rail P/R
Post & Wire P/W
Post & Barbed Wire B/W
Wire mesh W/M
Stile
Gate
Fence treestyle

ROADS

Kerbs
Edge of Surfacing
Pedestrian Crossing (PC)
Track
Footpath

STREET FURNITURE

Beltcha Beacon = BB
Bus Stop = BS
Bollard = B
Cats Eye = CE
Coal Chute = CC
Closed Circuit TV = CCTV
Drain = DR
Electricity Pole = EP
Flood Light = FL
Flag Staff = FS
Lamp Post = LP
Letter Box = LB
Name Plate (street) = NP
Mooring Ring = MR
Mile Post or Mooring Post = MP
Service Marker = MK
Mile Stone = MS
Post = P
Parking Meter = PM
Reflector Post = RP
Rodding Eye = RE
Road Sign = RS
Speed Camera Information Sign = S/CAM
Stay = SY
Traffic Light = TL
Telegraph Pole = TP
Traffic Light Push Button Post = TLP
Traffic Light Control Box = TLC/P
Control Box C/BOX
British Telecom Box BT BOX
Electricity Box EL BOX
Gas Box GAS BOX
Cycle Lane Bollard CLB

INSPECTION CHAMBERS AND PIPES

Inspection Cover IC
Inspection Cover (Elec) IC/EL
Manhole MH
British Telecom Cover BT
Inspection Cover (Comms) IC/COM
Cable TV CATV
Inspection Cover Traffic Signals IC/TL
Grid
Kerb Outlet KO
Vent Pipe = VP
Down Pipe = DP
Rain Water Pipe = RWP
Soil Pipe = SVP
Gas Pipe = G-PIPE
Unable to lift cover UTL
Stop Tap = ST
Stop Valve = SV
Lamphole = LH
Hydrant = HYD
Earth Rod = ER
Gas Valve = GV
Water Meter = WM
Washout = WO
Rodding Eye = RE

GEOTECHNICAL INFORMATION

Borehole BH
Trial Pit TP
Monitor Pin = MON
Probe Hole = PH
Window Sample = WS

GENERAL INFORMATION

Petrol Pump PP
Basement Light BL
Floodbridge (FB)
Dish Type Channel
Slot Type Channel
Grate Type Channel
Tactile Paving TAC
Crash Barrier C/BR
Column COL
Stanchion STAN
Air Vacuum VAC
Offset Fill = OF
Air Valve = AV
Trough TR
Chimney CHY
Telephone Call Box TCB

OVERHEAD FEATURES

Electricity Pylon E.P.H.ON
Electricity
Telephone

WATER FEATURES

Canal
Stream
Ditch
Weir
Culvert
Drip (Land Drain)
Spring = SPR

RELIEF AND VEGETATION

Hedge
Edge of wood/Bushes
Stump = STUMP
Individual Tree
Slopes with Height Greater than 1m
Cliff Face
Marsh
Reeds

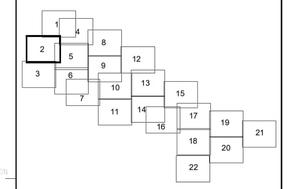
LEVEL AND HEIGHT INFORMATION

Standard Spot Height = 123.45
Predicted Spot Height = 123.456
Bed Level = BL23.52
Water Level = W.24.52
Soffit Level = SL25.52
Threshold Level = THR.98
Cover Level = CL26.45
Invert Level = I.25.15
Pipe Soffit Level = PSL5.00
Floor Level = FL8.00
Finished Floor Level = FFL6.00
Top of Tank Level = TT7.00
Cave Level = CL7.00
Ridge Level = RL8.00
Roof Hip Level = RHL8.50
Flat Roof Level = FRL7.00
Top of Canopy Level = TOP/C7.00
Underside of Canopy Level = SOF/CSL8.50
Window Sill Level = WSL8.00
Window Head Level = WHL8.00
Springing Level = SPL8.50
Arch Level = A.7.00
Cable Level = CHR.55
Top of Wall Level = TWL10.00
Underside of Beam Level = UBL8.55
General Height = HT8.00

SURVEY INFORMATION SIGNS

Permanent Ground Marker
O.S. Trig Station
O.S. Bench Mark

Sheet Index



Rev.	Date	Description

MALCOLM HUGHES
CHARTERED LAND SURVEYORS
Airlines House, Trident Business Park,
Daten Avenue, Risley, Warrington, WA3 6BX
Tel: 0161 980 1280
www.malcolmhughes.co.uk
survey@mhls.co.uk

Accreditations

RICS · The Survey Association · ICES · Constructionline · Safe Contractor

Client

Uniper Technologies Ltd
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project

Connah's Quay Power Station

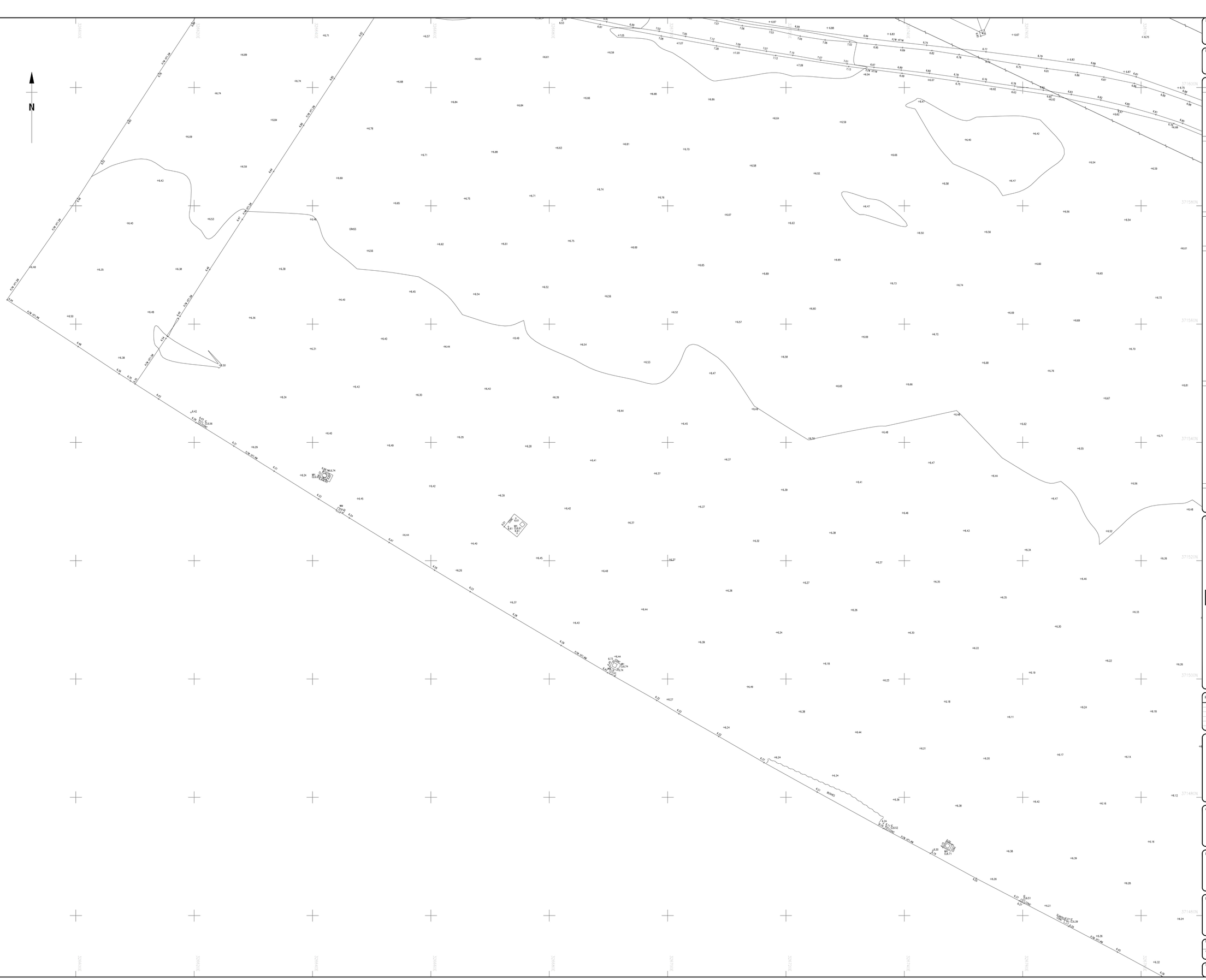
Drawing Title

Topographical Survey
Sheet 2 of 22

Drawn By	IC	23/12/24	Survey Date: November 2024
Checked by	ED/DJ	24/12/24	Scale: A0@1:200

Drawing No: 62330/2

Revision: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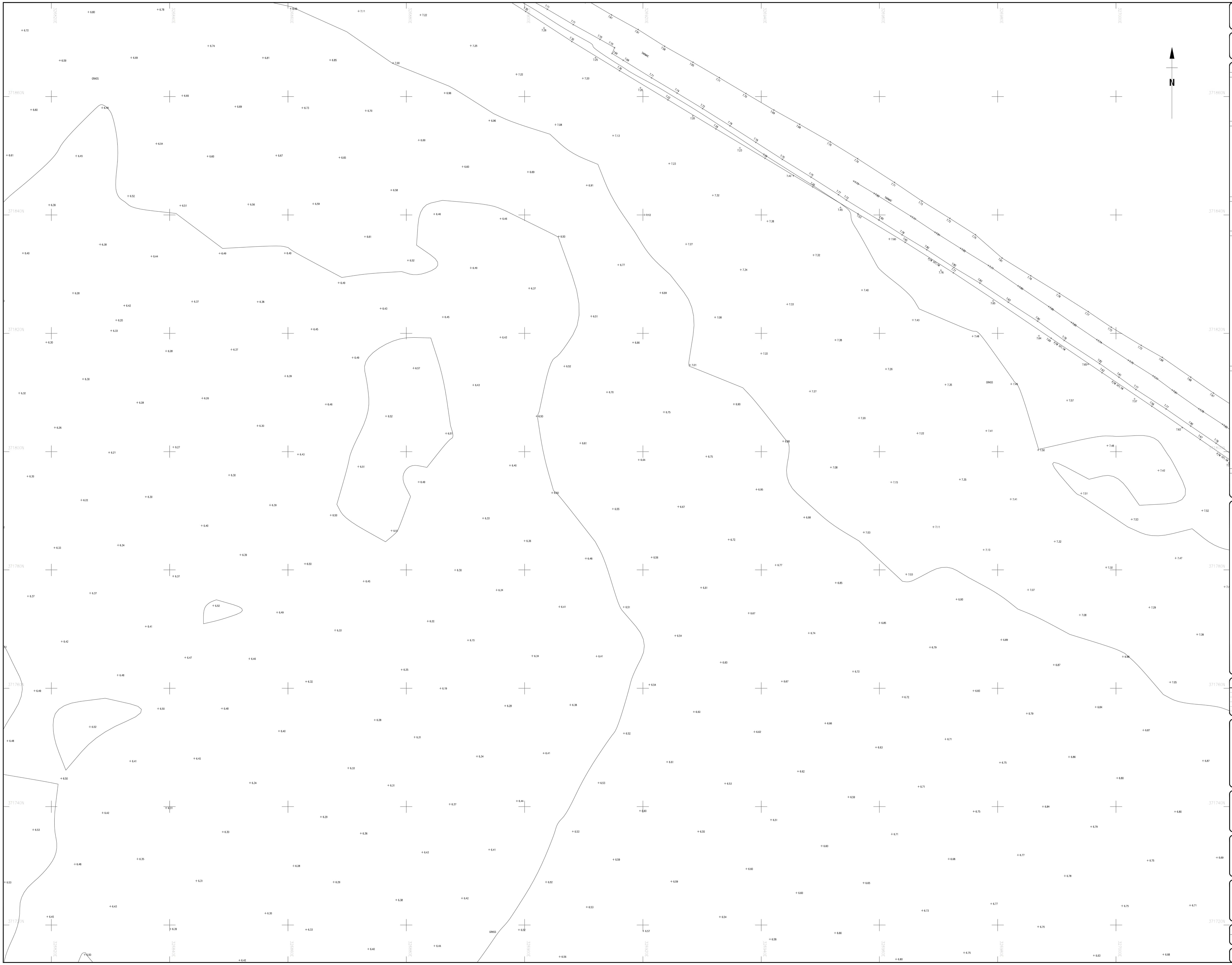
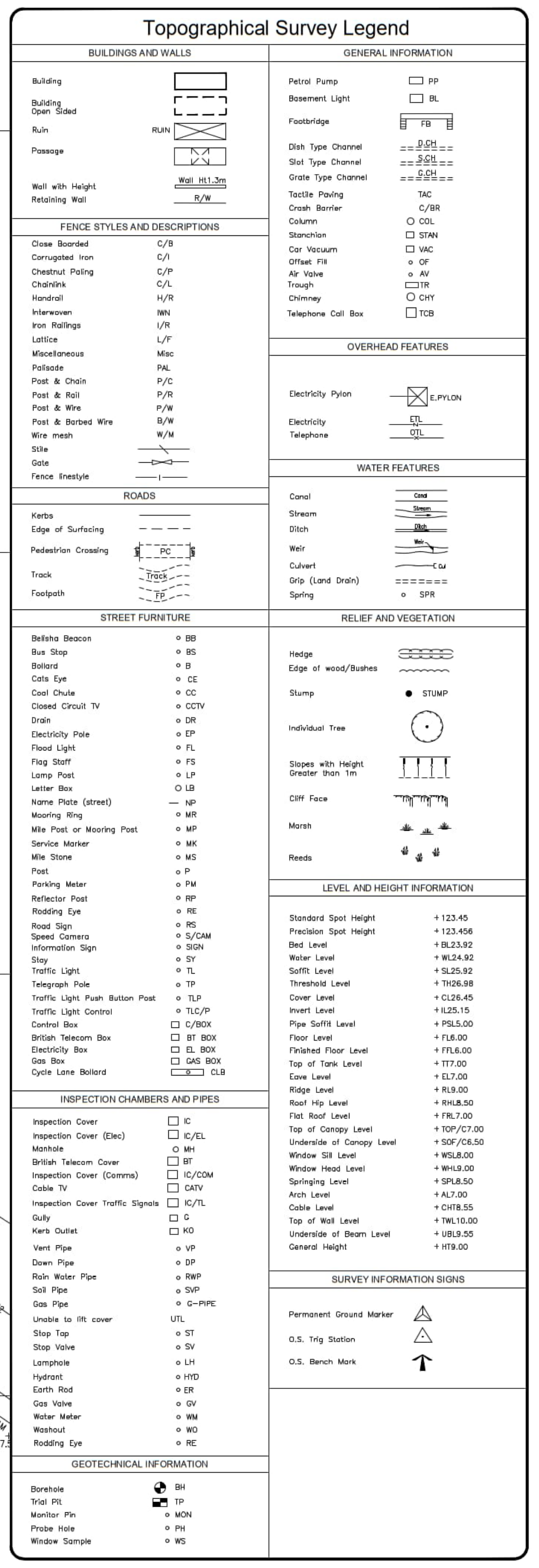


Survey Notes
Grid: National Grid, converted using OSTN15
Levels: Ordnance Datum converted using OSGM15

Notes



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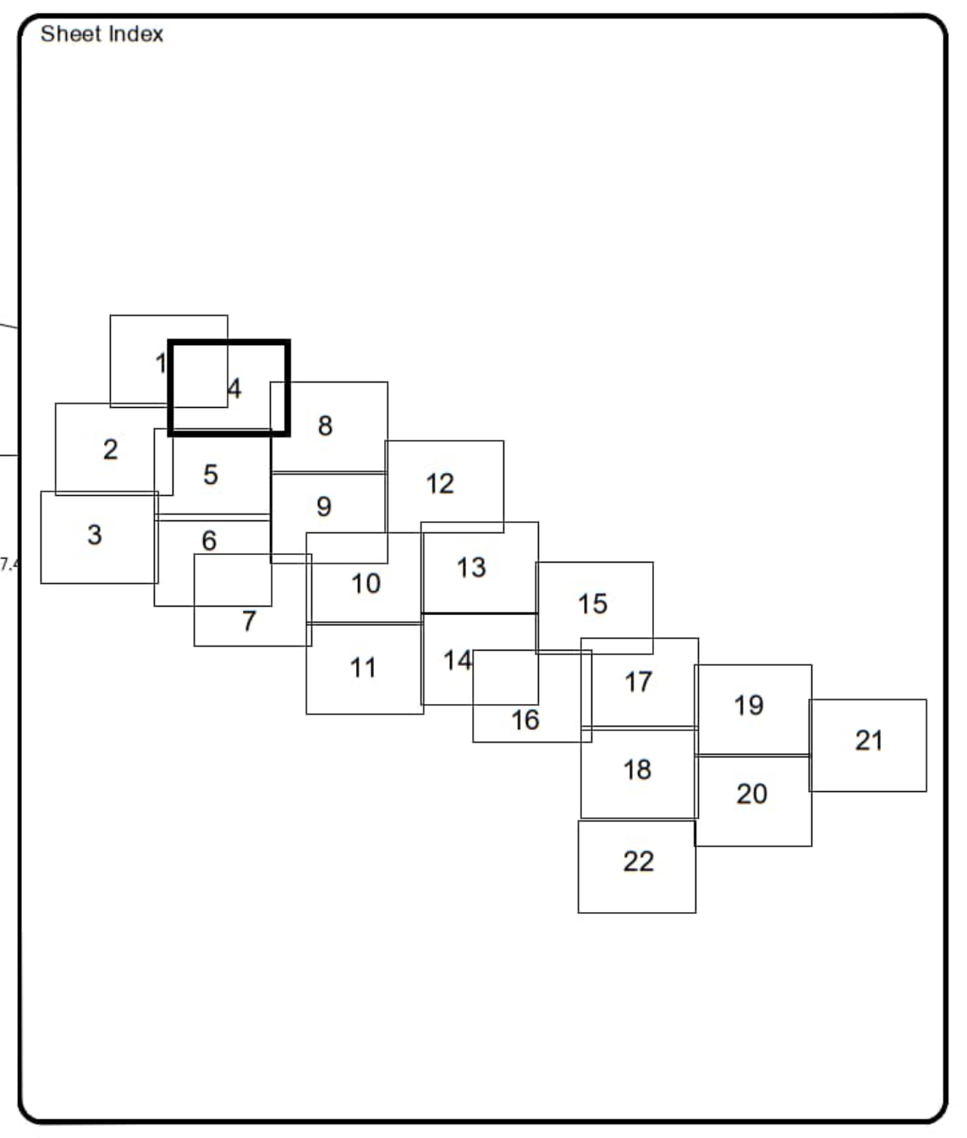


Rev.	Date	Description

MALCOLM HUGHES
CHARTERED LAND SURVEYORS
Aintree House, Trident Business Park
Daten Avenue, Risley, Warrington, WA3 6BX
Tel: 0161 905 1265
www.malcolmhughes.co.uk
survey@mhls.co.uk

Accreditations

Client
Uniper Technologies Ltd
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project
Connah's Quay Power Station

Drawing Title
Topographical Survey
Sheet 4 of 22

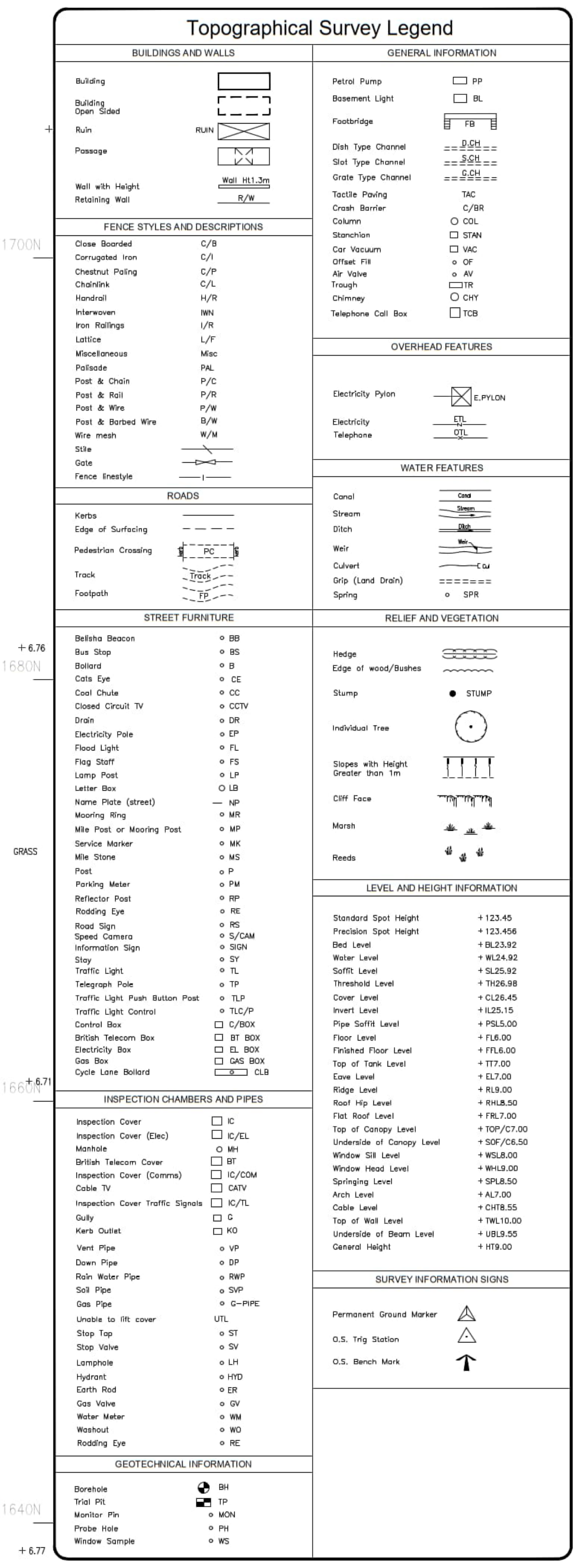
Drawn By	IC	23/12/24	Survey Date	November 2024
Checked by	ED/DJ	24/12/24	Scale	A0@1:200

Drawing No 62330/4
Revision

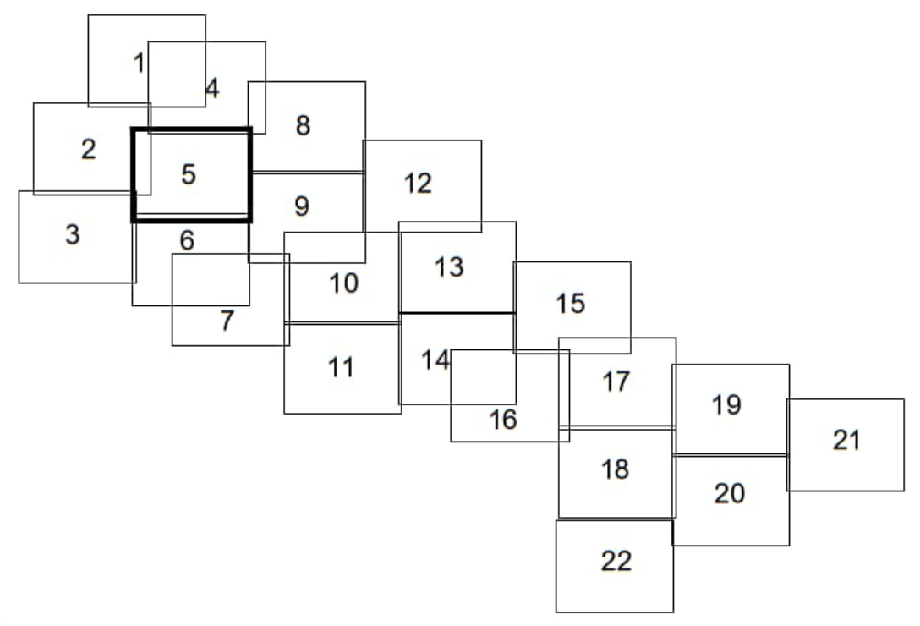
Survey Notes

Grid:	National Grid, converted using OSTN15
Levels:	Ordnance Datum converted using OSGM15

Notes



Sheet Index



Rev.	Date	Description

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Accreditations

FS 14126

Client

Uniper Technologies Ltd
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project

Connah's Quay Power Station

Drawing Title

Topographical Survey
Sheet 5 of 22

Drawn By	IC	23/12/24	Survey Date	November 2024
Checked by	ED/DJ	24/12/24	Scale	A0@1:200

Drawing No	Revision
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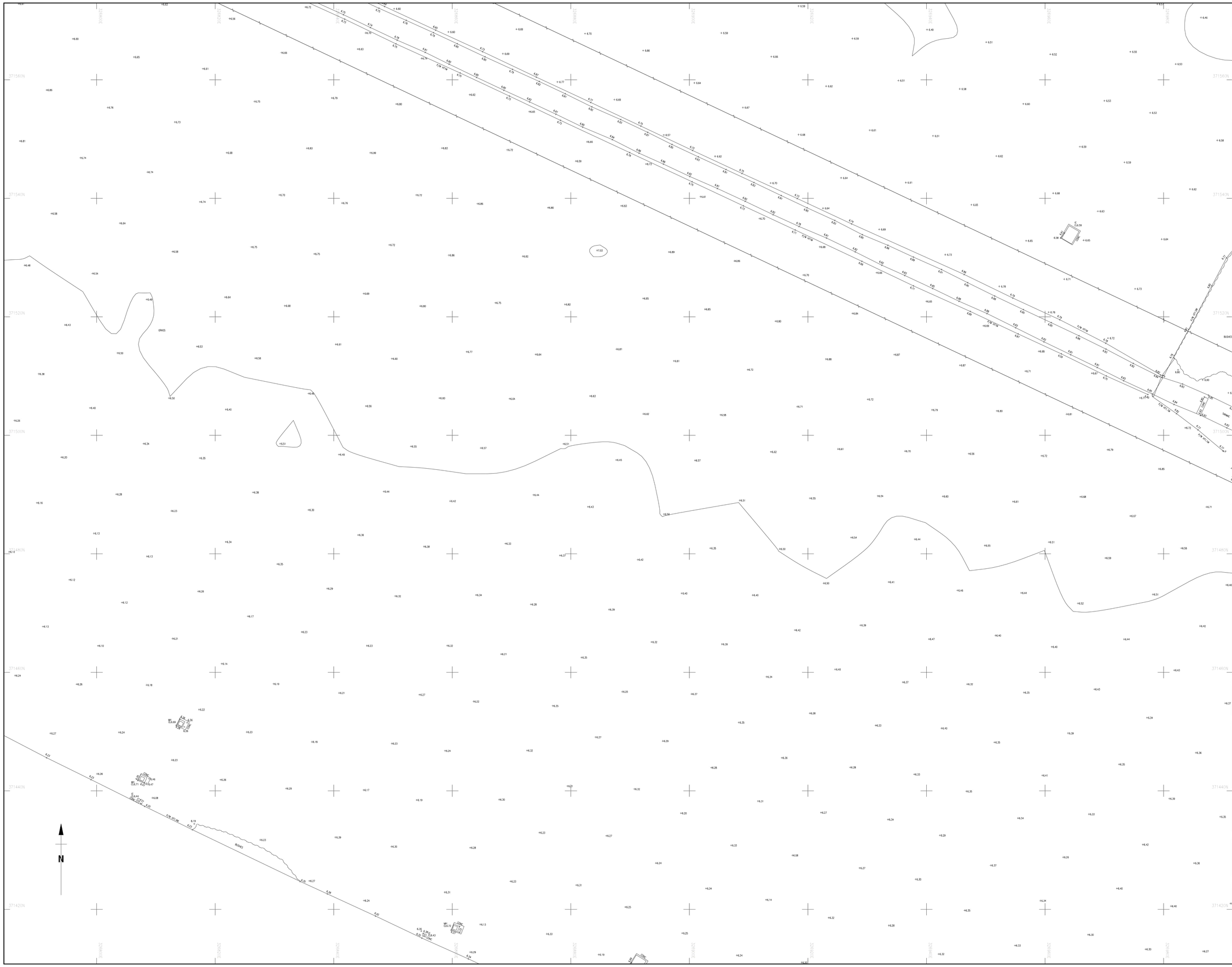
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Survey Notes

Grid: National Grid, converted using OSTN15

Levels: Ordnance Datum converted using OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building

Building Open Sided

Ruin — RUIN

Pressepa

Wall with Height — Wall Ht 1.5m

Retaining Wall — R/W

FENCE STYLES AND DESCRIPTIONS

Close Boarded	C/B
Corrugated Iron	C/I
Chestnut Paling	C/P
Chainlink	C/L
Handrail	H/R
Interwoven	IWH
Iron Railings	I/R
Lattice	L/T
Miscellaneous	Misc
Palisade	PAL
Post & Chain	P/C
Post & Rail	P/R
Post & Wire	P/W
Post & Barbed Wire	B/W
Wire mesh	W/M
Stile	
Gate	
Fence linestyle	

ROADS

Kerbs

Edge of Surfacing

Pedestrian Crossing — PC

Track

Footpath

STREET FURNITURE

Belisha Beacon	⊕ BB
Bus Stop	⊕ BS
Bollard	⊕ B
Cats Eye	⊕ CE
Coal Chute	⊕ CC
Closed Circuit TV	⊕ CCTV
Drain	⊕ DR
Electricity Pole	⊕ EP
Flood Light	⊕ FL
Flag Staff	⊕ FS
Lamp Post	⊕ LP
Letter Box	⊕ LB
Name Plate (street)	— NP
Mooring Ring	⊕ MR
Mile Post or Mooring Post	⊕ MP
Service Marker	⊕ MK
Mile Stone	⊕ MS
Post	⊕ P
Parking Meter	⊕ PM
Reflector Post	⊕ RP
Rodding Eye	⊕ RE
Road Sign	⊕ RS
Speed Camera	⊕ S/CAM
Information Sign	⊕ SGN
Stop	⊕ ST
Traffic Light	⊕ TL
Telegraph Pole	⊕ TP
Traffic Light Push Button Post	⊕ TLP
Traffic Light Control	⊕ TLC/P
Control Box	□ C/BOX
British Telecom Box	□ BT BOX
Electricity Box	□ EL BOX
Gas Box	□ GAS BOX
Cycle Lane Bollard	CLB

INSPECTION CHAMBERS AND PIPES

Inspection Cover	□ IC
Inspection Cover (Elec)	□ IC/EL
Manhole	○ MH
British Telecom Cover	□ BT
Inspection Cover (Comms)	□ IC/COM
Cable TV	□ CATV
Inspection Cover Traffic Signals	□ IC/TL
Grid	□
Kerb Outlet	□ KO
Vent Pipe	⊕ VP
Down Pipe	⊕ DP
Rain Water Pipe	⊕ RWP
Soil Pipe	⊕ SVP
Gas Pipe	⊕ G-PIPE
Unable to lift cover	UTL
Stop Tap	⊕ ST
Stop Valve	⊕ SV
Lamphole	⊕ LH
Hydrant	⊕ HYD
Earth Rod	⊕ ER
Gas Valve	⊕ GV
Water Meter	⊕ WM
Washout	⊕ WO
Rodding Eye	⊕ RE

GEOTECHNICAL INFORMATION

Borehole	BH
Trial Pit	TP
Monitor Pin	⊕ MON
Probe Hole	⊕ PH
Window Sample	⊕ WS

GENERAL INFORMATION

Petrol Pump	PP
Basement Light	BL
Floodlamp	FL
Dish Type Channel	
Slot Type Channel	
Grate Type Channel	
Tactile Paving	TAC
Crash Barrier	C/BR
Column	COL
Stanchion	STAN
Car Vacuum	VAC
Offset Fill	⊕ OF
Air Valve	⊕ AV
Trough	TR
Chimney	CHY
Telephone Call Box	TCB

OVERHEAD FEATURES

Electricity Pylon — E.P.Y.ON

Electricity — EL

Telephone — TEL

WATER FEATURES

Canal

Stream

Ditch

Weir

Culvert

Drip (Land Drain)

Spring — ⊕ SPR

RELIEF AND VEGETATION

Hedge

Edge of wood/Bushes

Stump — STUMP

Individual Tree

Slopes with Height Greater than 1m

Cliff Face

Marsh

Reeds

LEVEL AND HEIGHT INFORMATION

Standard Spot Height	+ 123.45
Predicted Spot Height	+ 123.456
Bed Level	+ BL53.92
Water Level	+ W.L4.52
Soffit Level	+ SL25.92
Threshold Level	+ THR6.88
Cover Level	+ CL26.45
Invert Level	+ I.L25.15
Pipe Soffit Level	+ PSL5.00
Floor Level	+ FL8.00
Finished Floor Level	+ FFL6.90
Top of Tank Level	+ TT7.00
Eave Level	+ EL7.00
Ridge Level	+ RIL8.00
Roof Hip Level	+ RHL8.90
Flat Roof Level	+ FRL7.00
Top of Canopy Level	+ TOP/CT.00
Underside of Canopy Level	+ SOF/CSL8.00
Window Sill Level	+ WSL8.00
Window Head Level	+ WHL8.00
Springing Level	+ SPL8.50
Arch Level	+ ALT.00
Cable Level	+ CHT8.55
Top of Wall Level	+ TWL10.00
Underside of Beam Level	+ UBL8.55
General Height	+ HT8.00

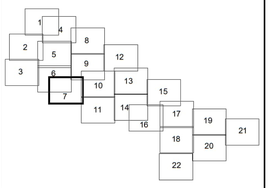
SURVEY INFORMATION SIGNS

Permanent Ground Marker

O.S. Trig Station

O.S. Bench Mark

Sheet Index



Rev.	Date	Description

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Accreditations

Client

Uniper Technologies Ltd
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project

Connah's Quay Power Station

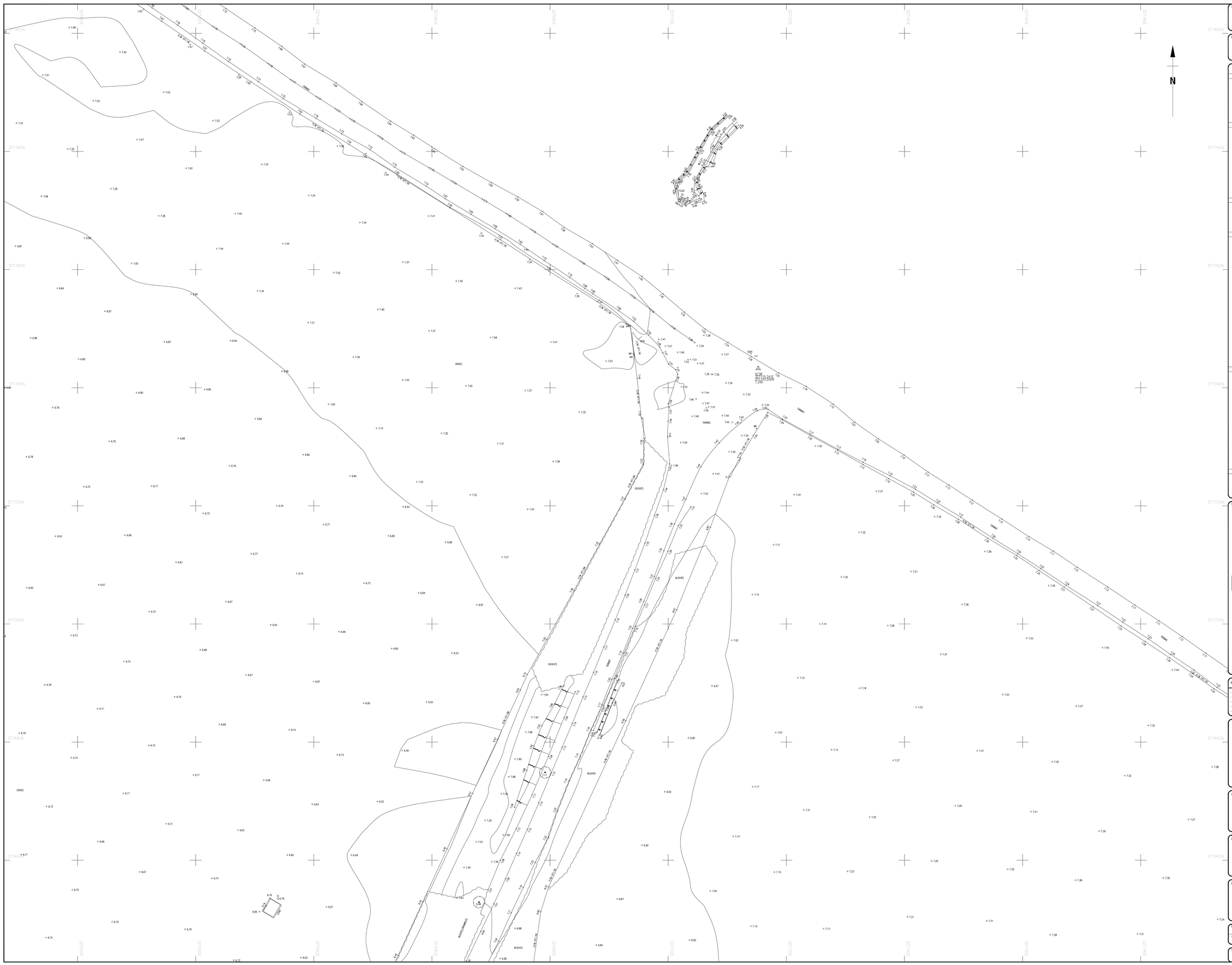
Drawing Title

Topographical Survey
Sheet 7 of 22

Drawn By	IC	23/12/24	Survey Date: November 2024
Checked by	ED/DJ	24/12/24	Scale: A0@1:200

Drawing No: 62330/7

Revision: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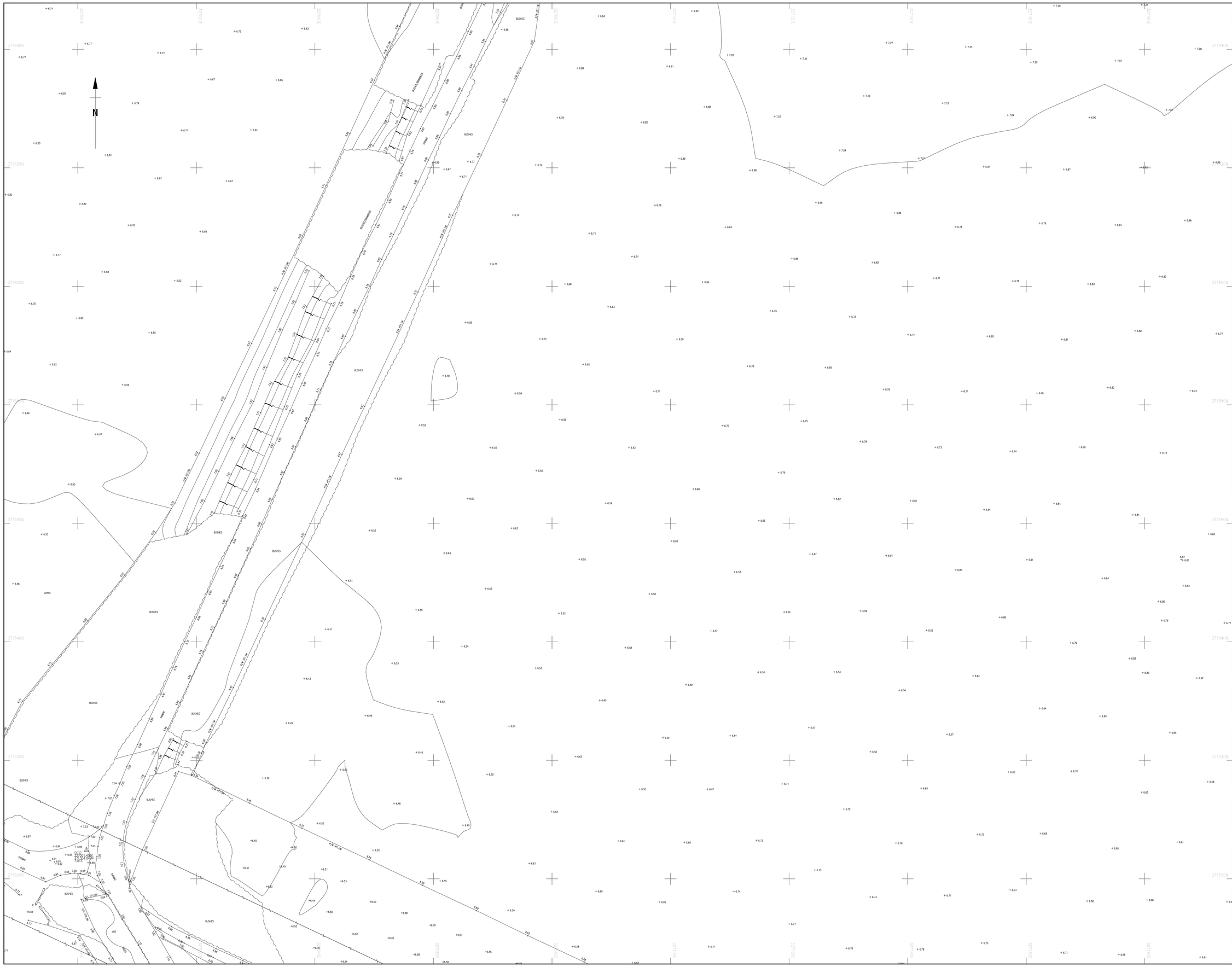
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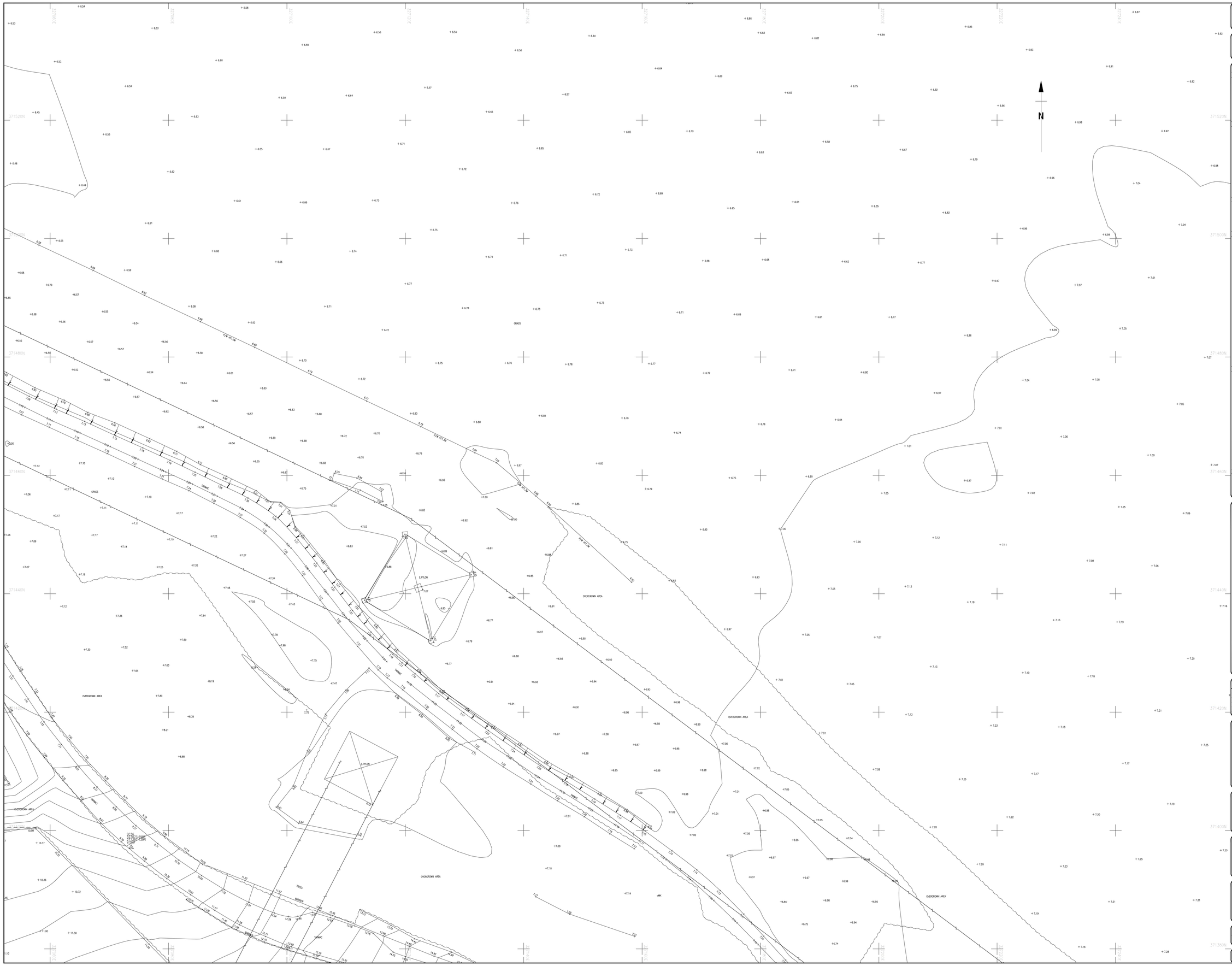


Survey Notes

Grid: National Grid, converted using OSTN15

Levels: Ordnance Datum converted using OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building

Building Open Sided

Ruin — RUIN

Pressaps

Wall with Height — Wall Ht 1.5m

Retaining Wall — R/W

FENCE STYLES AND DESCRIPTIONS

Close Boarded — C/B
Corrugated Iron — C/I
Chestnut Paling — C/P
Chainlink — C/L
Handrail — H/R
Intersecion — MH
Iron Railings — I/R
Lattice — L/T
Miscellaneous — Misc
Palisade — PAL
Post & Chain — P/C
Post & Rail — P/R
Post & Wire — P/W
Post & Barbed Wire — B/W
Wire mesh — W/M
Stile
Gate
Fence linestyle

ROADS

Kerbs
Edge of Surfacing
Pedestrian Crossing — PC
Track
Footpath — FP

STREET FURNITURE

Bellsha Beacon — BB
Bus Stop — BS
Bollard — B
Cats Eye — CE
Coal Chute — CC
Closed Circuit TV — CCTV
Drain — DR
Electricity Pole — EP
Flood Light — FL
Flag Staff — FS
Lamp Post — LP
Letter Box — LB
Name Plate (street) — NP
Mooring Ring — MR
Mte Post or Mooring Post — MP
Service Marker — MK
Mte Stone — MS
Post — P
Parking Meter — PM
Reflector Post — RP
Rodding Eye — RE
Road Sign — RS
Speed Camera — S/CAM
Information Sign — SGN
Stay — ST
Traffic Light — TL
Telegraph Pole — TP
Traffic Light Push Button Post — TLP
Traffic Light Control — TLC/P
Control Box — C/BOX
British Telecom Box — BT BOX
Electricity Box — EL BOX
Gas Box — GAS BOX
Cycle Lane Bollard — CLB

INSPECTION CHAMBERS AND PIPES

Inspection Cover — IC
Inspection Cover (Elec) — IC/EL
Manhole — MH
British Telecom Cover — BT
Inspection Cover (Comms) — IC/COM
Cable TV — CATV
Inspection Cover Traffic Signals — IC/TL
Grid — G
Kerb Outlet — KO
Vent Pipe — VP
Down Pipe — DP
Rain Water Pipe — RWP
Soil Pipe — SVP
Gas Pipe — G-PIPE
Unable to lift cover — U/L
Stop Tap — ST
Stop Valve — SV
Lamphole — LH
Hydrant — HYD
Earth Rod — ER
Gas Valve — GV
Water Meter — WM
Washout — WO
Rodding Eye — RE

GEOTECHNICAL INFORMATION

Borehole — BH
Trial Pit — TP
Monitor Pin — MON
Probe Hole — PH
Window Sample — WS

GENERAL INFORMATION

Petrol Pump — PP
Basement Light — BL
Floodlamp — FB
Dish Type Channel
Slot Type Channel
Grate Type Channel
Tactile Paving — TAC
Crash Barrier — C/BR
Column — COL
Stanchion — STAN
Car Vacuum — VAC
Offset Fill — OF
Air Valve — AV
Trough — TR
Chimney — CHY
Telephone Call Box — TCB

OVERHEAD FEATURES

Electricity Pylon — E.PYLON
Electricity — EL
Telephone — TEL

WATER FEATURES

Canal
Stream — Strm
Ditch — Dtch
Weir
Culvert
Drip (Land Drain) — D
Spring — SPR

RELIEF AND VEGETATION

Hedge
Edge of wood/Bushes
Stump — STUMP
Individual Tree
Slopes with Height Greater than 1m
Cliff Face
Marsh
Reeds

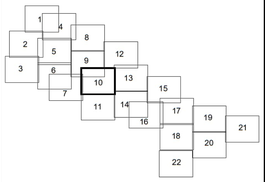
LEVEL AND HEIGHT INFORMATION

Standard Spot Height — + 123.45
Predicted Spot Height — + 123.456
Bed Level — + BL53.52
Water Level — + W.24.52
Soffit Level — + SL25.52
Threshold Level — + THR6.88
Cover Level — + CL26.45
Invert Level — + IL25.15
Pipe Soffit Level — + PSL5.00
Floor Level — + FL8.00
Finished Floor Level — + FFL6.00
Top of Tank Level — + TT7.00
Cave Level — + CL7.00
Ridge Level — + RL9.00
Roof Hip Level — + RHL8.50
Flat Roof Level — + FRL7.00
Top of Canopy Level — + TOP/C7.00
Underside of Canopy Level — + SOF/CSL5.50
Window Sill Level — + WSL8.00
Window Head Level — + WHL8.00
Springing Level — + SPL8.50
Arch Level — + ALT.00
Cable Level — + CHT8.55
Top of Wall Level — + TWL10.00
Underside of Beam Level — + UBL8.55
General Height — + HT8.00

SURVEY INFORMATION SIGNS

Permanent Ground Marker
O.S. Trig Station
O.S. Bench Mark

Sheet Index



Rev.	Date	Description

MALCOLM HUGHES
CHARTERED LAND SURVEYORS
Ashtree House, Trident Business Park,
Daten Avenue, Risley, Warrington, WA3 6BX
Tel: 0161 905 1265
www.malcolmhughes.co.uk
survey@mhls.co.uk

Accreditations

Client

Uniper Technologies Ltd
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project

Connah's Quay Power Station

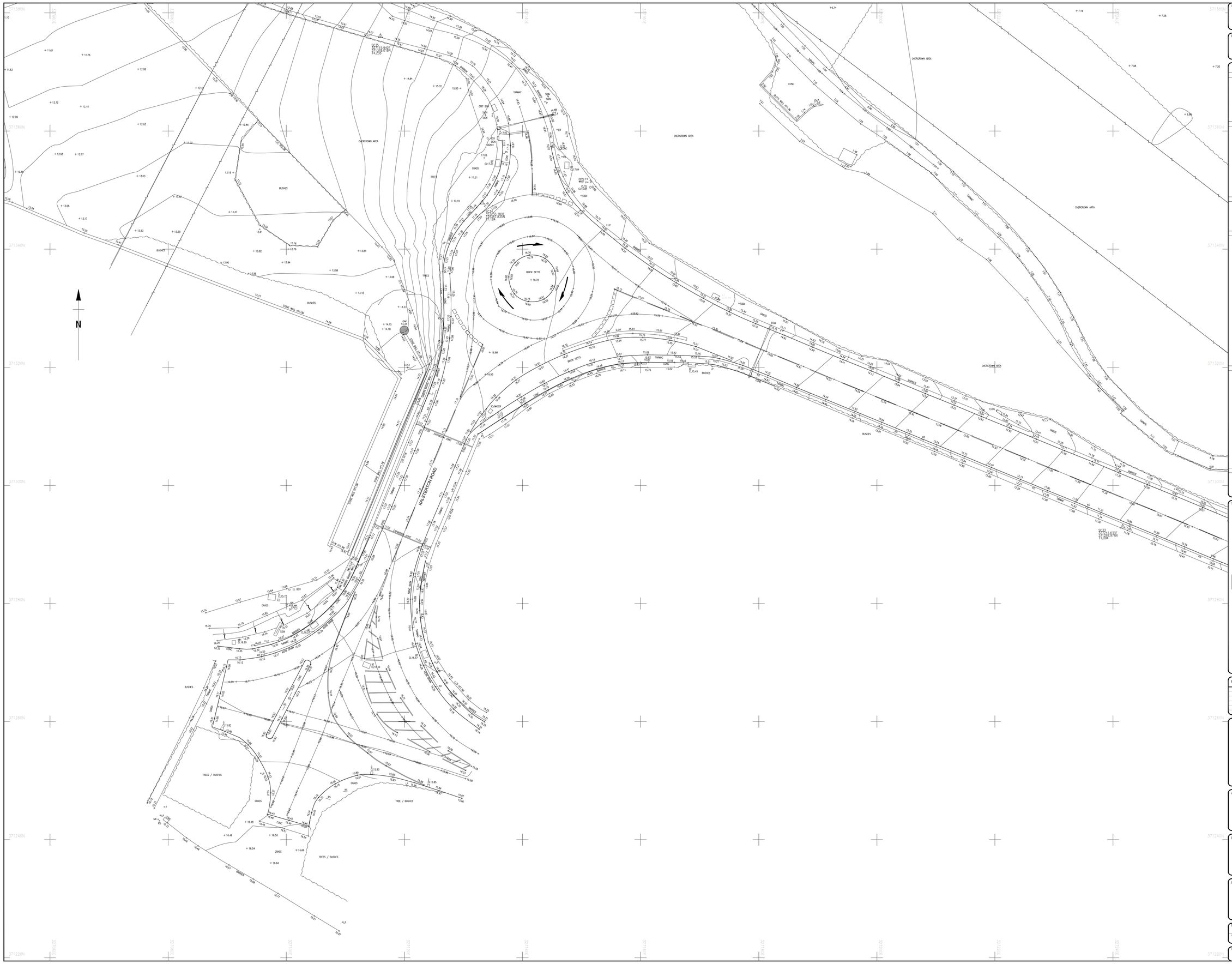
Drawing Title

Topographical Survey
Sheet 10 of 22

Drawn By	IC	23/12/24	Survey Date: November 2024
Checked by	ED/DJ	24/12/24	Scale: A0@1:200

Drawing No: 62330/10

Revison:



Survey Notes

Grid: National Grid, converted using OSTN15

Levels: Ordinance Datum converted using OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building
Building Open Sided
Ruin
Pressepa
Wall with Height
Retaining Wall

FENCE STYLES AND DESCRIPTIONS

Close Boarded
Corrugated Iron
Chestnut Paling
Chainlink
Hurdle
Interwoven
Iron Railings
Lattice
Miscellaneous
Palisade
Post & Chain
Post & Rail
Post & Wire
Post & Barbed Wire
Wire mesh
Stile
Gate
Fence Imelayle

ROADS

Kerbs
Edge of Surfacing
Pedestrian Crossing
Track
Footpath

STREET FURNITURE

Beckhs Beacon
Bus Stop
Bollard
Cable Eye
Coal Chute
Closed Circuit TV
Drain
Electricity Pole
Flood Light
Flag Staff
Lamp Post
Letter Box
Name Plate (street)
Mooring Ring
Mile Post or Mooring Post
Service Marker
Mile Stone
Post
Parking Meter
Reflector Post
Rodding Eye
Road Sign
Speed Camera
Information Sign
Stop
Traffic Light
Telegraph Pole
Traffic Light Push Button Post
Traffic Light Control
Control Box
British Telecom Box
Electricity Box
Gas Box
Cycle Lane Bollard

INSPECTION CHAMBERS AND PIPES

Inspection Cover
Inspection Cover (Elec)
Manhole
British Telecom Cover
Inspection Cover (Comms)
Cable TV
Inspection Cover Traffic Signals
Gully
Kerb Outlet
Vent Pipe
Down Pipe
Rain Water Pipe
Soil Pipe
Gas Pipe
Unable to lift cover
Stop Tap
Stop Valve
Lamphole
Hydrant
Earth Rod
Gas Valve
Water Meter
Washout
Rodding Eye

GEOTECHNICAL INFORMATION

Borehole
Trial Pit
Monitor Pin
Probe Hole
Window Sample

GENERAL INFORMATION

Petrol Pump
Basement Light
Floodvidge
Dish Type Channel
Slot Type Channel
Grate Type Channel
Tactile Paving
Crash Barrier
Column
Stanchion
Air Vacuum
Offset Fill
Air Valve
Trough
Chimney
Telephone Call Box

OVERHEAD FEATURES

Electricity Pylon
Electricity
Telephone

WATER FEATURES

Canal
Stream
Ditch
Weir
Culvert
Drip (Land Drain)
Spring

RELIEF AND VEGETATION

Hedge
Edge of wood/Bushes
Stump
Individual Tree
Slopes with Height Greater than 1m
Cliff Face
Marsh
Reeds

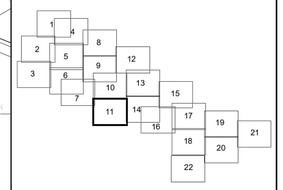
LEVEL AND HEIGHT INFORMATION

Standard Spot Height
Prominent Spot Height
Bed Level
Water Level
Soffit Level
Trackbed Level
Dower Level
Invert Level
Pipe Soffit Level
Floor Level
Finished Floor Level
Top of Tank Level
Cave Level
Ridge Level
Roof Hip Level
Flat Roof Level
Top of Canopy Level
Underside of Canopy Level
Window Sill Level
Window Head Level
Springing Level
Arch Level
Cable Level
Top of Wall Level
Underside of Beam Level
General Height

SURVEY INFORMATION SIGNS

Permanent Ground Marker
O.S. Trig Station
O.S. Bench Mark

Sheet Index



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Accreditations

Client

Uniper Technologies Ltd
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project

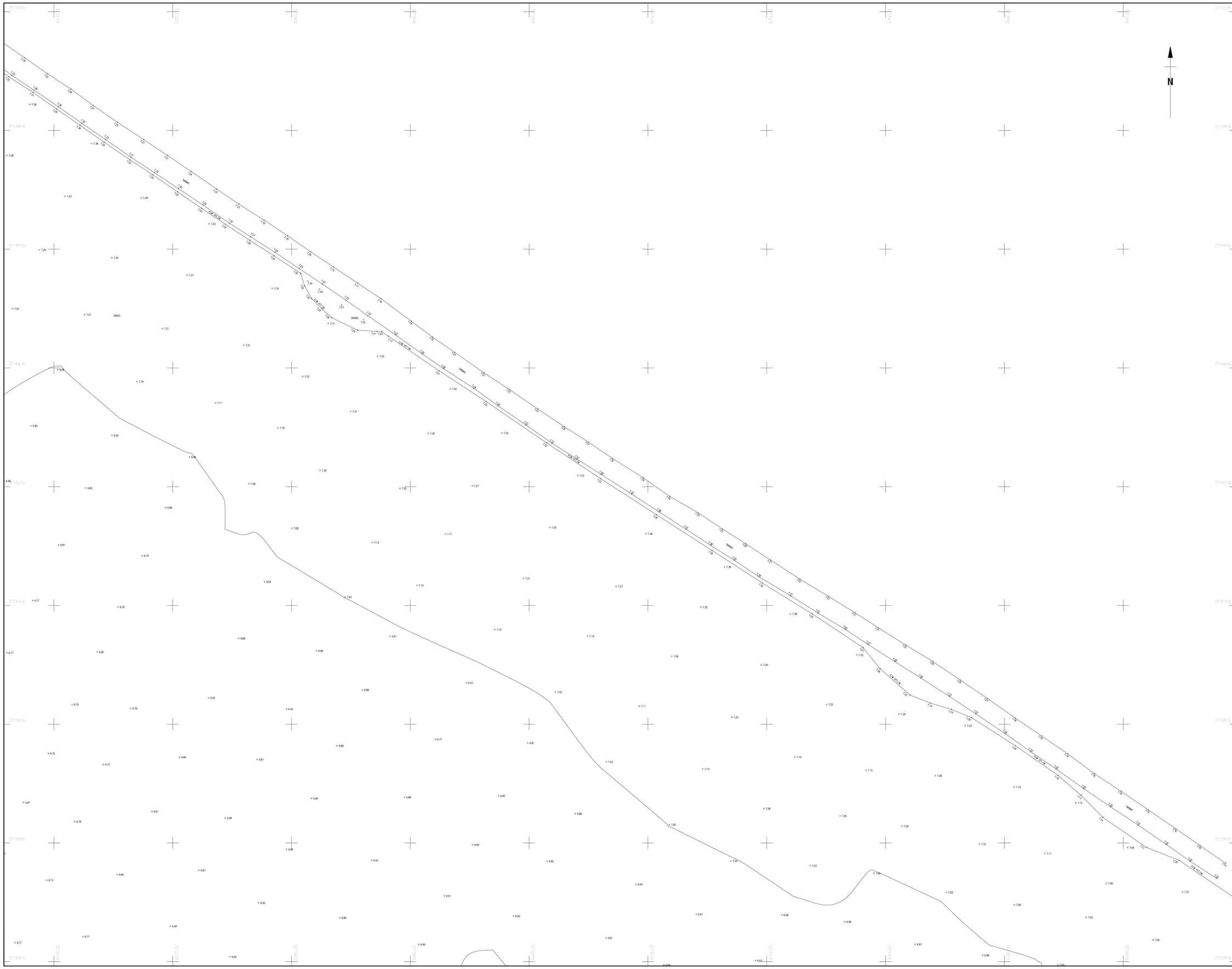
Connah's Quay Power Station

Drawing Title

Topographical Survey
Sheet 11 of 22

Drawn By	IC	23/12/24	Survey Date: November 2024
Checked by	ED/DJ	24/12/24	Scale: A0@1:200

Drawing No: 62330/11 Revision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372460E
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372500E
372520E
372540E
372560E
372580E
372600E
372620E
372640E
372660E
372680E
372700E
372720E
372740E
372760E
372780E

Survey Notes

Grid: National Grid, converted using OSTN15

Levels: Ordnance Datum converted using OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building
Building Open Sided
Ruin (RUIN)
Passage
Wall with Height / Retaining Wall (Wall 1m) / R/W

FENCE STYLES AND DESCRIPTIONS

Close Boarded C/B
Corrugated Iron C/I
Chestnut Paling C/P
Chainlink C/L
Handrail H/R
Interwoven I/W
Iron Railings I/R
Lattice L/T
Miscellaneous Misc
Palisade PAL
Post & Chain P/C
Post & Rail P/R
Post & Wire P/W
Post & Barbed Wire B/W
Wire mesh W/M
Stile
Gate
Fence Inestyle

ROADS

Kerbs
Edge of Surfacing
Pedestrian Crossing (PC)
Track
Footpath

STREET FURNITURE

Bollards Beacon = BB
Bus Stop = BS
Bollard = B
Cats Eye = CE
Coal Chute = CC
Closed Circuit TV = CCTV
Drain = DR
Electricity Pole = EP
Flood Light = FL
Flag Staff = FS
Lamp Post = LP
Letter Box = LB
Name Plate (street) = NP
Mooring Ring = MR
Mile Post or Mooring Post = MP
Service Marker = MK
Mile Stone = MS
Post = P
Parking Meter = PM
Reflector Post = RP
Rodding Eye = RE
Road Sign = RS
Speed Camera = S/CAM
Information Sign = SGN
Stay = ST
Traffic Light = TL
Telegram Pole = TP
Traffic Light Push Button Post = TLP
Traffic Light Control = TLC/P
Control Box (C/BOX)
British Telecom Box (BT BOX)
Electricity Box (EL BOX)
Gas Box (GAS BOX)
Cycle Lane Bollard (CLB)

INSPECTION CHAMBERS AND PIPES

Inspection Cover IC
Inspection Cover (Elec) IC/EL
Manhole MH
British Telecom Cover BT
Inspection Cover (Comms) IC/COM
Cable TV CATV
Inspection Cover Traffic Signals IC/TL
Grid G
Kerb Outlet KO
Vent Pipe VP
Down Pipe DP
Rain Water Pipe RWP
Soil Pipe SVP
Gas Pipe G-PIPE
Unable to lift cover UTL
Stop Tap ST
Stop Valve SV
Lamphole LH
Hydrant HYD
Earth Rod ER
Gas Valve GV
Water Meter WM
Washout WO
Rodding Eye RE

GEOTECHNICAL INFORMATION

Borehole BH
Trial Pit TP
Monitor Pin MON
Probe Hole PH
Window Sample WS

GENERAL INFORMATION

Petrol Pump PP
Basement Light BL
Floodbridge FB
Dish Type Channel
Slot Type Channel
Grate Type Channel
Tactile Paving TAC
Crash Barrier C/BR
Column COL
Stanchion STAN
Air Vacuum VAC
Offset Fill o OF
Air Valve o AV
Trough TR
Chimney CHY
Telephone Call Box TCB

OVERHEAD FEATURES

Electricity Pylon E/PYLON
Electricity
Telephone

WATER FEATURES

Canal
Stream
Ditch
Weir
Culvert
Drip (Land Drain)
Spring o SPR

RELIEF AND VEGETATION

Hedge
Edge of wood/Bushes
Stump STUMP
Individual Tree
Slopes with Height Greater than 1m
Cliff Face
Marsh
Reeds

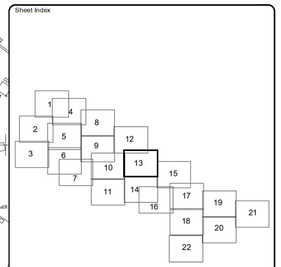
LEVEL AND HEIGHT INFORMATION

Standard Spot Height = 123.45
Prismatic Spot Height = 123.456
Bed Level = BL23.52
Water Level = WL24.52
Soffit Level = SL25.52
Threshold Level = THR6.88
Cover Level = CL26.45
Invert Level = IL25.15
Pipe Soffit Level = PSL5.00
Floor Level = FL6.00
Finished Floor Level = FFL6.00
Top of Tank Level = TT7.00
Cave Level = CL7.00
Ridge Level = RL8.00
Roof Hip Level = RHL8.50
Flat Roof Level = FRL7.00
Top of Canopy Level = TOP/CY7.00
Underside of Canopy Level = SOF/CSL6.50
Window Sill Level = WSL6.00
Window Head Level = WHL8.00
Springing Level = SPL8.50
Arch Level = ACL7.00
Cable Level = CHR.55
Top of Wall Level = TWL10.00
Underside of Beam Level = UBL8.50
General Height = HT8.00

SURVEY INFORMATION SIGNS

Permanent Ground Marker
O.S. Trig Station
O.S. Bench Mark

Sheet Index



Rev.	Date	Description

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Tel: 0161 905 1265
www.malcolmhughes.co.uk
survey@mhls.co.uk

Accreditations: RICS, The Survey Association, ICES, APAS

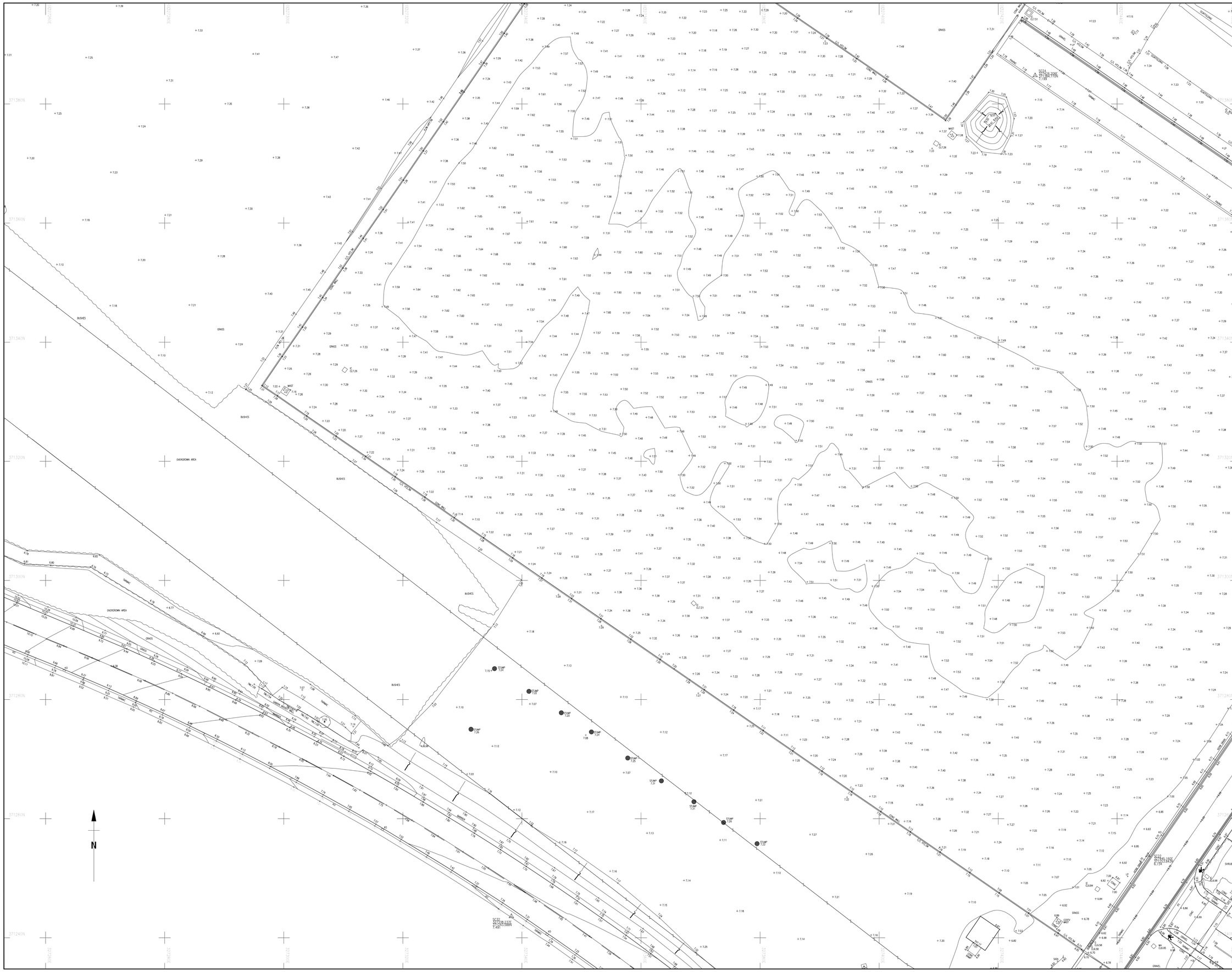
Client
Uniper Technologies Ltd
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project
Connah's Quay Power Station

Drawing Title
Topographical Survey
Sheet 13 of 22

Drawn By		Survey Date	
IC	23/12/24	November 2024	
Checked by		Scale	
ED/DJ	24/12/24	A0@1:200	

Drawing No: 62330/13 Revision:



Survey Notes

Grid: National Grid, converted using OSTN15

Levels: Ordnance Datum converted using OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building
Building Open Sided
Ruin
Pressepa
Wall with Height
Retaining Wall

FENCE STYLES AND DESCRIPTIONS

Close Boarded C/B
Corrugated Iron C/I
Chestnut Paling C/P
Chainlink C/L
Hurdle H/R
Interwoven I/W
Iron Railings I/R
Lattice L/T
Miscellaneous Misc
Palisade PAL
Post & Chain P/C
Post & Rail P/R
Post & Wire P/W
Post & Barbed Wire B/W
Wire mesh W/M
Stile
Gate
Fence Imaterial

ROADS

Kerbs
Edge of Surfacing
Pedestrian Crossing
Track
Footpath

STREET FURNITURE

Belisha Beacon
Bus Stop
Bollard
Cats Eye
Coal Chute
Closed Circuit TV
Drain
Electricity Pole
Flood Light
Flag Staff
Lamp Post
Letter Box
Name Plate (street)
Mooring Ring
Mile Post or Mooring Post
Service Marker
Mile Stone
Post
Parking Meter
Refractor Post
Rodding Eye
Road Sign
Speed Camera
Illuminable Sign
Stop
Traffic Light
Telegraph Pole
Traffic Light Push Button Post
Control Box
British Telecom Box
Electricity Box
Gas Box
Cycle Lane Bollard

INSPECTION CHAMBERS AND PIPES

Inspection Cover
Inspection Cover (Elec)
Manhole
British Telecom Cover
Inspection Cover (Comms)
Cable TV
Inspection Cover traffic Signals
Grid
Kerb Outlet
Vent Pipe
Down Pipe
Rain Water Pipe
Soil Pipe
Gas Pipe
Unable to lift cover
Stop Tap
Stop Valve
Lamphole
Hydrant
Earth Rod
Gas Valve
Water Meter
Washout
Rodding Eye

GEOTECHNICAL INFORMATION

Borehole
Trial Pit
Warrtior Pin
Probe Hole
Window Sample

GENERAL INFORMATION

Petrol Pump
Basement Light
Floodlamp
Dish Type Channel
Slot Type Channel
Grate Type Channel
Textile Paving
Crash Barrier
Column
Stanchion
Car Vacuum
Offset Fill
Air Valve
Trough
Handrail
Telephone Call Box

OVERHEAD FEATURES

Electricity Pylon
Electricity
Telephone

WATER FEATURES

Canal
Stream
Ditch
Weir
Culvert
Drip (Land Drain)
Spring

RELIEF AND VEGETATION

Hedge
Edge of wood/Bushes
Stump
Individual Tree
Slopes with Height Greater than 1m
Cliff Face
Marsh
Reeds

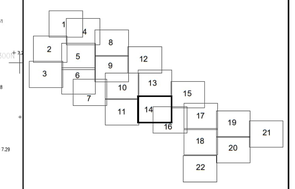
LEVEL AND HEIGHT INFORMATION

Standard Spot Height
Predicted Spot Height
Bed Level
Boiler Level
Soffit Level
Threshold Level
Dower Level
Invert Level
Pipe Soffit Level
Floor Level
Finished Floor Level
Top of Tank Level
Eave Level
Ridge Level
Roof Hip Level
Flat Roof Level
Top of Canopy Level
Underside of Canopy Level
Window Sill Level
Window Head Level
Springing Level
Arch Level
Cable Level
Top of Wall Level
Underside of Beam Level
General Height

SURVEY INFORMATION SIGNS

Permanent Ground Marker
O.S. Trig Station
O.S. Bench Mark

Sheet Index



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Daten Avenue, Risley, Warrington, WA3 6BX
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survey@mhls.co.uk

Accreditations

Client

Uniper Technologies Ltd
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project

Connah's Quay Power Station

Drawing Title

Topographical Survey
Sheet 14 of 22

Drawn By	IC	23/12/24	Survey Date: November 2024
Checked by	ED/DJ	24/12/24	Scale: A0@1:200

Drawing No: 62330/14

Revision:

Survey Notes

Grid: National Grid, converted using OSTN15

Levels: Ordnance Datum converted using OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building

Building Open Sided

Ruin — RUIN

Passage

Wall with Height Retaining Wall — Wall Ht 0.3m — R/W

FENCE STYLES AND DESCRIPTIONS

Close Boarded — C/B
Corrugated Iron — C/I
Chestnut Paling — C/P
Chainlink — C/L
Handrail — H/R
Interwoven — WH
Iron Railings — I/R
Lattice — L/T
Miscellaneous — Misc
Palisade — PAL
Post & Chain — P/C
Post & Rail — P/R
Post & Wire — P/W
Post & Barbed Wire — B/W
Wire mesh — W/M
Stile
Gate
Fence treestyle

ROADS

Kerbs
Edge of Surfacing
Pedestrian Crossing — PC
Track
Footpath

STREET FURNITURE

Bellsha Beacon — ⊕ BB
Bus Stop — ⊕ BS
Bollard — ⊕ B
Cats Eye — ⊕ CE
Coal Chute — ⊕ CC
Closed Circuit TV — ⊕ CCTV
Drain — ⊕ DR
Electricity Pole — ⊕ EP
Flood Light — ⊕ FL
Flag Staff — ⊕ FS
Lamp Post — ⊕ LP
Letter Box — LB
Name Plate (street) — NP
Mooring Ring — ⊕ MR
Mte Post or Mooring Post — ⊕ MP
Service Marker — ⊕ MK
Mte Stone — ⊕ MS
Post — ⊕ P
Parking Meter — ⊕ PM
Reflector Post — ⊕ RP
Rodding Eye — ⊕ RE
Road Sign — ⊕ RS
Speed Camera — ⊕ S/CAM
Information Sign — ⊕ SGN
Stop — ⊕ ST
Traffic Light — ⊕ TL
Telegraph Pole — ⊕ TP
Traffic Light Push Button Post — ⊕ TLP
Traffic Light Control — ⊕ TLC/P
Control Box — C/BOX
British Telecom Box — BT BOX
Electricity Box — EL BOX
Gas Box — GAS BOX
Cycle Lane Bollard — CLB

INSPECTION CHAMBERS AND PIPES

Inspection Cover — ⊕
Inspection Cover (Elec) — ⊕/EL
Manhole — ⊕ MH
British Telecom Cover — BT
Inspection Cover (Comms) — ⊕/COM
Cable TV — CATV
Inspection Cover Traffic Signals — ⊕/TL
Gully — ⊕
Kerb Outlet — ⊕O
Vent Pipe — ⊕ VP
Down Pipe — ⊕ DP
Rain Water Pipe — ⊕ RWP
Soil Pipe — ⊕ SVP
Gas Pipe — ⊕ G-PIPE
Unable to lift cover — U/L
Stop Tap — ⊕ ST
Stop Valve — ⊕ SV
Lamphole — ⊕ LH
Hydrant — ⊕ HYD
Earth Rod — ⊕ ER
Gas Valve — ⊕ GV
Water Meter — ⊕ WM
Washout — ⊕ WO
Rodding Eye — ⊕ RE

GEOTECHNICAL INFORMATION

Borehole — BH
Trial Pit — TP
Monitor Pin — ⊕ MON
Probe Hole — ⊕ PH
Window Sample — ⊕ WS

GENERAL INFORMATION

Petrol Pump — PP
Basement Light — BL
Floodlamp — FB
Dish Type Channel
Slot Type Channel
Grate Type Channel
Tactile Paving — TAC
Crash Barrier — C/BR
Column — ⊕ COL
Stanchion — STAN
Car Vacuum — VAC
Offset Fill — ⊕ OF
Air Valve — ⊕ AV
Trough — TR
Chimney — ⊕ CHY
Telephone Call Box — TCB

OVERHEAD FEATURES

Electricity Pylon — E.PYLON
Electricity — EL
Telephone — TEL

WATER FEATURES

Canal
Stream
Ditch
Weir
Culvert — Ø Dia
Drip (Land Drain)
Spring — ⊕ SPR

RELIEF AND VEGETATION

Hedge
Edge of wood/Bushes
Stump — STUMP
Individual Tree
Slopes with Height Greater than 1m
Cliff Face
Marsh
Reeds

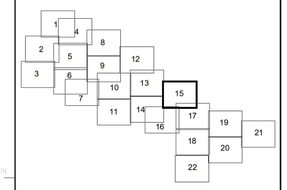
LEVEL AND HEIGHT INFORMATION

Standard Spot Height — + 123.45
Predicted Spot Height — + 123.456
Bed Level — + BL53.92
Water Level — + WL24.92
Soffit Level — + SL25.92
Threshold Level — + THR6.88
Cover Level — + CL26.45
Invert Level — + IL25.15
Pipe Soffit Level — + PSL5.00
Floor Level — + FL8.00
Finished Floor Level — + FFL6.00
Top of Tank Level — + TT7.00
Cave Level — + CL7.00
Ridge Level — + RL8.00
Roof Hip Level — + RHL8.00
Flat Roof Level — + FRL7.00
Top of Canopy Level — + TOP/CY7.00
Underside of Canopy Level — + SOF/CSL8.00
Window Sill Level — + WSL8.00
Window Head Level — + WHL9.00
Springing Level — + SPL8.50
Arch Level — + ALT.00
Cobble Level — + CHT8.55
Top of Wall Level — + TWL10.00
Underside of Beam Level — + UBL8.55
General Height — + HT8.00

SURVEY INFORMATION SIGNS

Permanent Ground Marker
O.S. Trig Station
O.S. Bench Mark

Sheet Index



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Nottingham NG11 0EE

Project

Connah's Quay Power Station

Drawing Title

Topographical Survey
Sheet 15 of 22

Drawn By	Date	Survey Date	
IC	23/12/24		November 2024
Checked by		Scale	
ED/DJ	24/12/24		A0@1:200

Drawing No: 62330/15 — Revision:

Survey Notes
Grid: National Grid, converted using OSTN15
Levels: Ordnance Datum converted using OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building
Building Open Sided
Ruin
Passage
Wall with Height
Retaining Wall

FENCE STYLES AND DESCRIPTIONS

Close Boarded	C/B
Corrugated Iron	C/I
Chestnut Paling	C/P
Chainlink	C/L
Handrail	H/R
Interwoven	WH
Iron Railings	I/R
Lattice	L/T
Miscellaneous	Misc
Palisade	PAL
Post & Chain	P/C
Post & Rail	P/R
Post & Wire	P/W
Post & Barbed Wire	B/W
Wire mesh	W/M
Stile	
Gate	
Fence linestyle	

ROADS

Kerbs
Edge of Surfacing
Pedestrian Crossing
Track
Footpath

STREET FURNITURE

Bollards Beacon	BB
Bus Stop	BS
Bollard	B
Cats Eye	CE
Coal Chute	CC
Closed Circuit TV	CCTV
Drain	DR
Electricity Pole	EP
Flood Light	FL
Flag Staff	FS
Lamp Post	LP
Letter Box	LB
Name Plate (street)	NP
Mooring Ring	MR
Mile Post or Mooring Post	MP
Service Marker	MK
Mile Stone	MS
Post	P
Parking Meter	PM
Reflector Post	RP
Rodding Eye	RE
Road Sign	RS
Speed Camera	S/CAM
Information Sign	SGN
Stay	ST
Traffic Light	TL
Telegraph Pole	TP
Traffic Light Push Button Post	TLP
Traffic Light Control	TLC/P
Control Box	C/BOX
British Telecom Box	BT BOX
Electricity Box	EL BOX
Gas Box	GAS BOX
Cycle Lane Bollard	CLB

INSPECTION CHAMBERS AND PIPES

Inspection Cover	IC
Inspection Cover (Elec)	IC/EL
Manhole	MH
British Telecom Cover	BT
Inspection Cover (Comms)	IC/COM
Cable TV	CATV
Inspection Cover Traffic Signals	IC/TL
Gully	G
Kerb Outlet	KO
Vent Pipe	VP
Down Pipe	DP
Rain Water Pipe	RWP
Soil Pipe	SVP
Gas Pipe	G-PIPE
Unable to lift cover	UTL
Stop Tap	ST
Stop Valve	SV
Lamphole	LH
Hydrant	HYD
Earth Rod	ER
Gas Valve	GV
Water Meter	WM
Washout	WO
Rodding Eye	RE

GEOTECHNICAL INFORMATION

Borehole	BH
Trial Pit	TP
Monitor Pin	MON
Probe Hole	PH
Window Sample	WS

GENERAL INFORMATION

Petrol Pump
Basement Light
Floodlamps
Dish Type Channel
Slot Type Channel
Grate Type Channel
Tactile Paving
Drain Barrier
Column
Stanchion
Cat Ladder
Offset Fill
Air Valve
Trough
Manhole
Telephone Call Box

OVERHEAD FEATURES

Electricity Pylon
Electricity
Telephone

WATER FEATURES

Canal
Stream
Ditch
Weir
Culvert
Drip (Land Drain)
Spring

RELIEF AND VEGETATION

Hedge
Edge of wood/Bushes
Stump
Individual Tree
Slopes with Height Greater than 1m
Cliff Face
Marsh
Reeds

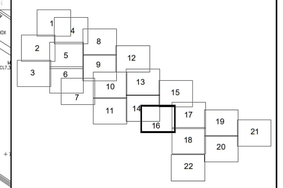
LEVEL AND HEIGHT INFORMATION

Standard Spot Height	+ 123.45
Protected Spot Height	+ 123.456
Bed Level	+ 96,23.502
Boiler Level	+ W,24.502
Soffit Level	+ SL25.502
Trickshaft Level	+ TH26.88
Dower Level	+ CL26.45
Invert Level	+ I.L25.15
Pipe Soffit Level	+ PSL5.00
Floor Level	+ FL8.00
Finished Floor Level	+ FFL6.00
Top of Tank Level	+ TT7.00
Eave Level	+ EL7.00
Ridge Level	+ RL9.00
Roof Hip Level	+ RHL8.50
Flat Roof Level	+ FRL7.00
Top of Canopy Level	+ TOP/C7.00
Underside of Canopy Level	+ USOF/CSL50
Window Sill Level	+ WSL8.00
Window Head Level	+ WH/L8.00
Springing Level	+ SPL8.50
Arch Level	+ AL7.00
Cable Level	+ CHT8.55
Top of Wall Level	+ TW/L10.00
Underside of Beam Level	+ UBL8.55
General Height	+ H16.00

SURVEY INFORMATION SIGNS

Permanent Ground Marker
O.S. Trig Station
O.S. Bench Mark

Sheet Index



Rev.	Date	Description

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Accreditations

Client
Uniper Technologies Ltd
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project
Connah's Quay Power Station

Drawing Title
Topographical Survey
Sheet 16 of 22

Drawn By	IC 23/12/24	Survey Date	November 2024
Checked by	ED/DJ 24/12/24	Scale	A0@1:200

Drawing No. 62330/16
Revision

Survey Notes

Grid: National Grid, converted using OSTN15

Levels: Ordnance Datum converted using OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building
Building Open Sided
Ruin (RUIN)
Pressepa
Wall with Height
Retaining Wall (RW)

FENCE STYLES AND DESCRIPTIONS

Close Boarded C/B
Corrugated Iron C/I
Chestnut Paling C/P
Chainlink C/L
Hurdrail H/R
Interwoven WH
Iron Railings I/R
Lattice L/T
Miscellaneous Misc
Palisade PAL
Post & Chain P/C
Post & Rail P/R
Post & Wire P/W
Post & Barbed Wire B/W
Wire mesh W/M
Stile
Gate
Fence linestyle

ROADS

Kerbs
Edge of Surfacing
Pedestrian Crossing (PC)
Track
Footpath

STREET FURNITURE

Beckhs Beacon ⊕ BB
Bus Stop ⊕ BS
Bollard ⊕ B
Cats Eye ⊕ CE
Coal Chute ⊕ CC
Closed Circuit TV ⊕ CCTV
Drain ⊕ DR
Electricity Pole ⊕ EP
Flood Light ⊕ FL
Flag Staff ⊕ FS
Lamp Post ⊕ LP
Letter Box ⊙ LB
Name Plate (street) ⊕ NP
Mooring Ring ⊕ MR
Mile Post or Mooring Post ⊕ MP
Notice Marker ⊕ NK
Mile Stone ⊕ MS
Post ⊕ P
Parking Meter ⊕ PM
Reflector Post ⊕ RP
Rodding Eye ⊕ RE
Road Sign ⊕ RS
Speed Camera ⊕ S/CAM
Information Sign ⊕ SGN
Stay ⊕ ST
Traffic Light ⊕ TL
Telegraph Pole ⊕ TP
Traffic Light Push Button Post ⊕ TLP
Traffic Light Control ⊕ TLC/P
Control Box □ C/BOX
British Telecom Box □ BT BOX
Electricity Box □ EL BOX
Gas Box □ GAS BOX
Cycle Lane Bollard CLB

INSPECTION CHAMBERS AND PITS

Inspection Cover □ IC
Inspection Cover (Elec) □ IC/EL
Manhole □ MH
British Telecom Cover □ BT
Inspection Cover (Comms) □ IC/COM
Cable TV □ CATV
Inspection Cover Traffic Signals □ IC/TL
Gully □ G
Kerb Outlet □ KO
Vent Pipe ⊕ VP
Down Pipe ⊕ DP
Rain Water Pipe ⊕ RWP
Soil Pipe ⊕ SVP
Gas Pipe ⊕ G=PIPE
Unable to lift cover UTL
Stop Tap ⊕ ST
Stop Valve ⊕ SV
Lamphole ⊕ LH
Hydrant ⊕ HYD
Earth Rod ⊕ ER
Gas Valve ⊕ GV
Water Meter ⊕ WM
Washout ⊕ WO
Rodding Eye ⊕ RE

GEOTECHNICAL INFORMATION

Borehole BH
Trial Pit TP
Monitor Pin ⊕ MON
Probe Hole ⊕ PH
Window Sample ⊕ WS

GENERAL INFORMATION

Petrol Pump PP
Basement Light BL
Floodlamp FL
Dish Type Channel
Slot Type Channel
Grate Type Channel
Tactile Paving TAC
Crash Barrier C/BR
Column COL
Stanchion STAN
Air Vacuum MAC
Offset Fill ⊕ OF
Air Valve ⊕ AV
Trough TR
Chimney CHY
Telephone Call Box TCB

OVERHEAD FEATURES

Electricity Pylon E/PYLON
Electricity
Telephone

WATER FEATURES

Canal
Stream
Ditch
Weir
Culvert
Drip (Land Drain) ⊕ DR
Spring ⊕ SPR

RELIEF AND VEGETATION

Hedge
Edge of wood/Bushes
Stump ⊕ STUMP
Individual Tree
Slopes with Height Greater than 1m
Cliff Face
Marsh
Reeds

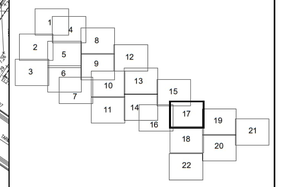
LEVEL AND HEIGHT INFORMATION

Standard Spot Height × 123.45
Prominent Spot Height × 123.456
Bed Level × BL23.52
Water Level × W.24.52
Soffit Level × SL25.52
Trackpad Level × TK26.88
Cover Level × CL26.45
Invert Level × IL25.15
Pipe Soffit Level × PSL5.00
Floor Level × FL8.00
Finished Floor Level × FFL6.00
Top of Tank Level × TT7.00
Cave Level × CL7.00
Ridge Level × RL8.00
Roof Hip Level × RHL8.00
Flat Roof Level × FRL7.00
Top of Canopy Level × TOP/C7.00
Underside of Canopy Level × SOF/CSL8.00
Window Sill Level × WSL8.00
Window Head Level × WHL8.00
Springing Level × SPL8.50
Arch Level × AL7.00
Cable Level × CHT8.55
Top of Wall Level × TWL10.00
Underside of Beam Level × UBL8.55
General Height × HT8.00

SURVEY INFORMATION SIGNS

Permanent Ground Marker
O.S. Trig Station
O.S. Bench Mark

Sheet Index



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Accreditations: RICS, The Survey Association, ICES, RICS CPD Certified, Acumen

Client
Uniper Technologies Ltd
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project
Connah's Quay Power Station

Drawing Title
Topographical Survey
Sheet 17 of 22

Drawn By	IC 23/12/24	Survey Date	November 2024
Checked by	ED/DJ 24/12/24	Scale	A0@1:200

Drawing No 62330/17 Revision

CAS WORKS NO ACCESS

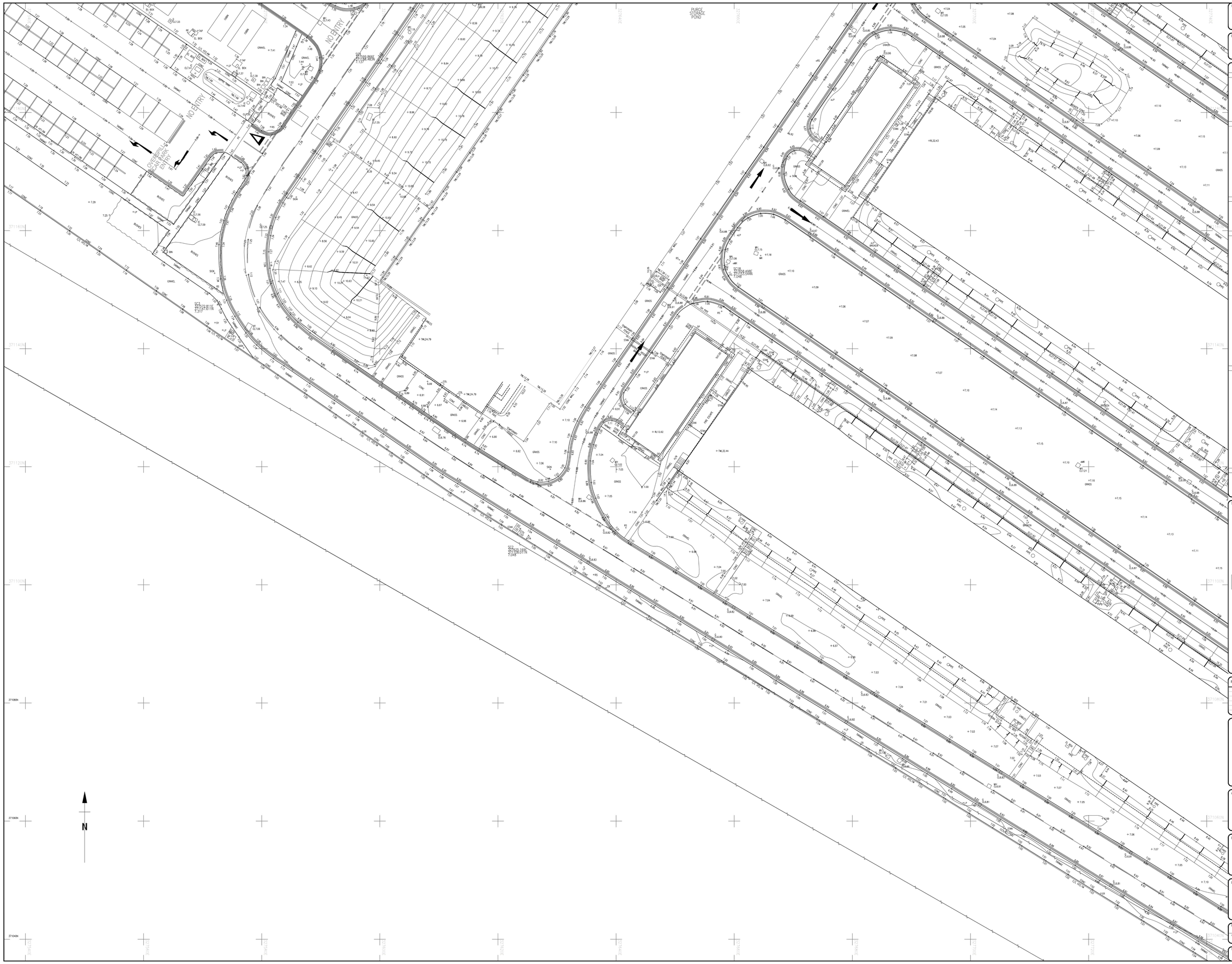
PURGE STORAGE POND

CONTRACTORS CANTEEN & TOILETS

DOLWEN ROAD

NO ENTRY

PLANT – NO ACCESS



Survey Notes

Grid: National Grid, converted using OSTN15

Levels: Ordinance Datum converted using OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building
Building Open Sided
Ruin (RUIN)
Pressepa
Wall with Height (Wall +0.5m)
Retaining Wall (R/W)

FENCE STYLES AND DESCRIPTIONS

Close Boarded C/B
Corrugated Iron C/I
Chestnut Paling C/P
Chainlink C/L
Handrail H/R
Interwoven WN
Iron Railings I/R
Lattice L/T
Miscellaneous Misc
Palisade PAL
Post & Chain P/C
Post & Rail P/R
Post & Wire P/W
Post & Barbed Wire B/W
Wire mesh W/M
Stile
Gate
Fence Inestyle

ROADS

Kerbs
Edge of Surfacing
Pedestrian Crossing (PC)
Track
Footpath

STREET FURNITURE

Belisha Beacon = BB
Bus Stop = BS
Bollard = B
Cats Eye = CE
Coal Chute = CC
Closed Circuit TV = CCTV
Drain = DR
Electricity Pole = EP
Flood Light = FL
Flag Staff = FS
Lamp Post = LP
Letter Box = LB
Name Plate (street) = NP
Mooring Ring = MR
Mile Post or Mooring Post = MP
Service Marker = MK
Mile Stone = MS
Post = P
Parking Meter = PM
Reflector Post = RP
Rodding Eye = RE
Road Sign = RS
Speed Camera = S/CAM
Information Sign = SGN
Stay = ST
Traffic Light = TL
Telegraph Pole = TP
Traffic Light Push Button Post = TLP
Traffic Light Control Box = TLC/P
British Telecom Box (BT BOX)
Electricity Box (EL BOX)
Gas Box (GAS BOX)
Cycle Lane Bollard (CLB)

INSPECTION CHAMBERS AND PIPES

Inspection Cover = IC
Inspection Cover (Elec) = IC/EL
Manhole = MH
British Telecom Cover = BT
Inspection Cover (Comms) = IC/COM
Cable TV = CATV
Inspection Cover Traffic Signals = IC/TL
Gully = IC
Kerb Outlet = KO
Vent Pipe = VP
Down Pipe = DP
Rain Water Pipe = RWP
Soil Pipe = SVP
Gas Pipe = G-PIPE
Unable to lift cover (UTL)
Stop Tap = ST
Stop Valve = SV
Lamphole = LH
Hydrant = HYD
Earth Rod = ER
Gas Valve = GV
Water Meter = WM
Washout = WO
Rodding Eye = RE

GEOTECHNICAL INFORMATION

Borehole = BH
Trial Pit = TP
Monitor Pin = MON
Probe Hole = PH
Window Sample = WS

GENERAL INFORMATION

Petrol Pump = PP
Basement Light = BL
Floodvatage (FB)
Ditch Type Channel
Slot Type Channel
Grate Type Channel
Tactile Paving = TAC
Crash Barrier = C/BR
Column = COL
Stanchion = STAN
Air Vacuum = AIR
Offset Fill = or OF
Air Valve = or AV
trough = TR
Chimney = CHY
Telephone Call Box = TCB

OVERHEAD FEATURES

Electricity Pylon = E.PYLON
Electricity = EL
Telephone = TEL

WATER FEATURES

Canal
Stream
Ditch
River
Weir
Culvert
Drip (Land Drain)
Spring = SPR

RELIEF AND VEGETATION

Hedge
Edge of wood/Bushes
Stump = STUMP
Individual Tree
Slopes with Height Greater than 1m
Cliff Face
Marsh
Reeds

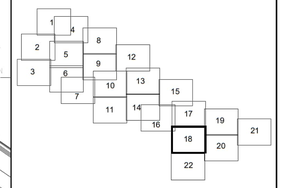
LEVEL AND HEIGHT INFORMATION

Standard Spot Height = 123.45
Prominent Spot Height = 123.456
Bed Level = BL23.52
Water Level = WL24.52
Soffit Level = SL25.52
Threshold Level = TH26.88
Cover Level = CL26.45
Invert Level = IL25.15
Pipe Soffit Level = PSL5.00
Floor Level = FL8.00
Finished Floor Level = FFL6.00
Top of Tank Level = TT7.00
Eave Level = EL7.00
Ridge Level = RL8.00
Roof Hip Level = RHL8.50
Flat Roof Level = FRL7.00
Top of Canopy Level = TOP/C7.00
Underside of Canopy Level = SOF/CSL8.00
Window Sill Level = WSL8.00
Window Head Level = WHL8.00
Springing Level = SPL8.50
Arch Level = AL7.00
Cable Level = CHT8.55
Top of Wall Level = TWL10.00
Underside of Beam Level = UBL8.88
General Height = HT8.00

SURVEY INFORMATION SIGNS

Permanent Ground Marker
O.S. Trig Station
O.S. Bench Mark

Sheet Index



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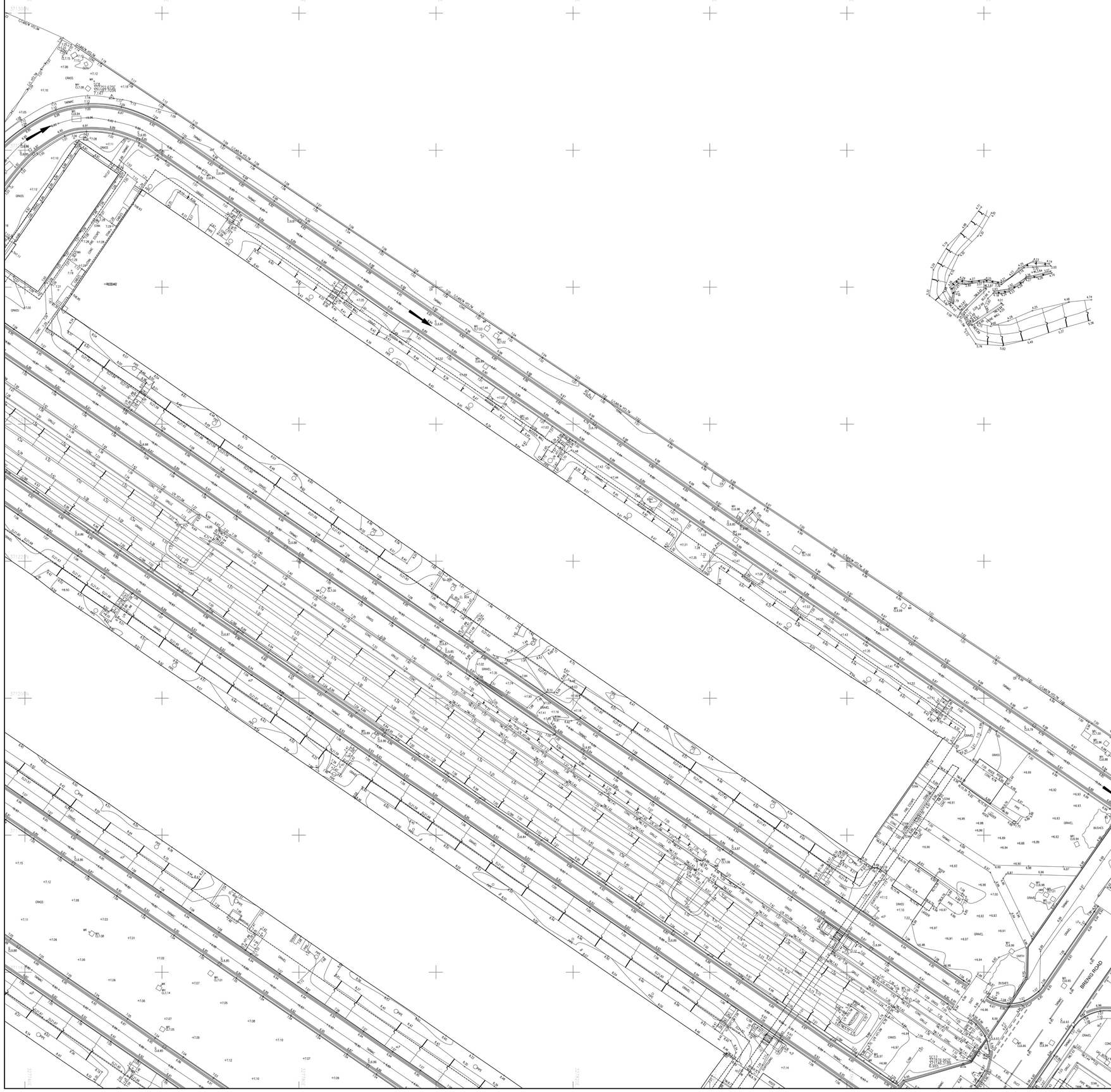
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project
Connah's Quay Power Station

Drawing Title
Topographical Survey
Sheet 18 of 22

Drawn By	IC	23/12/24	Survey Date: November 2024
Checked by	ED/DJ	24/12/24	Scale: A0@1:200

Drawing No: 62330/18 Revision:



Survey Notes

Grid: National Grid, converted using OSTN15

Levels: Ordinance Datum converted using OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building
Building Open Sided
Ruin — RUIN
Pressepa
Wall with Height — WALL H=3.5m
Retaining Wall — R/W

FENCE STYLES AND DESCRIPTIONS

Close Boarded — C/B
Corrugated Iron — C/I
Chestnut Paling — C/P
Chainlink — C/L
Handrail — H/R
Interwoven — WN
Iron Railings — I/R
Lattice — L/T
Miscellaneous — Misc
Palisade — PAL
Post & Chain — P/C
Post & Rail — P/R
Post & Wire — P/W
Post & Barbed Wire — B/W
Wire mesh — W/M
Stile
Gate
Fence Inestyle

ROADS

Kerbs
Edge of Surfacing
Pedestrian Crossing — PC
Track
Footpath — + SFR

STREET FURNITURE

Beckhs Beacon — + BB
Bus Stop — + BS
Bollard — + B
Cable Eye — + CE
Coal Chute — + CC
Closed Circuit TV — + CCTV
Drain — + DR
Electricity Pole — + EP
Flood Light — + FL
Flag Staff — + FS
Lamp Post — + LP
Letter Box — O LB
Name Plate (street) — NP
Mooring Ring — + MR
Mile Post or Mooring Post — + MP
Service Marker — + MK
Mile Stone — + MS
Post — + P
Parking Meter — + PM
Reflector Post — + RP
Rodding Eye — + RE
Road Sign — + RS
Speed Camera — + S/CAM
Information Sign — + SGN
Stay — + ST
Traffic Light — + TL
Telegraph Pole — + TP
Traffic Light Push Button Post — + TLP
Traffic Light Control Box — + TLC/P
Control Box — C/BOX
British Telecom Box — BT BOX
Electricity Box — EL BOX
Gas Box — GAS BOX
Cycle Lane Bollard — CLB

INSPECTION CHAMBERS AND PIPES

Inspection Cover — IC
Inspection Cover (Elec) — IC/EL
Manhole — MH
British Telecom Cover — BT
Inspection Cover (Comms) — IC/COM
Cable TV — CATV
Inspection Cover Traffic Signals — IC/TL
Gully — G
Kerb Outlet — KO
Vent Pipe — + VP
Down Pipe — + DP
Rain Water Pipe — + RWP
Soil Pipe — + SVP
Gas Pipe — + G-PIPE
Unable to lift cover — UTL
Stop Tap — + ST
Stop Valve — + SV
Lamphole — + LH
Hydrant — + HYD
Earth Rod — + ER
Gas Valve — + GV
Water Meter — + WM
Washout — + WO
Rodding Eye — + RE

GENERAL INFORMATION

Petrol Pump — PP
Basement Light — BL
Floodlridge — FB
Dish Type Channel
Slot Type Channel
Grate Type Channel
Tactile Paving — TAC
Crash Barrier — C/BR
Column — COL
Stanchion — STAN
Air Vacuum — AIR VAC
Offset Fill — + OF
Air Valve — + AV
Trough — TR
Chimney — CHY
Telephone Call Box — TCB

OVERHEAD FEATURES

Electricity Pylon — E.PYLON
Electricity
Telephone

WATER FEATURES

Canal
Stream
Ditch
Weir
Culvert
Drip (Land Drain)
Spring — + SPR

RELIEF AND VEGETATION

Hedge
Edge of wood/Bushes
Stump — STUMP
Individual Tree
Slopes with Height Greater than 1m
Cliff Face
Marsh
Reeds

LEVEL AND HEIGHT INFORMATION

Standard Spot Height — + 123.45
Predicted Spot Height — + 123.456
Bed Level — + BL23.52
Water Level — + W.24.52
Soffit Level — + SL25.52
Threshold Level — + THR6.88
Cover Level — + CL26.45
Invert Level — + I.25.15
Pipe Soffit Level — + PSL5.00
Floor Level — + FL8.00
Finished Floor Level — + FFL6.00
Top of Tank Level — + TT7.00
Eave Level — + EL7.00
Ridge Level — + RL8.00
Roof Hip Level — + RHL8.50
Flat Roof Level — + FRL7.00
Top of Canopy Level — + TOP/C7.00
Underside of Canopy Level — + SOF/CSL5.50
Window Sill Level — + WSL6.00
Window Head Level — + WHL8.00
Springing Level — + SPL8.50
Arch Level — + AL7.00
Cable Level — + CHT8.55
Top of Wall Level — + TWL10.00
Underside of Beam Level — + UBL8.55
General Height — + HT8.00

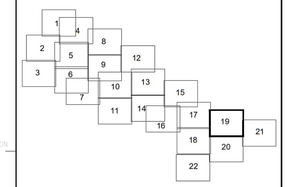
SURVEY INFORMATION SIGNS

Permanent Ground Marker
O.S. Trig Station
O.S. Bench Mark

GEOTECHNICAL INFORMATION

Borehole — BH
Trial Pit — TP
Monitor Pin — + MON
Probe Hole — + PH
Window Sample — + WS

Sheet Index



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Project

Connah's Quay Power Station

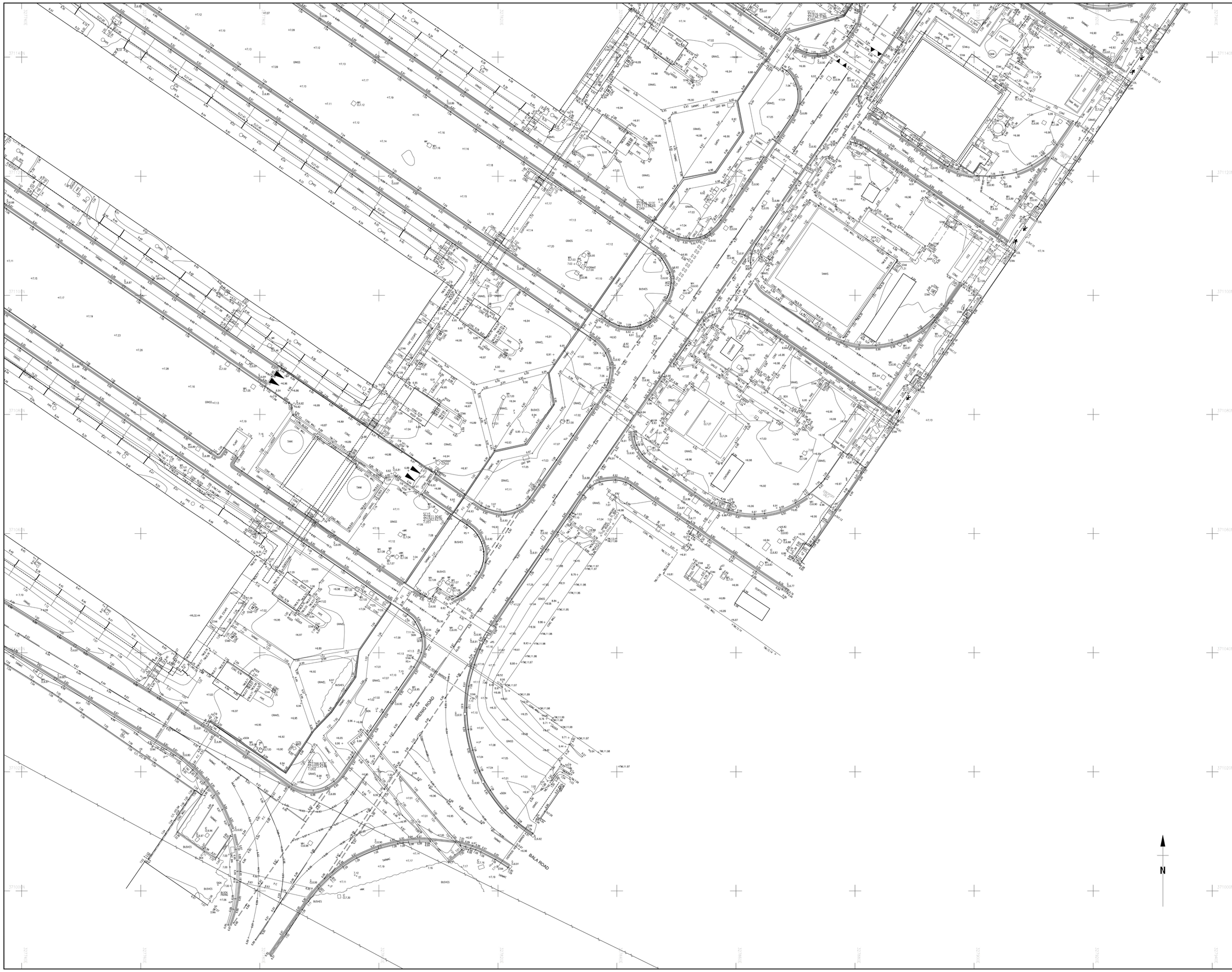
Drawing Title

Topographical Survey
Sheet 19 of 22

Drawn By	IC	23/12/24	
Checked by	ED/DJ	24/12/24	
Survey Date	November 2024		
Scale	A0@1:200		

Drawing No: 62330/19

Revision



Survey Notes

Grid: National Grid, converted using OSTN15

Levels: Ordnance Datum converted using OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building
Building Open Sided
Ruin (RUIN)
Pressepa
Wall with Height
Retaining Wall (Wall H=1.5m) R/W

FENCE STYLES AND DESCRIPTIONS

Close Boarded C/B
Corrugated Iron C/I
Chestnut Paling C/P
Chainlink C/L
Hurdrail H/R
Interwoven WH
Iron Railings I/R
Lattice L/T
Miscellaneous Misc
Palisade PAL
Post & Chain P/C
Post & Rail P/R
Post & Wire P/W
Post & Barbed Wire B/W
Wire mesh W/M
Stile
Gate
Fence linestyle

ROADS

Kerbs
Edge of Surfacing
Pedestrian Crossing (PC)
Track
Footpath

STREET FURNITURE

Beacon = BB
Bus Stop = BS
Bollard = B
Cable Dye = CE
Coal Chute = CC
Closed Circuit TV = CCTV
Drain = DR
Electricity Pole = EP
Flood Light = FL
Flag Staff = FS
Lamp Post = LP
Letter Box = LB
Name Plate (street) = NP
Mooring Ring = MR
Mile Post or Mooring Post = MP
Service Marker = MK
Mile Stone = MS
Post = P
Parking Meter = PM
Reflector Post = RP
Rodding Eye = RE
Road Sign = RS
Speed Camera = S/CAM
Information Sign = SGN
Stay = ST
Traffic Light = TL
Telegraph Pole = TP
Traffic Light Push Button Post = TLP
Traffic Light Control Box = TLC/P
Control Box = C/BOX
British Telecom Box = BT BOX
Electricity Box = EL BOX
Gas Box = GAS BOX
Cycle Lane Bollard = CLB

INSPECTION CHAMBERS AND PIPES

Inspection Cover = IC
Inspection Cover (Elec) = IC/EL
Manhole = MH
British Telecom Cover = BT
Inspection Cover (Comms) = IC/COM
Cable TV = CATV
Inspection Cover Traffic Signals = IC/TL
Gully = G
Kerb Outlet = KO
Vent Pipe = VP
Down Pipe = DP
Rain Water Pipe = RWP
Soil Pipe = SVP
Gas Pipe = G-PIPE
Unable to lift cover = UTL
Stop Tap = ST
Stop Valve = SV
Lamphole = LH
Hydrant = HYD
Earth Rod = ER
Gas Valve = GV
Water Meter = WM
Washout = WO
Rodding Eye = RE

GEOTECHNICAL INFORMATION

Borehole = BH
Trial Pit = TP
Monitor Pin = MON
Probe Hole = PH
Window Sample = WS

GENERAL INFORMATION

Petrol Pump = PP
Basement Light = BL
Floodlamp = FB
Dish Type Channel
Slot Type Channel
Grate Type Channel
Textile Paving = TXC
Drain Barrier = C/BR
Column = COL
Stanchion = STAN
Air Vacuum = VAC
Offset Fill = o OF
Air Valve = o AV
trough = TR
Chimney = CHY
Telephone Call Box = TCB

OVERHEAD FEATURES

Electricity Pylon = E.PYLON
Electricity
Telephone

WATER FEATURES

Canal
Stream
Ditch
Weir
Culvert
Drip (Land Drain)
Spring = SPR

RELIEF AND VEGETATION

Hedge
Edge of wood/Bushes
Stump = STUMP
Individual Tree
Slopes with Height Greater than 1m
Cliff Face
Marsh
Reeds

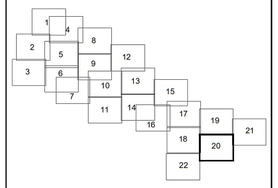
LEVEL AND HEIGHT INFORMATION

Standard Spot Height = 123.45
Predicted Spot Height = (123.456)
Bed Level = BL23.52
Water Level = WL24.52
Soffit Level = SL25.52
Threshold Level = THR6.88
Dower Level = CL26.45
Invert Level = IL25.15
Pipe Soffit Level = PSL5.00
Floor Level = FL8.00
Finished Floor Level = FFL8.00
Top of Tank Level = TT7.00
Cave Level = CL7.00
Ridge Level = RL8.00
Roof Hip Level = RHL8.00
Flat Roof Level = FRL7.00
Top of Canopy Level = TOP/C7.00
Underside of Canopy Level = SOF/CSL8.00
Window Sill Level = WSL8.00
Window Head Level = WHL8.00
Springing Level = SPL8.50
Arch Level = ALT.00
Cobble Level = CHR.55
Top of Wall Level = TWL10.00
Underside of Beam Level = UBL8.55
General Height = HT8.00

SURVEY INFORMATION SIGNS

Permanent Ground Marker
O.S. Trig Station
O.S. Bench Mark

Sheet Index



Rev.	Date	Description

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Client
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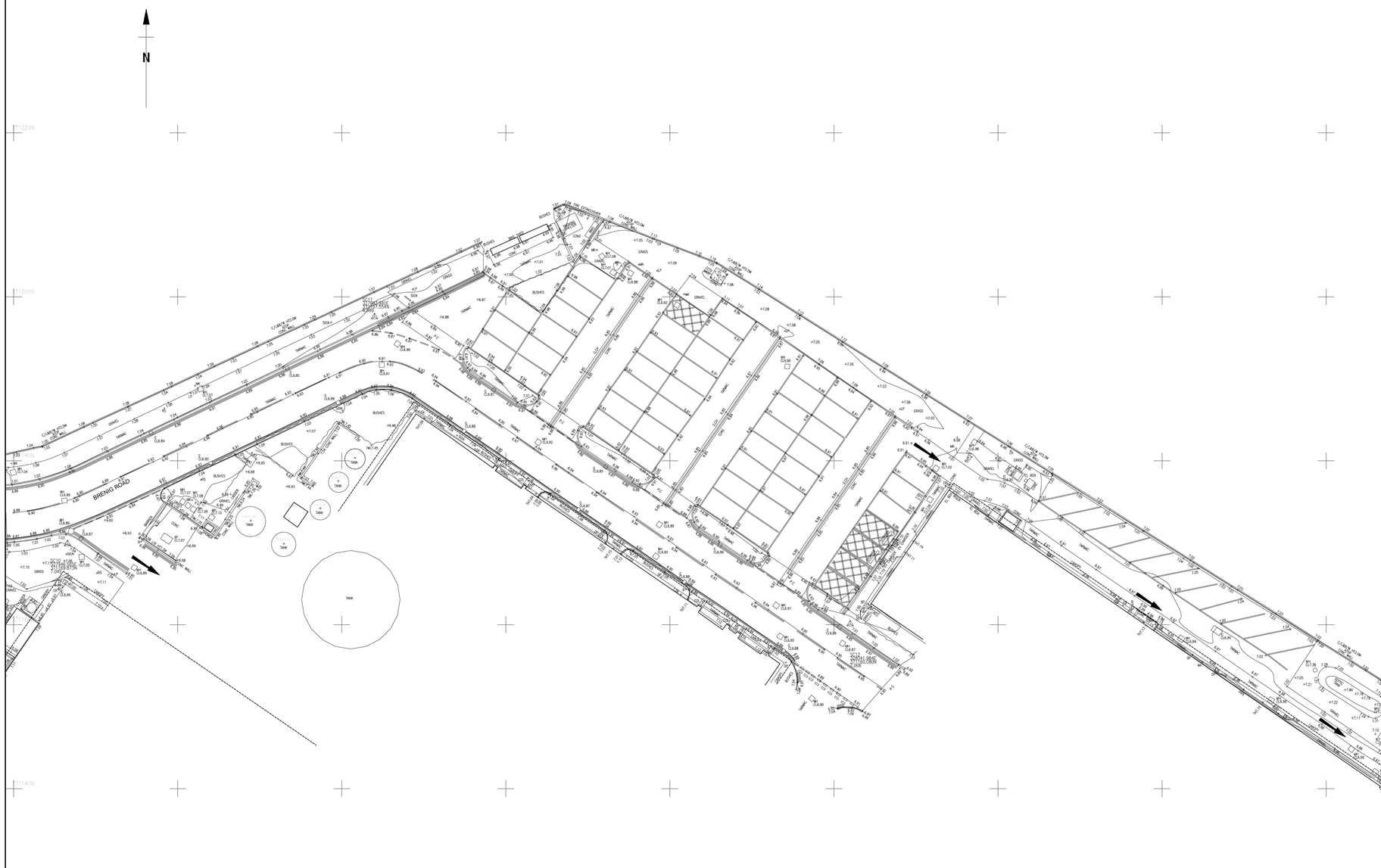
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project
Connah's Quay Power Station

Drawing Title
Topographical Survey
Sheet 20 of 22

Drawn By	IC	23/12/24	Survey Date: November 2024
Checked by	ED/DJ	24/12/24	Scale: A0@1:200

Drawing No: 62330/20
Revision:



Survey Notes

Grid: National Grid, converted using OSTN15

Levels: Ordnance Datum converted using OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building
Building Open Sided
Ruin (RUIN)
Passage
Wall with Height Retaining Wall (Wall 1m) RW

FENCE STYLES AND DESCRIPTIONS

Close Boarded C/B
Corrugated Iron C/I
Chestnut Paling C/P
Chainlink C/L
Handrail H/R
Interwoven WH
Iron Railings I/R
Lattice L/T
Miscellaneous Misc
Palisade PAL
Post & Chain P/C
Post & Rail P/R
Post & Wire P/W
Post & Barbed Wire B/W
Wire mesh W/M
Stile
Gate
Fence linestyle

ROADS

Kerbs
Edge of Surfacing
Pedestrian Crossing (PC)
Track
Footpath

STREET FURNITURE

Bedding Beacon ⊕ BB
Bus Stop ⊕ BS
Bollard ⊕ B
Cable Eye ⊕ CE
Coal Chute ⊕ CC
Closed Circuit TV ⊕ CCTV
Drain ⊕ DR
Electricity Pole ⊕ EP
Flood Light ⊕ FL
Flag Staff ⊕ FS
Lamp Post ⊕ LP
Letter Box ⊡ LB
Name Plate (street) — NP
Mooring Ring ⊕ MR
Mile Post or Mooring Post ⊕ MP
Service Marker ⊕ MK
Mile Stone ⊕ MS
Post ⊕ P
Parking Meter ⊕ PM
Reflector Post ⊕ RP
Rodding Eye ⊕ RE
Road Sign ⊕ RS
Speed Camera ⊕ S/CAM
Information Sign ⊕ SGN
Stop ⊕ ST
Traffic Light ⊕ TL
Telegraph Pole ⊕ TP
Traffic Light Push Button Post ⊕ TLP
Traffic Light Control Box ⊕ TLC/P
Control Box □ C/BOX
British Telecom Box □ BT BOX
Electricity Box □ EL BOX
Gas Box □ GAS BOX
Cycle Lane Bollard CLB

INSPECTION CHAMBERS AND PIPES

Inspection Cover □ IC
Inspection Cover (Elec) □ IC/EL
Manhole □ MH
British Telecom Cover □ BT
Inspection Cover (Comms) □ IC/COM
Cable TV □ CATV
Inspection Cover Traffic Signals □ IC/TL
Gully □ G
Kerb Outlet □ KO
Vent Pipe ⊕ VP
Down Pipe ⊕ DP
Rain Water Pipe ⊕ RWP
Soil Pipe ⊕ SVP
Gas Pipe ⊕ G-PIPE
Unable to lift cover UTL
Stop Tap ⊕ ST
Stop Valve ⊕ SV
Lamphole ⊕ LH
Hydrant ⊕ HYD
Earth Rod ⊕ ER
Gas Valve ⊕ GV
Water Meter ⊕ WM
Washout ⊕ WO
Rodding Eye ⊕ RE

GEOTECHNICAL INFORMATION

Borehole BH
Trial Pit TP
Monitor Pin ⊕ MON
Probe Hole ⊕ PH
Window Sample ⊕ WS

GENERAL INFORMATION

Petrol Pump PP
Basement Light BL
Floodlamp FL
Dish Type Channel
Slot Type Channel
Grate Type Channel
Tactile Paving TAC
Crash Barrier C/BR
Column COL
Stanchion STAN
Air Vacuum VAC
Offset Fill ⊕ OF
Air Valve ⊕ AV
Trough TR
Chimney CHY
Telephone Call Box TCB

OVERHEAD FEATURES

Electricity Pylon E.PYLON
Electricity
Telephone

WATER FEATURES

Canal
Stream
Ditch
Weir
Culvert
Drip (Land Drain)
Spring ⊕ SPR

RELIEF AND VEGETATION

Hedge
Edge of wood/Bushes
Stump ● STUMP
Individual Tree
Slopes with Height Greater than 1m
Cliff Face
Marsh
Reeds

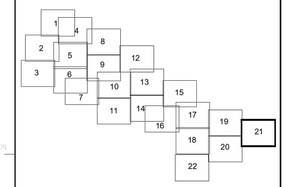
LEVEL AND HEIGHT INFORMATION

Standard Spot Height × 123.45
Predicted Spot Height × 123.456
Bed Level × BL23.52
Water Level × WL24.52
Soffit Level × SL25.52
Threshold Level × THR6.88
Cover Level × CL26.45
Invert Level × IL25.15
Pipe Soffit Level × PSL5.00
Floor Level × FL8.00
Finished Floor Level × FFL6.00
Top of Tank Level × TT7.00
Eave Level × EL7.00
Ridge Level × RL8.00
Roof Hip Level × RHL8.00
Flat Roof Level × FRL7.00
Top of Canopy Level × TOP/C7.00
Underside of Canopy Level × SOF/C6.50
Window Sill Level × WSL8.00
Window Head Level × WHL9.00
Springing Level × SPL8.50
Arch Level × ACL7.00
Cable Level × CVR.55
Top of Wall Level × TWL10.00
Underside of Beam Level × UBL8.55
General Height × HT8.00

SURVEY INFORMATION SIGNS

Permanent Ground Marker
O.S. Trig Station
O.S. Bench Mark

Sheet Index



Rev.	Date	Description

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Nottingham NG11 0EE

Project

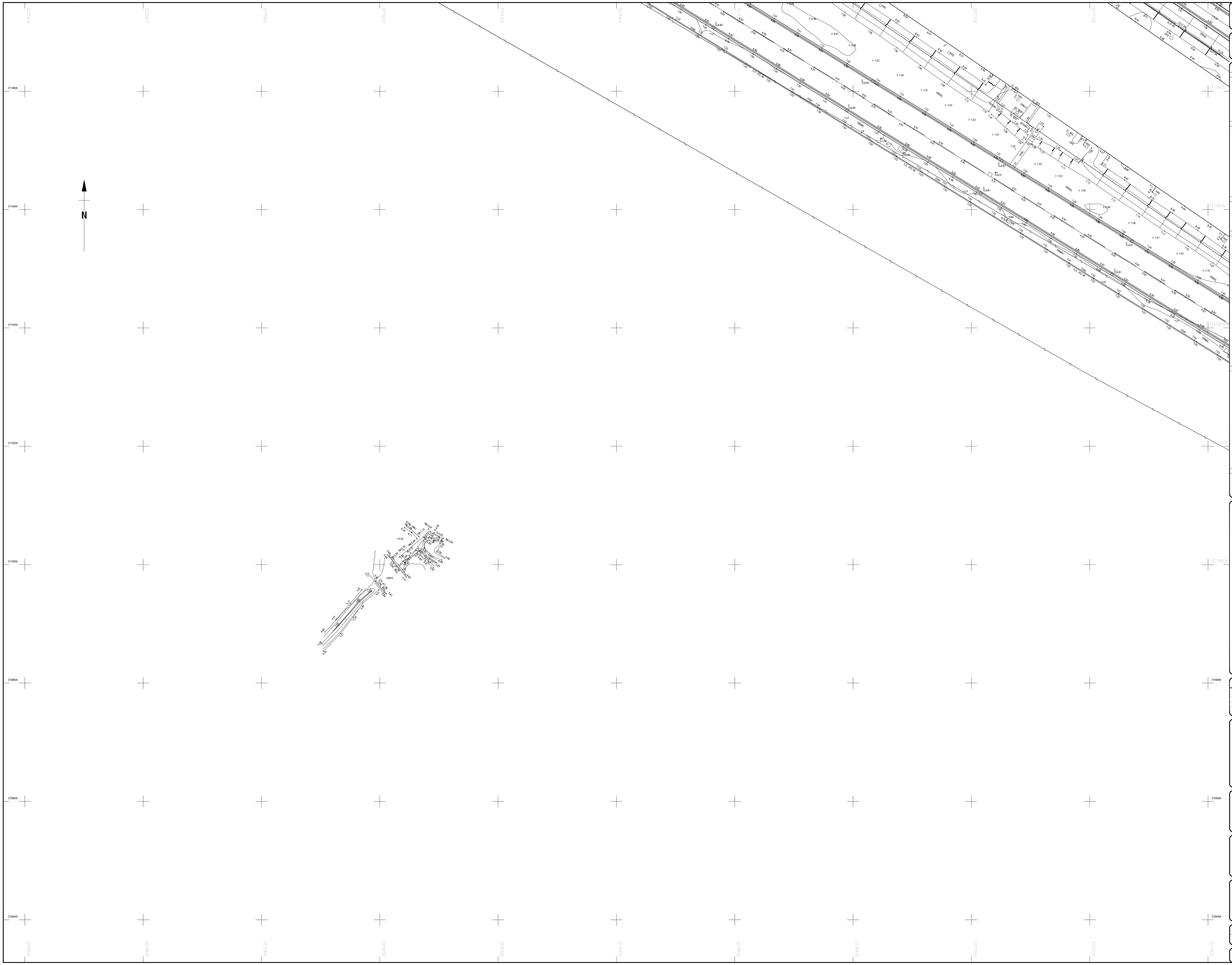
Connah's Quay Power Station

Drawing Title

Topographical Survey
Sheet 21 of 22

Drawn By	IC 23/12/24	Survey Date	November 2024
Checked by	ED/DJ 24/12/24	Scale	A0@1:200

Drawing No 62330/21 Revision



Survey Notes
Grid: National Grid, converted using OSTN15
Levels: Ordnance Datum converted using OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building	
Building Open Sided	
Ruin	RUIN
Passage	
Wall with Height	Wall Ht1.3m
Retaining Wall	R/W

FENCE STYLES AND DESCRIPTIONS

Close Boarded	C/B
Corrugated Iron	C/I
Chestnut Paling	C/P
Chainlink	C/L
Handrail	H/R
Interwoven	IWN
Iron Railings	I/R
Lattice	L/F
Miscellaneous	Misc
Palisade	PAL
Post & Chain	P/C
Post & Rail	P/R
Post & Wire	P/W
Post & Barbed Wire	B/W
Wire mesh	W/M
Stile	
Gate	
Fence linestyle	

ROADS

Kerbs	
Edge of Surfacing	
Pedestrian Crossing	PC
Track	Track
Footpath	FP

STREET FURNITURE

Belisha Beacon	∘ BB
Bus Stop	∘ BS
Bollard	∘ B
Cats Eye	∘ CE
Coal Chute	∘ CC
Closed Circuit TV	∘ CCTV
Drain	∘ DR
Electricity Pole	∘ EP
Flood Light	∘ FL
Flag Staff	∘ FS
Lamp Post	∘ LP
Letter Box	○ LB
Name Plate (street)	— NP
Mooring Ring	∘ MR
Mile Post or Mooring Post	∘ MP
Service Marker	∘ MK
Mile Stone	∘ MS
Post	∘ P
Parking Meter	∘ PM
Reflector Post	∘ RP
Rodding Eye	∘ RE
Road Sign	∘ RS
Speed Camera	∘ S/CAM
Information Sign	∘ SIGN
Stay	∘ SY
Traffic Light	∘ TL
Telegraph Pole	∘ TP
Traffic Light Push Button Post	∘ TLP
Traffic Light Control	∘ TLC/P
Control Box	☐ C/BOX
British Telecom Box	☐ BT BOX
Electricity Box	☐ EL BOX
Gas Box	☐ GAS BOX
Cycle Lane Bollard	CLB

INSPECTION CHAMBERS AND PIPES

Inspection Cover	☐ IC
Inspection Cover (Elec)	☐ IC/EL
Manhole	○ MH
British Telecom Cover	☐ BT
Inspection Cover (Comms)	☐ IC/COM
Cable TV	☐ CATV
Inspection Cover Traffic Signals	☐ IC/TL
Gully	☐ G
Kerb Outlet	☐ KO
Vent Pipe	∘ VP
Down Pipe	∘ DP
Rain Water Pipe	∘ RWP
Soil Pipe	∘ SVP
Gas Pipe	∘ G-PIPE
Unable to lift cover	UTL
Stop Tap	∘ ST
Stop Valve	∘ SV
Lamphole	∘ LH
Hydrant	∘ HYD
Earth Rod	∘ ER
Gas Valve	∘ GV
Water Meter	∘ WM
Washout	∘ WO
Rodding Eye	∘ RE

GEOTECHNICAL INFORMATION

Borehole	BH
Trial Pit	TP
Monitor Pin	∘ MON
Probe Hole	∘ PH
Window Sample	∘ WS

GENERAL INFORMATION

Petrol Pump	☐ PP
Basement Light	☐ BL
Footbridge	FB
Dish Type Channel	D.CH
Slot Type Channel	S.CH
Grate Type Channel	G.CH
Tactile Paving	TAC
Crash Barrier	C/BR
Column	○ COL
Stanchion	☐ STAN
Car Vacuum	☐ VAC
Offset Fill	∘ OF
Air Valve	∘ AV
Trough	TR
Chimney	○ CHY
Telephone Call Box	☐ TCB

OVERHEAD FEATURES

Electricity Pylon	E.PYLON
Electricity	ETL
Telephone	OTL

WATER FEATURES

Canal	Canal
Stream	Stream
Ditch	Ditch
Weir	Weir
Culvert	Cul
Grip (Land Drain)	
Spring	∘ SPR

RELIEF AND VEGETATION

Hedge	
Edge of wood/Bushes	
Stump	● STUMP
Individual Tree	
Slopes with Height Greater than 1m	
Cliff Face	
Marsh	
Reeds	

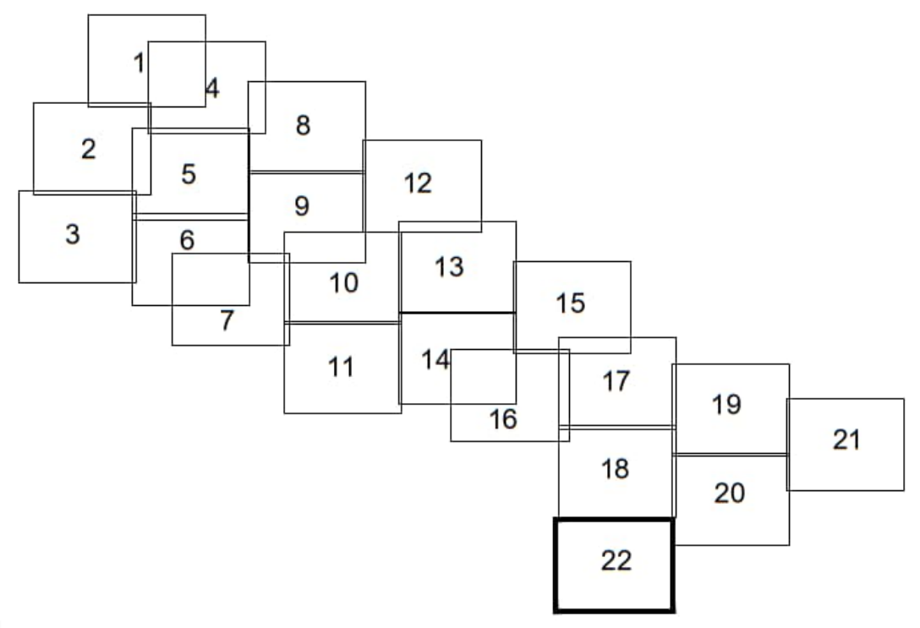
LEVEL AND HEIGHT INFORMATION

Standard Spot Height	+ 123.45
Precision Spot Height	+ 123.456
Bed Level	+ BL23.92
Water Level	+ WL24.92
Soffit Level	+ SL25.92
Threshold Level	+ TH26.98
Cover Level	+ CL26.45
Invert Level	+ IL25.15
Pipe Soffit Level	+ PSL5.00
Floor Level	+ FL6.00
Finished Floor Level	+ FFL6.00
Top of Tank Level	+ TT7.00
Eave Level	+ EL7.00
Ridge Level	+ RL9.00
Roof Hip Level	+ RHL8.50
Flat Roof Level	+ FRL7.00
Top of Canopy Level	+ TOP/C7.00
Underside of Canopy Level	+ SOF/C6.50
Window Sill Level	+ WSL8.00
Window Head Level	+ WHL9.00
Springing Level	+ SPL8.50
Arch Level	+ AL7.00
Cable Level	+ CHT8.55
Top of Wall Level	+ TWL10.00
Underside of Beam Level	+ UBL9.55
General Height	+ HT9.00

SURVEY INFORMATION SIGNS

- Permanent Ground Marker
- O.S. Trig Station
- O.S. Bench Mark

Sheet Index



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Nottingham NG11 0EE

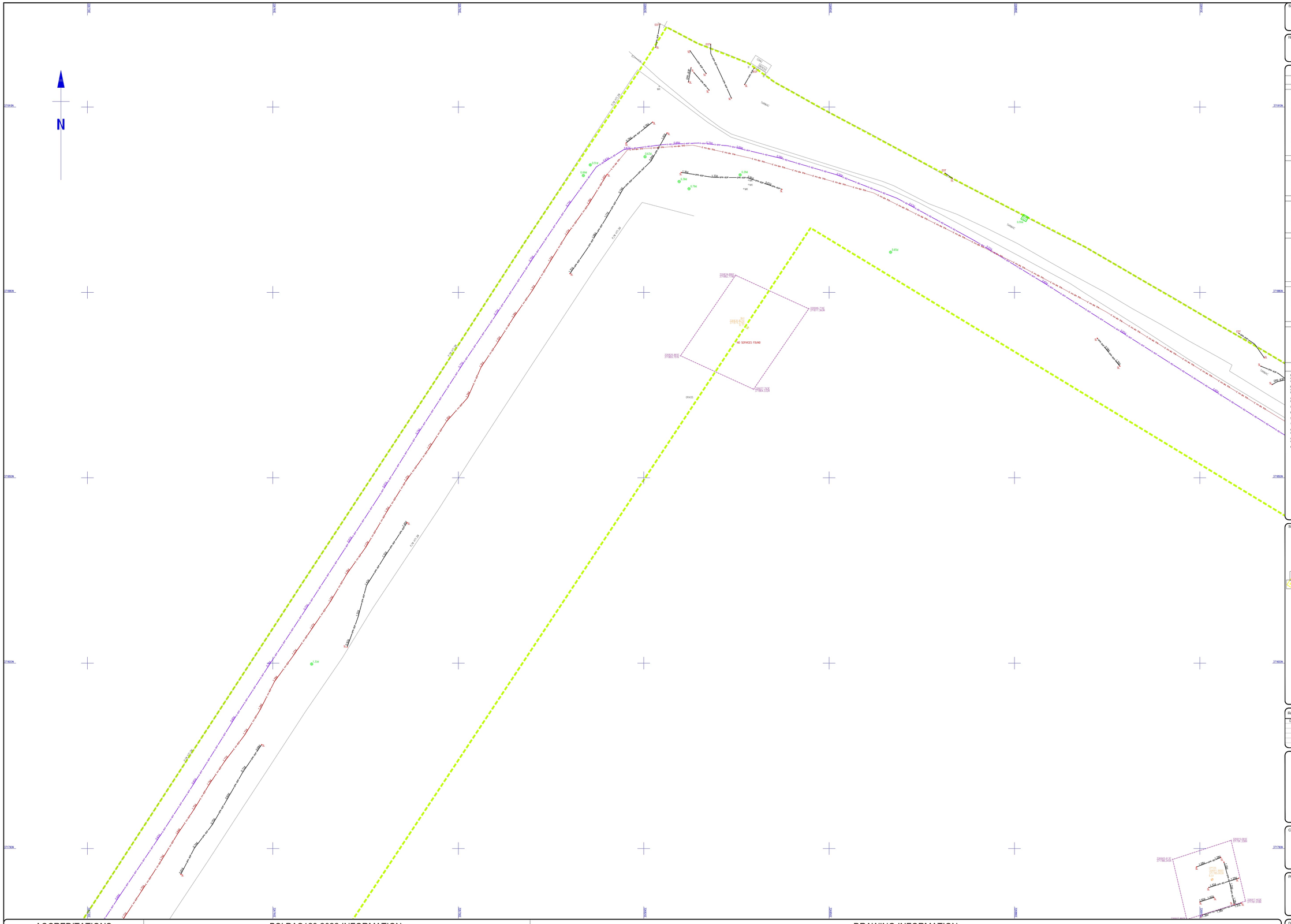
Project
Connah's Quay Power Station

Drawing Title
Topographical Survey
Sheet 22 of 22

Drawn By	IC	23/12/24	Survey Date: November 2024
Checked by	ED/DJ	24/12/24	Scale: A0@1:200

Drawing No: 62330/22
Revision:

Annex C: Utilities Survey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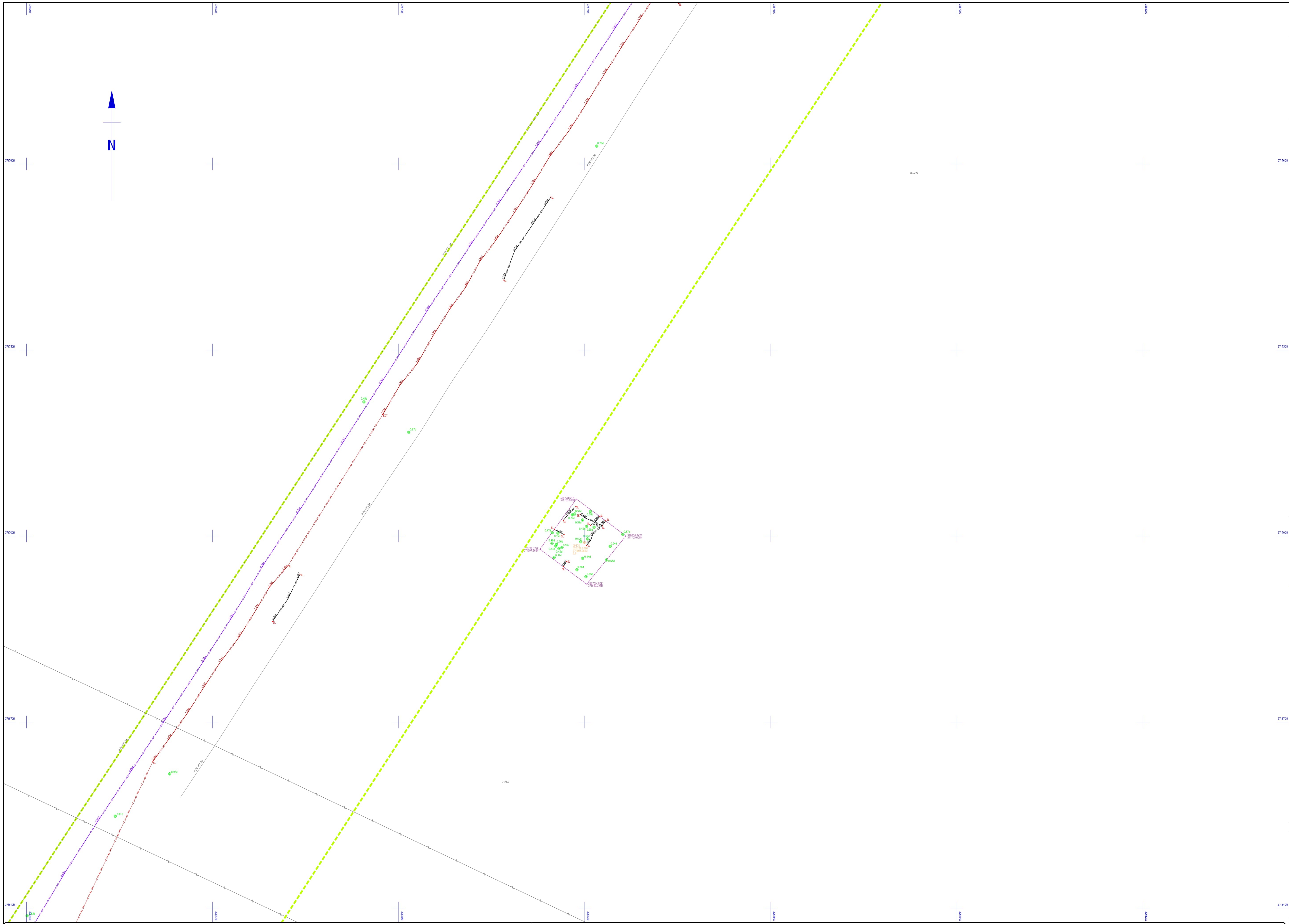


Survey Notes

Grid:	Plane, local related to OS Grid.
Levels:	OS Datum from GNSS positioning, converted using the National Geoid Model OSGM15.

Notes

Utility drawing to be read in conjuction with survey report.

Survey Legend

UNDERGROUND SERVICES KEY

COMMUNICATION CABLES

TV	Cable TV
COM	Communication
COM	Colt Telecom
COM	EU Networks
COM	Instalcom
COM	Neo Network
COM	Nynex
COM	Sky
TEL	Telecom
COM	Veolia
COM	Verizon
COM	Zayo

GROUND PENETRATING RADAR

▨	GPR Detected Anomaly Area/Point
▨	GPR Detected Rebar
▨	GPR Detected Structural Feature
▨	GPR Detected Structure
▨	GPR Low Data
GPR	GPR
0.79d	GPR Detected Anomaly Point Directional
	GPR Transect

DRAINAGE PIPES

CW	Chemically Contamined Drains Pumped
CW	Gas Turbine Washdown
CW	Oil Contaminted Station Drains System
CW	Sewer Combined
FW	Sewer Foul
SW	Sewer Surface Water

OTHER SERVICES

AD	Acid Drain
AIR	Air Line
AC	Alarm Cable
CCTV	CCTV
CH	Chemical
CA	Compressed Air
EA	Earthing Cables
EF	Effluent
DU	Empty Ducting
H	Heating Pipe
O	Overflow
OX	Oxygen Pipe
/	Rising Main
SM	Sludge Main
STM	Steam Duct
TM	Thermal Main
TL	Traffic Light Cable
U	Unidentified
VD	Vehicle Detector Loop
V	Vent Pipe
WW	Wash Water
W	Water
W	Cooling Water Return
W	Cooling Water Supply

FIBRE OPTICAL CABLES

FO	City Fibre
FO	EXA Fibre Optic
FO	GTT Fibre Optic
FO	Virgin Media
FO	Vodafone

FUEL SERVICES

GA	Fuel Gauge Line
FU	Fuel Line
V	Fuel Vent Line
OF	Offset Fill Pipe
OP	Oil Pipe
VR	Vapor Recovery Pipe

ELECTRICAL CABLES

L	Street Lighting
E	Electrical
E LV	Electrical LV
E HV	Electrical HV

OTHER LINETYPES

EOT	End of trace
	Services Survey Boundary
	Area of No Access

GAS PIPES

G	Gas
G LP	Gas LP
G MP	Gas MP
G IP	Gas IP
G HP	Gas HP

SERVICE QUALITY LEVEL EXAMPLE

TEL-A	Quality Level A
TEL-B1	Quality Level B1
TEL-B1P	Quality Level B1P
TEL-B2	Quality Level B2
TEL-B2P	Quality Level B2P
TEL-B3	Quality Level B3
TEL-B3P	Quality Level B3P
TEL-B4 AR	Quality Level B4 AR
TEL-B4 TFR	Quality Level B4 TFR

For Quality Level definitions see BSI PAS128:2022 information below.
For more information go to www.malcolmhughes.co.uk

DISCLAIMERS

Electromagnetic and Ground Penetrating Radar techniques have been used in the detection of underground services, features and anomalies shown on this survey plan. These are interpretive procedures and we recommend that trial excavations should be undertaken to confirm identification, location and depth of features where these are critical to design or site works.

It is important to understand that there are limitations when it comes to detecting and mapping buried pipes, cables and ducts due to various factors such as depth location, material type, geology and proximity to other utilities. Even with the use of advanced techniques and equipment, it is not always possible to accurately detect and map all underground infrastructure.

All reasonable effort and care has been made in searching available record drawings. The completeness of the underground service information supplied to and by us cannot be guaranteed.

Where services are non-metallic or not proven on site, positions are taken from records, trench scars and surface detail.

Pipe sizes which cannot be obtained by visual survey are taken from utilities record drawings or marker plates where available.

Services shown as PAS128 QL- B4 TFR (Taken from records) and QL - B4 AR (Assumed Route) have not been proven on site.

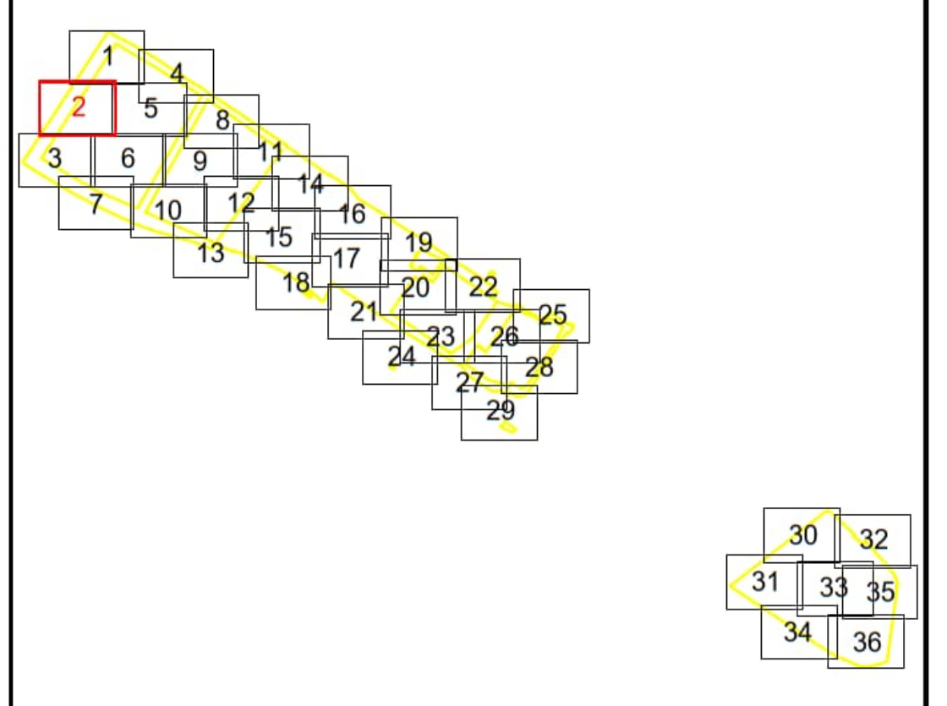
The CAD layering may contain further information.

Collected data from GPR has not been post processed unless specified elsewhere or denoted on the survey drawing by the abbreviation of (P).

All utilities inspected and measured at Inspection Covers or Manholes are considered to be a QL-A for a radius up to 5m from the chamber wall.

HSG47 safe digging practices should still be adhered to when using these Utility Mapping Survey plans.

Sheet Index



Rev.	Date	Description
00		First Issue

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Project
Connah's Quay Power Station

Drawing Title
Utility Mapping Survey
Sheet 2/36

Surveyed by	SL/JB	CAD by	PS	Survey Date	April 2025
Checked by	DJ/SL	Approved by	AT	Scale	1:200 [A0 Sheet]
Drawing No	62330/UG2	Revision	00		

ACCREDITATIONS

RICS
THE SURVEY ASSOCIATION
chartered ices
PUMA
PAS128 ACCREDITATION
RISQS QUALIFIED
bsi. ISO 9001 Quality Management
FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION
APPROX. DEPTH TO CENTRE
CABLE/FIBRE OPTIC

GRAVITY DRAIN (VISUAL OBSERVATION)
APPROX DEPTH TO INVERT

GROUND PENETRATING RADAR
APPROX DEPTH TO EXTERNAL CROWN

BSI PAS128:2022 QUALITY LEVEL INFORMATION

SURVEY TYPE		QUALITY LEVEL	POST-PROCESSING (GPR DATA ANALYSIS)	ACCURACY		DESCRIPTION (SUPPORTING DATA)
				HORIZONTAL	VERTICAL	
B	Detection	QL-B4 TFR	No	Undefined	Undefined	Location not detected on site, taken from records.
		QL-B4 AR	No	Undefined	Undefined	A utility segment that has not been detected but is suspected to exist. Denotes assumed route only.
		QL-B3	No	±500mm	Undefined (No reliable depth)	Horizontal detection by one geophysical technique only. Denotes utility segments with weak signals / no depth information.
		QL-B3P	Yes			
		QL-B2	No	±250mm	±40% of detected depth	Horizontal and vertical detection by one geophysical technique only (Electromagnetic Detection/Ground Penetrating Radar). Medium confidence level for position and depth.
		QL-B2P	Yes			
		QL-B1	No	±150mm	±15% of detected depth	Horizontal and vertical detection by multiple geophysical techniques. (Electromagnetic Detection/Ground Penetrating Radar). High confidence level for position and depth.
		QL-B1P	Yes			
A	Verification	QL-A	No	±50mm	±50mm	Horizontal and vertical location of the utility established by visual inspection at manholes and inspection covers or by use of targeted excavations (vacuum excavation and trial pits).

DRAWING INFORMATION

DUCTING LAYOUTS

1W:	1 WAY SINGLE DUCT
2W:	2 WAY FLAT
2W: 1/2	2 WAY: 1 WIDE, 2 DEEP
4W: 2/2	4 WAY: 2 WIDE, 2 DEEP
6W: 3/2	6 WAY: 3 WIDE, 2 DEEP
12W: 4/3	12 WAY: 4 WIDE, 3 DEEP

STREET FURNITURE

Air Valve	o AV
Bus Stop	o BS
Bollard	o B
Buchan Trap	o Buc
Cable Riser	o CR
Closed Circuit TV	o CCTV
Down Pipe	o DP
Drain	o D
Earth Rod	o ER
Electricity Pole	o EP
Flood Light	o FL
Gas Riser	o GR
Gas Valve	o GV
Hydrant	o FH
Lamp Post	o LP
Service Marker	o MK
Offset Fill	o OF
Post	o P
Parking Meter	o PM
Rain Water Pipe	o PR
Pipe Riser	o RWP
Rodding Eye	o RE
Road Sign	o RS
Soil Pipe	o SVP
Stop Tap	o ST
Stop Valve	o SV
Traffic Light	o TL
Telegraph Pole	o TP
Traffic Light Push Button Post	o TLP
Traffic Light Control	o TLC/P
Vent Pipe	o VP
Water Meter	o WM
Washout	o WO
Control Box	☐ C/BOX
Car Vacuum	☐ VAC
Car Air	☐ AIR
Electrical Box	☐ EB
Junction Box	☐ JB
Gas Governor	☐ GAS GOV
Telephone Call Box	☐ TCP
Petrol Pump	☐ PP
Dish Drainage Channel	CD
Slot Drainage Channel	SD
Grate Drainage Channel	G.CH

ABBREVIATIONS

Assumed Route	AR
Backdrop	BD
Blocked	BLK
Depth	d
Ground Penetrating Radar	GPR
No Visible Pipes	NVP
Offset Fill	OF
Signal Lost	SL
Taken From Records	TFR
Tank	T
Unable To Survey	UTS
Unable To Rod	UR
Unable To Trace	UT
Unable To Lift	UTL
Vapour Recovery Point	VR

OVERHEAD FEATURES

Electricity Pylon	☒
Electricity	Z Z
Telephone	T T

LEVEL AND HEIGHT

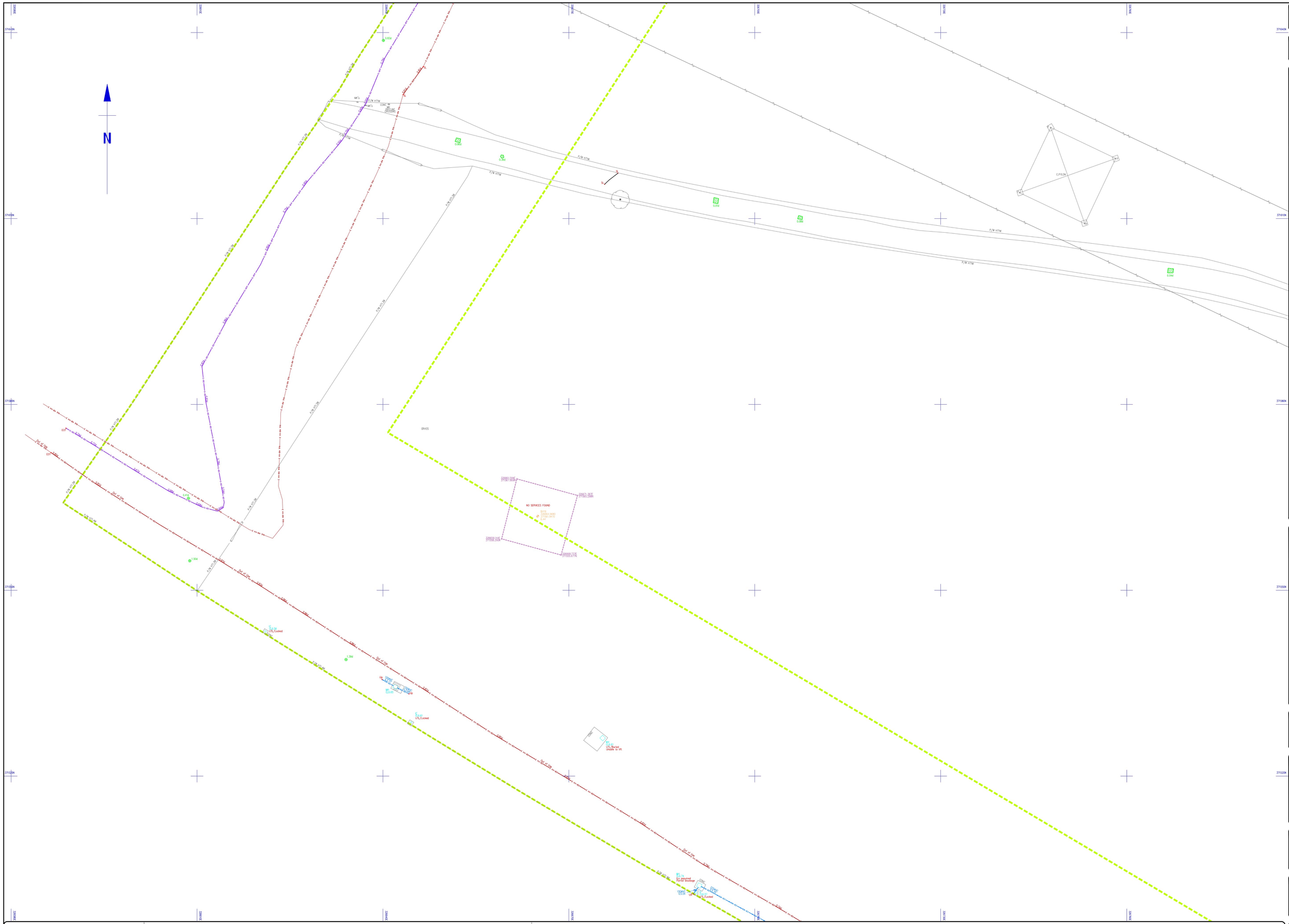
Inspection Cover	☐ IC
Inspection Cover (Elec)	☐ IC/EL
Manhole	☐ MH
British Telecom Cover	☐ BT
Inspection Cover (Comms)	☐ IC/COM
Cable TV	☐ CATV
Inspection Cover Traffic Signals	☐ IC/TL
Gully	☐ G
Kerb Outlet	☐ KO
Cover Level	CL:00.00
Invert Level	IL:00.00
Soffit Level	SL:00.00
Reducing Slab Level	RS:00.00
Sump Level	SUMP:00.00
Water Level	WL:00.00
Pit Level	PIT:00.00

Cover
Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	CO
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
Vitrified Clay	VC

ADDITIONAL NOTES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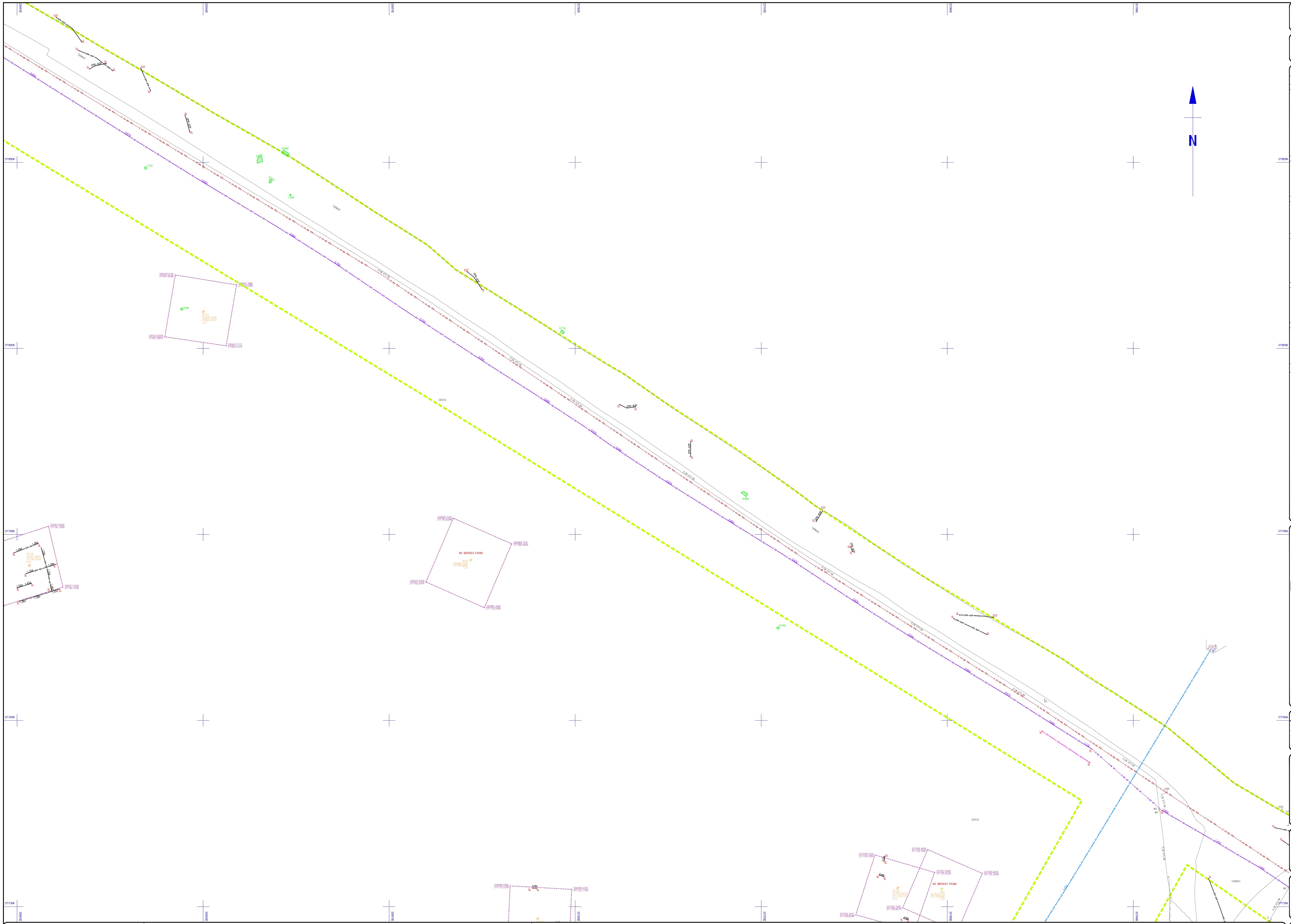
376600N
376800N
377000N
377200N
377400N
377600N
377800N
NO SERVICES FOUND
GRASS
EOT
P/W HTM
P/W UTL
P/W STM
P/W ELEC
P/W TEL
GAS
Ø4" CI Pipe
Ø6" CI Pipe
Ø8" CI Pipe
Ø10" CI Pipe
Ø12" CI Pipe
Ø14" CI Pipe
Ø16" CI Pipe
Ø18" CI Pipe
Ø20" CI Pipe
Ø24" CI Pipe
Ø30" CI Pipe
Ø36" CI Pipe
Ø42" CI Pipe
Ø48" CI Pipe
Ø54" CI Pipe
Ø60" CI Pipe
Ø66" CI Pipe
Ø72" CI Pipe
Ø78" CI Pipe
Ø84" CI Pipe
Ø90" CI Pipe
Ø96" CI Pipe



Survey Notes
Grid: Plane, local related to OS Grid.
Levels: OS Datum from GNSS positioning, converted using the National Geoid Model OSGM15.

Notes
Utility drawing to be read in conjuction with survey report.

Survey Legend

UNDERGROUND SERVICES KEY

COMMUNICATION CABLES

TV	Cable TV
COM	Communication
COM	Colt Telecom
COM	EU Networks
COM	Instalcom
COM	Neo Network
COM	Nynex
COM	Sky
TEL	Telecom
COM	Veolia
COM	Verizon
COM	Zayo

GROUND PENETRATING RADAR

▨	GPR Detected Anomaly Area/Point
▨	GPR Detected Rebar
▨	GPR Detected Structural Feature
▨	GPR Detected Structure
▨	GPR Low Data
GPR	GPR
0.79d	GPR Detected Anomaly Point Directional
	GPR Transect

DRAINAGE PIPES

CW	Chemically Contamined Drains Pumped
CW	Gas Turbine Washdown
CW	Oil Contamined Station Drains System
CW	Sewer Combined
FW	Sewer Foul
SW	Sewer Surface Water

OTHER SERVICES

AD	Acid Drain
AIR	Air Line
AC	Alarm Cable
CCTV	CCTV
CH	Chemical
CA	Compressed Air
EA	Earthing Cables
EF	Effluent
DU	Empty Ducting
H	Heating Pipe
O	Overflow
OX	Oxygen Pipe
/	Rising Main
SM	Sludge Main
STM	Steam Duct
TM	Thermal Main
TL	Traffic Light Cable
U	Unidentified
VD	Vehicle Detector Loop
V	Vent Pipe
WW	Wash Water
W	Water
W	Cooling Water Return
W	Cooling Water Supply

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FO	City Fibre
FO	EXA Fibre Optic
FO	GTT Fibre Optic
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FU	Fuel Line
V	Fuel Vent Line
OF	Offset Fill Pipe
OP	Oil Pipe
VR	Vapor Recovery Pipe

ELECTRICAL CABLES

L	Street Lighting
E	Electrical
E LV	Electrical LV
E HV	Electrical HV

OTHER LINETYPES

EOT	End of trace
	Services Survey Boundary
	Area of No Access

GAS PIPES

G	Gas
G LP	Gas LP
G MP	Gas MP
G IP	Gas IP
G HP	Gas HP

SERVICE QUALITY LEVEL EXAMPLE

TEL-A	Quality Level A
TEL-B1	Quality Level B1
TEL-B1P	Quality Level B1P
TEL-B2	Quality Level B2
TEL-B2P	Quality Level B2P
TEL-B3	Quality Level B3
TEL-B3P	Quality Level B3P
TEL-B4 AR	Quality Level B4 AR
TEL-B4 TFR	Quality Level B4 TFR

For Quality Level definitions see BSI PAS128:2022 information below.
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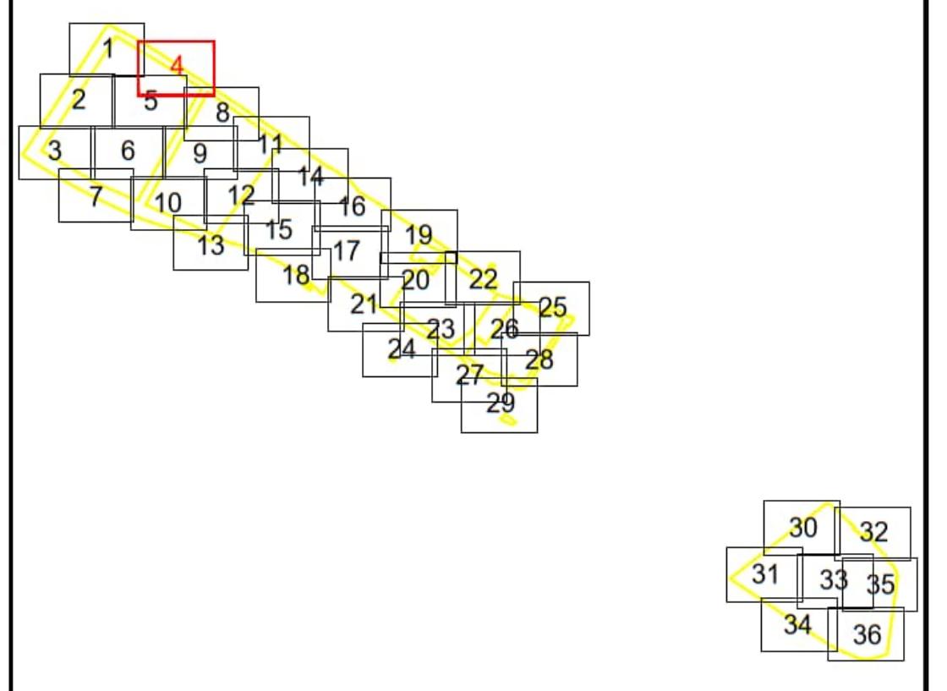

Rev.	Date	Description
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MALCOLM HUGHES
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Nottingham NG11 0EE

Project
Connah's Quay Power Station

Drawing Title
Utility Mapping Survey
Sheet 4/36

Surveyed by SL/JB	CAD by PS	Survey Date April 2025	
Checked by DJ/SL	Approved by AT	Scale 1:200	[A0 Sheet]
Drawing No 62330/UG4			Revision 00

ACCREDITATIONS

RICS
THE SURVEY ASSOCIATION
chartered ices
PUMA PAS128 ACCREDITATION
RISQS QUALIFIED
bsi ISO 9001 Quality Management FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION
APPROX. DEPTH TO CENTRE
CABLE/FIBRE OPTIC

GRAVITY DRAIN (VISUAL OBSERVATION)
APPROX DEPTH TO INVERT

GROUND PENETRATING RADAR
APPROX DEPTH TO EXTERNAL CROWN

BSI PAS128:2022 QUALITY LEVEL INFORMATION

SURVEY TYPE		QUALITY LEVEL	POST-PROCESSING (GPR DATA ANALYSIS)	ACCURACY		DESCRIPTION (SUPPORTING DATA)
				HORIZONTAL	VERTICAL	
B	Detection	QL-B4 TFR	No	Undefined	Undefined	Location not detected on site, taken from records.
		QL-B4 AR	No	Undefined	Undefined	A utility segment that has not been detected but is suspected to exist. Denotes assumed route only.
		QL-B3	No	±500mm	Undefined (No reliable depth)	Horizontal detection by one geophysical technique only. Denotes utility segments with weak signals / no depth information.
		QL-B3P	Yes			
		QL-B2	No	±250mm	±40% of detected depth	Horizontal and vertical detection by one geophysical technique only (Electromagnetic Detection/Ground Penetrating Radar). Medium confidence level for position and depth.
		QL-B2P	Yes			
		QL-B1	No	±150mm	±15% of detected depth	Horizontal and vertical detection by multiple geophysical techniques. (Electromagnetic Detection/Ground Penetrating Radar). High confidence level for position and depth.
		QL-B1P	Yes			
A	Verification	QL-A	No	±50mm	±50mm	Horizontal and vertical location of the utility established by visual inspection at manholes and inspection covers or by use of targeted excavations (vacuum excavation and trial pits).

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2W:	2 WAY FLAT
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4W: 2/2	4 WAY: 2 WIDE, 2 DEEP
6W: 3/2	6 WAY: 3 WIDE, 2 DEEP
12W: 4/3	12 WAY: 4 WIDE, 3 DEEP

STREET FURNITURE

Air Valve	○ AV	Parking Meter	○ PM	Control Box	☐ C/BOX
Bus Stop	○ BS	Rain Water Pipe	○ PR	Car Vacuum	☐ VAC
Bollard	○ B	Pipe Riser	○ RWP	Car Air	☐ AIR
Buchan Trap	○ Buc	Rodding Eye	○ RE	Electrical Box	☐ EB
Cable Riser	○ CR	Road Sign	○ RS	Junction Box	☐ JB
Closed Circuit TV	○ CCTV	Soil Pipe	○ SVP	Gas Governor	☐ GAS GOV
Down Pipe	○ DP	Stop Tap	○ ST	Telephone Call Box	☐ TCP
Drain	○ D	Stop Valve	○ SV	Petrol Pump	☐ PP
Earth Rod	○ ER	Traffic Light	○ TL		
Electricity Pole	○ EP	Telegraph Pole	○ TP	Dish Drainage Channel	CD
Flood Light	○ FL	Traffic Light Push Button Post	○ TLP	Slot Drainage Channel	SD
Gas Riser	○ GR	Traffic Light Control	○ TLC/P	Grate Drainage Channel	G.CH
Gas Valve	○ GV	Vent Pipe	○ VP		
Hydrant	○ FH	Water Meter	○ WM		
Lamp Post	○ LP	Washout	○ WO		
Service Marker	○ MK				
Offset Fill	○ OF				
Post	○ P				

ABBREVIATIONS

Assumed Route	AR
Backdrop	BD
Blocked	BLK
Depth	d
Ground Penetrating Radar	GPR
No Visible Pipes	NVP
Offset Fill	OF
Signal Lost	SL
Taken From Records	TFR
Tank	T
Unable To Survey	UTS
Unable To Rod	UR
Unable To Trace	UT
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Vapour Recovery Point	VR

OVERHEAD FEATURES

Electricity Pylon	☒
Electricity	Z
Telephone	T

LEVEL AND HEIGHT

Inspection Cover	☐ IC
Inspection Cover (Elec)	☐ IC/EL
Manhole	☐ MH
British Telecom Cover	☐ BT
Inspection Cover (Comms)	☐ IC/COM
Cable TV	☐ CATV
Inspection Cover Traffic Signals	☐ IC/TL
Gully	☐ G
Kerb Outlet	☐ KO
Cover Level	CL:00.00
Invert Level	IL:00.00
Soffit Level	SL:00.00
Reducing Slab Level	RS:00.00
Sump Level	SUMP:00.00
Water Level	WL:00.00
Pit Level	PIT:00.00

Cover
Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	CO
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
Vitrified Clay	VC

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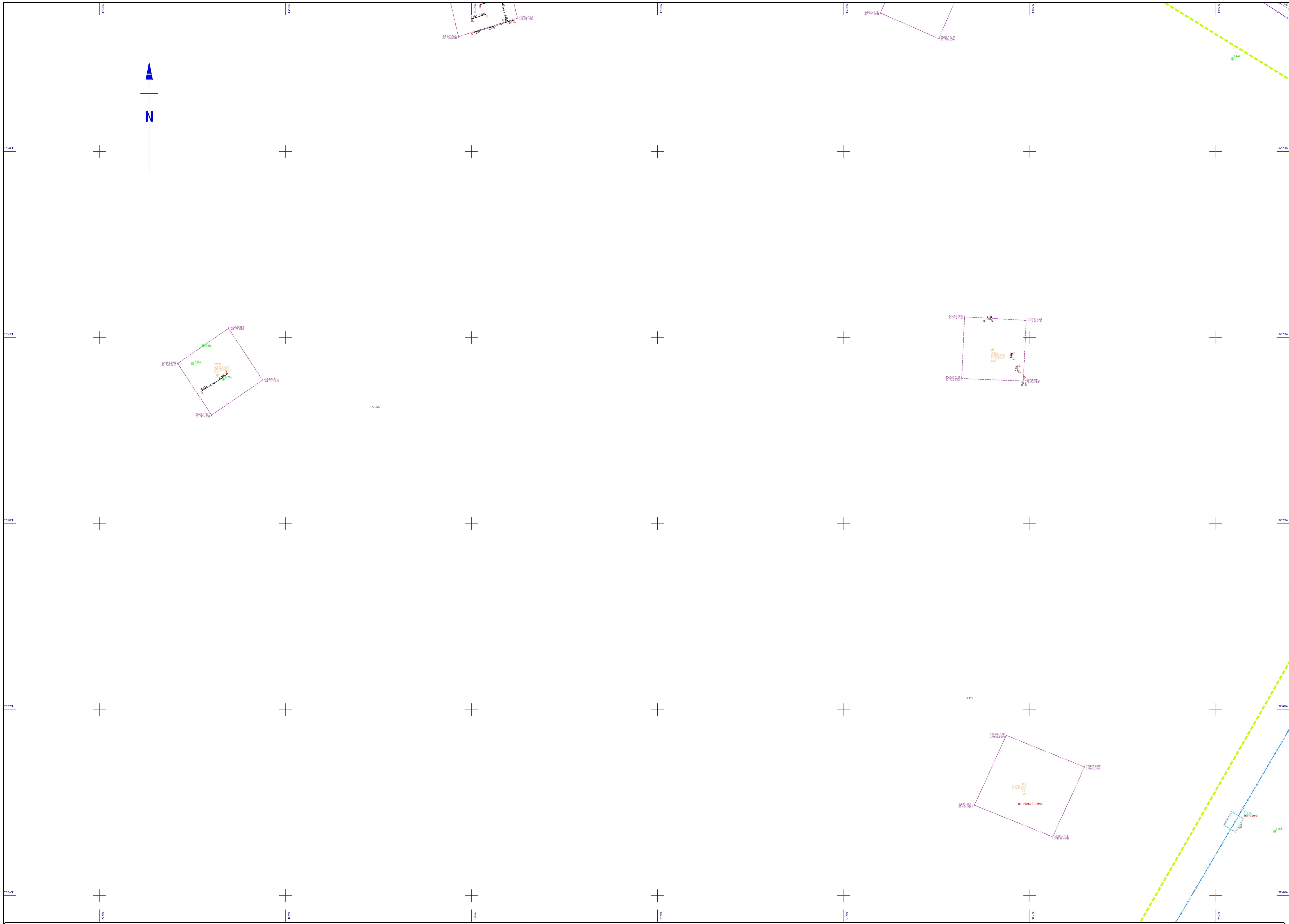

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TM	Thermal Main
TL	Traffic Light Cable
U	Unidentified
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TEL-A	Quality Level A
TEL-B1	Quality Level B1
TEL-B1P	Quality Level B1P
TEL-B2	Quality Level B2
TEL-B2P	Quality Level B2P
TEL-B3	Quality Level B3
TEL-B3P	Quality Level B3P
TEL-B4 AR	Quality Level B4 AR
TEL-B4 TFR	Quality Level B4 TFR

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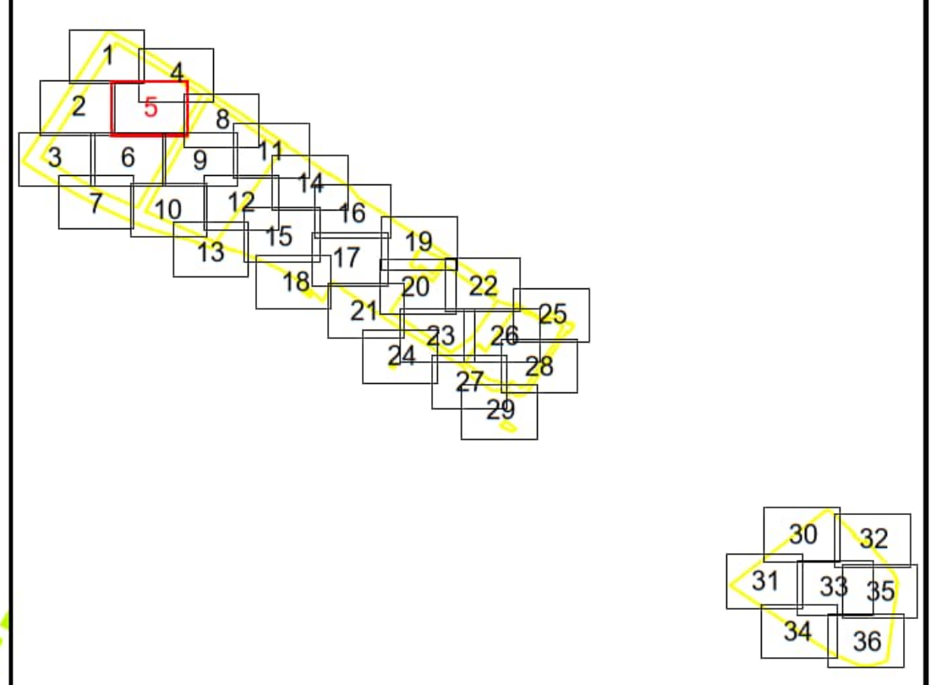

Rev.	Date	Description
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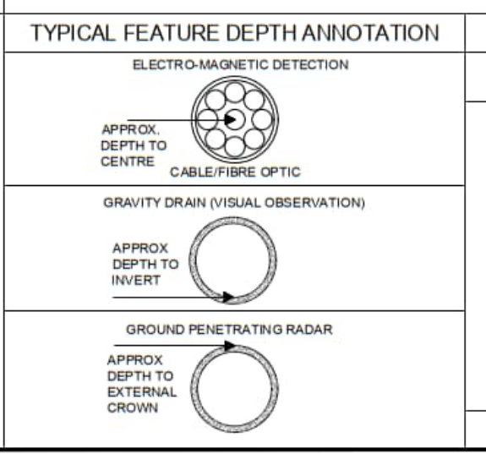
FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION



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Bus Stop	BS
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Drain	D
Earth Rod	ER
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Pipe Riser	RWP
Rodding Eye	RE
Road Sign	RS
Soil Pipe	SVP
Stop Tap	ST
Stop Valve	SV
Traffic Light	TL
Telegraph Pole	TP
Traffic Light Push Button Post	TLP
Traffic Light Control	TLC/P
Vent Pipe	VP
Water Meter	WM
Washout	WO
Control Box	☐ C/BOX
Car Vacuum	☐ VAC
Car Air	☐ AIR
Electrical Box	☐ EB
Junction Box	☐ JB
Gas Governor	☐ GAS GOV
Telephone Call Box	☐ TCP
Petrol Pump	☐ PP
Dish Drainage Channel	CD
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Inspection Cover (Comms)	☐ IC/COM
Cable TV	☐ CATV
Inspection Cover Traffic Signals	☐ IC/TL
Gully	☐ G
Kerb Outlet	☐ KO
Cover Level	CL:00.00
Invert Level	IL:00.00
Soffit Level	SL:00.00
Reducing Slab Level	RS:00.00
Sump Level	SUMP:00.00
Water Level	WL:00.00
Pit Level	PIT:00.00

Cover
Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	CO
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
Vitrified Clay	VC

ADDITIONAL NOTES

Drawing Title

Utility Mapping Survey
Sheet 5/36

Surveyed by SL/JB	CAD by PS	Survey Date April 2025
Checked by DJ/SL	Approved by AT	Scale 1:200 [A0 Sheet]

Drawing No	Revision
62330/UG5	00

Survey Notes

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- EARTH — Earthing Cables
- EFF — Effluent
- DUCT — Empty Ducting
- HEAT — Heating Pipe
- OVER — Overflow
- OXY — Oxygen Pipe
- RISING — Rising Main
- SLUDGE — Sludge Main
- STEAM — Steam Duct
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- TRAFFIC — Traffic Light Cable
- UNKNOWN — Unidentified
- VDL — Vehicle Detector Loop
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- TEL-B1P — Quality Level B1P
- TEL-B2 — Quality Level B2
- TEL-B2P — Quality Level B2P
- TEL-B3 — Quality Level B3
- TEL-B3P — Quality Level B3P
- TEL-B4 AR — Quality Level B4 AR
- TEL-B4 TFR — Quality Level B4 TFR

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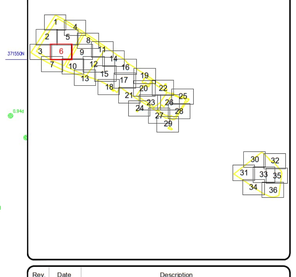

Rev	Date	Description
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Drawing Title
Utility Mapping Survey
Sheet 6/36

Surveyed by	CAD by	Survey Date
SL/JB	PS	April 2025
Checked by	Approved by	Scale
DJ/SL	AT	1:200 [A3 Sheet]

Drawing No: 62330/UG6
Revision: 00

ACCREDITATIONS

RICS · THE SURVEY ASSOCIATION · chartered ices · PUMA · RISQS QUALIFIED · Lloyd's Register ISO 9001 Quality Management FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION
APPROX DEPTH TO CENTRE — CABLE/FIBRE OPTIC

GRAVITY DRAIN (VISUAL OBSERVATION)
APPROX DEPTH TO INVERT

GROUND PENETRATING RADAR
APPROX DEPTH TO EXTERNAL CROWN

BSI PAS128:2022 QUALITY LEVEL INFORMATION

SURVEY TYPE		QUALITY LEVEL	POST-PROCESSING (GPR) DATA ANALYSIS	ACCURACY HORIZONTAL	ACCURACY VERTICAL	DESCRIPTION (SUPPORTING DATA)
B	Detection	QL-B4 TFR	No	Undefined	Undefined	Location not detected on site, taken from records.
		QL-B4 AR	No	Undefined	Undefined	A utility segment that has not been detected but is suspected to exist. Denotes assumed route only.
		QL-B3	No	±500mm	Undefined (No reliable depth)	Horizontal detection by one geophysical technique only. Denotes utility segments with weak signals / no depth information.
		QL-B3P	Yes			
		QL-B2	No	±250mm	±40% of detected depth	Horizontal and vertical detection by one geophysical technique only (Electromagnetic Detection/Ground Penetrating Radar). Medium confidence level for position and depth.
		QL-B2P	Yes			
		QL-B1	No	±150mm	±15% of detected depth	Horizontal and vertical detection by multiple geophysical techniques. (Electromagnetic Detection/Ground Penetrating Radar). High confidence level for position and depth.
		QL-B1P	Yes			
A	Verification	QL-A	No	±50mm	±50mm	Horizontal and vertical location of the utility established by visual inspection at manholes and inspection covers or by use of targeted excavations (vacuum excavation and trial pits).

DRAWING INFORMATION

DUCTING LAYOUTS

- 1W: 1 WAY SINGLE DUCT
- 2W: 2 WAY FLAT
- 2W 1/2: 2 WAY: 1 WIDE, 2 DEEP
- 4W 2/2: 4 WAY: 2 WIDE, 2 DEEP
- 6W 3/2: 6 WAY: 3 WIDE, 2 DEEP
- 12W 4/3: 12 WAY: 4 WIDE, 3 DEEP

STREET FURNITURE

- Air Valve — AV
- Box Stop — BS
- Bollard — B
- Bucket Trap — Bue
- Cable Riser — CR
- Closed Circut TV — CCTV
- Down Pipe — DP
- Drain — D
- Earth Rod — ER
- Electricity Pole — EP
- Flood Light — FL
- Gas Valve — GV
- Gully — GU
- Hydrant — FH
- Lamp Post — LP
- Marker Marker — MM
- Offset Fill — OF
- Post — P
- Parking Meter — PM
- Pipe Water Pipe — PW
- Post Box — PB
- Rodding Eye — RE
- Road Sign — RS
- Soil Pipe — SP
- Stop Tap — ST
- Stop Valve — SV
- Traffic Light — TL
- Telegraph Pole — TP
- Traffic Light with Button Post — TLP
- Traffic Light Control — TLCP
- Vent Pipe — VP
- Water Meter — WM
- Washout — WO
- Control Box — C/BOX
- Car Vacuum — VAC
- Cable TV — CB
- Electrical Box — EB
- Jumbler Box — JB
- Gas Governor — GAS GOV
- Telephone Call Box — TCP
- Petrol Pump — PP
- Dark Drainage Channel — DDC
- Soil Drainage Channel — SDC
- Grate Drainage Channel — GDC

ABBREVIATIONS

Assumed Route	AR
Backdrop	BD
Bottom Of	B
Depth	D
Ground Penetrating Radar	GPR
No Visible Pipes	NVP
Offset Fill	OF
Offset Pipe	OP
Taken From Records	TFR
Tank	T
Unable To Survey	UTS
Unable To Rod	UR
Unable To Trace	UT
Unable To Lift	UTL
Vapour Recovery Point	VR

OVERHEAD FEATURES

- Electricity Pylon
- Electricity
- Telephone

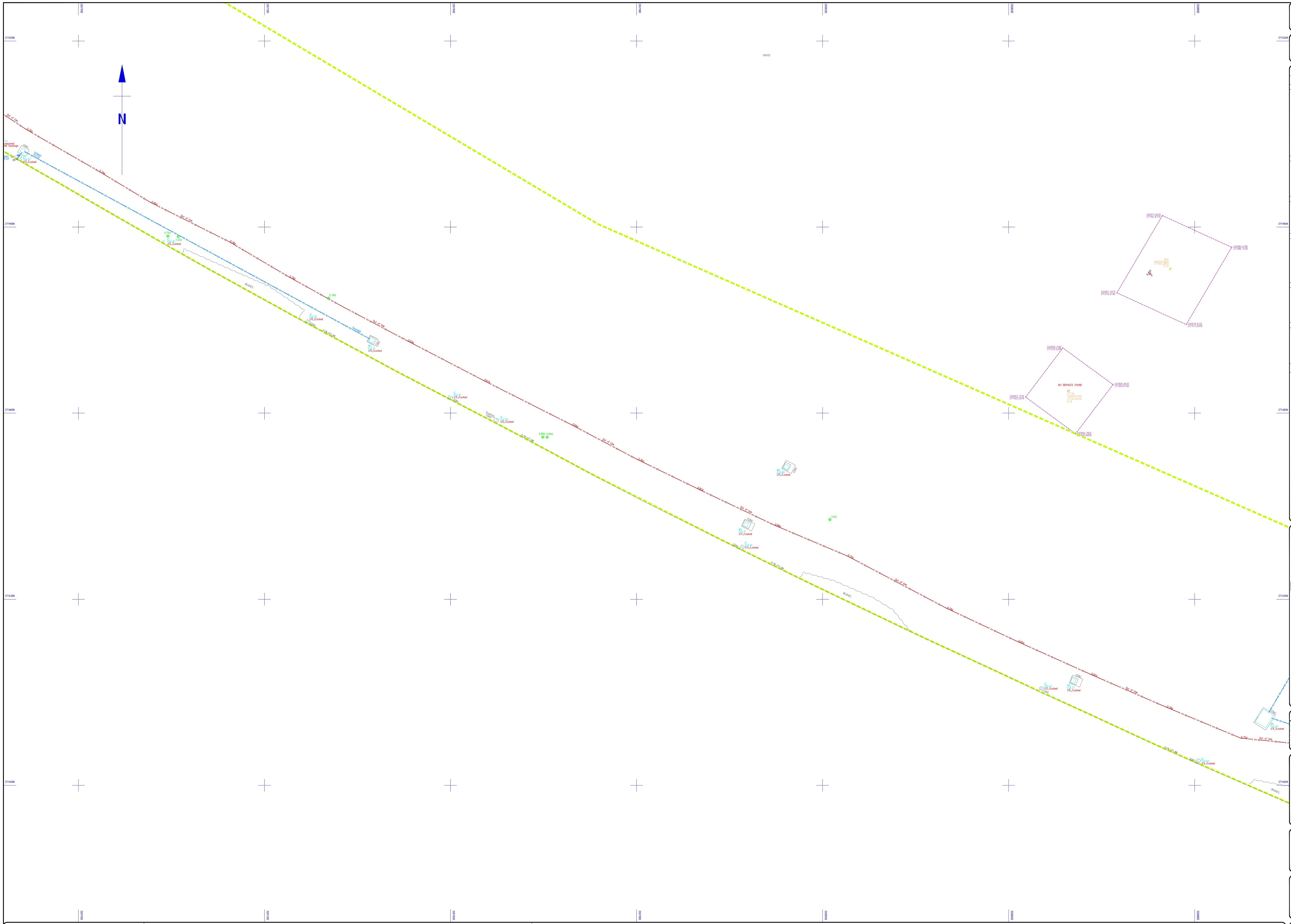
LEVEL AND HEIGHT

- Inspection Cover — IC
- Inspection Cover (Elec) — IC(E)
- Manhole — MH
- British Telecom Cover — BT
- Inspection Cover (Comms) — IC/COM
- Cover — IC/CV
- Inspection Cover Traffic Signals — IC/TL
- Gully — G
- Kerb Outlet — CI KO
- Cover Level — CL:00.00
- Invert Level — IL:00.00
- Soffit Level — SL:00.00
- Reducing Slab Level — RS:00.00
- Sump Level — SUMP:00.00
- Water Level — WL:00.00
- Pit Level — PIT:00.00
- Cover
- Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	CO
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
Vitrified Clay	VC

ADDITIONAL NOTES



Survey Notes

Grid: Plane, local related to OS Grid.
Levels: OS Datum from GNSS positioning, converted using the National Geoid Model OSGM15.

Notes

Utility drawing to be read in conjuction with survey report.

Survey Legend

UNDERGROUND SERVICES KEY

COMMUNICATION CABLES

TV	Cable TV
COM	Communication
COM	Colt Telecom
COM	EU Networks
COM	Instalcom
COM	Neo Network
COM	Nynex
COM	Sky
TEL	Telecom
COM	Veolia
COM	Verizon
COM	Zayo

GROUND PENETRATING RADAR

▨	GPR Detected Anomaly Area/Point
▨	GPR Detected Rebar
▨	GPR Detected Structural Feature
▨	GPR Detected Structure
▨	GPR Low Data
GPR	GPR
0.79d	GPR Detected Anomaly Point Directional
	GPR Transect

DRAINAGE PIPES

CW	Chemically Contamined Drains Pumped
CW	Gas Turbine Washdown
CW	Oil Contamined Station Drains System
CW	Sewer Combined
FW	Sewer Foul
SW	Sewer Surface Water

FIBRE OPTICAL CABLES

FO	City Fibre
FO	EXA Fibre Optic
FO	GTT Fibre Optic
FO	Virgin Media
FO	Vodafone

FUEL SERVICES

GA	Fuel Gauge Line
FU	Fuel Line
V	Fuel Vent Line
OF	Offset Fill Pipe
OP	Oil Pipe
VR	Vapor Recovery Pipe

OTHER SERVICES

AD	Acid Drain
AIR	Air Line
AC	Alarm Cable
CCTV	CCTV
CH	Chemical
CA	Compressed Air
EA	Earthing Cables
EF	Effluent
DU	Empty Ducting
H	Heating Pipe
O	Overflow
OX	Oxygen Pipe
/	Rising Main
SM	Sludge Main
STM	Steam Duct
TM	Thermal Main
TL	Traffic Light Cable
U	Unidentified
VD	Vehicle Detector Loop
V	Vent Pipe
WW	Wash Water
W	Water
W	Cooling Water Return
W	Cooling Water Supply

ELECTRICAL CABLES

L	Street Lighting
E	Electrical
E LV	Electrical LV
E HV	Electrical HV

OTHER LINETYPES

EOT	End of trace
	Services Survey Boundary
	Area of No Access

GAS PIPES

G	Gas
G LP	Gas LP
G MP	Gas MP
G IP	Gas IP
G HP	Gas HP

SERVICE QUALITY LEVEL EXAMPLE

TEL-A	Quality Level A
TEL-B1	Quality Level B1
TEL-B1P	Quality Level B1P
TEL-B2	Quality Level B2
TEL-B2P	Quality Level B2P
TEL-B3	Quality Level B3
TEL-B3P	Quality Level B3P
TEL-B4 AR	Quality Level B4 AR
TEL-B4 TFR	Quality Level B4 TFR

For Quality Level definitions see BSI PAS128:2022 information below.
For more information go to www.malcolmhughes.co.uk

DISCLAIMERS

Electromagnetic and Ground Penetrating Radar techniques have been used in the detection of underground services, features and anomalies shown on this survey plan. These are interpretive procedures and we recommend that trial excavations should be undertaken to confirm identification, location and depth of features where these are critical to design or site works.

It is important to understand that there are limitations when it comes to detecting and mapping buried pipes, cables and ducts due to various factors such as depth location, material type, geology and proximity to other utilities. Even with the use of advanced techniques and equipment, it is not always possible to accurately detect and map all underground infrastructure.

All reasonable effort and care has been made in searching available record drawings. The completeness of the underground service information supplied to and by us cannot be guaranteed.

Where services are non-metallic or not proven on site, positions are taken from records, trench scars and surface detail.

Pipe sizes which cannot be obtained by visual survey are taken from utilities record drawings or marker plates where available.

Services shown as PAS128 QL- B4 TFR (Taken from records) and QL - B4 AR (Assumed Route) have not been proven on site.

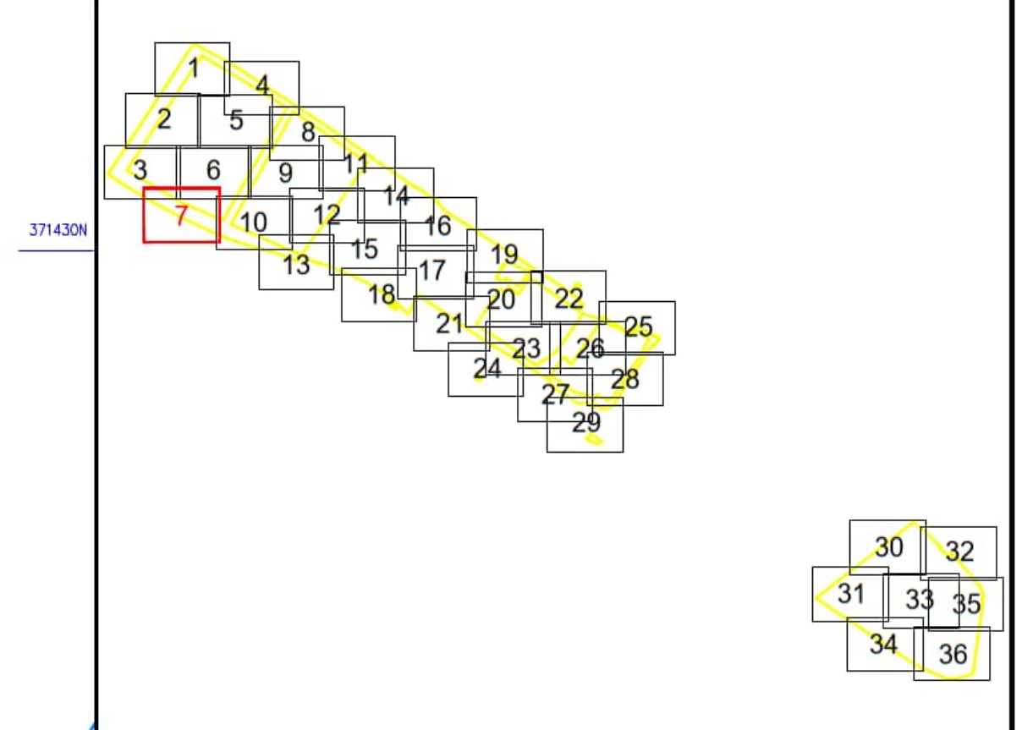
The CAD layering may contain further information.

Collected data from GPR has not been post processed unless specified elsewhere or denoted on the survey drawing by the abbreviation of (P).

All utilities inspected and measured at Inspection Covers or Manholes are considered to be a QL-A for a radius up to 5m from the chamber wall.

HSG47 safe digging practices should still be adhered to when using these Utility Mapping Survey plans.

Sheet Index



Rev.	Date	Description
00		First Issue

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Client
Uniper Technologies Ltd.
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project
Connah's Quay Power Station

Drawing Title
Utility Mapping Survey
Sheet 7/36

Surveyed by SL/JB	CAD by PS	Survey Date April 2025
Checked by DJ/SL	Approved by AT	Scale 1:200 [A0 Sheet]

Drawing No 62330/UG7
Revision 00

ACCREDITATIONS

RICS
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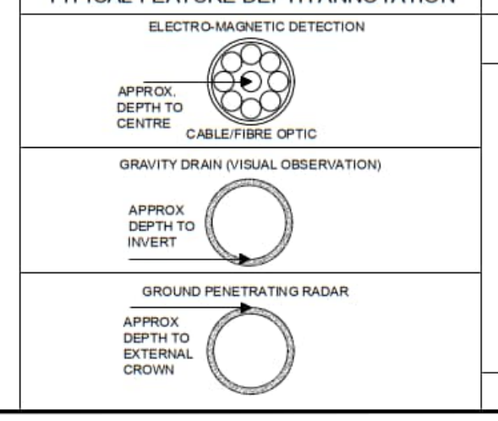
BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION



BSI PAS128:2022 QUALITY LEVEL INFORMATION

SURVEY TYPE		QUALITY LEVEL	POST-PROCESSING (GPR DATA ANALYSIS)	ACCURACY		DESCRIPTION (SUPPORTING DATA)
				HORIZONTAL	VERTICAL	
B	Detection	QL-B4 TFR	No	Undefined	Undefined	Location not detected on site, taken from records.
		QL-B4 AR	No	Undefined	Undefined	A utility segment that has not been detected but is suspected to exist. Denotes assumed route only.
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		QL-B2	No	±250mm	±40% of detected depth	Horizontal and vertical detection by one geophysical technique only (Electromagnetic Detection/Ground Penetrating Radar). Medium confidence level for position and depth.
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		QL-B1	No	±150mm	±15% of detected depth	Horizontal and vertical detection by multiple geophysical techniques. (Electromagnetic Detection/Ground Penetrating Radar). High confidence level for position and depth.
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A	Verification	QL-A	No	±50mm	±50mm	Horizontal and vertical location of the utility established by visual inspection at manholes and inspection covers or by use of targeted excavations (vacuum excavation and trial pits).

DRAWING INFORMATION

DUCTING LAYOUTS

1W:	1 WAY SINGLE DUCT
2W:	2 WAY FLAT
2W: 1/2	2 WAY: 1 WIDE, 2 DEEP
4W: 2/2	4 WAY: 2 WIDE, 2 DEEP
6W: 3/2	6 WAY: 3 WIDE, 2 DEEP
12W: 4/3	12 WAY: 4 WIDE, 3 DEEP

STREET FURNITURE

Air Valve	○ AV
Bus Stop	○ BS
Bollard	○ B
Buchan Trap	○ Buc
Cable Riser	○ CR
Closed Circuit TV	○ CCTV
Down Pipe	○ DP
Drain	○ D
Earth Rod	○ ER
Electricity Pole	○ EP
Flood Light	○ FL
Gas Riser	○ GR
Gas Valve	○ GV
Hydrant	○ FH
Lamp Post	○ LP
Service Marker	○ MK
Offset Fill	○ OF
Post	○ P
Parking Meter	○ PM
Rain Water Pipe	○ PR
Pipe Riser	○ RWP
Rodding Eye	○ RE
Road Sign	○ RS
Soil Pipe	○ SVP
Stop Tap	○ ST
Stop Valve	○ SV
Traffic Light	○ TL
Telegraph Pole	○ TP
Traffic Light Push Button Post	○ TLP
Traffic Light Control	○ TLC/P
Vent Pipe	○ VP
Water Meter	○ WM
Washout	○ WO
Control Box	☐ C/BOX
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Car Air	☐ AIR
Electrical Box	☐ EB
Junction Box	☐ JB
Gas Governor	☐ GAS GOV
Telephone Call Box	☐ TCP
Petrol Pump	☐ PP
Dish Drainage Channel	CD
Slot Drainage Channel	SD
Grate Drainage Channel	G.CH

ABBREVIATIONS

Assumed Route	AR
Backdrop	BD
Blocked	BLK
Depth	d
Ground Penetrating Radar	GPR
No Visible Pipes	NVP
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Signal Lost	SL
Taken From Records	TFR
Tank	T
Unable To Survey	UTS
Unable To Rod	UR
Unable To Trace	UT
Unable To Lift	UTL
Vapour Recovery Point	VR

OVERHEAD FEATURES

Electricity Pylon	☒
Electricity	Z Z
Telephone	T T

LEVEL AND HEIGHT

Inspection Cover	☐ IC
Inspection Cover (Elec)	☐ IC/EL
Manhole	☐ MH
British Telecom Cover	☐ BT
Inspection Cover (Comms)	☐ IC/COM
Cable TV	☐ CATV
Inspection Cover Traffic Signals	☐ IC/TL
Gully	☐ G
Kerb Outlet	☐ KO
Cover Level	CL:00.00
Invert Level	IL:00.00
Soffit Level	SL:00.00
Reducing Slab Level	RS:00.00
Sump Level	SUMP:00.00
Water Level	WL:00.00
Pit Level	PIT:00.00

Cover
Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
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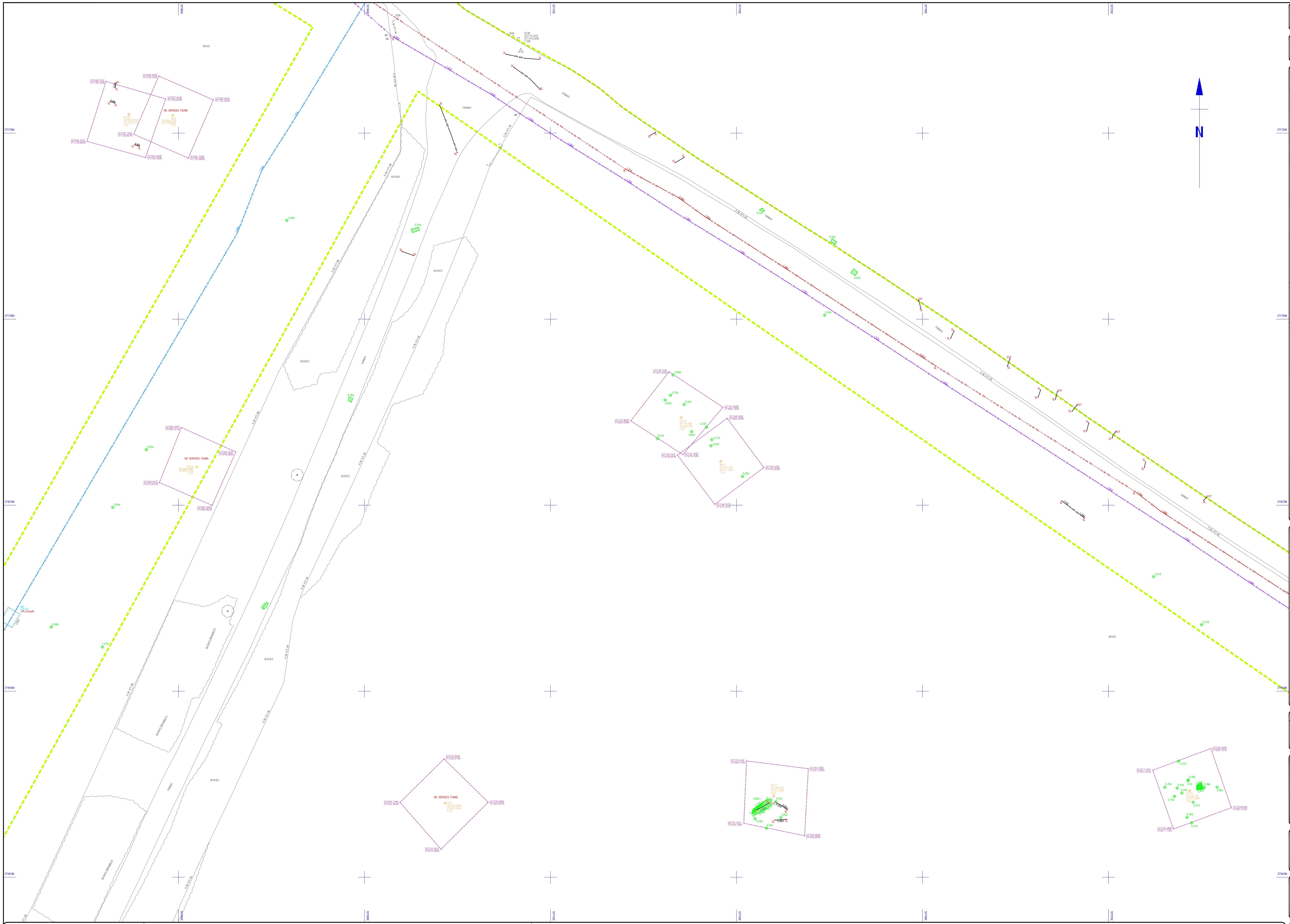
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
Vitrified Clay	VC

ADDITIONAL NOTES



Survey Notes

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Notes

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GROUND PENETRATING RADAR	
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/	Rising Main
SM	Sludge Main
STM	Steam Duct
TM	Thermal Main
TL	Traffic Light Cable
U	Unidentified
VD	Vehicle Detector Loop
V	Vent Pipe
WW	Wash Water
W	Water
W	Cooling Water Return
W	Cooling Water Supply

ELECTRICAL CABLES	
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E	Electrical
E LV	Electrical LV
E HV	Electrical HV

OTHER LINETYPES	
EOT	End of trace
🟩	Services Survey Boundary
🟥	Area of No Access

GAS PIPES	
G	Gas
G LP	Gas LP
G MP	Gas MP
G IP	Gas IP
G HP	Gas HP

SERVICE QUALITY LEVEL EXAMPLE	
TEL-A	Quality Level A
TEL-B1	Quality Level B1
TEL-B1P	Quality Level B1P
TEL-B2	Quality Level B2
TEL-B2P	Quality Level B2P
TEL-B3	Quality Level B3
TEL-B3P	Quality Level B3P
TEL-B4 AR	Quality Level B4 AR
TEL-B4 TFR	Quality Level B4 TFR

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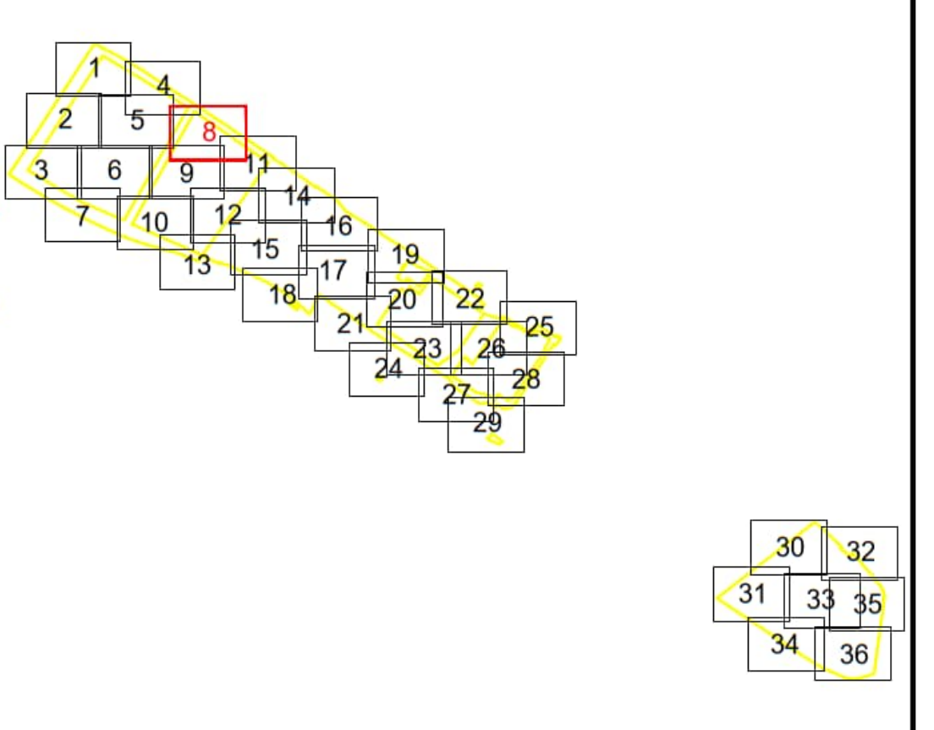

Rev.	Date	Description
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London Office
Tel: 0800 833312

Client
Uniper Technologies Ltd.
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project
Connah's Quay Power Station

Drawing Title
Utility Mapping Survey
Sheet 8/36

Surveyed by	SL/JB	CAD by	PS	Survey Date	April 2025
Checked by	DJ/SL	Approved by	AT	Scale	1:200 [A0 Sheet]

Drawing No 62330/UG8
Revision 00

ACCREDITATIONS

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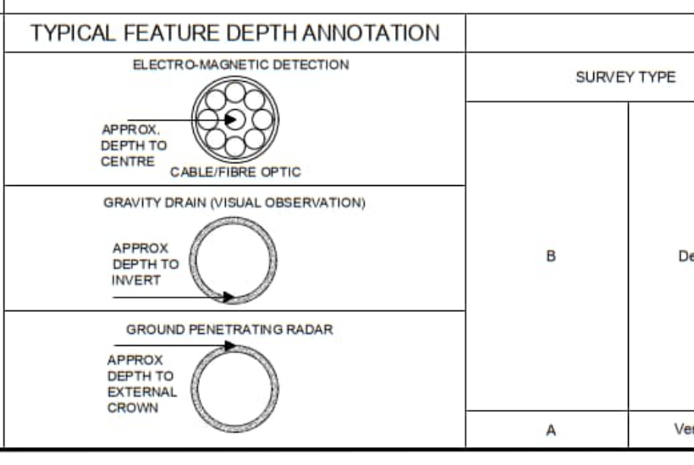

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Gas Valve	○ GV
Hydrant	○ FH
Lamp Post	○ LP
Service Marker	○ MK
Offset Fill	○ OF
Post	○ P
Parking Meter	○ PM
Rain Water Pipe	○ PR
Pipe Riser	○ RWP
Rodding Eye	○ RE
Road Sign	○ RS
Soil Pipe	○ SVP
Stop Tap	○ ST
Stop Valve	○ SV
Traffic Light	○ TL
Telegraph Pole	○ TP
Traffic Light Push Button Post	○ TLP
Traffic Light Control	○ TLC/P
Vent Pipe	○ VP
Water Meter	○ WM
Washout	○ WO
Control Box	☐ C/BOX
Car Vacuum	☐ VAC
Car Air	☐ AIR
Electrical Box	☐ EB
Junction Box	☐ JB
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Dish Drainage Channel	CD
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Unable To Survey	UTS
Unable To Rod	UR
Unable To Trace	UT
Unable To Lift	UTL
Vapour Recovery Point	VR

OVERHEAD FEATURES

Electricity Pylon	☒
Electricity	—Z—Z—
Telephone	—T—T—

LEVEL AND HEIGHT

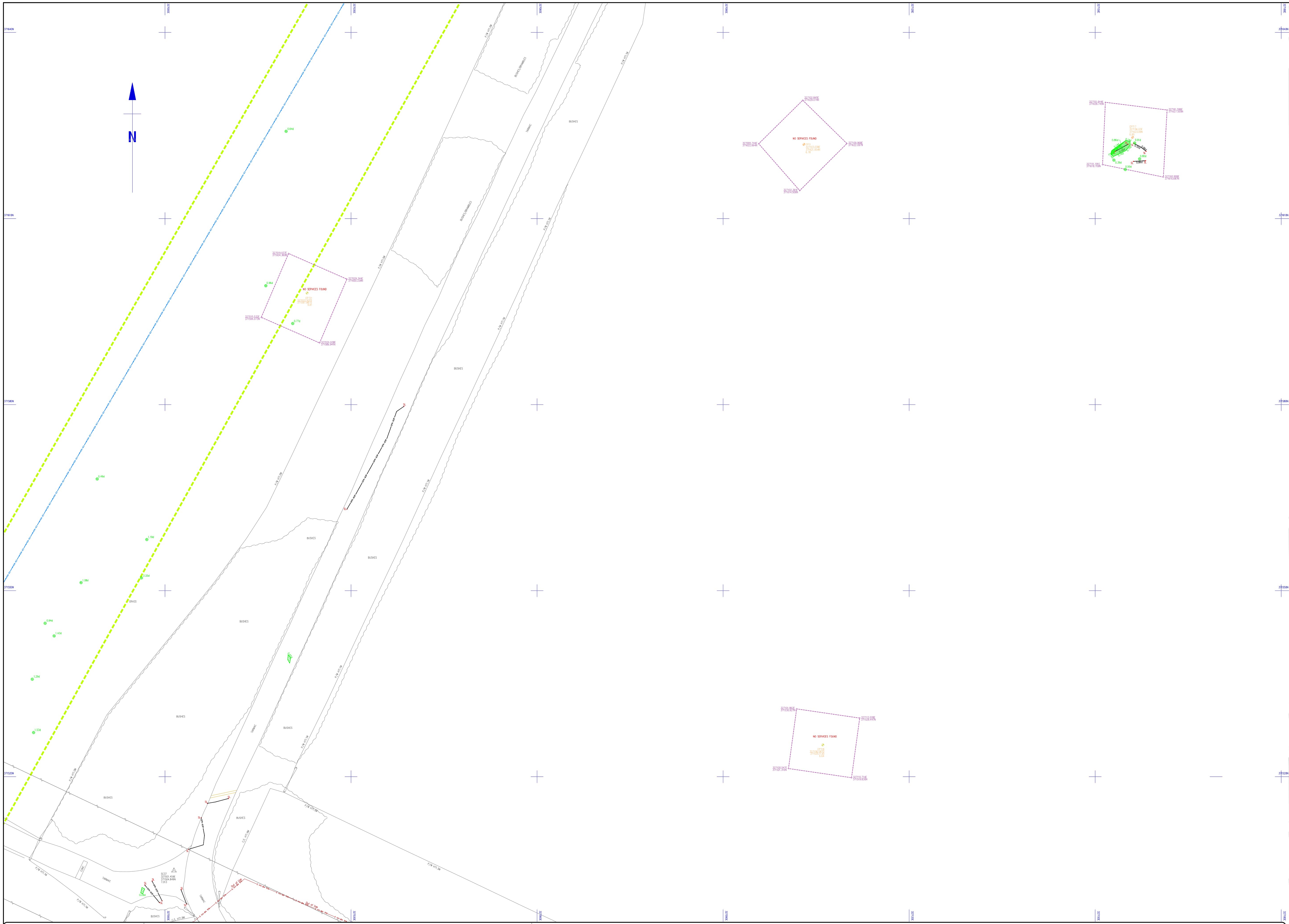
Inspection Cover	☐ IC
Inspection Cover (Elec)	☐ IC/EL
Manhole	☐ MH
British Telecom Cover	☐ BT
Inspection Cover (Comms)	☐ IC/COM
Cable TV	☐ CATV
Inspection Cover Traffic Signals	☐ IC/TL
Gully	☐ G
Kerb Outlet	☐ KO
Cover Level	CL:00.00
Invert Level	IL:00.00
Soffit Level	SL:00.00
Reducing Slab Level	RS:00.00
Sump Level	SUMP:00.00
Water Level	WL:00.00
Pit Level	PIT:00.00

Cover
Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	CO
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
Vitrified Clay	VC

ADDITIONAL NOTES



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Survey Legend

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COM	Neo Network
COM	Nynex
COM	Sky
TEL	Telecom
COM	Veolia
COM	Verizon
COM	Zayo

GROUND PENETRATING RADAR

▨	GPR Detected Anomaly Area/Point
▨	GPR Detected Rebar
▨	GPR Detected Structural Feature
▨	GPR Detected Structure
▨	GPR Low Data
GPR	GPR
0.79d	GPR Detected Anomaly Point Directional
—	GPR Transect

DRAINAGE PIPES

CW	Chemically Contamined Drains Pumped
CW	Gas Turbine Washdown
CW	Oil Contamined Station Drains System
CW	Sewer Combined
FW	Sewer Foul
SW	Sewer Surface Water

FIBRE OPTICAL CABLES

FO	City Fibre
FO	EXA Fibre Optic
FO	GTT Fibre Optic
FO	Virgin Media
FO	Vodafone

FUEL SERVICES

GA	Fuel Gauge Line
FU	Fuel Line
V	Fuel Vent Line
OF	Offset Fill Pipe
OP	Oil Pipe
VR	Vapor Recovery Pipe

OTHER SERVICES

AD	Acid Drain
AIR	Air Line
AC	Alarm Cable
CCTV	CCTV
CH	Chemical
CA	Compressed Air
EA	Earthing Cables
EF	Effluent
DU	Empty Ducting
H	Heating Pipe
O	Overflow
OX	Oxygen Pipe
/	Rising Main
SM	Sludge Main
STM	Steam Duct
TM	Thermal Main
TL	Traffic Light Cable
U	Unidentified
VD	Vehicle Detector Loop
V	Vent Pipe
WW	Wash Water
W	Water
W	Cooling Water Return
W	Cooling Water Supply

ELECTRICAL CABLES

L	Street Lighting
E	Electrical
E LV	Electrical LV
E HV	Electrical HV

OTHER LINETYPES

● EOT	End of trace
🟩	Services Survey Boundary
🟥	Area of No Access

GAS PIPES

G	Gas
G LP	Gas LP
G MP	Gas MP
G IP	Gas IP
G HP	Gas HP

SERVICE QUALITY LEVEL EXAMPLE

TEL–A	Quality Level A
TEL–B1	Quality Level B1
TEL–B1P	Quality Level B1P
TEL–B2	Quality Level B2
TEL–B2P	Quality Level B2P
TEL–B3	Quality Level B3
TEL–B3P	Quality Level B3P
TEL–B4 AR	Quality Level B4 AR
TEL–B4 TFR	Quality Level B4 TFR

For Quality Level definitions see BSI PAS128:2022 information below.
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DISCLAIMERS

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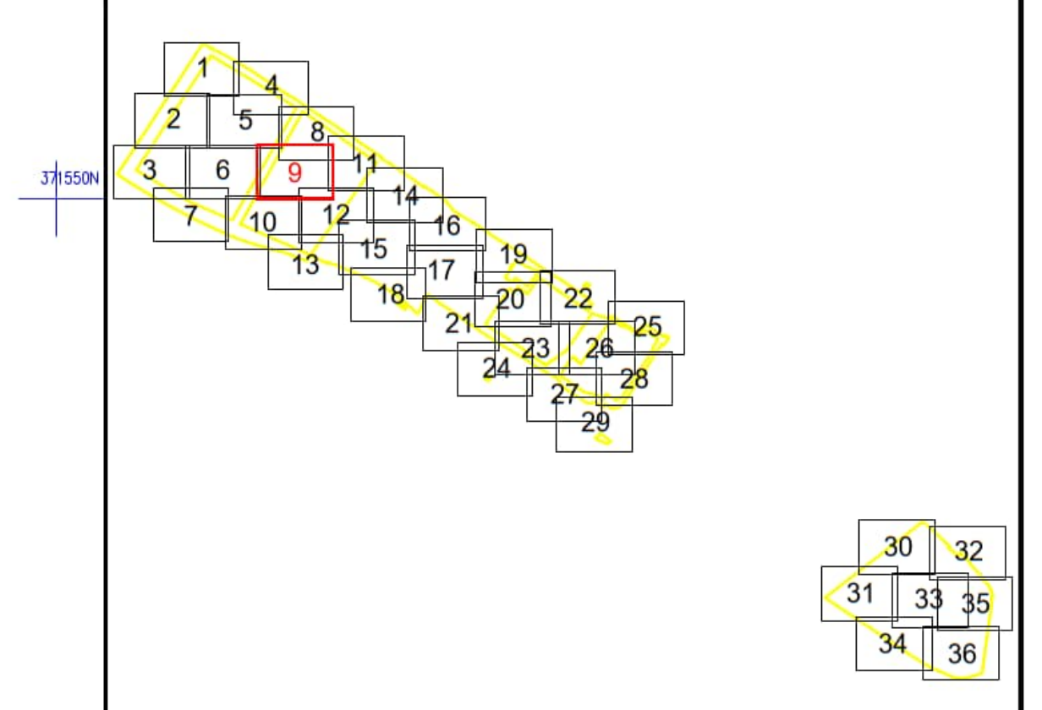

Rev.	Date	Description
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Technology Centre, Ratcliffe on Soar
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Project
Connah's Quay Power Station

Drawing Title
Utility Mapping Survey
Sheet 9/36

Surveyed by SL/JB	CAD by PS	Survey Date April 2025
Checked by DJ/SL	Approved by AT	Scale 1:200 [A0 Sheet]

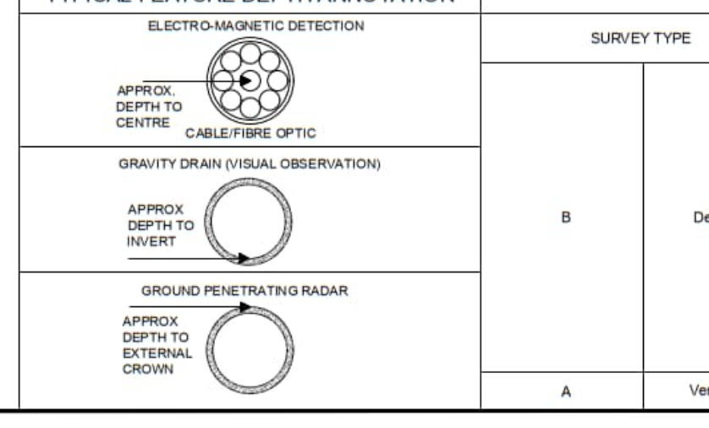
Drawing No 62330/UG9
Revision 00

ACCREDITATIONS

RICS
THE SURVEY ASSOCIATION
chartered ices
PUMA
ISO 9001 Quality Management
FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION



BSI PAS128:2022 QUALITY LEVEL INFORMATION

SURVEY TYPE		QUALITY LEVEL	POST-PROCESSING (GPR DATA ANALYSIS)	ACCURACY		DESCRIPTION (SUPPORTING DATA)
				HORIZONTAL	VERTICAL	
B	Detection	QL-B4 TFR	No	Undefined	Undefined	Location not detected on site, taken from records.
		QL-B4 AR	No	Undefined	Undefined	A utility segment that has not been detected but is suspected to exist. Denotes assumed route only.
		QL-B3	No	±500mm	Undefined (No reliable depth)	Horizontal detection by one geophysical technique only. Denotes utility segments with weak signals / no depth information.
		QL-B3P	Yes			
		QL-B2	No	±250mm	±40% of detected depth	Horizontal and vertical detection by one geophysical technique only (Electromagnetic Detection/Ground Penetrating Radar). Medium confidence level for position and depth.
		QL-B2P	Yes			
		QL-B1	No	±150mm	±15% of detected depth	Horizontal and vertical detection by multiple geophysical techniques. (Electromagnetic Detection/Ground Penetrating Radar). High confidence level for position and depth.
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A	Verification	QL-A	No	±50mm	±50mm	Horizontal and vertical location of the utility established by visual inspection at manholes and inspection covers or by use of targeted excavations (vacuum excavation and trial pits).

DRAWING INFORMATION

DUCTING LAYOUTS

1W:	1 WAY SINGLE DUCT
2W:	2 WAY FLAT
2W: 1/2	2 WAY: 1 WIDE, 2 DEEP
4W: 2/2	4 WAY: 2 WIDE, 2 DEEP
6W: 3/2	6 WAY: 3 WIDE, 2 DEEP
12W: 4/3	12 WAY: 4 WIDE, 3 DEEP

STREET FURNITURE

Air Valve	○ AV
Bus Stop	○ BS
Bollard	○ B
Buchan Trap	○ Buc
Cable Riser	○ CR
Closed Circuit TV	○ CCTV
Down Pipe	○ DP
Drain	○ D
Earth Rod	○ ER
Electricity Pole	○ EP
Flood Light	○ FL
Gas Riser	○ GR
Gas Valve	○ GV
Hydrant	○ FH
Lamp Post	○ LP
Service Marker	○ MK
Offset Fill	○ OF
Post	○ P
Parking Meter	○ PM
Rain Water Pipe	○ PR
Pipe Riser	○ RWP
Rodding Eye	○ RE
Road Sign	○ RS
Soil Pipe	○ SVP
Stop Tap	○ ST
Stop Valve	○ SV
Traffic Light	○ TL
Telegraph Pole	○ TP
Traffic Light Push Button Post	○ TLP
Traffic Light Control	○ TLC/P
Vent Pipe	○ VP
Water Meter	○ WM
Washout	○ WO
Control Box	☐ C/BOX
Car Vacuum	☐ VAC
Car Air	☐ AIR
Electrical Box	☐ EB
Junction Box	☐ JB
Gas Governor	☐ GAS GOV
Telephone Call Box	☐ TCP
Petrol Pump	☐ PP
Dish Drainage Channel	CD
Slot Drainage Channel	SD
Grate Drainage Channel	G.CH

ABBREVIATIONS

Assumed Route	AR
Backdrop	BD
Blocked	BLK
Depth	d
Ground Penetrating Radar	GPR
No Visible Pipes	NVP
Offset Fill	OF
Signal Lost	SL
Taken From Records	TFR
Tank	T
Unable To Survey	UTS
Unable To Rod	UR
Unable To Trace	UT
Unable To Lift	UTL
Vapour Recovery Point	VR

OVERHEAD FEATURES

Electricity Pylon	☒
Electricity	—Z—Z—
Telephone	—T—T—

LEVEL AND HEIGHT

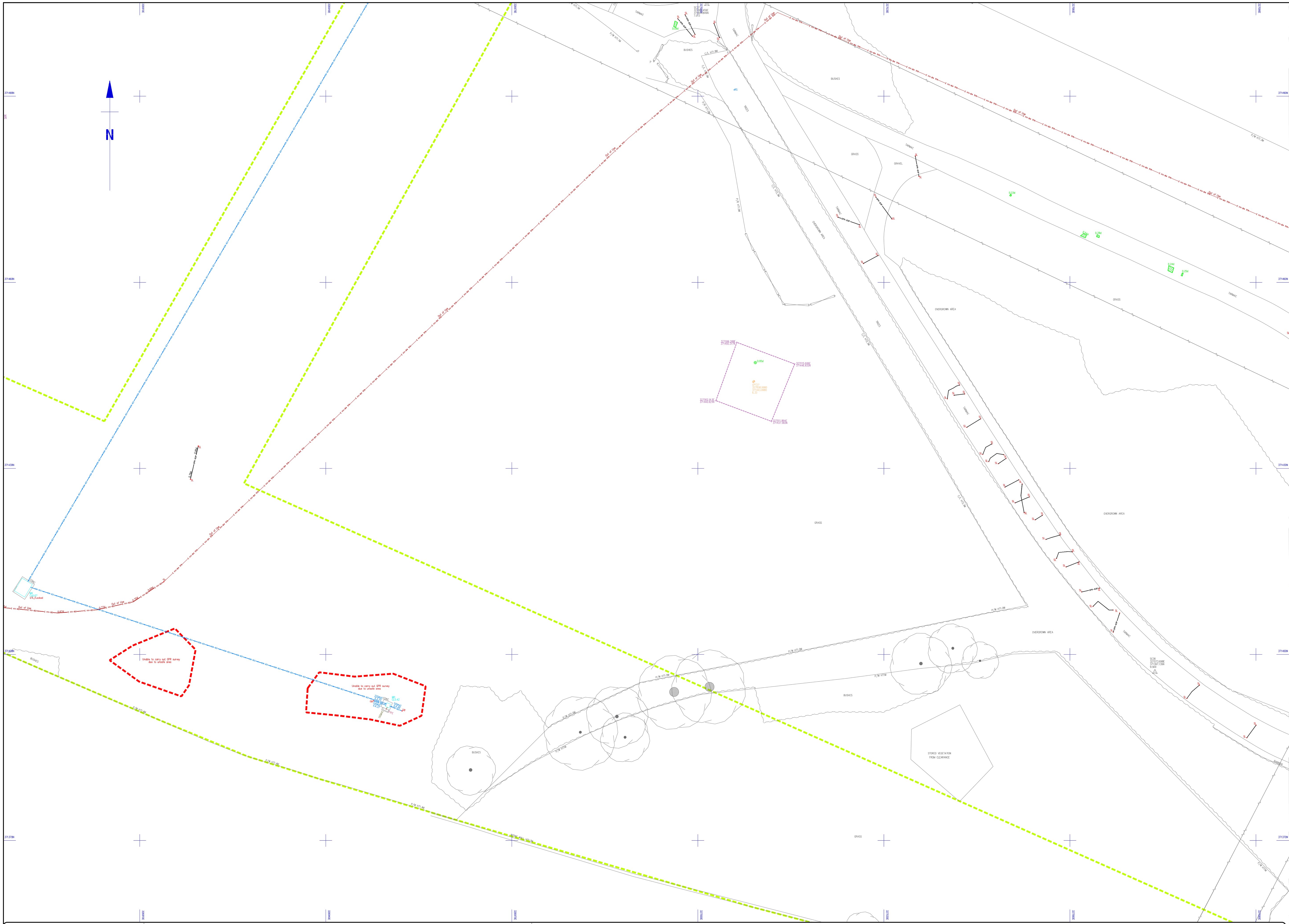
Inspection Cover	☐ IC
Inspection Cover (Elec)	☐ IC/EL
Manhole	☐ MH
British Telecom Cover	☐ BT
Inspection Cover (Comms)	☐ IC/COM
Cable TV	☐ CATV
Inspection Cover Traffic Signals	☐ IC/TL
Gully	☐ G
Kerb Outlet	☐ KO
Cover Level	CL:00.00
Invert Level	IL:00.00
Soffit Level	SL:00.00
Reducing Slab Level	RS:00.00
Sump Level	SUMP:00.00
Water Level	WL:00.00
Pit Level	PIT:00.00

Cover
Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	CO
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
Vitrified Clay	VC

ADDITIONAL NOTES



Survey Notes

Grid: Plane, local related to OS Grid.
Levels: OS Datum from GNSS positioning, converted using the National Geoid Model OSGM15.

Notes

Utility drawing to be read in conjuction with survey report.

Survey Legend

UNDERGROUND SERVICES KEY

COMMUNICATION CABLES

TV	Cable TV
COM	Communication
COM	Colt Telecom
COM	EU Networks
COM	Instalcom
COM	Neo Network
COM	Nynex
COM	Sky
TEL	Telecom
COM	Veolia
COM	Verizon
COM	Zayo

GROUND PENETRATING RADAR

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GAS PIPES

G	Gas
G LP	Gas LP
G MP	Gas MP
G IP	Gas IP
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SERVICE QUALITY LEVEL EXAMPLE

TEL-A	Quality Level A
TEL-B1	Quality Level B1
TEL-B1P	Quality Level B1P
TEL-B2	Quality Level B2
TEL-B2P	Quality Level B2P
TEL-B3	Quality Level B3
TEL-B3P	Quality Level B3P
TEL-B4 AR	Quality Level B4 AR
TEL-B4 TFR	Quality Level B4 TFR

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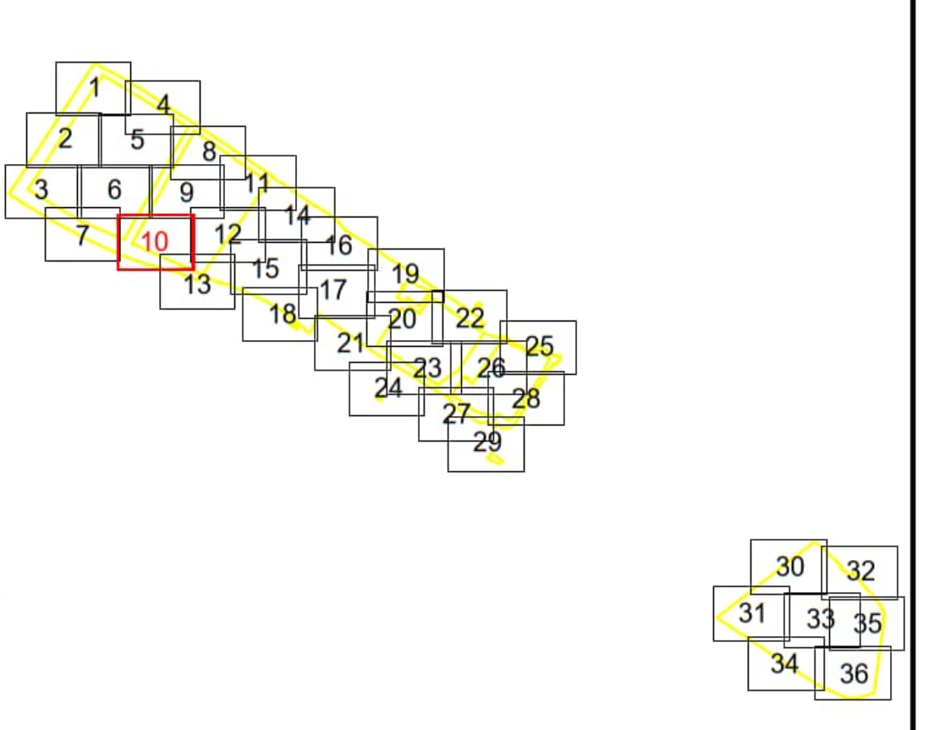

Rev.	Date	Description
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Project
Connah's Quay Power Station

Drawing Title
Utility Mapping Survey
Sheet 10/36

Surveyed by	SL/JB	CAD by	PS
Checked by	DJ/SL	Approved by	AT
Survey Date	April 2025		
Scale	1:200	[A0 Sheet]	

Drawing No: 62330/UG10
Revision: 00

ACCREDITATIONS

RICS
THE SURVEY ASSOCIATION
chartered ices
PUMA
PAS128 ACCREDITATION
RISQS QUALIFIED
bsi. ISO 9001 Quality Management
FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION: APPROX. DEPTH TO CENTRE — CABLE/FIBRE OPTIC
GRAVITY DRAIN (VISUAL OBSERVATION): APPROX. DEPTH TO INVERT
GROUND PENETRATING RADAR: APPROX DEPTH TO EXTERNAL CROWN

BSI PAS128:2022 QUALITY LEVEL INFORMATION

SURVEY TYPE		QUALITY LEVEL	POST-PROCESSING (GPR DATA ANALYSIS)	ACCURACY HORIZONTAL	ACCURACY VERTICAL	DESCRIPTION (SUPPORTING DATA)
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Drain	○ D
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Hydrant	○ FH
Lamp Post	○ LP
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Offset Fill	○ OF
Post	○ P
Parking Meter	○ PM
Rain Water Pipe	○ PR
Pipe Riser	○ RWP
Rodding Eye	○ RE
Road Sign	○ RS
Soil Pipe	○ SVP
Stop Tap	○ ST
Stop Valve	○ SV
Traffic Light	○ TL
Telegraph Pole	○ TP
Traffic Light Push Button Post	○ TLP
Traffic Light Control	○ TLC/P
Vent Pipe	○ VP
Water Meter	○ WM
Washout	○ WO
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Electricity	—Z—Z—
Telephone	—T—T—

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Inspection Cover (Elec)	☐ IC/EL
Manhole	☐ MH
British Telecom Cover	☐ BT
Inspection Cover (Comms)	☐ IC/COM
Cable TV	☐ CATV
Inspection Cover Traffic Signals	☐ IC/TL
Gully	☐ G
Kerb Outlet	☐ KO
Cover Level	CL:00.00
Invert Level	IL:00.00
Soffit Level	SL:00.00
Reducing Slab Level	RS:00.00
Sump Level	SUMP:00.00
Water Level	WL:00.00
Pit Level	PIT:00.00

Cover
Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	CO
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
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Vitrified Clay	VC

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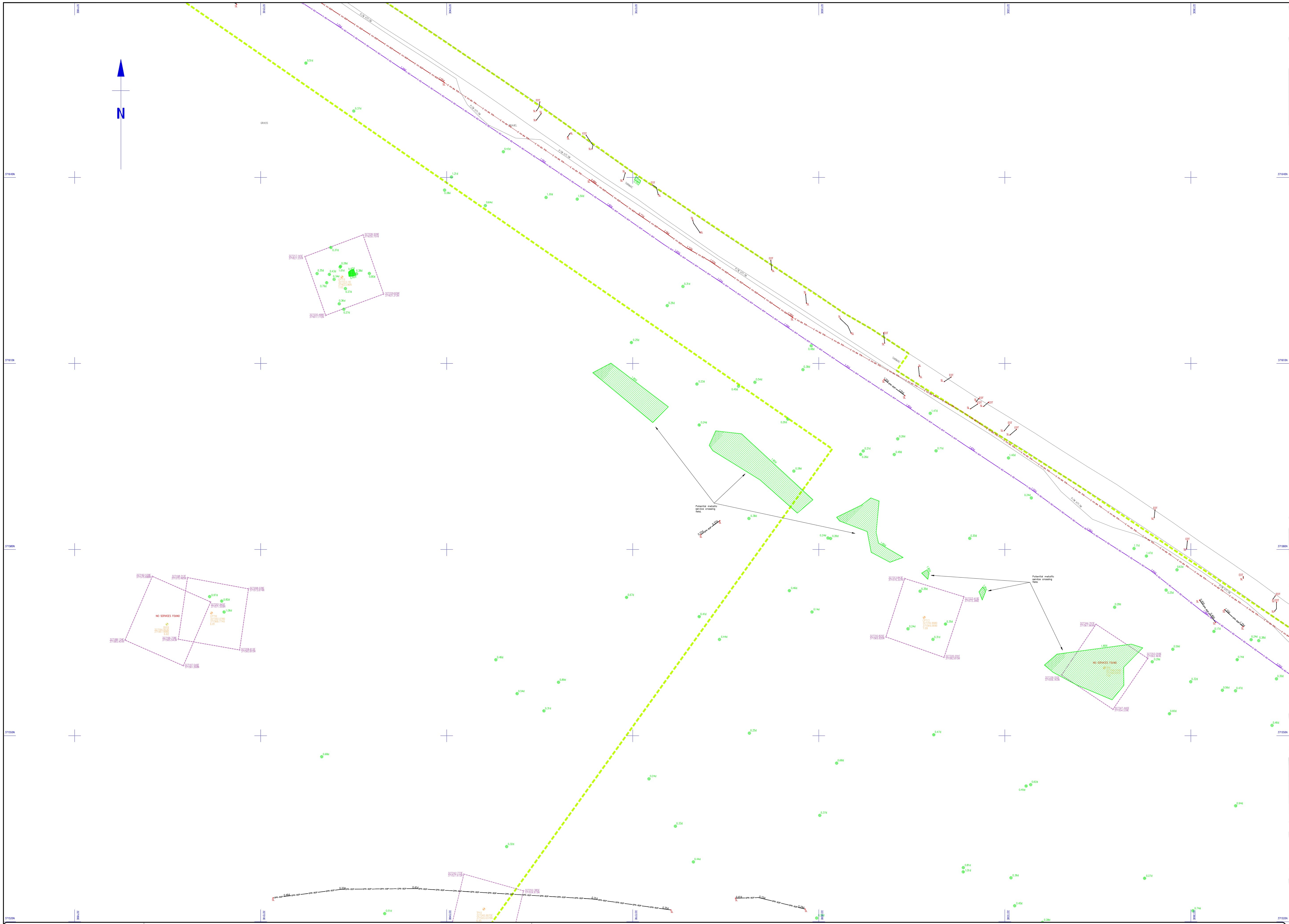

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SERVICE QUALITY LEVEL EXAMPLE

TEL-A	Quality Level A
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TEL-B2	Quality Level B2
TEL-B2P	Quality Level B2P
TEL-B3	Quality Level B3
TEL-B3P	Quality Level B3P
TEL-B4 AR	Quality Level B4 AR
TEL-B4 TFR	Quality Level B4 TFR

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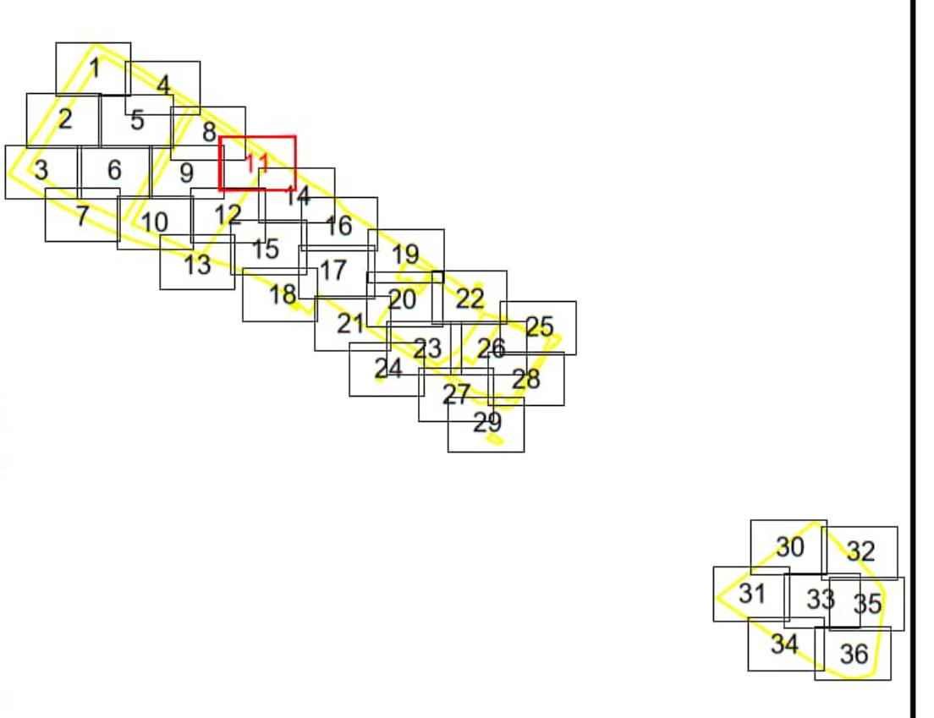

Rev.	Date	Description
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Drawing Title
Utility Mapping Survey
Sheet 11/36

Surveyed by SL/JB	CAD by PS	Survey Date April 2025
Checked by DJ/SL	Approved by AT	Scale 1:200 [A0 Sheet]

Drawing No 62330/UG11
Revision 00

ACCREDITATIONS

RICS
THE SURVEY ASSOCIATION
chartered ices
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RISQS
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SURVEY TYPE		QUALITY LEVEL	POST-PROCESSING (GPR DATA ANALYSIS)	ACCURACY		DESCRIPTION (SUPPORTING DATA)
				HORIZONTAL	VERTICAL	
B	Detection	QL-B4 TFR	No	Undefined	Undefined	Location not detected on site, taken from records.
		QL-B4 AR	No	Undefined	Undefined	A utility segment that has not been detected but is suspected to exist. Denotes assumed route only.
		QL-B3	No	±500mm	Undefined (No reliable depth)	Horizontal detection by one geophysical technique only. Denotes utility segments with weak signals / no depth information.
		QL-B3P	Yes			
		QL-B2	No	±250mm	±40% of detected depth	Horizontal and vertical detection by one geophysical technique only (Electromagnetic Detection/Ground Penetrating Radar). Medium confidence level for position and depth.
		QL-B2P	Yes			
		QL-B1	No	±150mm	±15% of detected depth	Horizontal and vertical detection by multiple geophysical techniques. (Electromagnetic Detection/Ground Penetrating Radar). High confidence level for position and depth.
		QL-B1P	Yes			
A	Verification	QL-A	No	±50mm	±50mm	Horizontal and vertical location of the utility established by visual inspection at manholes and inspection covers or by use of targeted excavations (vacuum excavation and trial pits).

DRAWING INFORMATION

DUCTING LAYOUTS

1W:	1 WAY SINGLE DUCT
2W:	2 WAY FLAT
2W: 1/2	2 WAY: 1 WIDE, 2 DEEP
4W: 2/2	4 WAY: 2 WIDE, 2 DEEP
6W: 3/2	6 WAY: 3 WIDE, 2 DEEP
12W: 4/3	12 WAY: 4 WIDE, 3 DEEP

STREET FURNITURE

Air Valve	○ AV
Bus Stop	○ BS
Bollard	○ B
Buchan Trap	○ Buc
Cable Riser	○ CR
Closed Circuit TV	○ CCTV
Down Pipe	○ DP
Drain	○ D
Earth Rod	○ ER
Electricity Pole	○ EP
Flood Light	○ FL
Gas Riser	○ GR
Gas Valve	○ GV
Hydrant	○ FH
Lamp Post	○ LP
Service Marker	○ MK
Offset Fill	○ OF
Post	○ P
Parking Meter	○ PM
Rain Water Pipe	○ PR
Pipe Riser	○ RWP
Rodding Eye	○ RE
Road Sign	○ RS
Soil Pipe	○ SVP
Stop Tap	○ ST
Stop Valve	○ SV
Traffic Light	○ TL
Telegraph Pole	○ TP
Traffic Light Push Button Post	○ TLP
Traffic Light Control	○ TLC/P
Vent Pipe	○ VP
Water Meter	○ WM
Washout	○ WO
Control Box	☐ C/BOX
Car Vacuum	☐ VAC
Car Air	☐ AIR
Electrical Box	☐ EB
Junction Box	☐ JB
Gas Governor	☐ GAS GOV
Telephone Call Box	☐ TCP
Petrol Pump	☐ PP
Dish Drainage Channel	CD
Slot Drainage Channel	SD
Grate Drainage Channel	G.CH

ABBREVIATIONS

Assumed Route	AR
Backdrop	BD
Blocked	BLK
Depth	d
Ground Penetrating Radar	GPR
No Visible Pipes	NVP
Offset Fill	OF
Signal Lost	SL
Taken From Records	TFR
Tank	T
Unable To Survey	UTS
Unable To Rod	UR
Unable To Trace	UT
Unable To Lift	UTL
Vapour Recovery Point	VR

OVERHEAD FEATURES

Electricity Pylon	☒
Electricity	Z Z
Telephone	T T

LEVEL AND HEIGHT

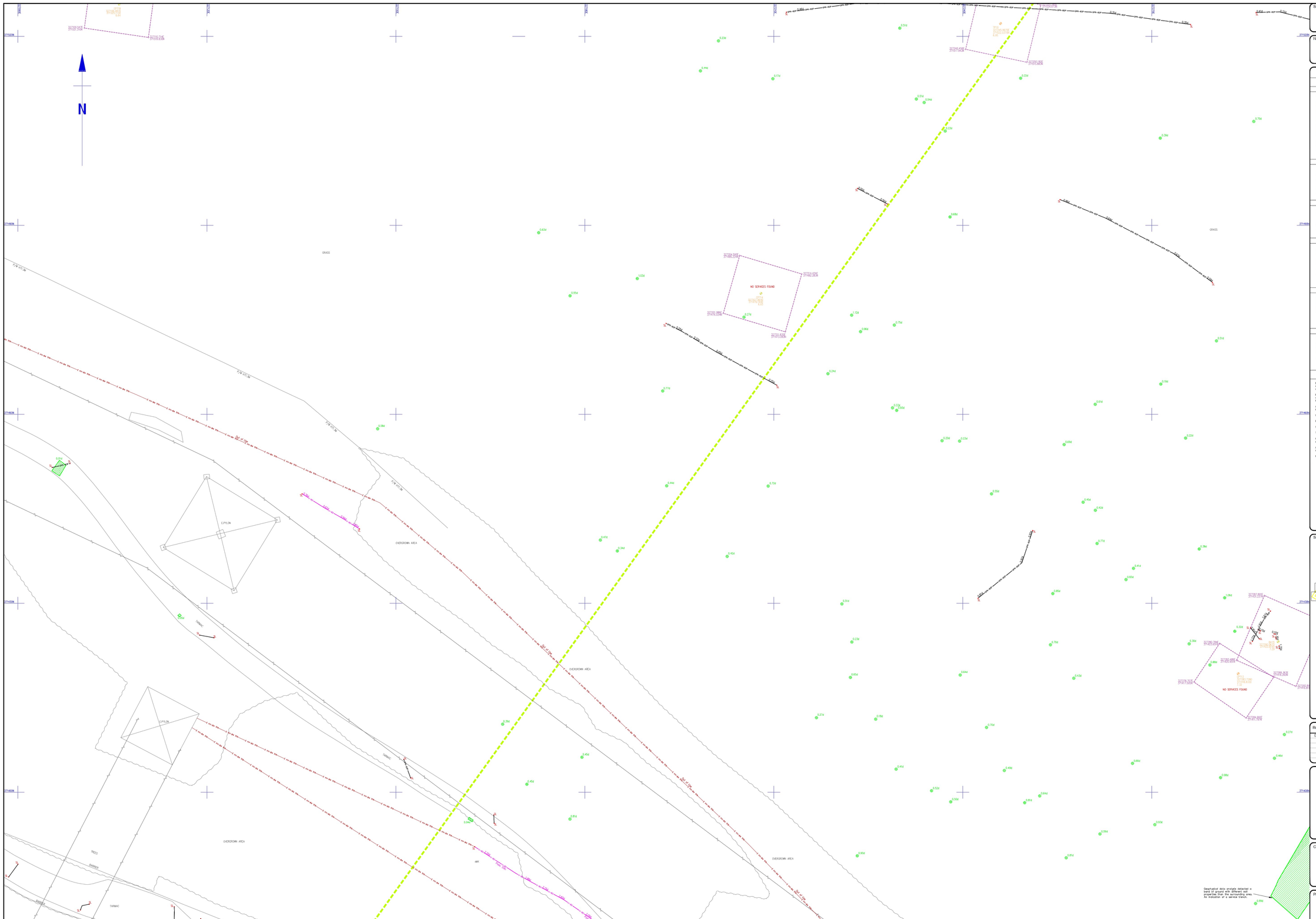
Inspection Cover	☐ IC
Inspection Cover (Elec)	☐ IC/EL
Manhole	☐ MH
British Telecom Cover	☐ BT
Inspection Cover (Comms)	☐ IC/COM
Cable TV	☐ CATV
Inspection Cover Traffic Signals	☐ IC/TL
Gully	☐ G
Kerb Outlet	☐ KO
Cover Level	CL:00.00
Invert Level	IL:00.00
Soffit Level	SL:00.00
Reducing Slab Level	RS:00.00
Sump Level	SUMP:00.00
Water Level	WL:00.00
Pit Level	PIT:00.00

Cover
Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	CO
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
Vitrified Clay	VC

ADDITIONAL NOTES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371220N
371210N
371200N
371190N
371180N
371170N
371160N
371150N
371140N
371130N

Survey Notes

Grid: Plane, local related to OS Grid.
Levels: OS Datum from GNSS positioning, converted using the National Geoid Model OSGM15.

Notes

Utility drawing to be read in conjuction with survey report.

Survey Legend

UNDERGROUND SERVICES KEY

COMMUNICATION CABLES

- TV — Cable TV
- COM — Communication
- COM — Colt Telecom
- COM — EU Networks
- COM — Instalcom
- COM — Neo Network
- COM — Nynex
- COM — Sky
- TEL — Telecom
- COM — Verizon
- COM — Vodafone
- COM — Zayo

GROUND PENETRATING RADAR

- GPR Detected Anomaly Area/Point
- GPR Detected Rebar
- GPR Detected Structural Feature
- GPR Detected Structure
- GPR Low Data
- GPR — GPR
- 0.76d Variable — GPR Detected Anomaly Point Directional
- GPR Transect

DRAINAGE PIPES

- CW — Chemically Contamined Sewer Combined
- GW — Gas Turbine Washdown
- CW — Oil Contamined Station Sewer Combined
- SW — Sewer Combined
- FW — Sewer Foul
- SW — Sewer Surface Water

OTHER SERVICES

- AD — Acid Drain
- AIR — Air Line
- AC — Alarm Cable
- CCTV — CCTV
- CH — Chemical
- CA — Compressed Air
- EA — Earthing Cables
- EF — Effluent
- DU — Empty Ducting
- H — Heating Pipe
- O — Overflow
- OX — Oxygen Pipe
- R — Rising Main
- SM — Sludge Main
- STM — Steam Duct
- TM — Thermal Main
- TL — Traffic Light Cable
- U — Unidentified
- VD — Vehicle Detector Loop
- V — Vent Pipe
- WW — Wash Water
- W — Water
- CW — Cooling Water Return
- CW — Cooling Water Supply

FIBRE OPTICAL CABLES

- FO — City Fibre
- FO — EXA Fibre Optic
- FO — GTT Fibre Optic
- FO — Virgin Media
- FO — Vodafone

FUEL SERVICES

- GA — Fuel Gauge Line
- FU — Fuel Line
- V — Fuel Vent Line
- OF — Offset Fill Pipe
- OP — Oil Pipe
- VR — Vapor Recovery Pipe

ELECTRICAL CABLES

- L — Street Lighting
- E — Electrical
- E LV — Electrical LV
- E HV — Electrical HV

OTHER LINETYPES

- EOT — End of trace
- Services Survey Boundary
- Area of No Access

GAS PIPES

- G — Gas
- G LP — Gas LP
- G MP — Gas MP
- G IP — Gas IP
- G HP — Gas HP

SERVICE QUALITY LEVEL EXAMPLE

- TEL-A — Quality Level A
- TEL-B1 — Quality Level B1
- TEL-B1P — Quality Level B1P
- TEL-B2 — Quality Level B2
- TEL-B2P — Quality Level B2P
- TEL-B3 — Quality Level B3
- TEL-B3P — Quality Level B3P
- TEL-B4 AR — Quality Level B4 AR
- TEL-B4 TFR — Quality Level B4 TFR

For Quality Level definitions see BSI PAS 128:2022 information below.
For more information go to www.malcolmhughes.co.uk

DISCLAIMERS

Electromagnetic and Ground Penetrating Radar techniques have been used in the detection of underground services, features and anomalies shown on this survey plan. These are interpretive processes and we recommend trial excavations should be undertaken to confirm identification, location and depth of features where these are critical to design or site works.

It is important to understand that there are limitations when it comes to detecting and mapping buried pipes, cables and ducts due to various factors such as depth location, material type, geology and proximity to other utilities. Even with the use of advanced techniques and equipment, it is not always possible to accurately detect and map all underground infrastructure.

All reasonable effort and care has been made in searching available record drawings. The completeness of the underground service information supplied to and by us cannot be guaranteed.

Where services are non-metallic or not proven on site, positions are taken from records, trench scars and surface detail.

Pipe sizes which cannot be obtained by visual survey are taken from utilities record drawings or marker plates where available.

Services shown as PAS128 QL- B4 TFR (Taken from records) and QL - B4 AR (Assumed Route) have not been proven on site.

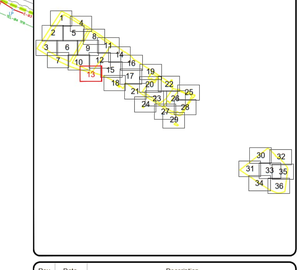
The CAD layering may contain further information.

Collected data from GPR has not been post processed unless specified elsewhere or denoted on the survey drawing by the abbreviation of (P).

All utilities inspected and measured at Inspection Covers or Manholes are considered to be a QL-A for a radius up to 5m from the chamber wall.

HSG47 safe digging practices should still be adhered to when using these Utility Mapping Survey plans.

Sheet Index



Rev.	Date	Description
00		First Issue

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Nottingham NG11 0EE

Project

Connah's Quay Power Station

ACCREDITATIONS

RICS · THE SURVEY ASSOCIATION · chartered ICES · PUMA · RISQS QUALIFIED · Exor Supplier · ISO 9001 Quality Management FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION

- ELECTRO-MAGNETIC DETECTION — APPROX. DEPTH TO CENTRE / INVERT
- CABLE FIBRE OPTIC
- GRAVITY (MAIN) (VISUAL OBSERVATION) — APPROX. DEPTH TO INVERT
- GROUND PENETRATING RADAR — APPROX. DEPTH TO EXTERNAL CROWN

BSI PAS128:2022 QUALITY LEVEL INFORMATION

SURVEY TYPE		QUALITY LEVEL	POST-PROCESSING (GPR DATA ANALYSIS)	ACCURACY HORIZONTAL	ACCURACY VERTICAL	DESCRIPTION (SUPPORTING DATA)
B	Detection	QL-B4 TFR	No	Undefined	Undefined	Location not detected on site, taken from records.
		QL-B4 AR	No	Undefined	Undefined	A utility segment that has not been detected but is suspected to exist. Denotes assumed route only.
		QL-B3	No	±500mm	Undefined (No reliable depth)	Horizontal detection by one geophysical technique only. Denotes utility segments with weak signals / no depth information.
		QL-B3P	Yes			
		QL-B2	No	±250mm	±40% of detected depth	Horizontal and vertical detection by one geophysical technique only (Electromagnetic Detection/Ground Penetrating Radar). Medium confidence level for position and depth.
		QL-B2P	Yes			
		QL-B1	No	±150mm	±15% of detected depth	Horizontal and vertical detection by multiple geophysical techniques. (Electromagnetic Detection/Ground Penetrating Radar). High confidence level for position and depth.
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A	Verification	QL-A	No	±50mm	±50mm	Horizontal and vertical location of the utility established by visual inspection at manholes and inspection covers or by use of targetted excavations (vacuum excavation and trial pits).

DRAWING INFORMATION

DUCTING LAYOUTS

- 1W: 1 WAY SINGLE DUCT
- 2W: 2 WAY FLAT
- 2W 1/2: 2 WAY 1 WIDE, 2 DEEP
- 4W 2/2: 4 WAY, 2 WIDE, 2 DEEP
- 6W 3/2: 6 WAY, 3 WIDE, 2 DEEP
- 12W 4/3: 12 WAY, 4 WIDE, 3 DEEP

STREET FURNITURE

- Air Valve — AV
- Box Stop — BS
- Bollard — B
- Buchan Trap — Bu
- Bus Stop — BUS
- Closed Circuit TV — CCTV
- Down Pipe — DP
- Drain — DR
- Earth Rod — ER
- Electricity Pole — EP
- Flood Light — FL
- Gas Riser — GR
- Gully Grate — GG
- Hydrant — HY
- Lamp Post — LP
- Service Marker — MK
- Offset Fill — OF
- Post — P
- Parking Meter — PM
- Rain Water Pipe — PW
- Radio Mast — RE
- Reddring Eye — RS
- Road Sign — SVP
- Soil Pipe — ST
- Stop Tap — TAP
- Traffic Light — TL
- Telegraph Pole — TP
- Traffic Light Push Button Post — TLP
- Traffic Light Control — TLCP
- Vent Pipe — VP
- Water Meter — WM
- Washout — WO
- Control Box — C/BOX
- Car Vacuum — VAC
- Car Air — AIR
- Electrical Box — EB
- Gas Governor Box — GB
- Gas Governor — GAS GOV
- Telephone Call Box — TCP
- Petrol Pump — PP
- Dish Drainage Channel — CD
- Slot Drainage Channel — SLOT
- Grate Drainage Channel — GULLY

ABBREVIATIONS

- Assumed Route — AR
- Backdrop — BD
- Blocked — BLK
- Depth — d
- Ground Penetrating Radar — GPR
- Not Visible Pipes — NVP
- Offset Fill — OF
- Surface Fall — SF
- Taken From Records — TFR
- Tank — T
- Unable To Survey — UTS
- Unable To Rod — UR
- Unable To Trace — UTR
- Unable To Lift — UTL
- Vapour Recovery Point — VR

OVERHEAD FEATURES

- Electricity Pylon
- Electricity — E — E — E
- Telephone — T — T — T

LEVEL AND HEIGHT

- Inspection Cover — IC
- Inspection Cover (Elec) — ICEL
- Kerb — KERB
- British Telecom Cover — BT
- Inspection Cover (Comms) — ICCOM
- Cable TV — CATV
- Inspection Cover Traffic Signals — ICTL
- Gully — GO
- Kerb Outlet — KO
- Cover Level — CL:00.00
- Invert Level — IL:00.00
- Soffit Level — SL:00.00
- Sump Level - Slab Level — SLSP:00.00
- Sump Level — SUMP:00.00
- Water Level — WL:00.00
- Pit Level — PIT:00.00
- Cover
- Chamber Extents

PIPE MATERIAL

- Asbestos Cement — AC
- Brick — BR
- Cast Iron — CI
- Concrete — CO
- Ductile Iron — DI
- Glass Reinforced Pipe — GRP
- Polyvinyl Chloride — PVC
- Spun Iron — SI
- Steel — ST
- Vitrified Clay — VC

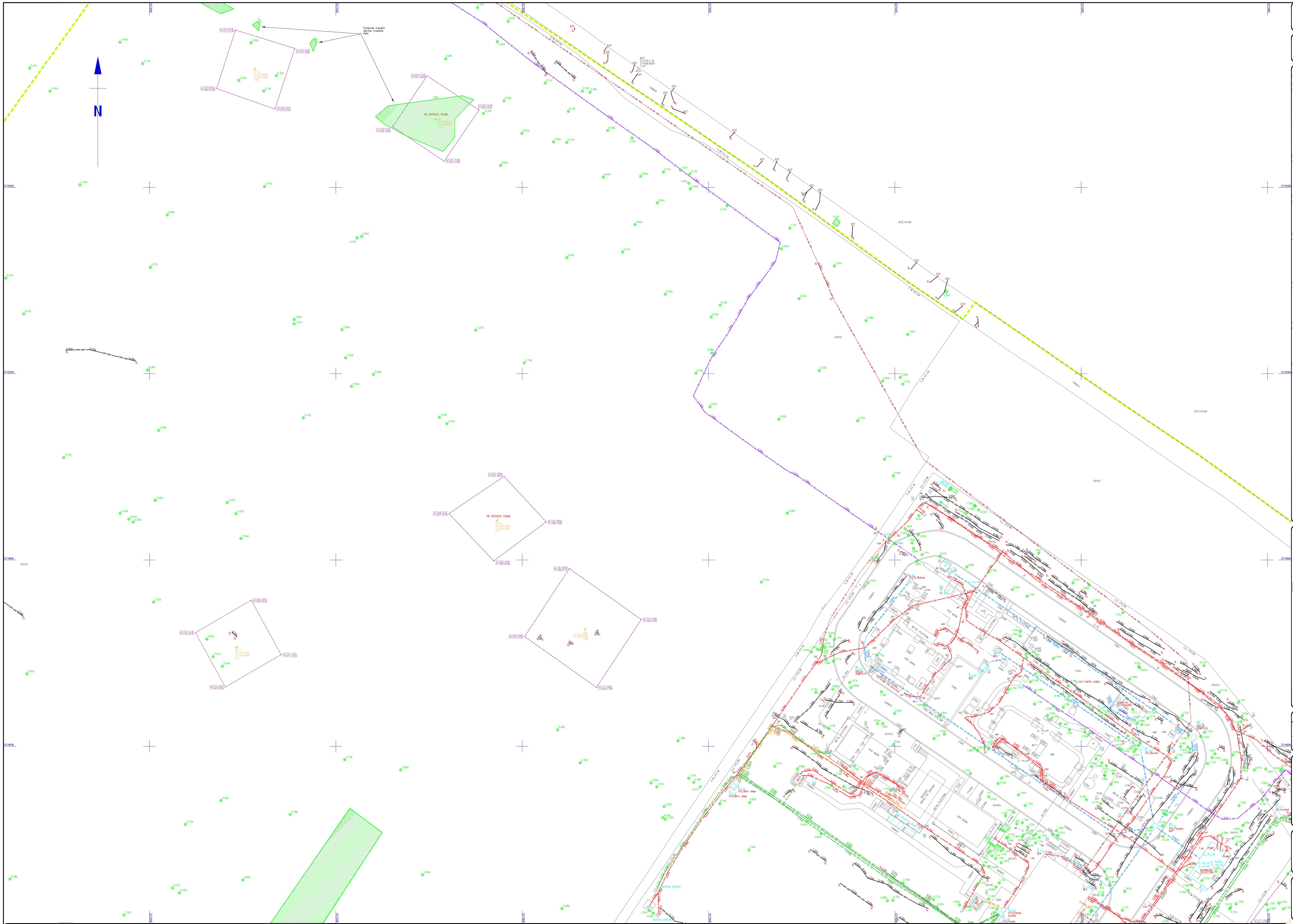
ADDITIONAL NOTES

Surveyed By	CAD by	Survey Date
SU/JB	PS	April 2025
Checked By	Approved by	Scale
DJ/SL	AT	1:200 [A0 Sheet]

Drawing Title

Utility Mapping Survey
Sheet 13/36

Drawing No: 62330/UG13 — Revision: 00



Survey Notes
Grid: Plane, local related to OS Grid.
Levels: OS Datum from GNSS positioning, converted using the National Geoid Model OSGM15.

Notes
Utility drawing to be read in conjuction with survey report.

Survey Legend

UNDERGROUND SERVICES KEY

COMMUNICATION CABLES	
TV	Cable TV
COM	Communication
COM	Colt Telecom
COM	EU Networks
COM	Instalcom
COM	Neo Network
COM	Nynex
COM	Sky
TEL	Telecom
COM	Veolia
COM	Verizon
COM	Zayo

GROUND PENETRATING RADAR	
▨	GPR Detected Anomaly Area/Point
▨	GPR Detected Rebar
▨	GPR Detected Structural Feature
▨	GPR Detected Structure
▨	GPR Low Data
GPR	GPR
0.79d	GPR Detected Anomaly Point Directional
	GPR Transect

DRAINAGE PIPES	
CW	Chemically Contamined Drains Pumped
CW	Gas Turbine Washdown
CW	Oil Contamined Station Drains System
CW	Sewer Combined
FW	Sewer Foul
SW	Sewer Surface Water

FIBRE OPTICAL CABLES	
FO	City Fibre
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FO	Vodafone

FUEL SERVICES	
GA	Fuel Gauge Line
FU	Fuel Line
V	Fuel Vent Line
OF	Offset Fill Pipe
OP	Oil Pipe
VR	Vapor Recovery Pipe

OTHER SERVICES	
AD	Acid Drain
AIR	Air Line
AC	Alarm Cable
CCTV	CCTV
CH	Chemical
CA	Compressed Air
EA	Earthing Cables
EF	Effluent
DU	Empty Ducting
H	Heating Pipe
O	Overflow
OX	Oxygen Pipe
/	Rising Main
SM	Sludge Main
STM	Steam Duct
TM	Thermal Main
TL	Traffic Light Cable
U	Unidentified
VD	Vehicle Detector Loop
V	Vent Pipe
WW	Wash Water
W	Water
W	Cooling Water Return
W	Cooling Water Supply

ELECTRICAL CABLES	
L	Street Lighting
E	Electrical
E LV	Electrical LV
E HV	Electrical HV

OTHER LINETYPES	
EOT	End of trace
	Services Survey Boundary
	Area of No Access

GAS PIPES	
G	Gas
G LP	Gas LP
G MP	Gas MP
G IP	Gas IP
G HP	Gas HP

SERVICE QUALITY LEVEL EXAMPLE	
TEL-A	Quality Level A
TEL-B1	Quality Level B1
TEL-B1P	Quality Level B1P
TEL-B2	Quality Level B2
TEL-B2P	Quality Level B2P
TEL-B3	Quality Level B3
TEL-B3P	Quality Level B3P
TEL-B4 AR	Quality Level B4 AR
TEL-B4 TFR	Quality Level B4 TFR

For Quality Level definitions see BSI PAS128:2022 information below.
For more information go to www.malcolmhughes.co.uk

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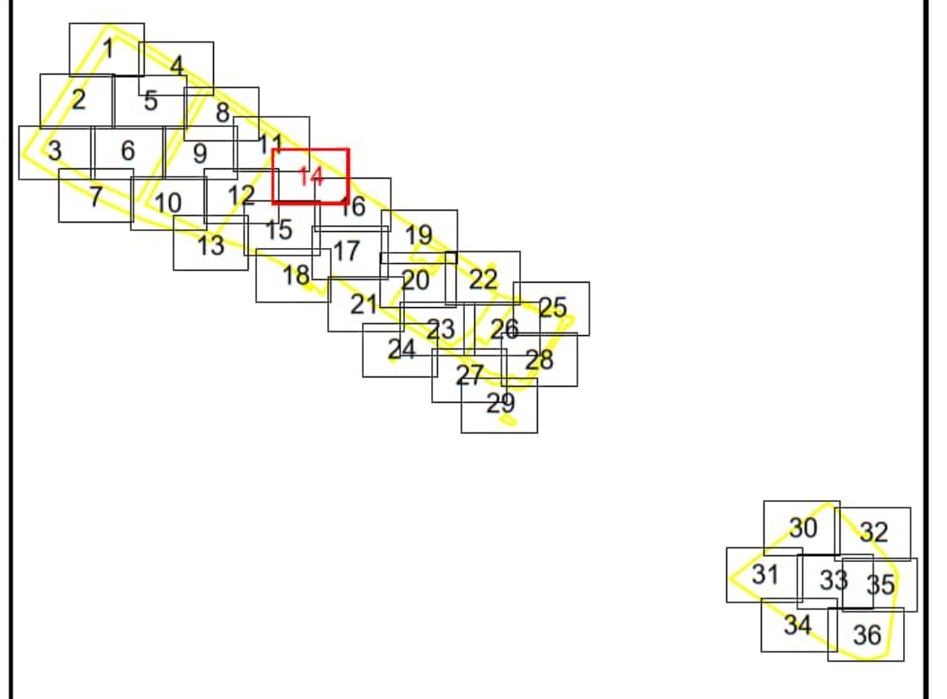
Sheet Index



Rev.	Date	Description
00		First Issue

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Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project
Connah's Quay Power Station

Drawing Title
Utility Mapping Survey
Sheet 14/36

Surveyed by	SL/JB	CAD by	PS	Survey Date	April 2025
Checked by	DJ/SL	Approved by	AT	Scale [A0 Sheet]	1:200

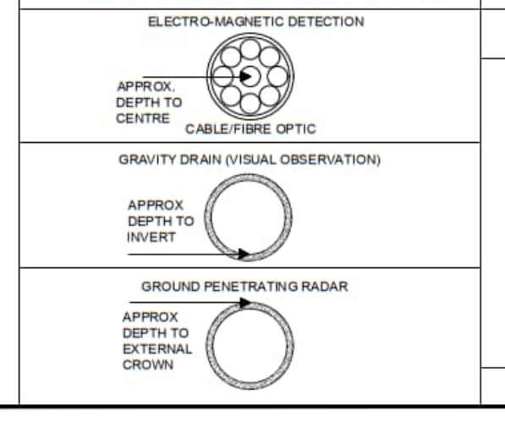
Drawing No 62330/UG14
Revision 00

ACCREDITATIONS

RICS
THE SURVEY ASSOCIATION
chartered ices
PUMA PAS128 ACCREDITATION
RISQS QUALIFIED
bsi ISO 9001 Quality Management
FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION



BSI PAS128:2022 QUALITY LEVEL INFORMATION

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12W: 4/3	○○○○ ○○○○ ○○○○	12 WAY: 4 WIDE, 3 DEEP

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Drain	○ D
Earth Rod	○ ER
Electricity Pole	○ EP
Flood Light	○ FL
Gas Riser	○ GR
Gas Valve	○ GV
Hydrant	○ FH
Lamp Post	○ LP
Service Marker	○ MK
Offset Fill	○ OF
Post	○ P
Parking Meter	○ PM
Rain Water Pipe	○ PR
Pipe Riser	○ RWP
Rodding Eye	○ RE
Road Sign	○ RS
Soil Pipe	○ SVP
Stop Tap	○ ST
Stop Valve	○ SV
Traffic Light	○ TL
Telegraph Pole	○ TP
Traffic Light Push Button Post	○ TLP
Traffic Light Control	○ TLC/P
Vent Pipe	○ VP
Water Meter	○ WM
Washout	○ WO
Control Box	☐ C/BOX
Car Vacuum	☐ VAC
Car Air	☐ AIR
Electrical Box	☐ EB
Junction Box	☐ JB
Gas Governor	☐ GAS GOV
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Taken From Records	TFR
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Unable To Survey	UTS
Unable To Rod	UR
Unable To Trace	UT
Unable To Lift	UTL
Vapour Recovery Point	VR

OVERHEAD FEATURES

Electricity Pylon	☒
Electricity	—Z—Z—
Telephone	—T—T—

LEVEL AND HEIGHT

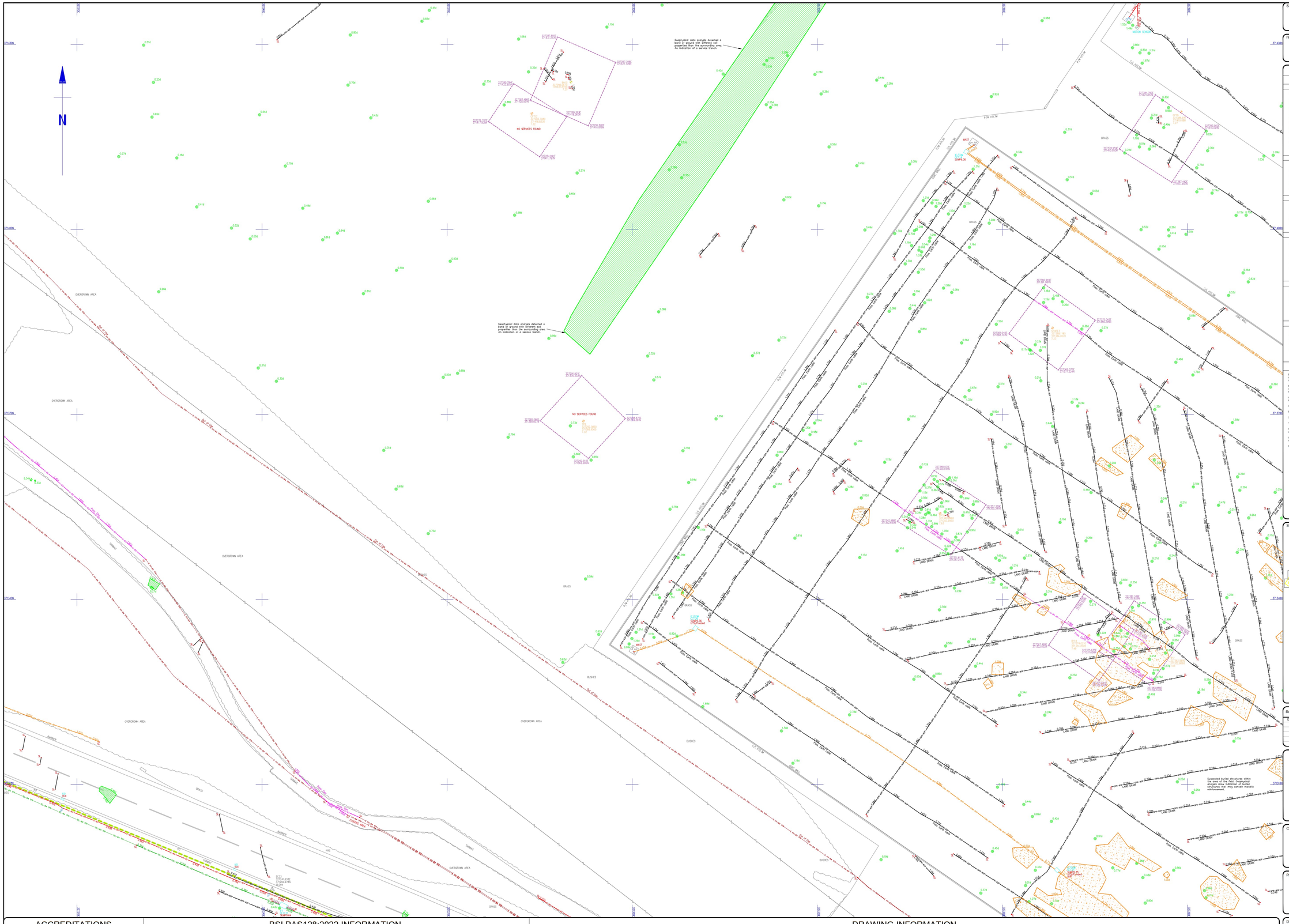
Inspection Cover	☐ IC
Inspection Cover (Elec)	☐ IC/EL
Manhole	☐ MH
British Telecom Cover	☐ BT
Inspection Cover (Comms)	☐ IC/COM
Cable TV	☐ CATV
Inspection Cover Traffic Signals	☐ IC/TL
Gully	☐ G
Kerb Outlet	☐ KO
Cover Level	CL:00.00
Invert Level	IL:00.00
Soffit Level	SL:00.00
Reducing Slab Level	RS:00.00
Sump Level	SUMP:00.00
Water Level	WL:00.00
Pit Level	PIT:00.00

Cover
Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	CO
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
Vitrified Clay	VC

ADDITIONAL NOTES



Survey Notes

Grid: Plane, local related to OS Grid.

Levels: OS Datum from GNSS positioning, converted using the National Geoid Model OSGM15.

Notes

Utility drawing to be read in conjuction with survey report.

Survey Legend

UNDERGROUND SERVICES KEY

COMMUNICATION CABLES

- TV — Cable TV
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- TEL — Telecom
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GROUND PENETRATING RADAR

- GPR Detected Anomaly Area/Point
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- GPR — GPR
- 0.76d Depth
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- GPR Transect

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- CW — Chemically Contamined Sewer Combined
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- CW — Oil Contaminted Station Sewer Foul
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- AC — Acid Drain
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- CH — Chemical
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- H — Heating Pipe
- O — Overflow
- OX — Oxygen Pipe
- RM — Rising Main
- SM — Sludge Main
- STM — Steam Duct
- TM — Thermal Main
- TL — Traffic Light Cable
- ? — Unidentified
- VD — Vehicle Detector Loop
- V — Vent Pipe
- WW — Wash Water
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SERVICE QUALITY LEVEL EXAMPLE

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- TEL-B1 — Quality Level B1
- TEL-B1P — Quality Level B1P
- TEL-B2 — Quality Level B2
- TEL-B2P — Quality Level B2P
- TEL-B3 — Quality Level B3
- TEL-B3P — Quality Level B3P
- TEL-B4 AS — Quality Level B4 AS
- TEL-B4 TFR — Quality Level B4 TFR

For Quality Level definitions see BSI PAS 128:2022 information below. For more information go to www.malcolmhughes.co.uk

DISCLAIMERS

Electromagnetic and Ground Penetrating Radar techniques have been used in the detection of underground services, features and anomalies shown on this survey plan. The survey information should be used for general guidance only. Excavations should be undertaken to confirm identification, location and depth of features where these are critical to design or site works.

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Sheet Index

Rev	Date	Description
00		First Issue

MALCOLM HUGHES
CHARTERED LAND SURVEYORS

www.malcolmhughes.co.uk
surveythis@mhls.co.uk

Warrington Office
Tel: 0161 905 1265

Swansea Office
Tel: 01792 644 181

Glasgow Office
Tel: 0141 885 0800

London Office
Tel: 0800 833312

Client

Uniper Technologies Ltd.
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project

Connah's Quay Power Station

Drawing Title

Utility Mapping Survey
Sheet 15/36

Surveyed by	CAD by	Survey Date
SL/JB	PS	April 2025
Checked by: DJ/SL	Approved by: AT	Scale: 1:200 [A0 Sheet]

Drawing No: 62330/UG15 — Revision: 00

ACCREDITATIONS

RICS · The Survey Association · chartered ices · PUMA · RISQS QUALIFIED · isqa ISO 9001 Quality Management FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION

- ELECTRO-MAGNETIC DETECTION — APPROX DEPTH TO CENTRE — CABLE/FIBRE OPTIC
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		QL-B3P	Yes			
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- 1W — 1 WAY SINGLE DUCT
- 2W — 2 WAY FLAT
- 2W 1/2 — 2 WAY: 1 WIDE, 2 DEEP
- 4W 2/2 — 4 WAY: 2 WIDE, 2 DEEP
- 6W 3/2 — 6 WAY: 3 WIDE, 2 DEEP
- 12W 4/3 — 12 WAY: 4 WIDE, 3 DEEP

STREET FURNITURE

Air Valve	AV	Parking Meter	PM
Bus Stop	BS	Rain Water Pipe	RW
Bollard	B	Pipe Riser	RWP
Buchan Trap	Buc	Rodding Eye	RE
Cable Riser	CR	Road Sign	RS
Closed Circuit TV	CCTV	Soil Pipe	SVP
Down Pipe	DP	Stop Tap	ST
Drain	D	Stop Valve	SV
Earth Rod	ER	Traffic Light	TL
Electricity Pole	EP	Telegraph Pole	TP
Flood Light	FL	Traffic Light Push Button Post	TLP
Gas Riser	GR	Traffic Light Control	TLC/P
Gas Valve	GV	Vent Pipe	VP
Hydrant	FH	Water Meter	WM
Lamp Post	LP	Washout	WO
Marker Marker	MK		
Offset Fill	OF		
Post	P		

Control Box	C/BOX
Car Vacuum	VAC
Car Air	AIR
Electrical Box	EB
Junction Box	JB
Pay Machine	PAY-GOV
Telephone Call Box	TCP
Petrol Pump	PP
Dish Drainage Channel	CD
Slot Drainage Channel	SD
Grate Drainage Channel	G.GD

ABBREVIATIONS

Assumed Route	AR
Backdrop	BD
Blocked	BLK
Depth	d
Ground Penetrating Radar	GPR
Invert Level	IL
Offset Fill	OF
Signal Lost	SL
Taken From Records	TFR
Top	Th
Unable To Survey	UTS
Unable To Rod	UR
Unable To Trace	UT
Unable To Lift	UTL
Vapour Recovery Point	VR

OVERHEAD FEATURES

- Electricity Pylon
- Electricity
- Telephone

LEVEL AND HEIGHT

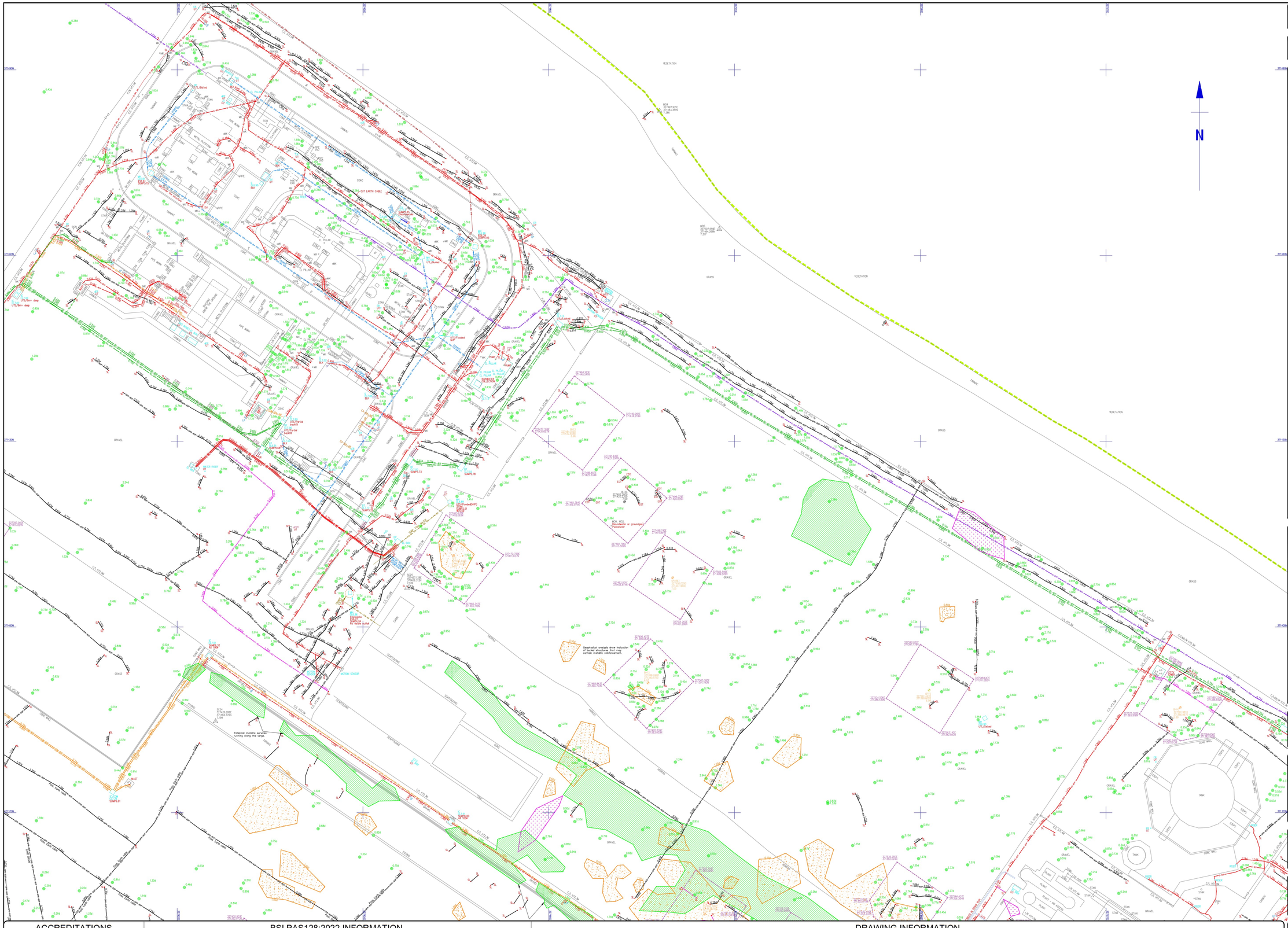
Inspection Cover	IC
Inspection Cover (Elec)	IC/EL
Manhole	MH
Inspection Cover	IC
Inspection Cover (Comms)	IC/COM
Cable TV	CATV
Inspection Cover Traffic Signals	IC/TL
Gully	G
Gully Outlet	GO
Cover Level	CL:00.00
Invert Level	IL:00.00
Soffit Level	SL:00.00
Reducing Slab Level	RS:00.00
Kerb Level	KL:00.00
Water Level	WL:00.00
Pit Level	PIT:00.00

Cover — Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	CO
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
Vitrified Clay	VC

ADDITIONAL NOTES


N
VEGETATION
GRASS
GRAVEL
TARMAC
CONC
CONC WALL
PIPE WORK
TANK
MOTION SENSOR
Potential metallic services running along the verge.
Geophysical analysis show indication of faint anomalies that may contain metallic reinforcement.
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SCP2 337426.356E 371264.772N 17.04
MS1 337417.925E 371464.358N 7.31
MS2 337417.925E 371464.358N 7.31
SCP3 337426.356E 371264.772N 17.04
SCP4 337426.356E 371264.772N 17.04
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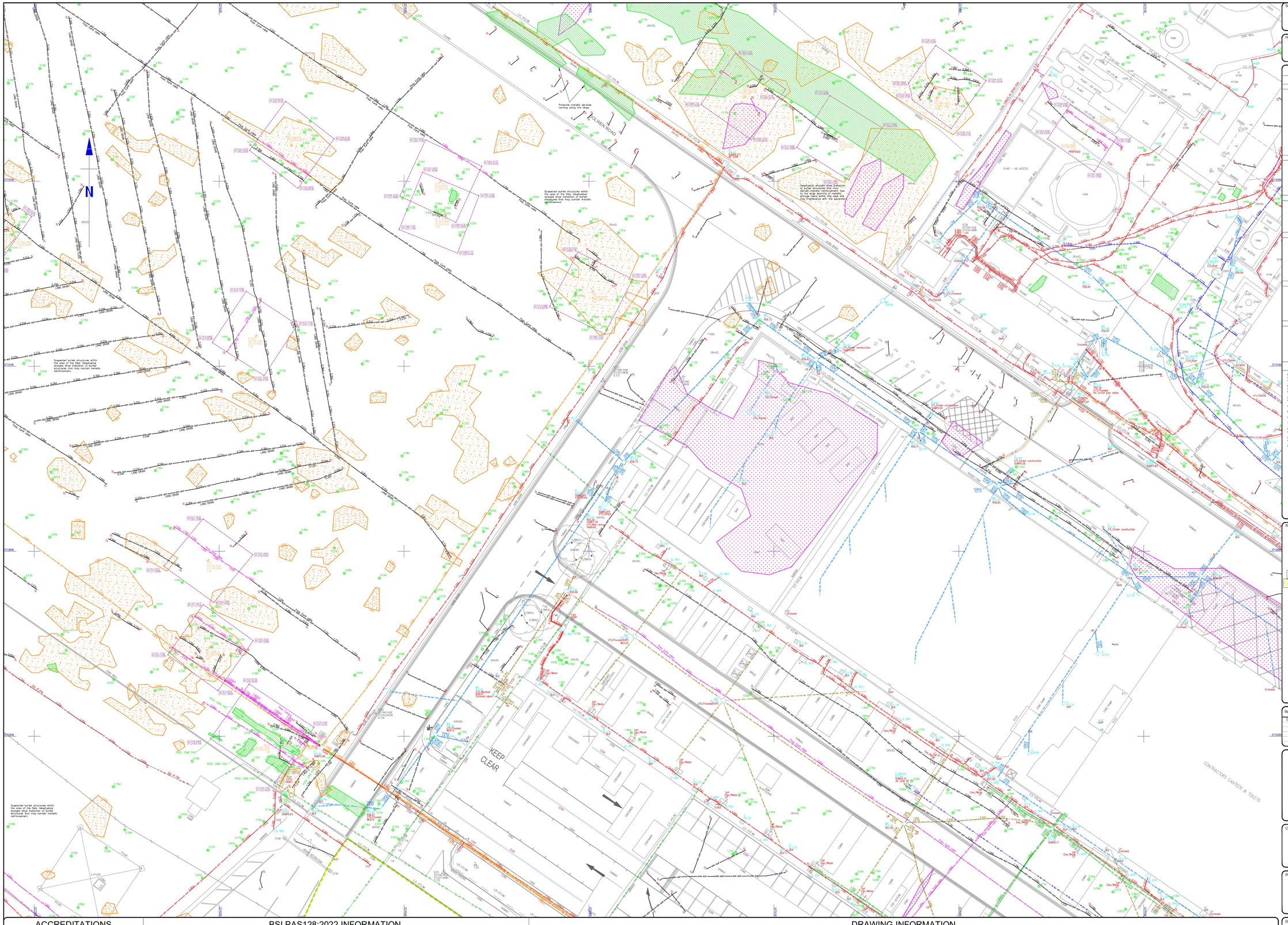

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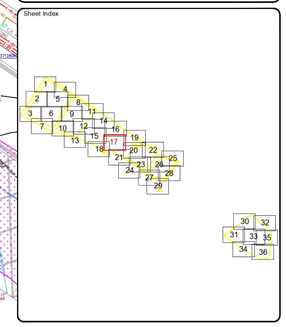

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Technology Centre, Ratcliffe on Soar
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Project

Connah's Quay Power Station

Drawing Title

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Surveyed by	CAD by	Survey Date
SL/JB	PS	April 2025
Checked by	Approved by	Scale
DJ/SL	AT	1:200 [A0 Sheet]

Drawing No: 62330/UG17
Revision: 00

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ABBREVIATIONS

Assumed Route, Backdrop, Crown, Depth, Ground Penetrating Radar, No Visible Pipes, Offset Fill, Pipe Invert, Taken From Records, Tank, Unable To Survey, Unable To Rod, Unable To Trace, Unable To Lift, Vapour Recovery Point

OVERHEAD FEATURES

Electricity Pylon, Electricity, Telephone

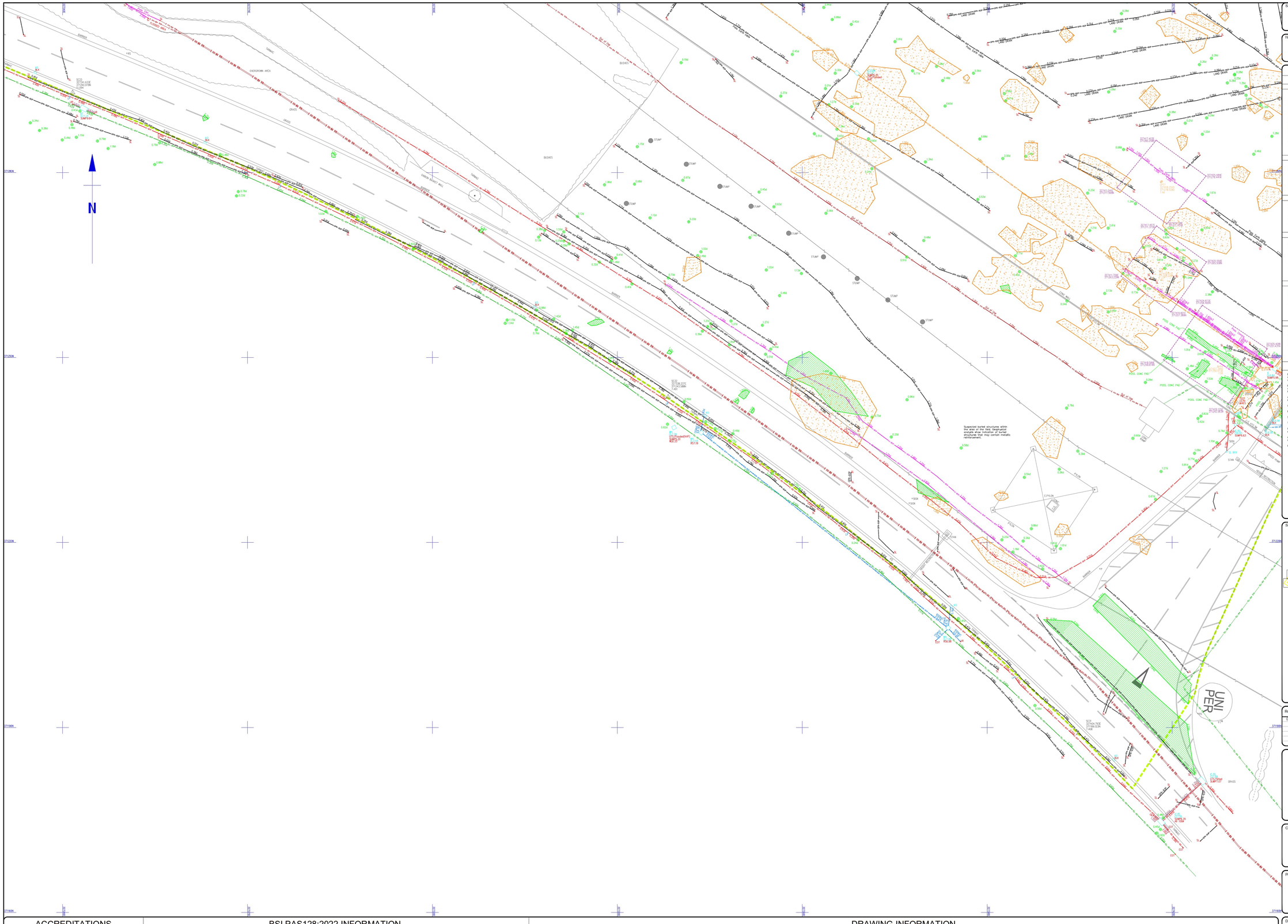
LEVEL AND HEIGHT

Inspection Cover, Inspection Cover (Elec), Manhole, British Telecom Cover, Inspection Cover (Comms), Gas, Inspection Cover Traffic Signals, Gully, Kerb Outlet, Cover Level, Spot Level, Soffit Level, Reducing Slab Level, Sump Level, Water Level, Pin Level

PIPE MATERIAL

Asbestos Cement, Brick, Cast Iron, Concrete, Ductile Iron, Polyethylene Pipe, Plywood Chloride, Spun Iron, Steel, Vitrified Clay

ADDITIONAL NOTES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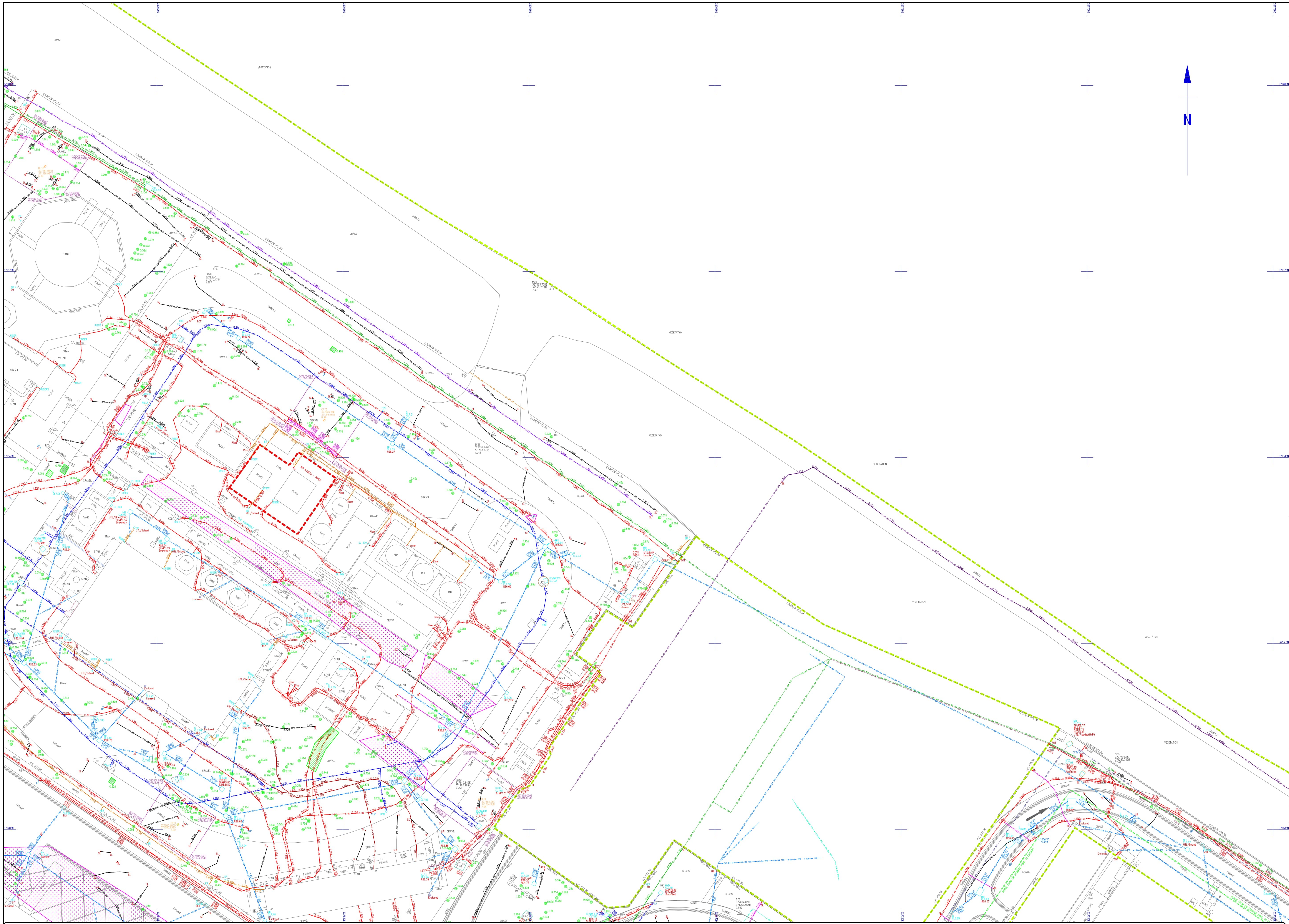

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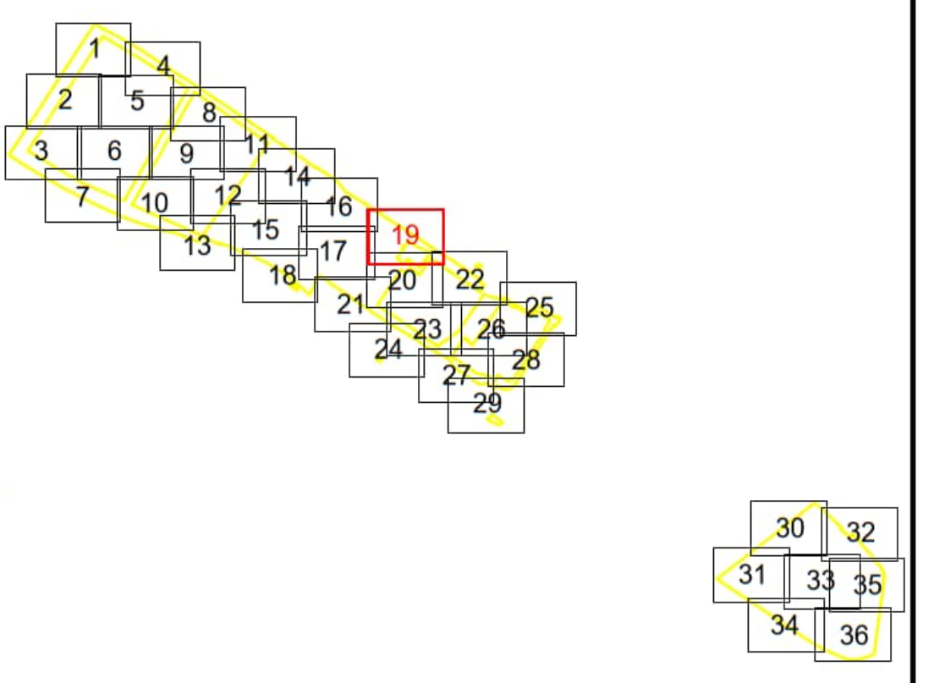
Sheet Index



Rev.	Date	Description
00		First Issue

MALCOLM HUGHES
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Nottingham NG11 0EE

Project
Connah's Quay Power Station

Drawing Title
Utility Mapping Survey
Sheet 19/36

Surveyed by SL/JB	CAD by PS	Survey Date April 2025
Checked by DJ/SL	Approved by AT	Scale 1:200 [A0 Sheet]

Drawing No 62330/UG19
Revision 00

ACCREDITATIONS

RICS
THE SURVEY ASSOCIATION
chartered ices
PUMA PAS128 ACCREDITATION
RISQS QUALIFIED
bsi. ISO 9001 Quality Management FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION
APPROX. DEPTH TO CENTRE
CABLE/FIBRE OPTIC

GRAVITY DRAIN (VISUAL OBSERVATION)
APPROX DEPTH TO INVERT

GROUND PENETRATING RADAR
APPROX DEPTH TO EXTERNAL CROWN

BSI PAS128:2022 QUALITY LEVEL INFORMATION

SURVEY TYPE		QUALITY LEVEL	POST-PROCESSING (GPR DATA ANALYSIS)	ACCURACY		DESCRIPTION (SUPPORTING DATA)
				HORIZONTAL	VERTICAL	
B	Detection	QL-B4 TFR	No	Undefined	Undefined	Location not detected on site, taken from records.
		QL-B4 AR	No	Undefined	Undefined	A utility segment that has not been detected but is suspected to exist. Denotes assumed route only.
		QL-B3	No	±500mm	Undefined (No reliable depth)	Horizontal detection by one geophysical technique only. Denotes utility segments with weak signals / no depth information.
		QL-B3P	Yes			
		QL-B2	No	±250mm	±40% of detected depth	Horizontal and vertical detection by one geophysical technique only (Electromagnetic Detection/Ground Penetrating Radar). Medium confidence level for position and depth.
		QL-B2P	Yes			
		QL-B1	No	±150mm	±15% of detected depth	Horizontal and vertical detection by multiple geophysical techniques. (Electromagnetic Detection/Ground Penetrating Radar). High confidence level for position and depth.
		QL-B1P	Yes			
A	Verification	QL-A	No	±50mm	±50mm	Horizontal and vertical location of the utility established by visual inspection at manholes and inspection covers or by use of targeted excavations (vacuum excavation and trial pits).

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1W:	1 WAY SINGLE DUCT
2W:	2 WAY FLAT
2W: 1/2	2 WAY: 1 WIDE, 2 DEEP
4W: 2/2	4 WAY: 2 WIDE, 2 DEEP
6W: 3/2	6 WAY: 3 WIDE, 2 DEEP
12W: 4/3	12 WAY: 4 WIDE, 3 DEEP

STREET FURNITURE

Air Valve	o AV
Bus Stop	o BS
Bollard	o B
Buchan Trap	o Buc
Cable Riser	o CR
Closed Circuit TV	o CCTV
Down Pipe	o DP
Drain	o D
Earth Rod	o ER
Electricity Pole	o EP
Flood Light	o FL
Gas Riser	o GR
Gas Valve	o GV
Hydrant	o FH
Lamp Post	o LP
Service Marker	o MK
Offset Fill	o OF
Post	o P
Parking Meter	o PM
Rain Water Pipe	o PR
Pipe Riser	o RWP
Rodding Eye	o RE
Road Sign	o RS
Soil Pipe	o SVP
Stop Tap	o ST
Stop Valve	o SV
Traffic Light	o TL
Telegraph Pole	o TP
Traffic Light Push Button Post	o TLP
Traffic Light Control	o TLC/P
Vent Pipe	o VP
Water Meter	o WM
Washout	o WO
Control Box	☐ C/BOX
Car Vacuum	☐ VAC
Car Air	☐ AIR
Electrical Box	☐ EB
Junction Box	☐ JB
Gas Governor	☐ GAS GOV
Telephone Call Box	☐ TCP
Petrol Pump	☐ PP
Dish Drainage Channel	CD
Slot Drainage Channel	SD
Grate Drainage Channel	G.CH

ABBREVIATIONS

Assumed Route	AR
Backdrop	BD
Blocked	BLK
Depth	d
Ground Penetrating Radar	GPR
No Visible Pipes	NVP
Offset Fill	OF
Signal Lost	SL
Taken From Records	TFR
Tank	T
Unable To Survey	UTS
Unable To Rod	UR
Unable To Trace	UT
Unable To Lift	UTL
Vapour Recovery Point	VR

OVERHEAD FEATURES

Electricity Pylon	☒
Electricity	Z—Z
Telephone	T—T

LEVEL AND HEIGHT

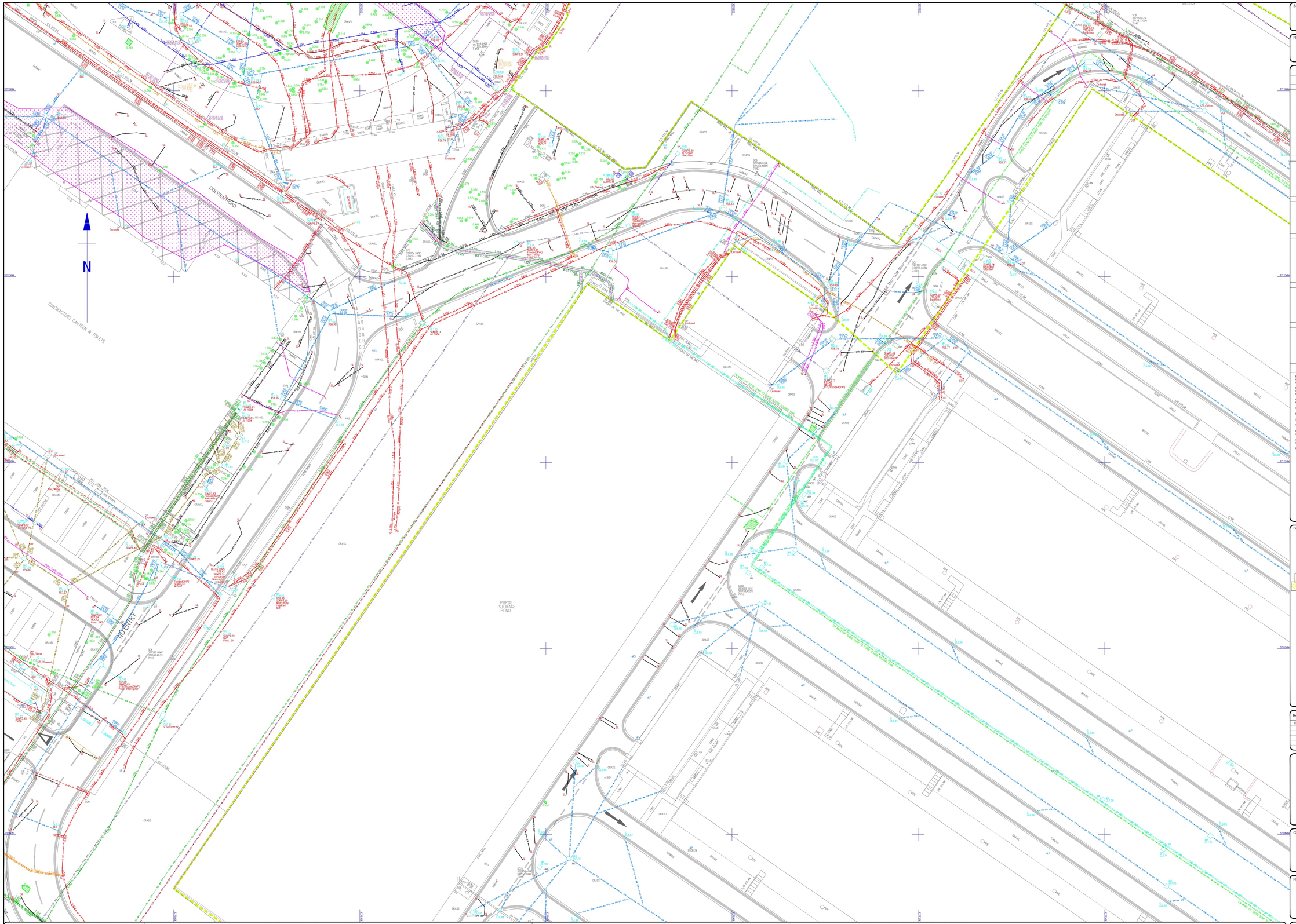
Inspection Cover	☐ IC
Inspection Cover (Elec)	☐ IC/EL
Manhole	☐ MH
British Telecom Cover	☐ BT
Inspection Cover (Comms)	☐ IC/COM
Cable TV	☐ CATV
Inspection Cover Traffic Signals	☐ IC/TL
Gully	☐ G
Kerb Outlet	☐ KO
Cover Level	CL:00.00
Invert Level	IL:00.00
Soffit Level	SL:00.00
Reducing Slab Level	RS:00.00
Sump Level	SUMP:00.00
Water Level	WL:00.00
Pit Level	PIT:00.00

Cover
Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	CO
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
Vitrified Clay	VC

ADDITIONAL NOTES



Survey Notes

Grid: Plane, local related to OS Grid.
Levels: OS Datum from GNSS positioning, converted using the National Geoid Model OSGM15.

Notes

Utility drawing to be read in conjuction with survey report.

Survey Legend

UNDERGROUND SERVICES KEY

COMMUNICATION CABLES

- TV — Cable TV
- COM — Communication
- COM — Colt Telecom
- COM — EU Networks
- COM — Instalcom
- COM — Neo Network
- COM — Nynex
- COM — Sky
- TEL — Telecom
- COM — Verizon
- COM — Zayo

GROUND PENETRATING RADAR

- GPR Detected Anomaly Area/Point
- GPR Detected Rebar
- GPR Detected Structural Feature
- GPR Detected Structure
- GPR Low Data
- GPR
- GPR Detected Anomaly Point Directional
- GPR Transect

DRAINAGE PIPES

- CW — Chemically Contamined Sewer Combined
- CW — Gas Turbine Washdown
- CW — Oil Contaminted Station Sewer Foul
- CW — Sewer Combined
- FW — Sewer Foul
- SW — Sewer Surface Water

OTHER SERVICES

- AD — Acid Drain
- AIR — Air Line
- AC — Alarm Cable
- CCTV — CCTV
- CH — Chemical
- CA — Compressed Air
- EC — Earthing Cables
- EF — Effluent
- ED — Empty Ducting
- H — Heating Pipe
- O — Overflow
- OX — Oxygen Pipe
- R — Rising Main
- SM — Sludge Main
- STM — Steam Duct
- TM — Thermal Main
- TC — Traffic Light Cable
- U — Unidentified
- VD — Vehicle Detector Loop
- V — Vent Pipe
- WW — Wash Water
- W — Water
- CW — Cooling Water Return
- CW — Cooling Water Supply

FIBRE OPTICAL CABLES

- FO — City Fibre
- FO — EXA Fibre Optic
- FO — GTT Fibre Optic
- FO — Virgin Media
- FO — Vodafone

FUEL SERVICES

- GA — Fuel Gauge Line
- FU — Fuel Line
- V — Fuel Vent Line
- OF — Offset Fill Pipe
- OP — Oil Pipe
- VT — Vapor Recovery Pipe

ELECTRICAL CABLES

- L — Street Lighting
- E — Electrical
- E LV — Electrical LV
- E HV — Electrical HV

OTHER LINETYPES

- EOT — End of trace
- Services Survey Boundary
- Area of No Access

GAS PIPES

- G — Gas
- G LP — Gas LP
- G MP — Gas MP
- G IP — Gas IP
- G HP — Gas HP

SERVICE QUALITY LEVEL EXAMPLE

- QL-A — Quality Level A
- QL-B1 — Quality Level B1
- QL-B1P — Quality Level B1P
- QL-B2 — Quality Level B2
- QL-B2P — Quality Level B2P
- QL-B3 — Quality Level B3
- QL-B3P — Quality Level B3P
- QL-B4 AR — Quality Level B4 AR
- QL-B4 TFR — Quality Level B4 TFR

For Quality Level definitions see BSI PAS 128:2022 information below.
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Electromagnetic and Ground Penetrating Radar techniques have been used in the detection of underground services, features and anomalies shown on this survey plan. These are interpretive processes and accurate underground detection always should be undertaken to confirm identification, location and depth of features where these are critical to design or site works.

It is important to understand that there are limitations when it comes to detecting and mapping buried pipes, cables and ducts due to various factors such as depth location, material type, geology and proximity to other utilities. Even with the use of advanced techniques and equipment, it is not always possible to accurately detect and map all underground infrastructure.

All reasonable effort and care has been made in searching available record drawings. The completeness of the underground service information supplied to and by us cannot be guaranteed.

Where services are non-metallic or not proven on site, positions are taken from records, trench scars and surface detail.

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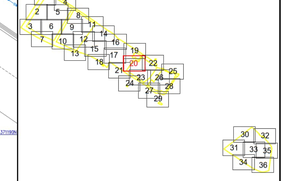

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Sheet 20/36

Surveyed by	CAD by	Survey Date
SL/JB	PS	April 2025
Checked by: DJ/SL	Approved by: AT	Scale: 1:200 [A0 Sheet]

Drawing No: 62330/UG20 | Revision: 00

ACCREDITATIONS

RICS · The Survey Association · chartered ices · PUMA · RISQS QUALIFIED · bsi ISO 9001 Quality Management FS 14126

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- 6W 3/2: 6 WAY: 3 WIDE, 2 DEEP
- 12W 4/3: 12 WAY: 4 WIDE, 3 DEEP

STREET FURNITURE

- AV Air Valve
- BO Bus Stop
- B Bollard
- BT Buchan Trap
- CB Cable Riser
- CCTV Closed Circuit TV
- DP Down Pipe
- D Drain
- EB Earth Rod
- EP Electricity Pole
- FH Fire Hydrant
- GR Gas Riser
- GV Gas Valve
- HP Hydrant
- LP Lamp Post
- MM Magnetic Marker
- OF Offset Fill
- P Post
- PM Parking Meter
- RR Rain Water Pipe
- RWP Pipe Riser
- RE Rodding Eye
- RS Road Sign
- SP Soil Pipe
- ST Stop Tap
- SV Stop Valve
- TP Telegraph Pole
- TB Telegraph Pole
- TLP Traffic Light Push Button Post
- TC Traffic Light Control
- VP Vent Pipe
- WM Water Meter
- WO Washout

ABBREVIATIONS

Assumed Route	AR
Backdrop	BD
Blocked	BLK
Depth	d
Ground Penetrating Radar	GPR
Not Found Pipes	NF
Offset Fill	OF
Signal Lost	SL
Taken From Records	TFR
Void	V
Unable To Survey	UTS
Unable To Rod	UR
Unable To Trace	UT
Unable To Lift	UTL
Vapour Recovery Point	VR

OVERHEAD FEATURES

- Electricity Pylon
- Electricity
- Telephone

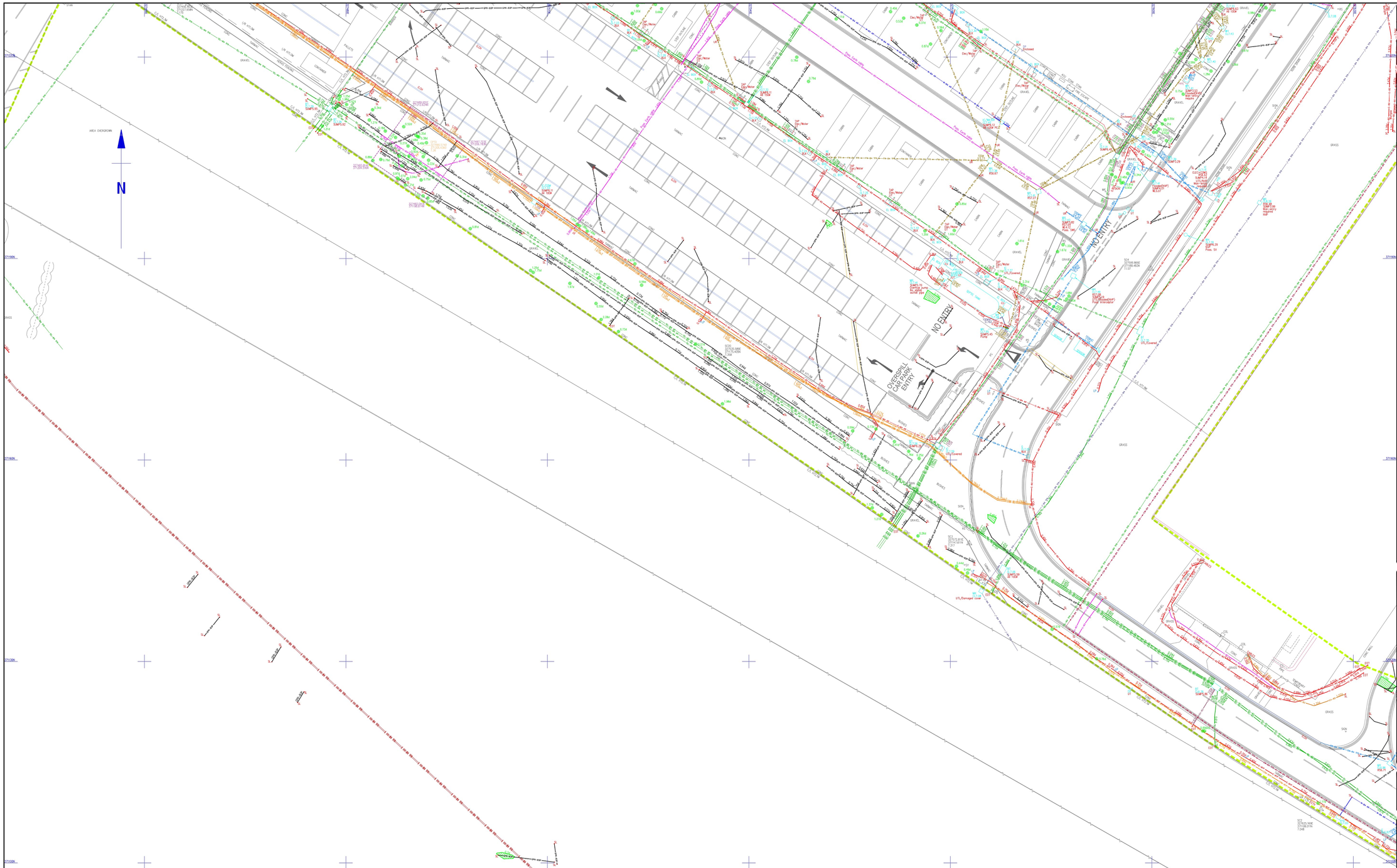
LEVEL AND HEIGHT

- Inspection Cover
- Inspection Cover (Elec)
- Manhole
- Broken Telecom Cover
- Inspection Cover (Comms)
- Cable TV
- Inspection Cover Traffic Signals
- Gully
- Gully Outlet
- Cover Level
- Invert Level
- Soffit Level
- Reducing Slab Level
- Kerb Level
- Water Level
- Pit Level
- IC
- ICIEL
- MH
- SC
- SCCOM
- CATV
- ICTL
- G
- GO
- CL:00.00
- IL:00.00
- SL:00.00
- RS:00.00
- WL:00.00
- WL:00.00
- PIT:00.00
- Cover
- Chamber Extents

PIPE MATERIAL

- Asbestos Cement — AC
- Brick — BR
- Cast Iron — CI
- Concrete — CO
- Ductile Iron — DI
- Polyethylene Pipe — PE
- Polyvinyl Chloride — PVC
- Spun Iron — SI
- Steel — ST
- Vitrified Clay — VC

ADDITIONAL NOTES



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Notes

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FUEL SERVICES

GA	Fuel Gauge Line
FU	Fuel Line
V	Fuel Vent Line
OF	Offset Fill Pipe
OP	Oil Pipe
VR	Vapor Recovery Pipe

OTHER SERVICES

ACID	Acid Drain
AIR	Air Line
AC	Alarm Cable
CCTV	CCTV
CH	Chemical
CA	Compressed Air
EA	Earthing Cables
EF	Effluent
DU	Empty Ducting
H	Heating Pipe
O	Overflow
OX	Oxygen Pipe
R	Rising Main
SM	Sludge Main
STM	Steam Duct
TM	Thermal Main
TL	Traffic Light Cable
U	Unidentified
VD	Vehicle Detector Loop
V	Vent Pipe
WW	Wash Water
W	Water
CW	Cooling Water Return
CW	Cooling Water Supply

ELECTRICAL CABLES

L	Street Lighting
E	Electrical
E LV	Electrical LV
E HV	Electrical HV

OTHER LINETYPES

EOT	End of trace
	Services Survey Boundary
	Area of No Access

GAS PIPES

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G IP	Gas MP
G IP	Gas IP
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SERVICE QUALITY LEVEL EXAMPLE

TEL-A	Quality Level A
TEL-B1	Quality Level B1
TEL-B1P	Quality Level B1P
TEL-B2	Quality Level B2
TEL-B2P	Quality Level B2P
TEL-B3	Quality Level B3
TEL-B3P	Quality Level B3P
TEL-B4 AR	Quality Level B4 AR
TEL-B4 TFR	Quality Level B4 TFR

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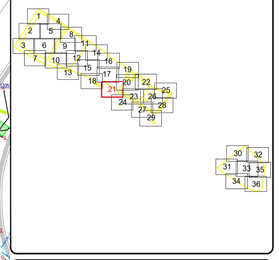

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Sheet 21/36

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SL/JB	PS	April 2025
Checked by	Approved by	Scale
DJ/SL	AT	1:200 [A0 Sheet]

Drawing No: 62330/UG21
Revision: 00

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APPROX DEPTH TO INVERT

GROUND PENETRATING RADAR
APPROX DEPTH TO TOP OF CROWN

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1W	1 WAY SINGLE DUCT
2W	2 WAY FLAT
2W 1/2	2 WAY, 1 HIDE, 2 DEEP
4W 2/2	4 WAY, 2 HIDE, 2 DEEP
6W 3/2	6 WAY, 3 HIDE, 2 DEEP
12W 4/3	12 WAY, 4 HIDE, 3 DEEP

STREET FURNITURE

Air Valve	AV	Parking Meter	PM
Bell Box	BB	Pedestrian Pole	PP
Bollard	B	Pipe Riser	RWP
Buchan Trap	Buc	Rodding Eye	RE
Cable Riser	CR	Roof Drain	RWP
Closed Circuit TV	CCTV	Soil Pipe	SVP
Control Pipe	CP	Stop Tap	ST
Drain	D	Stop Valve	SV
Earth Rod	ER	Traffic Light	TL
Electricity Pole	EP	Traffic Light	TL
Flood Light	FL	Traffic Light Push Button Post	TLP
Gas Governor	GV	Traffic Light Control	TLCP
Gas Valve	GV	Vent Pipe	VP
Hydrant	FH	Water Meter	WM
Lamp Post	LP	Washout	WO
Service Marker	MK		
Offset Fill	OF		
Post	P		

Control Box	CBOX	Junction Box	JB
Control Valcum	CV	Car Park	CP
Electrical Box	EB	Gas Governor	GAS GOV
Junction Box	JB	Gas Valve	GV
Gas Governor	GAS GOV	Petrol Pumps	PP
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Grate Drainage Channel	GRD		

ABBREVIATIONS

Assumed Route	AR	Ground	GND
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Bricked	BLK	No Visible Pipes	NVP
Depth	d	Post	P
Ground Penetrating Radar	GPR	Signal Lost	SL
No Visible Pipes	NVP	Taken From Records	TFR
Post	P	Tank	T
Signal Lost	SL	Unable To Survey	UTS
Taken From Records	TFR	Unable To Trace	UT
Tank	T	Unable To Trace	UT
Unable To Survey	UTS	Unable To Lift	UTL
Unable To Trace	UT	Vapour Recovery Point	VR
Unable To Trace	UT		
Unable To Lift	UTL		
Vapour Recovery Point	VR		

OVERHEAD FEATURES

Electricity Pylon	
Electricity	
Telephone	

LEVEL AND HEIGHT

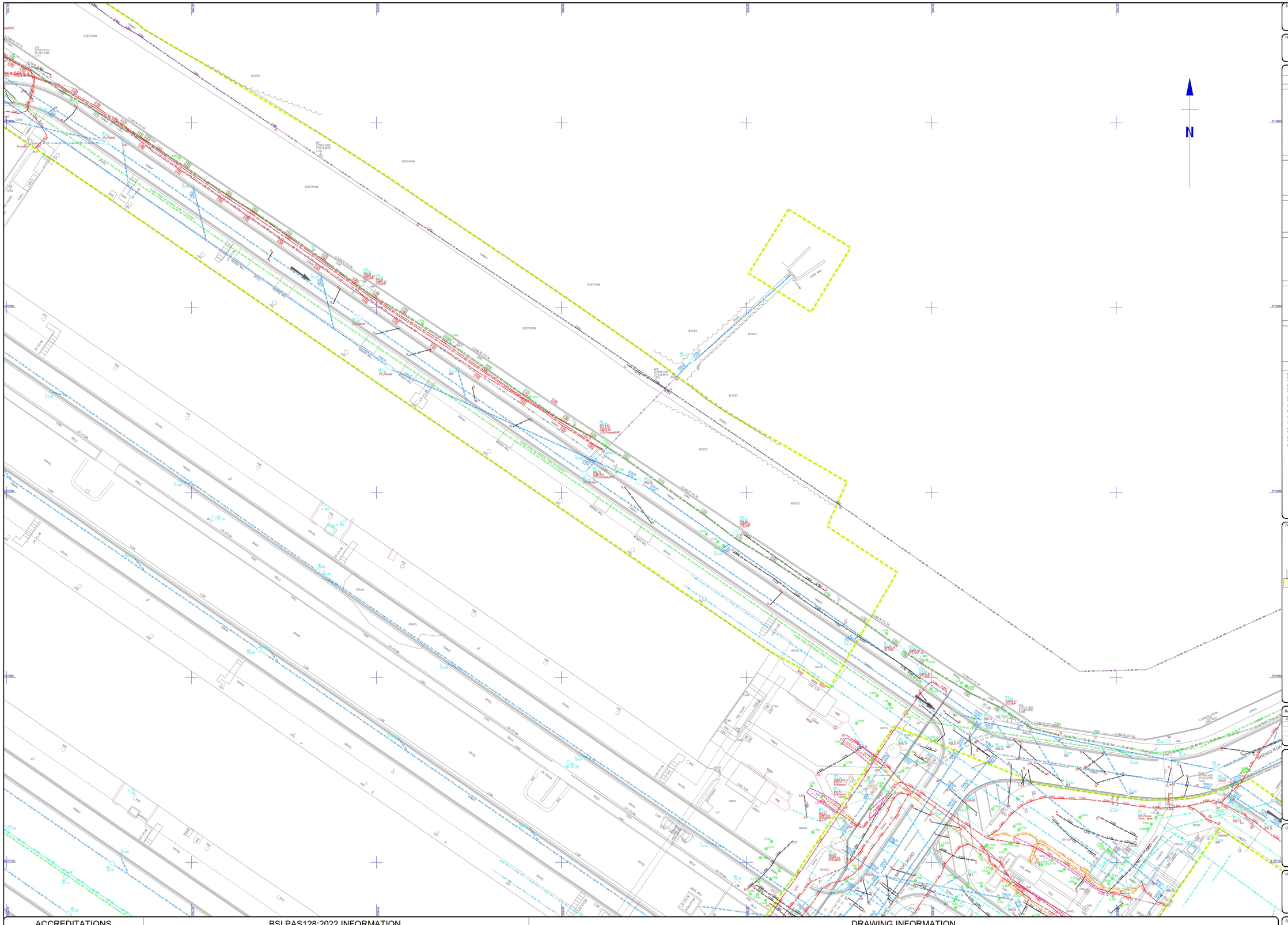
Inspection Cover	IC
Inspection Cover (Elec)	ICEL
Manhole	MH
British Telecom Cover	BT
Communication Cover (Comms)	COMCOM
Cable TV	CATV
Inspection Cover Traffic Signals	ICTL
Gully	G
Kerb Outlet	KO
Kerb Level	5.00.00
Invert Level	5.00.00
Soffit Level	SL.00.00
Reducing Slab Level	RS.00.00
Sump Level	SUMP.00.00
Pit Invert	INV.00.00
Pit Level	PIT.00.00

Cover
Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	CO
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
Vitrified Clay	VC

ADDITIONAL NOTES



Survey Notes

Grid: Plane, local related to OS Grid.
Levels: OS Datum from GNSS positioning, converted using the National Geoid Model OSGM15.

Notes

Utility drawing to be read in conjuction with survey report.

Survey Legend

UNDERGROUND SERVICES KEY

COMMUNICATION CABLES

- TV — Cable TV
- COM — Communication
- COM — Colt Telecom
- COM — EU Networks
- COM — Instalcom
- COM — Neo Network
- COM — Nynex
- COM — Sky
- TEL — Telecom
- COM — Verizon
- COM — Zayo

GROUND PENETRATING RADAR

- GPR Detected Anomaly Area/Point
- GPR Detected Rebar
- GPR Detected Structural Feature
- GPR Detected Structure
- GPR Low Delta
- GPR — GPR
- GPR Detected Anomaly Point Directional
- GPR Transect

DRAINAGE PIPES

- CW — Chemically Contamined Drains Pumped
- CW — Gas Turbine Washdown
- CW — Oil Contamined Station Drains Pumped
- CW — Sewer Combined
- FW — Sewer Foul
- SW — Sewer Surface Water

OTHER SERVICES

- ACID — Acid Drain
- AIR — Air Line
- ALARM — Alarm Cable
- CCTV — CCTV
- CHEM — Chemical
- CA — Compressed Air
- EARTH — Earthing Cables
- EFF — Effluent
- DUCT — Empty Ducting
- HEAT — Heating Pipe
- OVER — Overflow
- OXY — Oxygen Pipe
- RISING — Rising Main
- SLUDGE — Sludge Main
- STEAM — Steam Duct
- THERMAL — Thermal Main
- TRAFFIC — Traffic Light Cable
- UNIDENT — Unidentified
- VDL — Vehicle Detector Loop
- VENT — Vent Pipe
- WASH — Wash Water
- WATER — Water
- CWR — Cooling Water Return
- CWS — Cooling Water Supply

FIBRE OPTICAL CABLES

- FO — City Fibre
- FO — EXA Fibre Optic
- FO — GTT Fibre Optic
- FO — Virgin Media
- FO — Vodafone

FUEL SERVICES

- GAUGE — Fuel Gauge Line
- FU — Fuel Line
- VENT — Fuel Vent Line
- OF — Offset Fill Pipe
- OP — Oil Pipe
- VR — Vapor Recovery Pipe

ELECTRICAL CABLES

- L — Street Lighting
- E — Electrical
- E LV — Electrical LV
- E HV — Electrical HV

OTHER LINETYPES

- EOT — End of trace
- Services Survey Boundary
- Area of No Access

GAS PIPES

- G — Gas
- G LP — Gas LP
- G IP — Gas MP
- G IP — Gas IP
- G HP — Gas HP

SERVICE QUALITY LEVEL EXAMPLE

- TEL-A — Quality Level A
- TEL-B1 — Quality Level B1
- TEL-B1P — Quality Level B1P
- TEL-B2 — Quality Level B2
- TEL-B2P — Quality Level B2P
- TEL-B3 — Quality Level B3
- TEL-B3P — Quality Level B3P
- TEL-B4 AR — Quality Level B4 AR
- TEL-B4 TFR — Quality Level B4 TFR

For Quality Level definitions see BSI PAS 128:2022 information below.
For more information go to www.malcolmhughes.co.uk

DISCLAIMERS

Electromagnetic and Ground Penetrating Radar techniques have been used in the detection of underground services, features and anomalies shown on this survey plan. These are interpretive processes and the accuracy is dependent on ground conditions. Trial pits should be undertaken to confirm identification, location and depth of features where these are critical to design or site works.

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All reasonable effort and care has been made in searching available record drawings. The completeness of the underground service information supplied to and by us cannot be guaranteed.

Where services are non-metallic or not proven on site, positions are taken from records, trench scars and surface detail.

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Services shown as PAS128 QL- B4 TFR (Taken from records) and QL - B4 AR (Assumed Route) have not been proven on site.

The CAD layering may contain further information.

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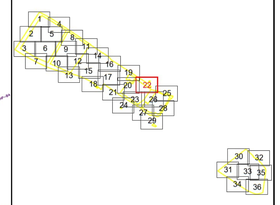
HSG47 safe digging practices should still be adhered to when using these Utility Mapping Survey plans.

Sheet Index



Rev	Date	Description
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Tel: 0800 833312

Client

Uniper Technologies Ltd.
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project

Connah's Quay Power Station

Drawing Title

Utility Mapping Survey
Sheet 22/36

Surveyed by	CAD by	Survey Date
SL/JB	PS	April 2025
Checked by: DJ/SL	Approved by: AT	Scale: 1:200 [A0 Sheet]

Drawing No: 62330/UG22
Revision: 00

ACCREDITATIONS

RICS · The Survey Association · chartered ices · PUMA Accredited · Exor Approved · bsi ISO 9001 Quality Assurance FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION
APPROX DEPTH TO CENTRE
CABLE/FIBRE OPTIC

GRAVITY DRAIN SYDRAL OBSERVATION
APPROX DEPTH TO INVERT

GROUND PENETRATING RADAR
APPROX DEPTH TO EXTERNAL CROWN

BSI PAS128:2022 QUALITY LEVEL INFORMATION

SURVEY TYPE		QUALITY LEVEL	POST-PROCESSING (GPR DATA ANALYSIS)	ACCURACY HORIZONTAL	ACCURACY VERTICAL	DESCRIPTION (SUPPORTING DATA)
B	Detection	QL-B4 TFR	No	Undefined	Undefined	Location not detected on site, taken from records.
		QL-B4 AR	No	Undefined	Undefined	A utility segment that has not been detected but is suspected to exist. Denotes assumed route only.
		QL-B3	No	±500mm (No reliable depth)	Undefined	Horizontal detection by one geophysical technique only. Denotes utility segments with weak signals / no depth information.
		QL-B3P	Yes			
		QL-B2	No	±250mm	±40% of detected depth	Horizontal and vertical detection by one geophysical technique only (Electromagnetic Detection/Ground Penetrating Radar). Medium confidence level for position and depth.
		QL-B2P	Yes			
		QL-B1	No	±150mm	±15% of detected depth	Horizontal and vertical detection by multiple geophysical techniques. (Electromagnetic Detection/Ground Penetrating Radar). High confidence level for position and depth.
		QL-B1P	Yes			
A	Verification	QL-A	No	±50mm	±50mm	Horizontal and vertical location of the utility established by visual inspection at manholes and inspection covers or by use of targetted excavations (vacuum excavation and trial pits).

DRAWING INFORMATION

DUCTING LAYOUTS

- 1W: 1 WAY SINGLE DUCT
- 2W: 2 WAY FLAT
- 2W 1/2: 2 WAY 1 WIDE, 2 DEEP
- 4W 2/2: 4 WAY 2 WIDE, 2 DEEP
- 6W 3/2: 6 WAY 3 WIDE, 2 DEEP
- 12W 4/3: 12 WAY 4 WIDE, 3 DEEP

STREET FURNITURE

- Air Valve — AV
- Bus Stop — BS
- Bollard — B
- Buchan Trap — BT
- Cable Riser — CR
- Closed Circuit TV — CCTV
- Down Pipe — DP
- Drain — D
- Electric Post — EP
- Electricity Pole — EP
- Flood Light — FL
- Gas Riser — GR
- Gas Valve — GV
- Lamp Post — LP
- Service Marker — MK
- Offset Fill — OF
- Post — P
- Parking Meter — PM
- Rain Water Pipe — RWP
- Pipe Riser — RISER
- Road Marking — RS
- Soil Pipe — SVP
- Stop Tap — ST
- Stop Valve — SV
- Traffic Light — TL
- Telegraph Pole — TP
- Traffic Light Push Button Post — TLP
- Traffic Light Control Unit — TLCP
- Vent Pipe — VP
- Water Meter — WM
- Washout — WO

- Control Box — C/BOX
- Car Vacuum — VAC
- Car Air — AIR
- Electrical Box — EB
- Junction Box — JB
- Gas Governor — GAS GOV
- Telephone Call Box — TCP
- Petrol Pump — PP
- Dish Drainage Channel — CHANNEL
- Slot Drainage Channel — CHANNEL
- Grate Drainage Channel — GRATE

ABBREVIATIONS

- Assumed Route — AR
- Backdrop — BD
- Blocked — BLK
- Broken — B
- Ground Penetrating Radar — GPR
- No Visible Pipes — NVP
- Offset Fill — OF
- Signal Lost — SL
- Trench Scan Records — TSR
- Tank — T
- Unable To Survey — UTS
- Unable To Rod — UR
- Unable To Trace — UT
- Unable To Lift — UTL
- Vapour Recovery Point — VR

OVERHEAD FEATURES

- Electricity Pylon
- Electricity
- Telephone

LEVEL AND HEIGHT

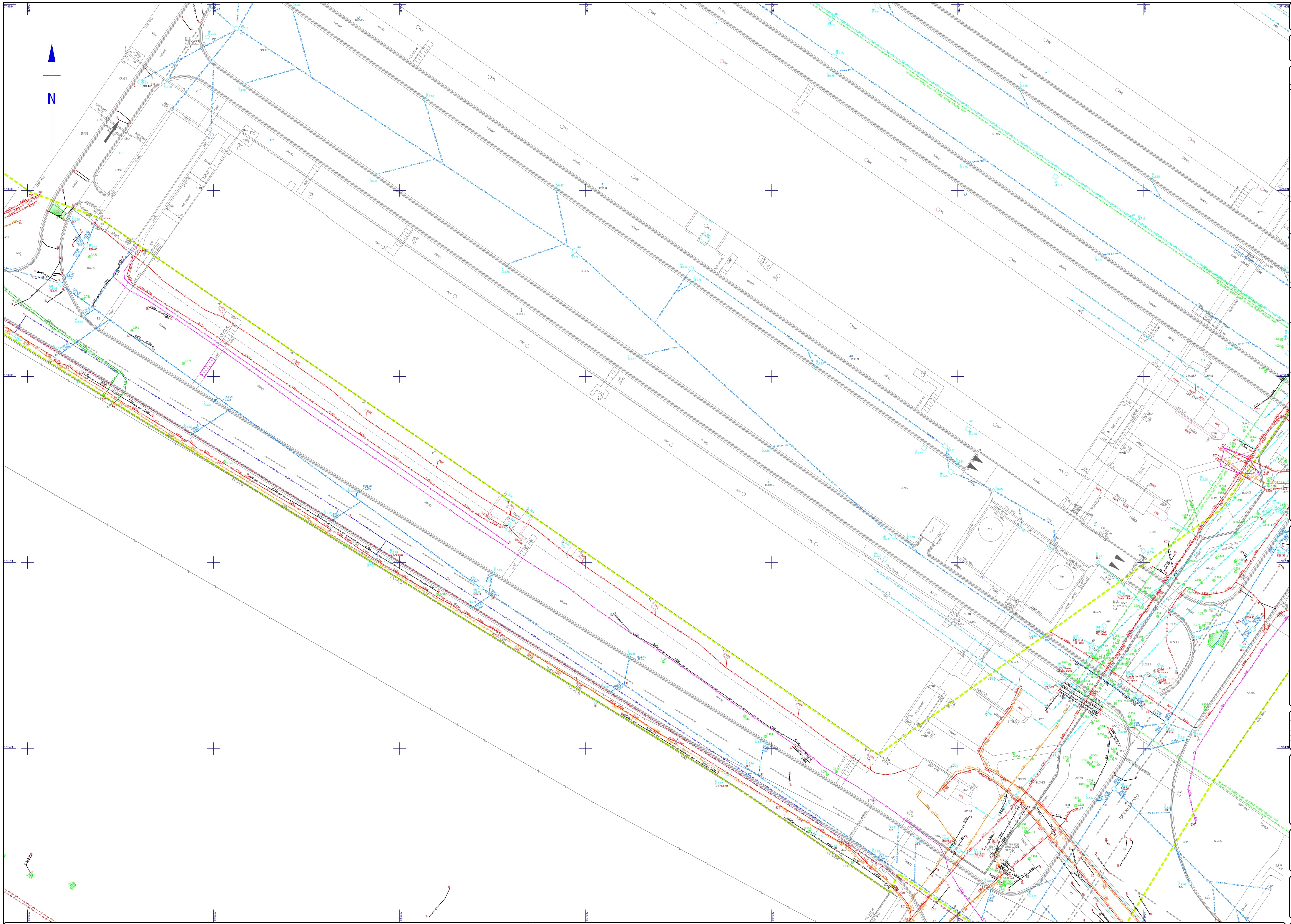
- Inspection Cover — IC
- Inspection Cover (Elec) — IC/EL
- Manhole — MH
- Inspection Hatcon Cover — IC
- Inspection Cover (Comms) — IC/COM
- Cable TV — CATV
- Inspection Cover Traffic Signals — IC/TL
- Gully — G
- Gully Outlet — GO
- Cover Level — CL:00.00
- Invert Level — IL:00.00
- Soffit Level — SO:00.00
- Retaining Slab Level — RSL:00.00
- Sump Level — SUMP:00.00
- Water Level — WL:00.00
- Pit Level — PIT:00.00

Cover
Chamber Extents

PIPE MATERIAL

- Asbestos Cement — AC
- Brick — BR
- Cast Iron — CI
- Concrete — CO
- Ductile Iron — DI
- Polyethylene Pipe — PE
- Polyvinyl Chloride — PVC
- Spun Iron — SI
- Steel — ST
- Vitrified Clay — VC

ADDITIONAL NOTES



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Grid: Plane, local related to OS Grid.
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FU	Fuel Line
V	Fuel Vent Line
OF	Offset Fill Pipe
OP	Oil Pipe
VR	Vapor Recovery Pipe

OTHER SERVICES	
AD	Acid Drain
AIR	Air Line
AC	Alarm Cable
CCTV	CCTV
CH	Chemical
CA	Compressed Air
EA	Earthing Cables
EF	Effluent
DU	Empty Ducting
H	Heating Pipe
O	Overflow
OX	Oxygen Pipe
/	Rising Main
SM	Sludge Main
STM	Steam Duct
TM	Thermal Main
TL	Traffic Light Cable
U	Unidentified
VD	Vehicle Detector Loop
V	Vent Pipe
WW	Wash Water
W	Water
W	Cooling Water Return
W	Cooling Water Supply

ELECTRICAL CABLES	
L	Street Lighting
E	Electrical
E LV	Electrical LV
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OTHER LINETYPES	
EOT	End of trace
	Services Survey Boundary
	Area of No Access

GAS PIPES	
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TEL-A	Quality Level A
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TEL-B2	Quality Level B2
TEL-B2P	Quality Level B2P
TEL-B3	Quality Level B3
TEL-B3P	Quality Level B3P
TEL-B4 AR	Quality Level B4 AR
TEL-B4 TFR	Quality Level B4 TFR

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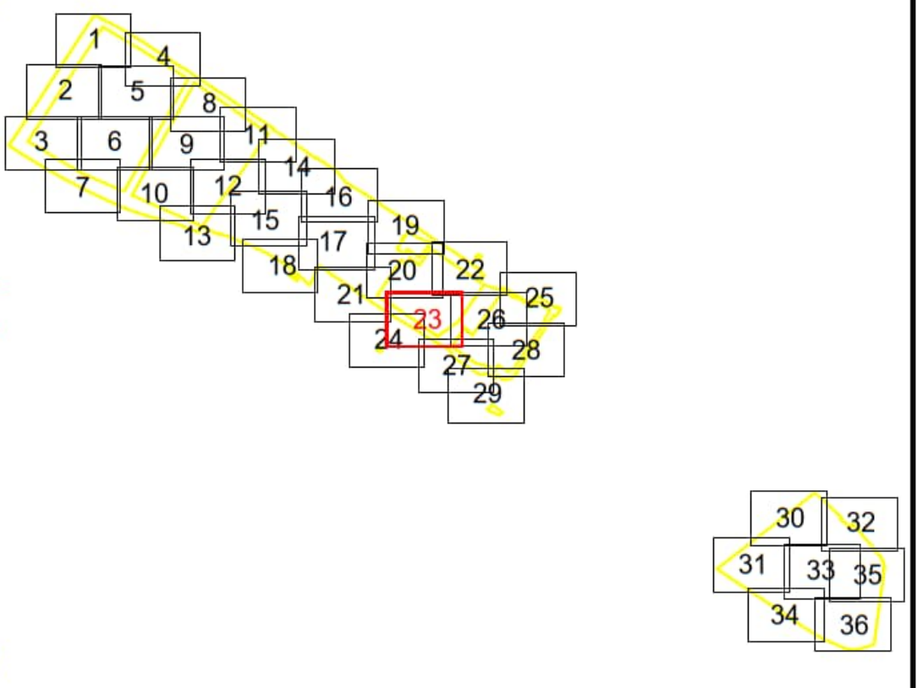

Rev.	Date	Description
00		First Issue

MALCOLM HUGHES
CHARTERED LAND SURVEYORS

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surveythis@mhls.co.uk

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Tel: 0141 885 0800

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Tel: 0800 833312

Client
Uniper Technologies Ltd.
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project
Connah's Quay Power Station

Drawing Title
Utility Mapping Survey
Sheet 23/36

Surveyed by	SL/JB	CAD by	PS	Survey Date	April 2025
Checked by	DJ/SL	Approved by	AT	Scale	1:200 [A0 Sheet]

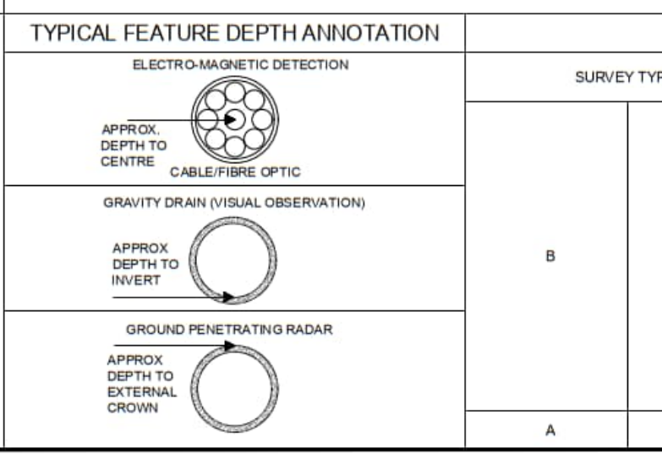
Drawing No 62330/UG23
Revision 00

ACCREDITATIONS

PUMA PAS128 ACCREDITATION
QUALIFIED
ISO 9001 Quality Management
FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION



BSI PAS128:2022 QUALITY LEVEL INFORMATION

SURVEY TYPE		QUALITY LEVEL	POST-PROCESSING (GPR DATA ANALYSIS)	ACCURACY		DESCRIPTION (SUPPORTING DATA)
				HORIZONTAL	VERTICAL	
B	Detection	QL-B4 TFR	No	Undefined	Undefined	Location not detected on site, taken from records.
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2W:	2 WAY FLAT
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STREET FURNITURE

Air Valve	○ AV
Bus Stop	○ BS
Bollard	○ B
Buchan Trap	○ Buc
Cable Riser	○ CR
Closed Circuit TV	○ CCTV
Down Pipe	○ DP
Drain	○ D
Earth Rod	○ ER
Electricity Pole	○ EP
Flood Light	○ FL
Gas Riser	○ GR
Gas Valve	○ GV
Hydrant	○ FH
Lamp Post	○ LP
Service Marker	○ MK
Offset Fill	○ OF
Post	○ P
Parking Meter	○ PM
Rain Water Pipe	○ PR
Pipe Riser	○ RWP
Rodding Eye	○ RE
Road Sign	○ RS
Soil Pipe	○ SVP
Stop Tap	○ ST
Stop Valve	○ SV
Traffic Light	○ TL
Telegraph Pole	○ TP
Traffic Light Push Button Post	○ TLP
Traffic Light Control	○ TLC/P
Vent Pipe	○ VP
Water Meter	○ WM
Washout	○ WO
Control Box	☐ C/BOX
Car Vacuum	☐ VAC
Car Air	☐ AIR
Electrical Box	☐ EB
Junction Box	☐ JB
Gas Governor	☐ GAS GOV
Telephone Call Box	☐ TCP
Petrol Pump	☐ PP
Dish Drainage Channel	CD
Slot Drainage Channel	SD
Grate Drainage Channel	G.CH

ABBREVIATIONS

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Backdrop	BD
Blocked	BLK
Depth	d
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Signal Lost	SL
Taken From Records	TFR
Tank	T
Unable To Survey	UTS
Unable To Rod	UR
Unable To Trace	UT
Unable To Lift	UTL
Vapour Recovery Point	VR

OVERHEAD FEATURES

Electricity Pylon	☒
Electricity	Z Z
Telephone	T T

LEVEL AND HEIGHT

Inspection Cover	☐ IC
Inspection Cover (Elec)	☐ IC/EL
Manhole	☐ MH
British Telecom Cover	☐ BT
Inspection Cover (Comms)	☐ IC/COM
Cable TV	☐ CATV
Inspection Cover Traffic Signals	☐ IC/TL
Gully	☐ G
Kerb Outlet	☐ KO
Cover Level	CL:00.00
Invert Level	IL:00.00
Soffit Level	SL:00.00
Reducing Slab Level	RS:00.00
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Cover
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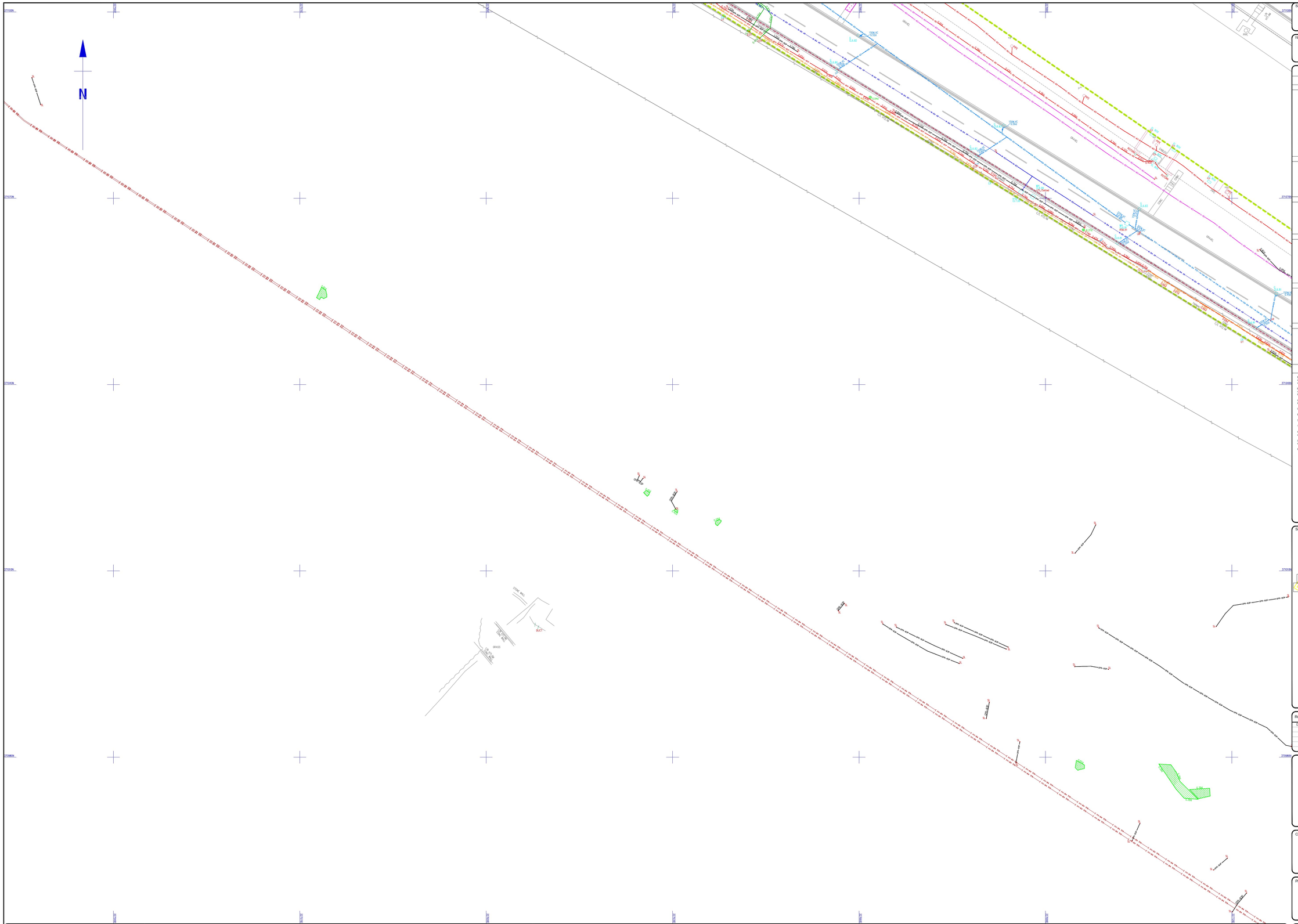
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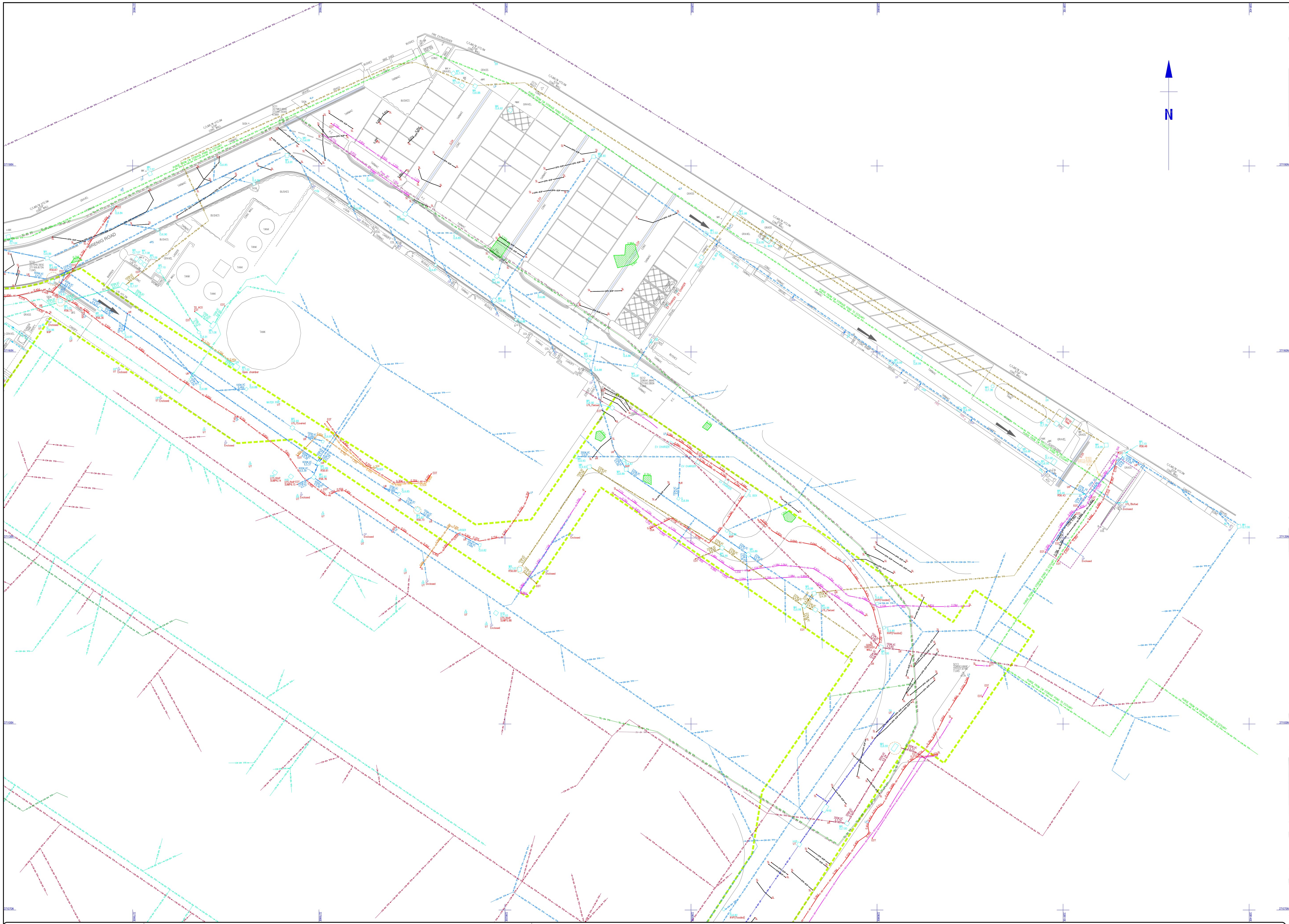

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DU	Empty Ducting
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O	Overflow
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/	Rising Main
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STM	Steam Duct
TM	Thermal Main
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U	Unidentified
VD	Vehicle Detector Loop
V	Vent Pipe
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W	Water
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GAS PIPES

G	Gas
G LP	Gas LP
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SERVICE QUALITY LEVEL EXAMPLE

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Where services are non-metallic or not proven on site, positions are taken from records, trench scars and surface detail.

Pipe sizes which cannot be obtained by visual survey are taken from utilities record drawings or marker plates where available.

Services shown as PAS128 QL- B4 TFR (Taken from records) and QL - B4 AR (Assumed Route) have not been proven on site.

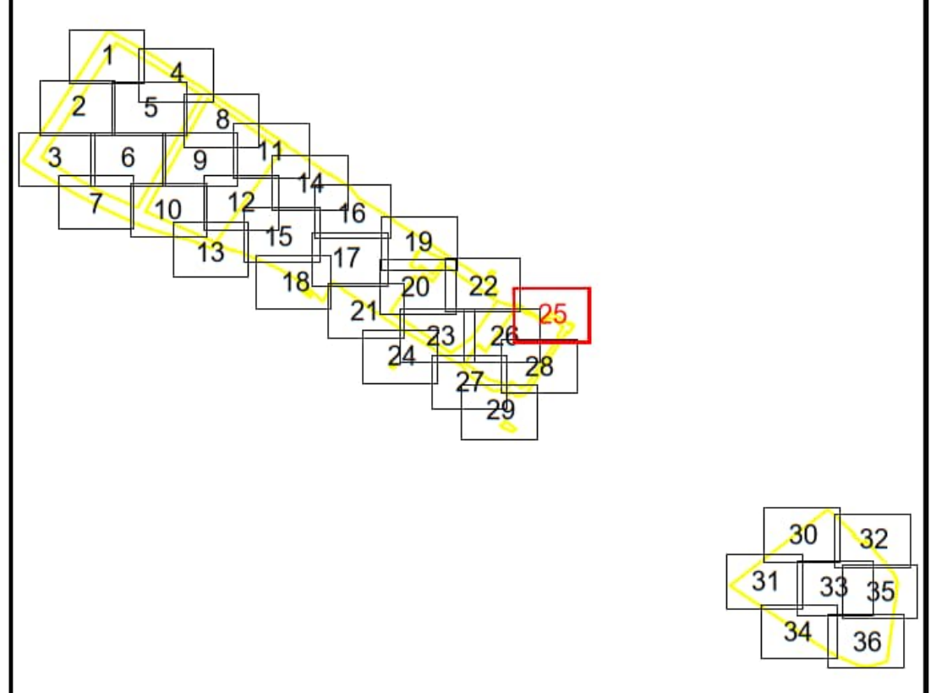
The CAD layering may contain further information.

Collected data from GPR has not been post processed unless specified elsewhere or denoted on the survey drawing by the abbreviation of (P).

All utilities inspected and measured at Inspection Covers or Manholes are considered to be a QL-A for a radius up to 5m from the chamber wall.

HSG47 safe digging practices should still be adhered to when using these Utility Mapping Survey plans.

Sheet Index



Rev.	Date	Description
00		First Issue

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Glasgow Office
Tel: 0141 885 0800

London Office
Tel: 0800 833312

Client

Uniper Technologies Ltd.
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project

Connah's Quay Power Station

Drawing Title

Utility Mapping Survey
Sheet 25/36

Surveyed by SL/JB	CAD by PS	Survey Date April 2025
Checked by DJ/SL	Approved by AT	Scale 1:200 [A0 Sheet]

Drawing No	Revision
62330/UG25	00

ACCREDITATIONS

RICS
THE SURVEY ASSOCIATION
chartered ices
PUMA
PAS128 ACCREDITATION
RISQS QUALIFIED
bsi. ISO 9001 Quality Management
FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION
APPROX. DEPTH TO CENTRE
CABLE/FIBRE OPTIC

GRAVITY DRAIN (VISUAL OBSERVATION)
APPROX DEPTH TO INVERT

GROUND PENETRATING RADAR
APPROX DEPTH TO EXTERNAL CROWN

BSI PAS128:2022 QUALITY LEVEL INFORMATION

SURVEY TYPE		QUALITY LEVEL	POST-PROCESSING (GPR DATA ANALYSIS)	ACCURACY		DESCRIPTION (SUPPORTING DATA)
				HORIZONTAL	VERTICAL	
B	Detection	QL-B4 TFR	No	Undefined	Undefined	Location not detected on site, taken from records.
		QL-B4 AR	No	Undefined	Undefined	A utility segment that has not been detected but is suspected to exist. Denotes assumed route only.
		QL-B3	No	±500mm	Undefined (No reliable depth)	Horizontal detection by one geophysical technique only. Denotes utility segments with weak signals / no depth information.
		QL-B3P	Yes			
		QL-B2	No	±250mm	±40% of detected depth	Horizontal and vertical detection by one geophysical technique only (Electromagnetic Detection/Ground Penetrating Radar). Medium confidence level for position and depth.
		QL-B2P	Yes			
		QL-B1	No	±150mm	±15% of detected depth	Horizontal and vertical detection by multiple geophysical techniques. (Electromagnetic Detection/Ground Penetrating Radar). High confidence level for position and depth.
		QL-B1P	Yes			
A	Verification	QL-A	No	±50mm	±50mm	Horizontal and vertical location of the utility established by visual inspection at manholes and inspection covers or by use of targeted excavations (vacuum excavation and trial pits).

DRAWING INFORMATION

DUCTING LAYOUTS

1W:	1 WAY SINGLE DUCT
2W:	2 WAY FLAT
2W: 1/2	2 WAY: 1 WIDE, 2 DEEP
4W: 2/2	4 WAY: 2 WIDE, 2 DEEP
6W: 3/2	6 WAY: 3 WIDE, 2 DEEP
12W: 4/3	12 WAY: 4 WIDE, 3 DEEP

STREET FURNITURE

Air Valve	○ AV
Bus Stop	○ BS
Bollard	○ B
Buchan Trap	○ Buc
Cable Riser	○ CR
Closed Circuit TV	○ CCTV
Down Pipe	○ DP
Drain	○ D
Earth Rod	○ ER
Electricity Pole	○ EP
Flood Light	○ FL
Gas Riser	○ GR
Gas Valve	○ GV
Hydrant	○ FH
Lamp Post	○ LP
Service Marker	○ MK
Offset Fill	○ OF
Post	○ P
Parking Meter	○ PM
Rain Water Pipe	○ PR
Pipe Riser	○ RWP
Rodding Eye	○ RE
Road Sign	○ RS
Soil Pipe	○ SVP
Stop Tap	○ ST
Stop Valve	○ SV
Traffic Light	○ TL
Telegraph Pole	○ TP
Traffic Light Push Button Post	○ TLP
Traffic Light Control	○ TLC/P
Vent Pipe	○ VP
Water Meter	○ WM
Washout	○ WO
Control Box	☐ C/BOX
Car Vacuum	☐ VAC
Car Air	☐ AIR
Electrical Box	☐ EB
Junction Box	☐ JB
Gas Governor	☐ GAS GOV
Telephone Call Box	☐ TCP
Petrol Pump	☐ PP
Dish Drainage Channel	CD
Slot Drainage Channel	SD
Grate Drainage Channel	G.CH

ABBREVIATIONS

Assumed Route	AR
Backdrop	BD
Blocked	BLK
Depth	d
Ground Penetrating Radar	GPR
No Visible Pipes	NVP
Offset Fill	OF
Signal Lost	SL
Taken From Records	TFR
Tank	T
Unable To Survey	UTS
Unable To Rod	UR
Unable To Trace	UT
Unable To Lift	UTL
Vapour Recovery Point	VR

OVERHEAD FEATURES

Electricity Pylon	☒
Electricity	—Z—Z—
Telephone	—T—T—

LEVEL AND HEIGHT

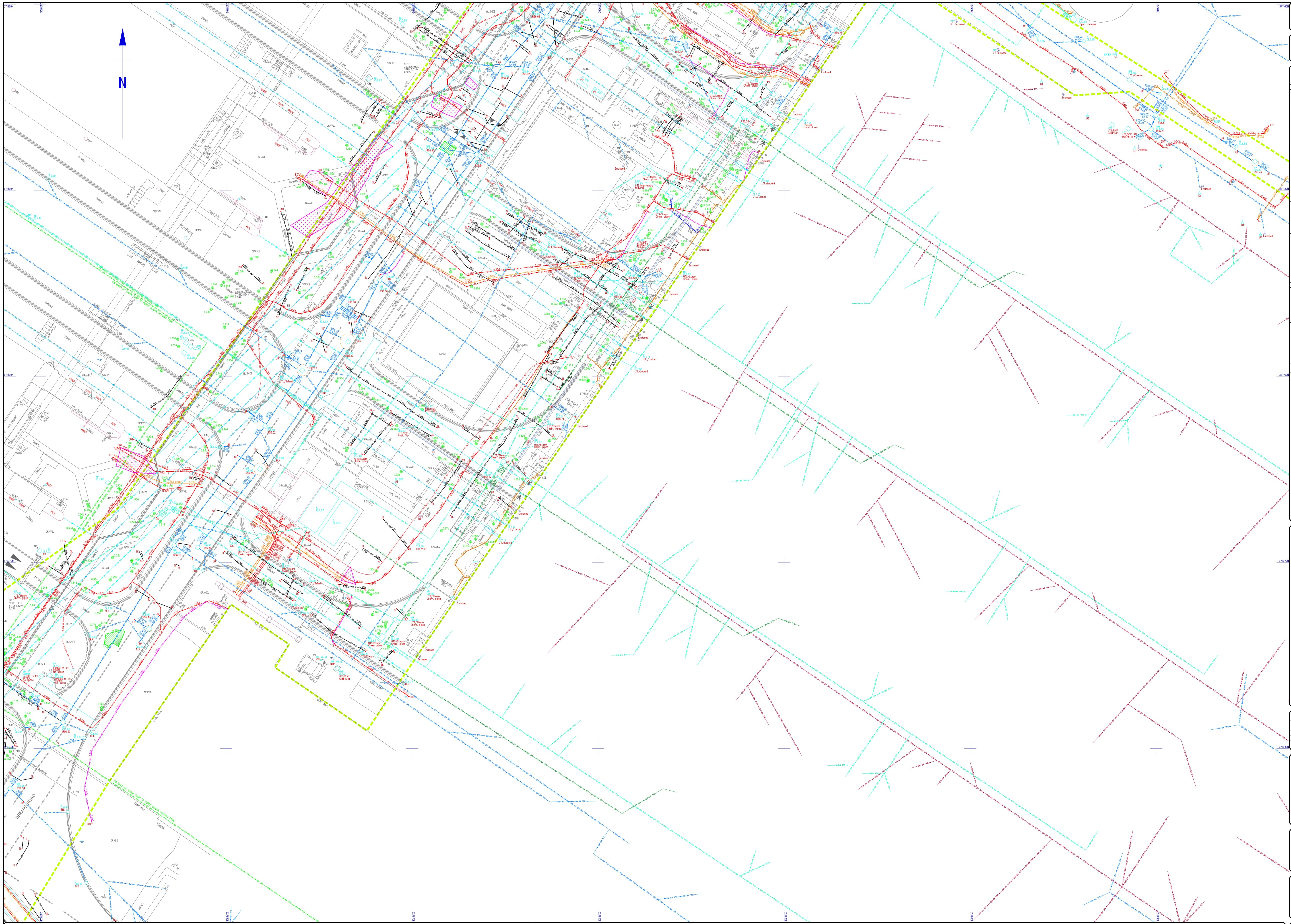
Inspection Cover	☐ IC
Inspection Cover (Elec)	☐ IC/EL
Manhole	☐ MH
British Telecom Cover	☐ BT
Inspection Cover (Comms)	☐ IC/COM
Cable TV	☐ CATV
Inspection Cover Traffic Signals	☐ IC/TL
Gully	☐ G
Kerb Outlet	☐ KO
Cover Level	CL:00.00
Invert Level	IL:00.00
Soffit Level	SL:00.00
Reducing Slab Level	RS:00.00
Sump Level	SUMP:00.00
Water Level	WL:00.00
Pit Level	PIT:00.00

Cover
Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	CO
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
Vitrified Clay	VC

ADDITIONAL NOTES



Survey Notes

Grid: Plane, local related to OS Grid.
Levels: OS Datum from GNSS positioning, converted using the National Geoid Model OSGM15.

Notes

Utility drawing to be read in conjuction with survey report.

Survey Legend

UNDERGROUND SERVICES KEY

COMMUNICATION CABLES

Line	Service
TV	Cable TV
COM	Communication
COM	Colt Telecom
COM	EU Networks
COM	Instalcom
COM	Neo Network
COM	Nynex
COM	Sky
TEL	Telecom
COM	Veolia
COM	Verizon
COM	Zayo

GROUND PENETRATING RADAR

Symbol	Meaning
▨	GPR Detected Anomaly Area/Point
▨	GPR Detected Rebar
▨	GPR Detected Structural Feature
▨	GPR Detected Structure
▨	GPR Low Data
GPR	GPR
0.79d	GPR Detected Anomaly Point Directional
—	GPR Transect

DRAINAGE PIPES

Line	Service
CW	Chemically Contamined Drains Pumped
CW	Gas Turbine Washdown
CW	Oil Contamined Station Drains System
CW	Sewer Combined
FW	Sewer Foul
SW	Sewer Surface Water

FIBRE OPTICAL CABLES

Line	Service
FO	City Fibre
FO	EXA Fibre Optic
FO	GTT Fibre Optic
FO	Virgin Media
FO	Vodafone

FUEL SERVICES

Line	Service
GA	Fuel Gauge Line
FU	Fuel Line
V	Fuel Vent Line
OF	Offset Fill Pipe
OP	Oil Pipe
VR	Vapor Recovery Pipe

OTHER SERVICES

Line	Service
AD	Acid Drain
AIR	Air Line
AC	Alarm Cable
CCTV	CCTV
CH	Chemical
CA	Compressed Air
EA	Earthing Cables
EF	Effluent
DU	Empty Ducting
H	Heating Pipe
O	Overflow
OX	Oxygen Pipe
/	Rising Main
SM	Sludge Main
STM	Steam Duct
TM	Thermal Main
TL	Traffic Light Cable
U	Unidentified
VD	Vehicle Detector Loop
V	Vent Pipe
WW	Wash Water
W	Water
W	Cooling Water Return
W	Cooling Water Supply

ELECTRICAL CABLES

Line	Service
L	Street Lighting
E	Electrical
E LV	Electrical LV
E HV	Electrical HV

OTHER LINETYPES

Line	Meaning
● EOT	End of trace
▬ ▬ ▬	Services Survey Boundary
▬ ▬ ▬	Area of No Access

GAS PIPES

Line	Service
G	Gas
G LP	Gas LP
G MP	Gas MP
G IP	Gas IP
G HP	Gas HP

SERVICE QUALITY LEVEL EXAMPLE

Line	Quality Level
TEL-A	Quality Level A
TEL-B1	Quality Level B1
TEL-B1P	Quality Level B1P
TEL-B2	Quality Level B2
TEL-B2P	Quality Level B2P
TEL-B3	Quality Level B3
TEL-B3P	Quality Level B3P
TEL-B4 AR	Quality Level B4 AR
TEL-B4 TFR	Quality Level B4 TFR

For Quality Level definitions see BSI PAS128:2022 information below.
For more information go to www.malcolmhughes.co.uk

DISCLAIMERS

Electromagnetic and Ground Penetrating Radar techniques have been used in the detection of underground services, features and anomalies shown on this survey plan. These are interpretive procedures and we recommend that trial excavations should be undertaken to confirm identification, location and depth of features where these are critical to design or site works.

It is important to understand that there are limitations when it comes to detecting and mapping buried pipes, cables and ducts due to various factors such as depth location, material type, geology and proximity to other utilities. Even with the use of advanced techniques and equipment, it is not always possible to accurately detect and map all underground infrastructure.

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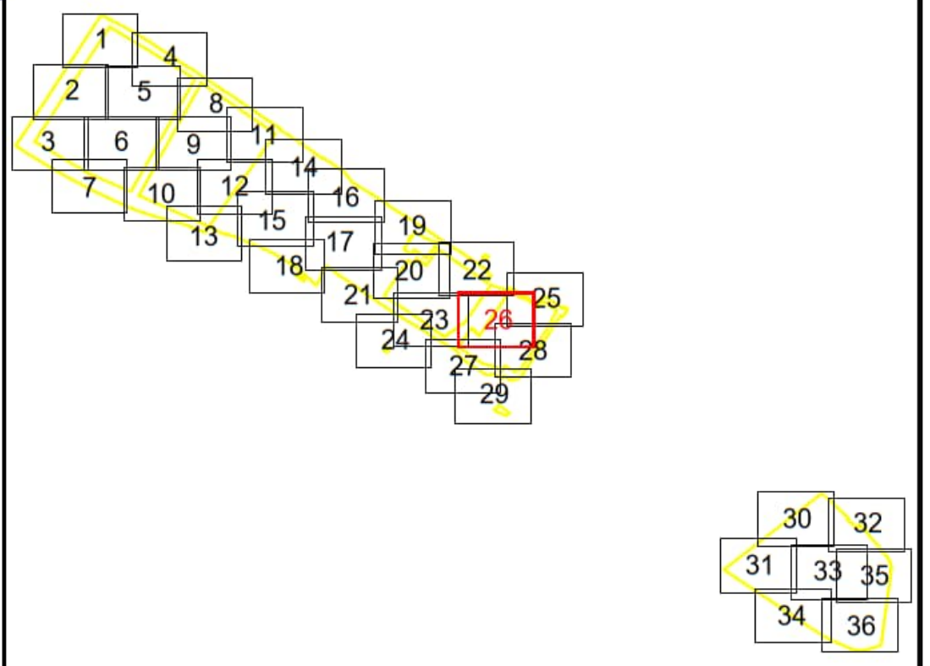

Rev.	Date	Description
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Nottingham NG11 0EE

Project

Connah's Quay Power Station

Drawing Title

Utility Mapping Survey
Sheet 26/36

Surveyed by SL/JB	CAD by PS	Survey Date April 2025	
Checked by DJ/SL	Approved by AT	Scale 1:200	[A0 Sheet]
Drawing No 62330/UG26			Revision 00

ACCREDITATIONS

RICS
THE SURVEY ASSOCIATION
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PUMA PAS128 ACCREDITATION
RISQS QUALIFIED
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BSI PAS128:2022 INFORMATION

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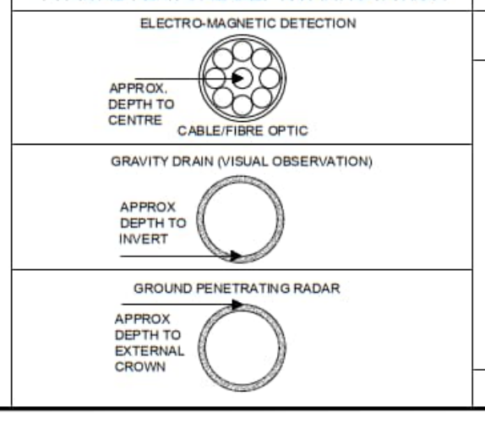

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SURVEY TYPE		QUALITY LEVEL	POST-PROCESSING (GPR DATA ANALYSIS)	ACCURACY HORIZONTAL	ACCURACY VERTICAL	DESCRIPTION (SUPPORTING DATA)
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2W:	2 WAY FLAT
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12W: 4/3	12 WAY: 4 WIDE, 3 DEEP

STREET FURNITURE

Item	Symbol
Air Valve	○ AV
Bus Stop	○ BS
Bollard	○ B
Buchan Trap	○ Buc
Cable Riser	○ CR
Closed Circuit TV	○ CCTV
Down Pipe	○ DP
Drain	○ D
Earth Rod	○ ER
Electricity Pole	○ EP
Flood Light	○ FL
Gas Riser	○ GR
Gas Valve	○ GV
Hydrant	○ FH
Lamp Post	○ LP
Service Marker	○ MK
Offset Fill	○ OF
Post	○ P
Parking Meter	○ PM
Rain Water Pipe	○ PR
Pipe Riser	○ RWP
Rodding Eye	○ RE
Road Sign	○ RS
Soil Pipe	○ SVP
Stop Tap	○ ST
Stop Valve	○ SV
Traffic Light	○ TL
Telegraph Pole	○ TP
Traffic Light Push Button Post	○ TLP
Traffic Light Control	○ TLC/P
Vent Pipe	○ VP
Water Meter	○ WM
Washout	○ WO
Control Box	☐ C/BOX
Car Vacuum	☐ VAC
Car Air	☐ AIR
Electrical Box	☐ EB
Junction Box	☐ JB
Gas Governor	☐ GAS GOV
Telephone Call Box	☐ TCP
Petrol Pump	☐ PP
Dish Drainage Channel	CD
Slot Drainage Channel	SD
Grate Drainage Channel	G.CH

ABBREVIATIONS

Assumed Route	AR
Backdrop	BD
Blocked	BLK
Depth	d
Ground Penetrating Radar	GPR
No Visible Pipes	NVP
Offset Fill	OF
Signal Lost	SL
Taken From Records	TFR
Tank	T
Unable To Survey	UTS
Unable To Rod	UR
Unable To Trace	UT
Unable To Lift	UTL
Vapour Recovery Point	VR

OVERHEAD FEATURES

Electricity Pylon	☒
Electricity	—Z—Z—
Telephone	—T—T—

LEVEL AND HEIGHT

Inspection Cover	☐ IC
Inspection Cover (Elec)	☐ IC/EL
Manhole	☐ MH
British Telecom Cover	☐ BT
Inspection Cover (Comms)	☐ IC/COM
Cable TV	☐ CATV
Inspection Cover Traffic Signals	☐ IC/TL
Gully	☐ G
Kerb Outlet	☐ KO
Cover Level	CL:00.00
Invert Level	IL:00.00
Soffit Level	SL:00.00
Reducing Slab Level	RS:00.00
Sump Level	SUMP:00.00
Water Level	WL:00.00
Pit Level	PIT:00.00

Cover
Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	CO
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
Vitrified Clay	VC

ADDITIONAL NOTES

Survey Notes

Grid: Plane, local related to OS Grid.
Levels: OS Datum from GNSS positioning, converted using the National Geoid Model OSGM15.

Notes

Utility drawing to be read in conjuction with survey report.

Survey Legend

UNDERGROUND SERVICES KEY

COMMUNICATION CABLES

- TV — Cable TV
- COM — Communication
- COM — Colt Telecom
- COM — EU Networks
- COM — Instalcom
- COM — Neo Network
- COM — Nynex
- COM — Sky
- TEL — Telecom
- COM — Verlink
- COM — Verizon
- COM — Zayo

GROUND PENETRATING RADAR

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DRAINAGE PIPES

- CW — Chemically Contamined
- CW — Contaminated
- CW — Gas Turbine Washdown
- CW — Oil Contaminated Station
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- FW — Sewer Combined
- FW — Sewer Foul
- SW — Sewer Surface Water

OTHER SERVICES

- AD — Acid Drain
- AIR — Air Line
- AC — Alarm Cable
- CCTV — CCTV
- CH — Chemical
- CA — Compressed Air
- EA — Earthing Cables
- EF — Effluent
- ED — Empty Ducting
- H — Heating Pipe
- O — Overflow
- OX — Oxygen Pipe
- RM — Rising Main
- SM — Sludge Main
- STM — Steam Duct
- TM — Thermal Main
- TL — Traffic Light Cable
- UNK — Unidentified
- VD — Vehicle Detector Loop
- V — Vent Pipe
- WW — Wash Water
- W — Water
- CW — Cooling Water Return
- CW — Cooling Water Supply

FIBRE OPTICAL CABLES

- FO — City Fibre
- FO — EXA Fibre Optic
- FO — GTT Fibre Optic
- FO — Virgin Media
- FO — Vodafone

FUEL SERVICES

- GA — Fuel Gauge Line
- FU — Fuel Line
- V — Fuel Vent Line
- OF — Offset Fill Pipe
- OP — Oil Pipe
- VR — Vapor Recovery Pipe

ELECTRICAL CABLES

- L — Street Lighting
- E — Electrical
- E LV — Electrical LV
- E HV — Electrical HV

OTHER LINETYPES

- EOT — End of trace
- Services Survey Boundary
- Area of No Access

GAS PIPES

- G — Gas
- G LP — Gas LP
- G IP — Gas MP
- G IP — Gas IP
- G HP — Gas HP

SERVICE QUALITY LEVEL EXAMPLE

- TEL - A — Quality Level A
- TEL - B1 — Quality Level B1
- TEL - B1P — Quality Level B1P
- TEL - B2 — Quality Level B2
- TEL - B2P — Quality Level B2P
- TEL - B3 — Quality Level B3
- TEL - B3P — Quality Level B3P
- TEL - B4 AR — Quality Level B4 AR
- TEL - B4 TFR — Quality Level B4 TFR

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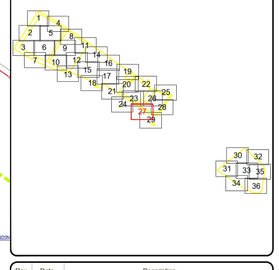

Rev	Date	Description
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Nottingham NG11 0EE

Project

Connah's Quay Power Station

Drawing Title

Utility Mapping Survey
Sheet 27/36

Surveyed by	CAD by	Survey Date
SL/JB	PS	April 2025
Checked by	Approved by	Scale
DJ/SL	AT	1:200 [A0 Sheet]

Drawing No: 62330/UG27
Revision: 00

ACCREDITATIONS

RICS · THE SURVEY ASSOCIATION · chartered ices · PUMA · RISQS QUALIFIED · SAFE2DIG · IMS ISO 9001 Quality Management FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION

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Air Valve	AV	Parking Meter	PM
Bus Stop	BS	Pelco Button Pipe	PB
Bollard	B	Post Box	PO
Bucket Trap	Bue	Reddring Eye	RE
Cable Riser	CR	Road Sign	RS
Closed Circuit TV	CCTV	Soil Pipe	SOIL
Down Pipe	DP	Stop Tap	ST
Drain	D	Stop Valve	SV
Earth Rod	ER	Traffic Light	TL
Electricity Pole	EP	Telegraph Pole	T
Flood Light	FL	Traffic Light with Button Post	TLP
Gas Tap	Gta	Traffic Light Control	TLCP
Gas Valve	GV	Vent Pipe	VP
Hydrant	FH	Water Meter	WM
Lamp Post	LP	Washout	WO
Magnetic Marker	MM		
Offset Fill	OF		
Pillar	P		

Control Box	C/BOX		
Car Vacuum	VAC		
Cabinet	CAB		
Electrical Box	EB		
Junction Box	JB		
Gas Governor	GAS GOV		
Telephone Call Box	TCP		
Petrol Pump	PP		
Dish Drainage Channel	CH DRN		
Slot Drainage Channel	SLOT DRN		
Grate Drainage Channel	GRATE DRN		

ABBREVIATIONS

Assumed Route	AR
Backdrop	BD
Cable Duct	C.D.K
Depth	d
Ground Penetrating Radar	GPR
No Visible Pipes	NVP
Offset Fill	OF
Surface Pipe	SP
Taken From Records	TFR
Tank	T
Unable To Survey	UTS
Unable To Rod	UR
Unable To Trace	UT
Unable To Lift	UTL
Vapour Recovery Point	VR

OVERHEAD FEATURES

- Electricity Pylon
- Electricity
- Telephone

LEVEL AND HEIGHT

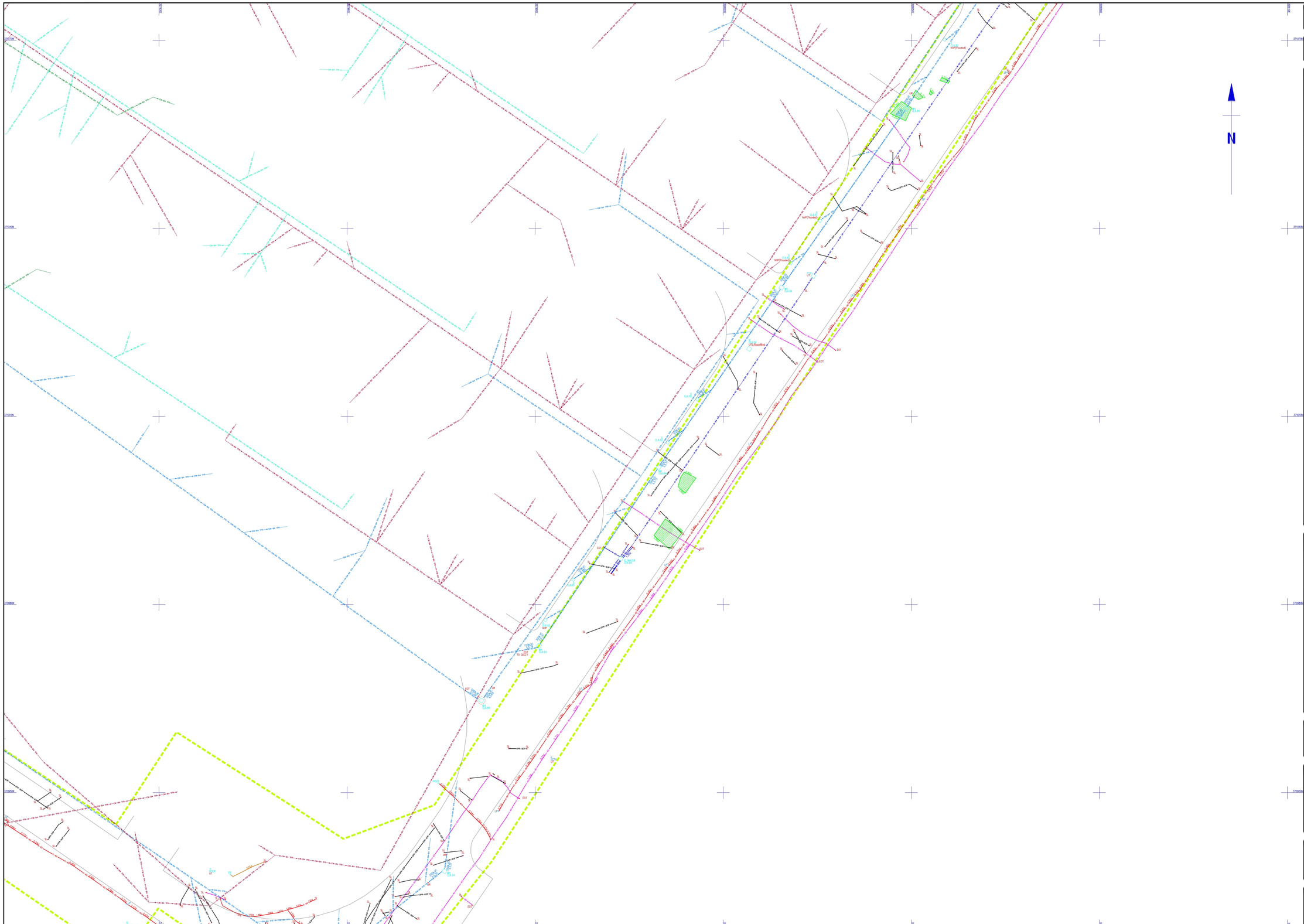
Inspection Cover	IC
Inspection Cover (Elec)	IC(E)
Manhole	MH
British Telecom Cover	BT
Inspection Cover (Comms)	IC/COM
Kerb	KERB
Inspection Cover Traffic Signals	IC/TL
Gully	G
Kerb Outlet	KO
Cover Level	CL:00.00
Invert Level	IL:00.00
Soffit Level	SL:00.00
Reducing Slab Level	RS:00.00
Sump Level	SUMP:00.00
Water Level	WL:00.00
Pit Level	PIT:00.00

Cover
Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	C
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
Vitrified Clay	VC

ADDITIONAL NOTES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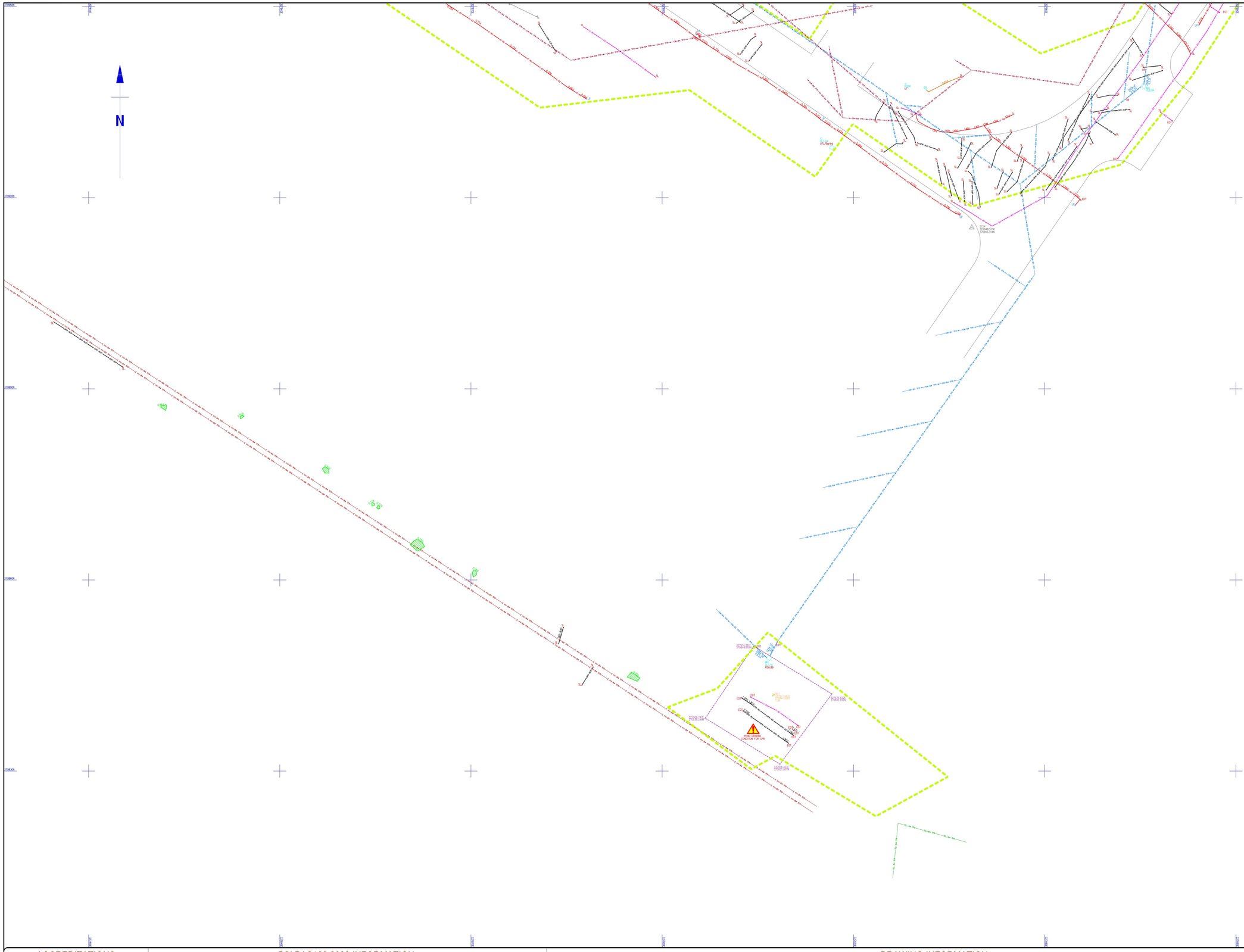
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STORFLOWR
UKLINEPIPE
POOR GROUND CONDITION FOR GPR
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OHP
UP
LP
CWP
SW
FW
SS
ST
TEL
FO
GAS
ELEC
STA6000
STA6010
STA6020
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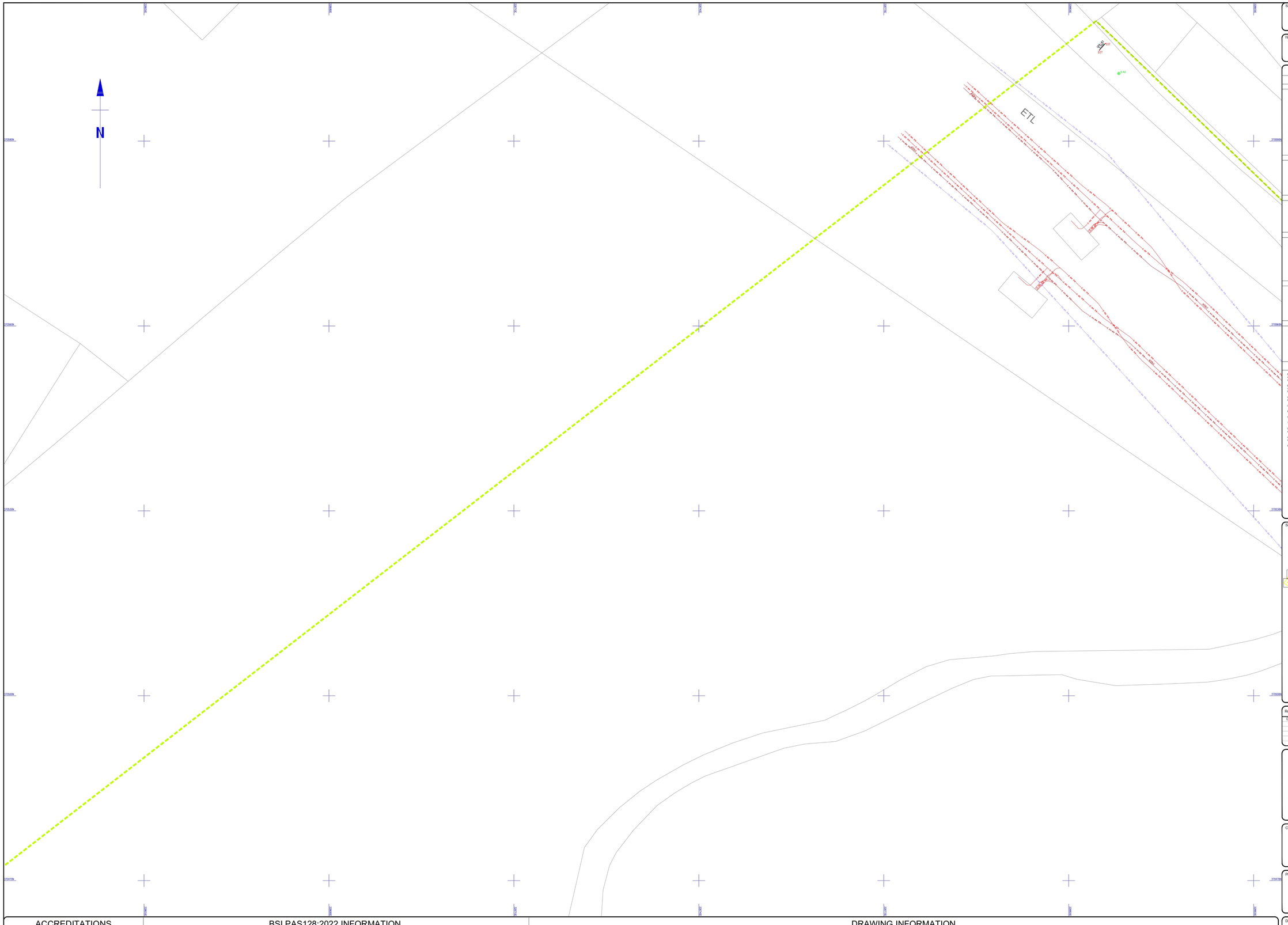

Survey Notes

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Levels: OS Datum from GNSS positioning, converted using the National Geoid Model OSGM15.

Notes

Utility drawing to be read in conjuction with survey report.
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Survey Legend

UNDERGROUND SERVICES KEY

COMMUNICATION CABLES

TV	Cable TV
COM	Communication
COM	Colt Telecom
COM	EU Networks
COM	Instalcom
COM	Neo Network
COM	Nynex
COM	Sky
TEL	Telecom
COM	Verizo
COM	Verizon
COM	Zayo

GROUND PENETRATING RADAR

GPR Detected Anomaly Area/Point
GPR Detected Rebar
GPR Detected Structural Feature
GPR Detected Structure
GPR Low Data
GPR
GPR Detected Anomaly Point Directional
GPR Transect

DRAINAGE PIPES

CW	Chemically Contamined Sewer Pumped
CF	Gas Turbine Washdown
CW	Oil Contamined Station
SW	Sewer Combined
FW	Sewer Foul
FW	Sewer Foul
SW	Sewer Surface Water

OTHER SERVICES

AD	Acid Drain
AIR	Air Line
AC	Alarm Cable
CCTV	CCTV
CH	Chemical
CA	Compressed Air
EA	Earthing Cables
EF	Effluent
DU	Empty Ducting
H	Heating Pipe
O	Overflow
OX	Oxygen Pipe
RM	Rising Main
SM	Sludge Main
STM	Steam Duct
TM	Thermal Main
TL	Traffic Light Cable
U	Unidentified
VL	Vehicle Detector Loop
V	Vent Pipe
WW	Wash Water
W	Water
W	Cooling Water Return
W	Cooling Water Supply

FIBRE OPTICAL CABLES

FO	City Fibre
FO	EXA Fibre Optic
FO	GTT Fibre Optic
FO	Virgin Media
FO	Vodafone

FUEL SERVICES

GA	Fuel Gauge Line
FU	Fuel Line
V	Fuel Vent Line
OF	Offset Fill Pipe
OP	Oil Pipe
VR	Vapor Recovery Pipe

ELECTRICAL CABLES

L	Street Lighting
E	Electrical
ELV	Electrical LV
EHV	Electrical HV

OTHER LINETYPES

EOT End of trace
Services Survey Boundary
Area of No Access

GAS PIPES

G	Gas
G LP	Gas LP
G MP	Gas MP
G IP	Gas IP
G HP	Gas HP

SERVICE QUALITY LEVEL EXAMPLE

TEL-A	Quality Level A
TEL-B1	Quality Level B1
TEL-B1P	Quality Level B1P
TEL-B2	Quality Level B2
TEL-B2P	Quality Level B2P
TEL-B3	Quality Level B3
TEL-B3P	Quality Level B3P
TEL-B4 AR	Quality Level B4 AR
TEL-B4 TFR	Quality Level B4 TFR

For Quality Level definitions see BSI PAS 128:2022 information below.
For more information go to www.malcolmhughes.co.uk

DISCLAIMERS

Electromagnetic and Ground Penetrating Radar techniques have been used in the detection of underground services, features and anomalies shown on this survey plan. These are interpretive processes and accuracy may vary. Trial excavations should be undertaken to confirm identification, location and depth of features where these are critical to design or site works.

It is important to understand that there are limitations when it comes to detecting and mapping buried pipes, cables and ducts due to various factors such as depth location, material type, geology and proximity to other utilities. Even with the use of advanced techniques and equipment, it is not always possible to accurately detect and map all underground infrastructure.

All reasonable effort and care has been made in searching available record drawings. The completeness of the underground service information supplied to and by us cannot be guaranteed.

Where services are non-metallic or not proven on site, positions are taken from records, trench scars and surface detail.

Pipe sizes which cannot be obtained by visual survey are taken from utilities record drawings or marker plates where available.

Services shown as PAS128 QL- B4 TFR (Taken from records) and QL- B4 AR (Assumed Route) have not been proven on site.

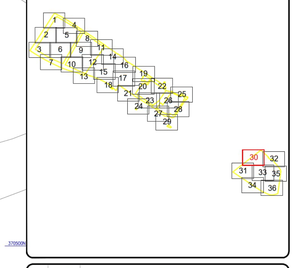
The CAD layering may contain further information.

Collected data from GPR has not been post processed unless specified elsewhere or denoted on the survey drawing by the abbreviation of (P).

All utilities inspected and measured at Inspection Covers or Manholes are considered to be a QL-A for a radius up to 5m from the chamber wall.

HSG47 safe digging practices should still be adhered to when using these Utility Mapping Survey plans.

Sheet Index



Rev	Date	Description
00		First Issue

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CHARTERED LAND SURVEYORS

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London Office
Tel: 0800 833312

Client

Uniper Technologies Ltd.
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project

Connah's Quay Power Station

Drawing Title

Utility Mapping Survey
Sheet 30/36

Surveyed by	SU,JB	CAD by	PS
Checked by	DJ/SL	Approved by	AT
Survey Date	April 2025		
Scale	1:200	[A0 Sheet]	

Drawing No. 62330/UG30
Revision 00

ACCREDITATIONS

RICS · THE SURVEY ASSOCIATION · chartered ices · PUMA · FISAUK Qualified Member · IMI ISO 9001 Quality Management FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION
APPROX DEPTH TO CENTRE — CABLE/FIBRE OPTIC
GRAVITY DRAIN (VISUAL OBSERVATION)
APPROX DEPTH TO INVERT
GROUND PENETRATING RADAR
APPROX DEPTH TO EXTERNAL CROWN

BSI PAS128:2022 QUALITY LEVEL INFORMATION

SURVEY TYPE		QUALITY LEVEL	POST-PROCESSING (GPR DATA ANALYSIS)	ACCURACY HORIZONTAL	ACCURACY VERTICAL	DESCRIPTION (SUPPORTING DATA)
B	Detection	QL-B4 TFR	No	Undefined	Undefined	Location not detected on site, taken from records.
		QL-B4 AR	No	Undefined	Undefined	A utility segment that has not been detected but is suspected to exist. Denotes assumed route only.
		QL-B3	No	±500mm	Undefined (No reliable depth)	Horizontal detection by one geophysical technique only. Denotes utility segments with weak signals / no depth information.
		QL-B3P	Yes			
		QL-B2	No	±250mm	±40% of detected depth	Horizontal and vertical detection by one geophysical technique only (Electromagnetic Detection/Ground Penetrating Radar). Medium confidence level for position and depth.
		QL-B2P	Yes			
		QL-B1	No	±150mm	±15% of detected depth	Horizontal and vertical detection by multiple geophysical techniques. (Electromagnetic Detection/Ground Penetrating Radar). High confidence level for position and depth.
		QL-B1P	Yes			
A	Verification	QL-A	No	±50mm	±50mm	Horizontal and vertical location of the utility established by visual inspection at manholes and inspection covers or by use of targeted excavations (vacuum excavation and trial pits).

DRAWING INFORMATION

DUCTING LAYOUTS

1W: 1 WAY SINGLE DUCT
2W: 2 WAY FLAT
2W 1/3: 2 WAY 1 WIDE, 3 DEEP
4W: 2/2: 4 WAY 2 WIDE, 2 DEEP
6W: 3/2: 6 WAY, 3 WIDE, 2 DEEP
12W: 4/3: 12 WAY, 4 WIDE, 3 DEEP

STREET FURNITURE

Air Valve	AV
Bollard	BS
Box Stop	BS
Buchan Trap	Buc
Cable Riser	CR
Camera/ Cctv/ TV	CCTV
Down Pipe	DP
Drain	D
Earth Rod	ER
Electricity Pole	EP
Flood Light	FL
Gas Riser	GR
Gas Valve	GV
Hydrant	FH
Lamp Post	LP
Meter/ Chamber	MC
Offset Fill	OF
Post	P
Parking Meter	PM
Rain Water Pipe	RW
Pipe Riser	RWP
Rodding Eye	RE
Road Sign	RS
Soil Pipe	SVP
Stop Tap	ST
Stop Valve	SV
Traffic Light	TL
Telegraph Pole	TP
Traffic Light Push Button Post	TLP
Traffic Light Control	TLC/P
Vent Pipe	VP
Water Meter	WM
Washout	WO
Control Box	C/BOX
Car Vacuum	VAC
Cctv	CCTV
Electrical Box	EB
Junction Box	JB
Gas Governor	GAS GOV
Telephone Call Box	TCB
Petrol Pump	PP
Dish Drainage Channel	CD
Slot Drainage Channel	SDC
Grate Drainage Channel	GDC

ABBREVIATIONS

Assumed Route	AR
Backdrop	BD
Bitumen	BCK
Depth	#
Ground Penetrating Radar	GPR
Invert Of Pipes	INV
Offset Fill	OF
Signal Lost	SL
Taken From Records	TFR
Tank	T
Unable To Survey	UTS
Unable To Rod	UR
Unable To Trace	UT
Unable To Lift	UTL
Vapour Recovery Point	VR

OVERHEAD FEATURES

Electricity Pylon
Electricity
Telephone

LEVEL AND HEIGHT

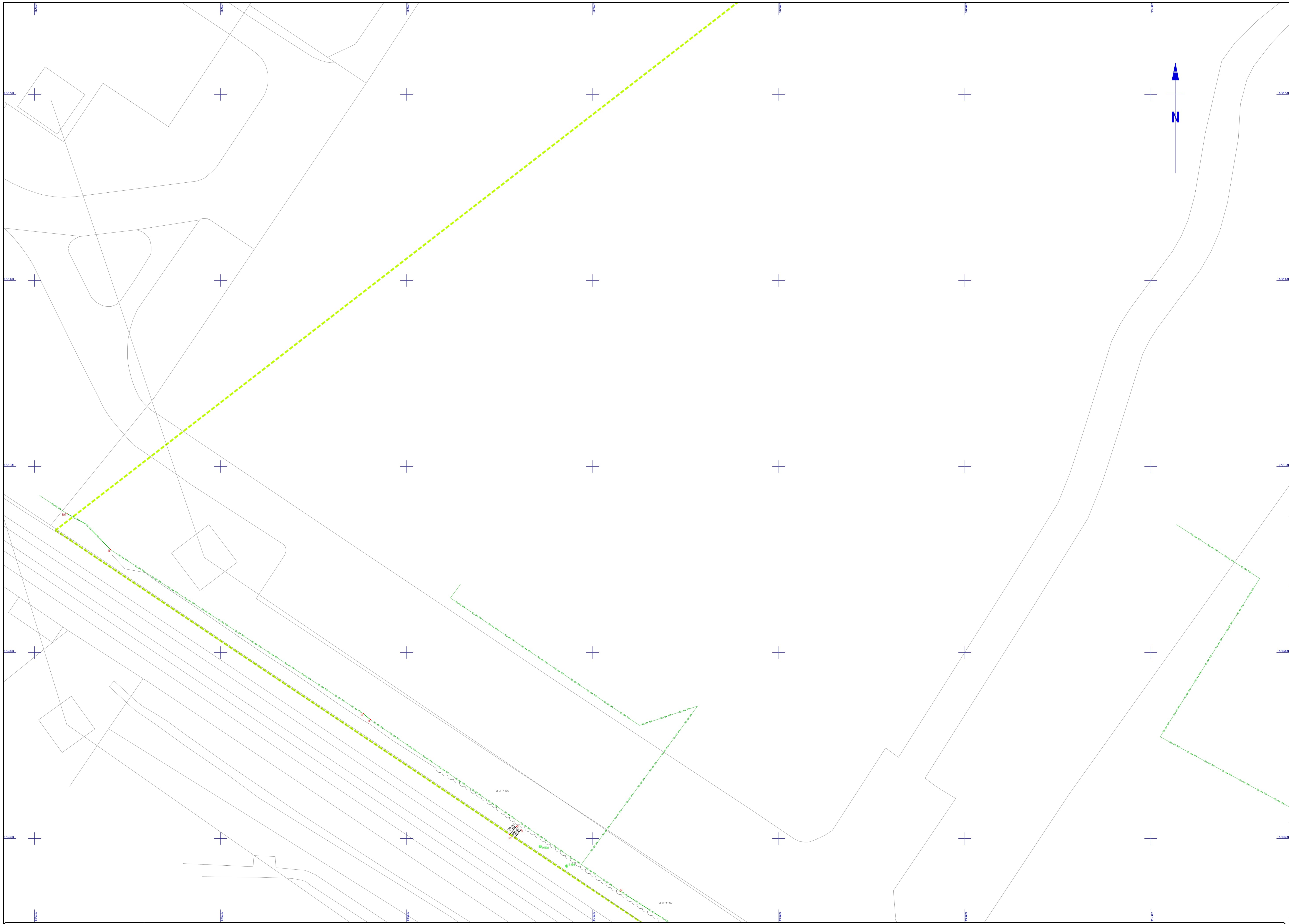
Inspection Cover	IC
Inspection Cover (Elec)	IC ICID.
Manhole	MH
British Telecom Cover	BT
Inspection Cover (Comms)	IC ICICOM
Cctv	IC CCTV
Inspection Cover Traffic Signals	IC ICTL
Gully	G
Kerb Outlet	KO
Cover Level	CL 00.00
Invert Level	IL 00.00
Soffit Level	SL 00.00
Reducing Slab Level	RS 00.00
Sump Level	SUMP 00.00
Water Level	WL 00.00
Pit Level	PIT 00.00

Cover
Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	CO
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
Vitrified Clay	VC

ADDITIONAL NOTES



Survey Notes

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Notes

Utility drawing to be read in conjuction with survey report.
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Survey Legend

UNDERGROUND SERVICES KEY

COMMUNICATION CABLES

TV	Cable TV
COM	Communication
COM	Colt Telecom
COM	EU Networks
COM	Instalcom
COM	Neo Network
COM	Nynex
COM	Sky
TEL	Telecom
COM	Veolia
COM	Verizon
COM	Zayo

GROUND PENETRATING RADAR

▨	GPR Detected Anomaly Area/Point
▨	GPR Detected Rebar
▨	GPR Detected Structural Feature
▨	GPR Detected Structure
☐	GPR Low Data
GPR	GPR
0.79d	GPR Detected Anomaly Point Directional
	GPR Transect

DRAINAGE PIPES

CW	Chemically Contamined Drains Pumped
CW	Gas Turbine Washdown
CW	Oil Contamined Station Drains System
CW	Sewer Combined
FW	Sewer Foul
SW	Sewer Surface Water

FIBRE OPTICAL CABLES

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EA	Earthing Cables
EF	Effluent
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H	Heating Pipe
O	Overflow
OX	Oxygen Pipe
/	Rising Main
SM	Sludge Main
STM	Steam Duct
TM	Thermal Main
TL	Traffic Light Cable
U	Unidentified
VD	Vehicle Detector Loop
V	Vent Pipe
WW	Wash Water
W	Water
W	Cooling Water Return
W	Cooling Water Supply

ELECTRICAL CABLES

L	Street Lighting
E	Electrical
E LV	Electrical LV
E HV	Electrical HV

OTHER LINETYPES

EOT	End of trace
	Services Survey Boundary
	Area of No Access

GAS PIPES

G	Gas
G LP	Gas LP
G MP	Gas MP
G IP	Gas IP
G HP	Gas HP

SERVICE QUALITY LEVEL EXAMPLE

TEL-A	Quality Level A
TEL-B1	Quality Level B1
TEL-B1P	Quality Level B1P
TEL-B2	Quality Level B2
TEL-B2P	Quality Level B2P
TEL-B3	Quality Level B3
TEL-B3P	Quality Level B3P
TEL-B4 AR	Quality Level B4 AR
TEL-B4 TFR	Quality Level B4 TFR

For Quality Level definitions see BSI PAS128:2022 information below.
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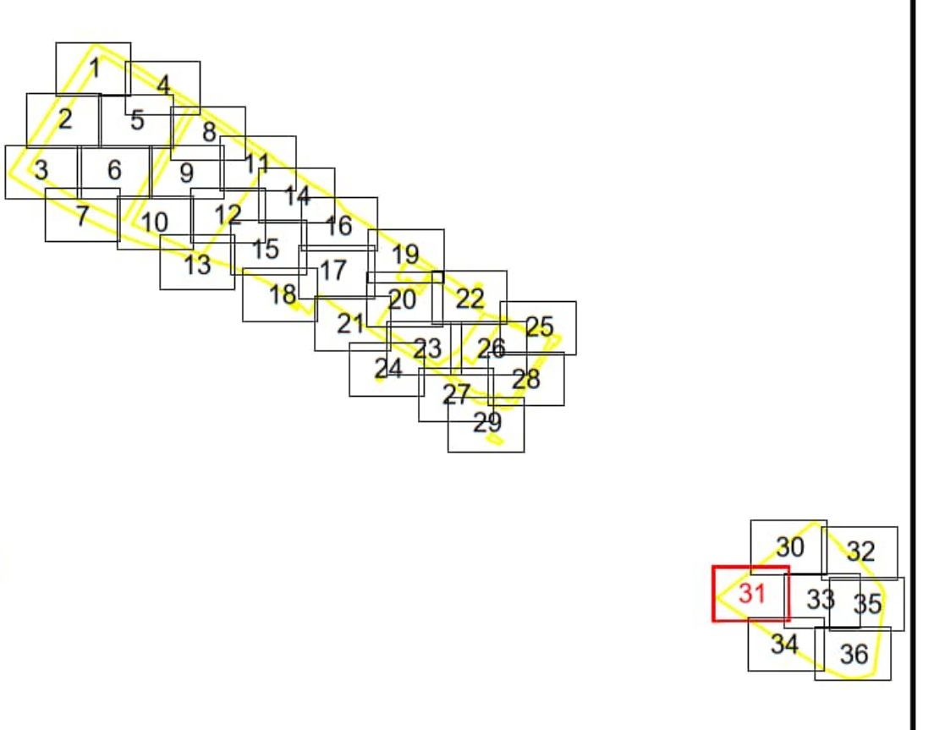
Sheet Index



Rev.	Date	Description
00		First Issue

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Glasgow Office
Tel: 0141 885 0800

London Office
Tel: 0800 833312

Client

Uniper Technologies Ltd.
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project

Connah's Quay Power Station

Drawing Title

Utility Mapping Survey
Sheet 31/36

Surveyed by SL/JB	CAD by PS	Survey Date April 2025
Checked by DJ/SL	Approved by AT	Scale 1:200 [A0 Sheet]

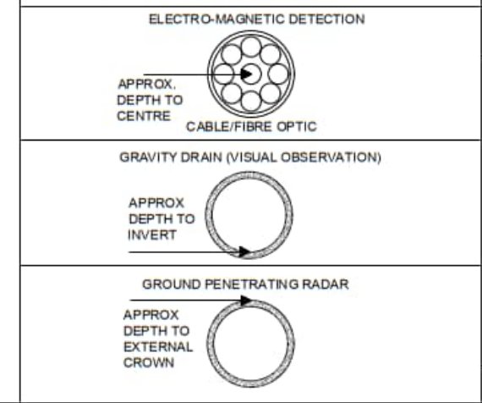
Drawing No 62330/UG31
Revision 00

ACCREDITATIONS

RICS
THE SURVEY ASSOCIATION
chartered ices
PUMA
PAS128 ACCREDITATION
RISQS QUALIFIED
bsi ISO 9001 Quality Management
FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION



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DRAWING INFORMATION

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2W:	2 WAY FLAT
2W: 1/2	2 WAY: 1 WIDE, 2 DEEP
4W: 2/2	4 WAY: 2 WIDE, 2 DEEP
6W: 3/2	6 WAY: 3 WIDE, 2 DEEP
12W: 4/3	12 WAY: 4 WIDE, 3 DEEP

STREET FURNITURE

Air Valve	○ AV
Bus Stop	○ BS
Bollard	○ B
Buchan Trap	○ Buc
Cable Riser	○ CR
Closed Circuit TV	○ CCTV
Down Pipe	○ DP
Drain	○ D
Earth Rod	○ ER
Electricity Pole	○ EP
Flood Light	○ FL
Gas Riser	○ GR
Gas Valve	○ GV
Hydrant	○ FH
Lamp Post	○ LP
Service Marker	○ MK
Offset Fill	○ OF
Post	○ P
Parking Meter	○ PM
Rain Water Pipe	○ PR
Pipe Riser	○ RWP
Rodding Eye	○ RE
Road Sign	○ RS
Soil Pipe	○ SVP
Stop Tap	○ ST
Stop Valve	○ SV
Traffic Light	○ TL
Telegraph Pole	○ TP
Traffic Light Push Button Post	○ TLP
Traffic Light Control	○ TLC/P
Vent Pipe	○ VP
Water Meter	○ WM
Washout	○ WO
Control Box	☐ C/BOX
Car Vacuum	☐ VAC
Car Air	☐ AIR
Electrical Box	☐ EB
Junction Box	☐ JB
Gas Governor	☐ GAS GOV
Telephone Call Box	☐ TCP
Petrol Pump	☐ PP
Dish Drainage Channel	CD
Slot Drainage Channel	SD
Grate Drainage Channel	G.CH

ABBREVIATIONS

Assumed Route	AR
Backdrop	BD
Blocked	BLK
Depth	d
Ground Penetrating Radar	GPR
No Visible Pipes	NVP
Offset Fill	OF
Signal Lost	SL
Taken From Records	TFR
Tank	T
Unable To Survey	UTS
Unable To Rod	UR
Unable To Trace	UT
Unable To Lift	UTL
Vapour Recovery Point	VR

OVERHEAD FEATURES

Electricity Pylon	☒
Electricity	—Z—Z—
Telephone	—T—T—

LEVEL AND HEIGHT

Inspection Cover	☐ IC
Inspection Cover (Elec)	☐ IC/EL
Manhole	☐ MH
British Telecom Cover	☐ BT
Inspection Cover (Comms)	☐ IC/COM
Cable TV	☐ CATV
Inspection Cover Traffic Signals	☐ IC/TL
Gully	☐ G
Kerb Outlet	☐ KO
Cover Level	CL:00.00
Invert Level	IL:00.00
Soffit Level	SL:00.00
Reducing Slab Level	RS:00.00
Sump Level	SUMP:00.00
Water Level	WL:00.00
Pit Level	PIT:00.00

Cover
Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	CO
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
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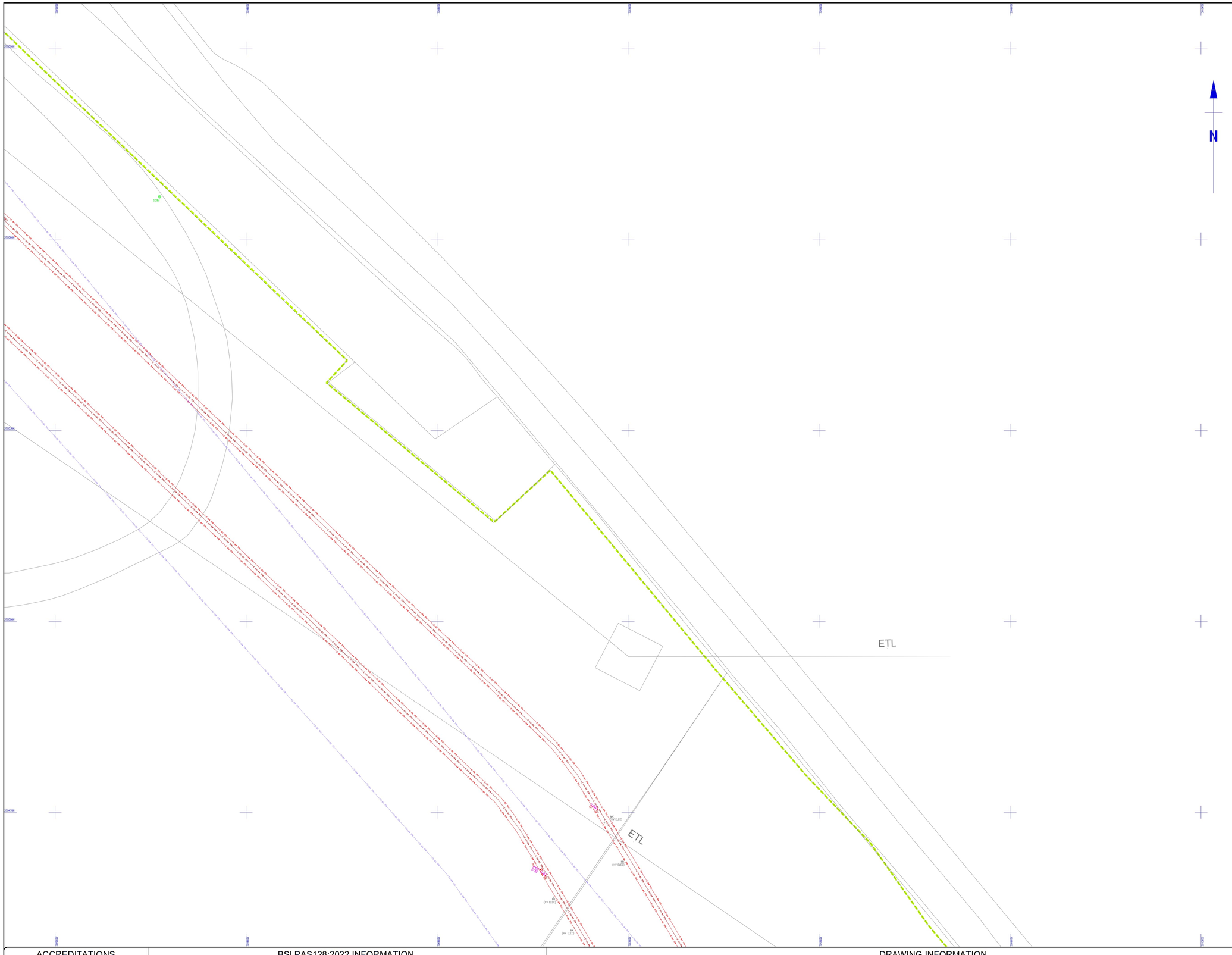

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Notes

Utility drawing to be read in conjuction with survey report.
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Survey Legend

UNDERGROUND SERVICES KEY

COMMUNICATION CABLES

TV	Cable TV
COM	Communication
COM	Colt Telecom
COM	EU Networks
COM	Instalcom
COM	Neo Network
COM	Nynex
COM	Sky
TEL	Telecom
COM	Verizo
COM	Verizon
COM	Zayo

GROUND PENETRATING RADAR

	GPR Detected Anomaly Area/Point
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	GPR Detected Structural Feature
	GPR Detected Structure
	GPR Low Data
GPR	GPR
0.764 Variable	GPR Detected Anomaly Point Directional
	GPR Transect

DRAINAGE PIPES

CW	Chemically Contamined
CW	Gas Condensate
CW	Gas Turbine Washdown
CW	Oil Contamined Station
CW	Sewer Combined
FW	Sewer Foul
FW	Sewer Foul
SW	Sewer Surface Water

FIBRE OPTICAL CABLES

FO	City Fibre
FO	EXA Fibre Optic
FO	GTT Fibre Optic
FO	Virgin Media
FO	Vodafone

FUEL SERVICES

GA	Fuel Gauge Line
FU	Fuel Line
V	Fuel Vent Line
OF	Offset Fill Pipe
OP	Oil Pipe
VR	Vapor Recovery Pipe

OTHER SERVICES

AD	Acid Drain
AIR	Air Line
AC	Alarm Cable
CCTV	CCTV
CH	Chemical
CA	Compressed Air
EA	Earthing Cables
EF	Effluent
DU	Empty Ducting
H	Heating Pipe
O	Overflow
OX	Oxygen Pipe
R	Rising Main
SM	Sludge Main
STM	Steam Duct
TM	Thermal Main
TL	Traffic Light Cable
U	Unidentified
VD	Vehicle Detector Loop
V	Vent Pipe
WW	Wash Water
W	Water
W	Cooling Water Return
W	Cooling Water Supply

ELECTRICAL CABLES

L	Street Lighting
E	Electrical
E LV	Electrical LV
E HV	Electrical HV

OTHER LINETYPES

EOT	End of trace
	Services Survey Boundary
	Area of No Access

GAS PIPES

G	Gas
G LP	Gas LP
G MP	Gas MP
G IP	Gas IP
G HP	Gas HP

SERVICE QUALITY LEVEL EXAMPLE

TEL - A	Quality Level A
TEL - B1	Quality Level B1
TEL - B1P	Quality Level B1P
TEL - B2	Quality Level B2
TEL - B2P	Quality Level B2P
TEL - B3	Quality Level B3
TEL - B3P	Quality Level B3P
TEL - B4 AR	Quality Level B4 AR
TEL - B4 TFR	Quality Level B4 TFR

For Quality Level definitions see BSI PAS 128:2022 information below.
For more information go to www.malcolmhughes.co.uk

DISCLAIMERS

Electromagnetic and Ground Penetrating Radar techniques have been used in the detection of underground services, features and anomalies shown on this survey plan. The accuracy of these techniques is dependant on a number of factors and excavations should be undertaken to confirm identification, location and depth of features where these are critical to design or site works.

It is important to understand that there are limitations when it comes to detecting and mapping buried pipes, cables and ducts due to various factors such as depth location, material type, geology and proximity to other utilities. Even with the use of advanced techniques and equipment, it is not always possible to accurately detect and map all underground infrastructure.

All reasonable effort and care has been made in searching available record drawings. The completeness of the underground service information supplied to and by us cannot be guaranteed.

Where services are non-metallic or not proven on site, positions are taken from records, trench scars and surface detail.

Pipe sizes which cannot be obtained by visual survey are taken from utilities record drawings or marker plates where available.

Services shown as PAS128 QL- B4 TFR (Taken from records) and QL - B4 AR (Assumed Route) have not been proven on site.

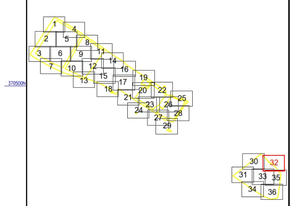
The CAD layering may contain further information.

Collected data from GPR has not been post processed unless specified elsewhere or denoted on the survey drawing by the abbreviation of (P).

All utilities inspected and measured at Inspection Covers or Manholes are considered to be a QL-A for a radius up to 5m from the chamber wall.

HSG47 safe digging practices should still be adhered to when using these Utility Mapping Survey plans.

Sheet Index



Rev	Date	Description
00		First Issue

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Project

Connah's Quay Power Station

ACCREDITATIONS

RICS · THE SURVEY ASSOCIATION · chartered ICES · PUMA · FISRWG · CAT&GENNY · ISO 9001 Bureau Veritas Certification · FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION
APPROX DEPTH TO CENTRE — C-MEASURED OPTIC

GRAVITY DRAIN (VISUAL OBSERVATION)
APPROX DEPTH TO INVERT

GROUND PENETRATING RADAR
APPROX DEPTH TO EXTERNAL CROWN

BSI PAS128:2022 QUALITY LEVEL INFORMATION

SURVEY TYPE		QUALITY LEVEL	POST-PROCESSING (GPR DATA ANALYSIS)	ACCURACY HORIZONTAL	ACCURACY VERTICAL	DESCRIPTION (SUPPORTING DATA)
B	Detection	QL-B4 TFR	No	Undefined	Undefined	Location not detected on site, taken from records.
		QL-B4 AR	No	Undefined	Undefined	A utility segment that has not been detected but is suspected to exist. Denotes assumed route only.
		QL-B3	No	±500mm	Undefined (No reliable depth)	Horizontal detection by one geophysical technique only. Denotes utility segments with weak signals / no depth information.
		QL-B3P	Yes			
		QL-B2	No	±250mm	±40% of detected depth	Horizontal and vertical detection by one geophysical technique only (Electromagnetic Detection/Ground Penetrating Radar). Medium confidence level for position and depth.
		QL-B2P	Yes			
		QL-B1	No	±150mm	±15% of detected depth	Horizontal and vertical detection by multiple geophysical techniques. (Electromagnetic Detection/Ground Penetrating Radar). High confidence level for position and depth.
		QL-B1P	Yes			
A	Verification	QL-A	No	±50mm	±50mm	Horizontal and vertical location of the utility established by visual inspection at manholes and inspection covers or by use of targeted excavation (vacuum excavation and trial pits).

DRAWING INFORMATION

DUCTING LAYOUTS

1W	1 WAY SINGLE DUCT
2W	2 WAY FLAT
2W 1/2	2 WAY 1 WIDE, 2 DEEP
4W 2/2	4 WAY 2 WIDE, 2 DEEP
6W 3/2	6 WAY 3 WIDE, 2 DEEP
12W 4/3	12 WAY 4 WIDE, 3 DEEP

STREET FURNITURE

Air Valve	AV	Parking Meter	PM
Bus Stop	BS	Rayo Water Pipe	PW
Bollard	B	Pedestal	PED
Buchan Trap	BT	Redding Eye	RE
Cable Riser	CR	Road Sign	RS
Closed Circuit TV	CCTV	Soil Pipe	SVP
Down Pipe	DP	Stop Tap	ST
Drain	D	Traffic Light	TL
Earth Rod	ER	Telegraph Pole	TP
Electricity Pole	EP	Traffic Light Push Button Post	TLPB
Flood Light	FL	Traffic Light Control	TLC/P
Gas Riser	GR	Vent Pipe	VP
Hydrant	H	Water Meter	WM
Kiosk	K	Washout	WO
Lamp Post	LP		
Service Marker	MK		
Offset Fill	OF		
Post	P		

Control Box	C/BOX
Car Vacuum	VAC
Cash Till	CT
Electrical Box	EB
Junction Box	JB
Gas Governor	GAS GOV
Telephone Call Box	TCP
Petrol Pump	PP
Dish Drainage Channel	CD
Slot Drainage Channel	SD
Grate Drainage Channel	GD

ABBREVIATIONS

Assumed Route	AR
Backdrop	BD
Bollard	B/L
Depth	D
Ground Penetrating Radar	GPR
No Visible Pipes	NVP
Offset Fill	OF
Surface Soil	SS
Taken From Records	TFR
Tank	T
Unable To Survey	UTS
Unable To Rod	UR
Unable To Raise	UR
Unable To Lift	UTL
Vapour Recovery Point	VR

OVERHEAD FEATURES

Electricity Pylon
Electricity
Telephone

LEVEL AND HEIGHT

Inspection Cover	IC
Inspection Cover (Elec)	IC/EL
Kerb Inlet	KI/EL
British Telecom Cover	IC/BT
Inspection Cover (Comms)	IC/COM
Gully	GY/GULLY
Inspection Cover Traffic Signals	IC/TL
Kerb	KI
Kerb Outlet	KO
Cover Level	CL:00.00
Invert Level	IL:00.00
Soffit Level	SL:00.00
Reduging Slab Level	RS:00.00
Sump Level	SUMP:00.00
Water Level	WL:00.00
Pit Level	PIT:00.00
	Cover
	Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	CO
Clay Pipe	CP
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
Vitrified Clay	VC

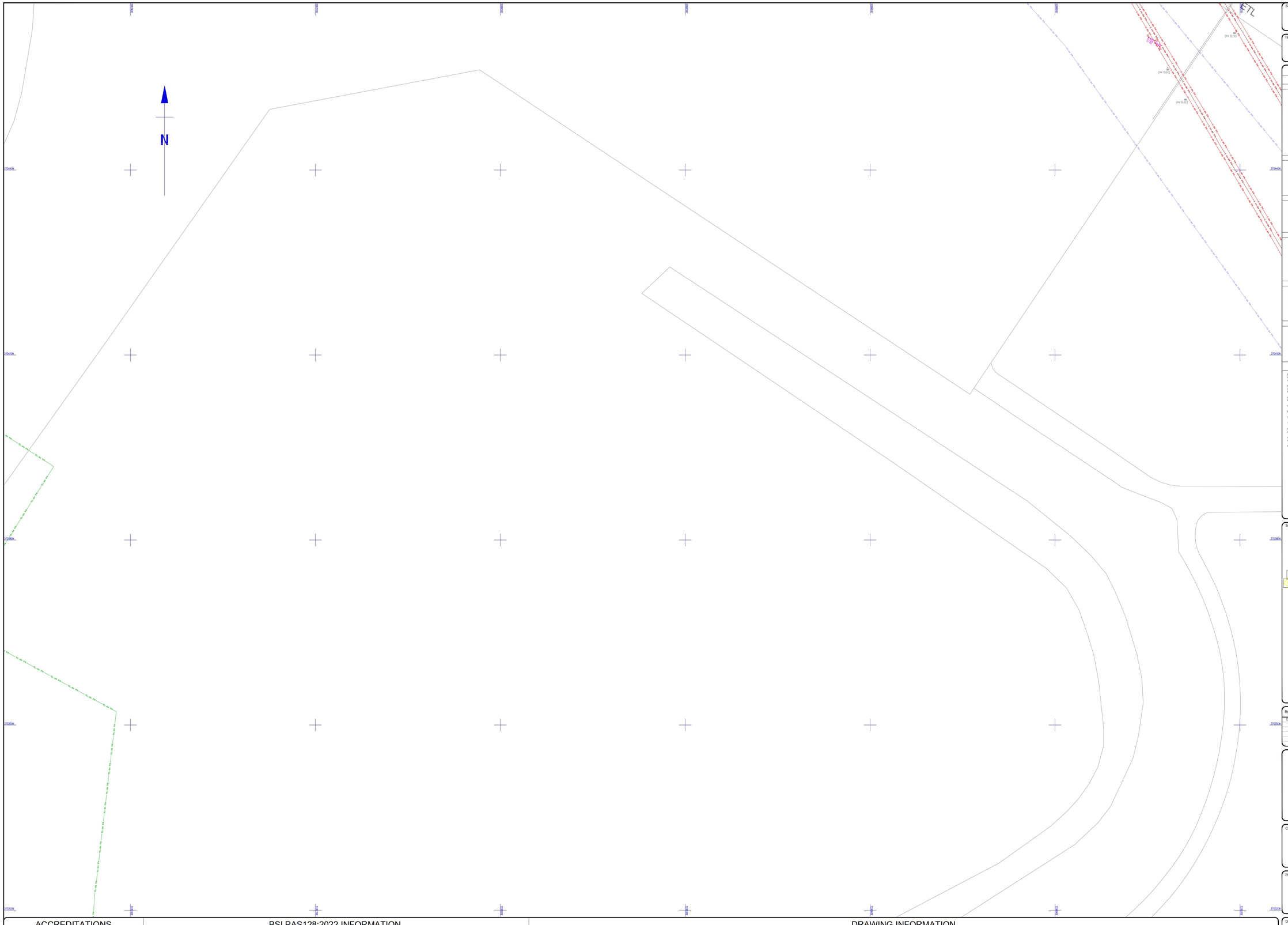
ADDITIONAL NOTES

Drawing Title

Utility Mapping Survey
Sheet 32/36

Surveyed By	SL/JB	CAD by	PS
Checked by	DJ/SL	Approved by	AT
Survey Date	April 2025		
Scale	1:200	[A0 Sheet]	

Drawing No: 62330/UG32
Revision: 00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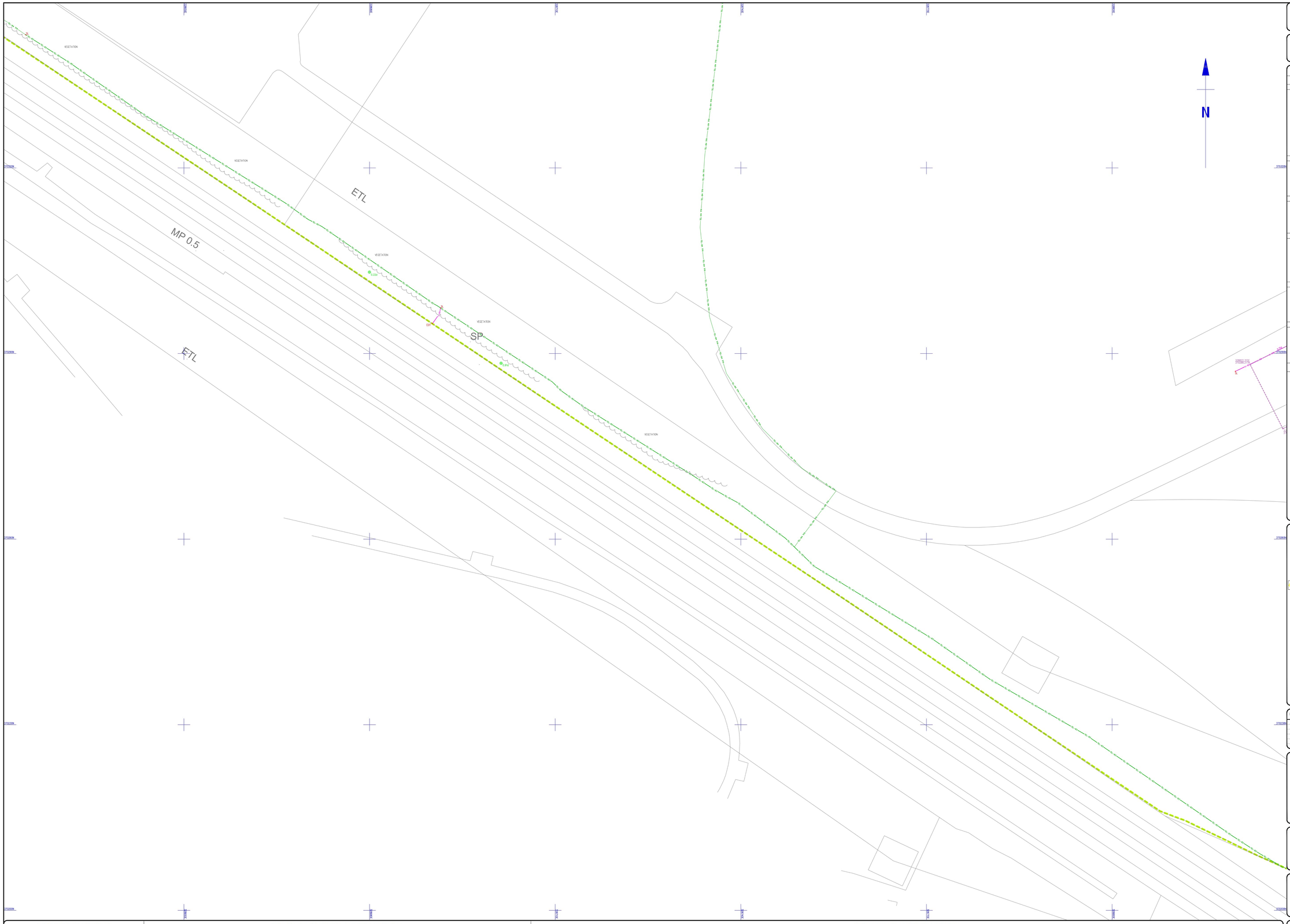

Survey Notes

Grid: Plane, local related to OS Grid.
Levels: OS Datum from GNSS positioning, converted using the National Geoid Model OSGM15.

Notes

Utility drawing to be read in conjuction with survey report.
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Survey Legend

UNDERGROUND SERVICES KEY

COMMUNICATION CABLES

TV Cable TV
COM Communication
COM Colt Telecom
COM EU Networks
COM Instalcom
COM Neo Network
COM Nynex
COM Sky
TEL Telecom
COM Verlink
COM Verizon
COM Zayo

GROUND PENETRATING RADAR

GPR Detected Anomaly Area/Point
GPR Detected Rebar
GPR Detected Structural Feature
GPR Detected Structure
GPR Low Data
GPR
GPR Detected Anomaly Point Directional
GPR Transect

DRAINAGE PIPES

CW Chemically Contamined Sewer Combined
CW Gas Turbine Washdown
CW Oil Contamined Station Sewer Combined
CW Sewer Combined
FW Sewer Foul
SW Sewer Surface Water

OTHER SERVICES

AD Acid Drain
AIR Air Line
AC Alarm Cable
CCTV CCTV
CH Chemical
CA Compressed Air
EA Earthing Cables
EF Effluent
DU Empty Ducting
H Heating Pipe
O Overflow
OX Oxygen Pipe
R Rising Main
SM Sludge Main
STM Steam Duct
TM Thermal Main
T Traffic Light Cable
U Unidentified
VD Vehicle Detector Loop
V Vent Pipe
WW Wash Water
W Water
CW Cooling Water Return
CW Cooling Water Supply

FIBRE OPTICAL CABLES

FO City Fibre
FO EXA Fibre Optic
FO GTT Fibre Optic
FO Virgin Media
FO Vodafone

FUEL SERVICES

GA Fuel Gauge Line
FU Fuel Line
V Fuel Vent Line
OF Offset Fill Pipe
OP Oil Pipe
VR Vapor Recovery Pipe

ELECTRICAL CABLES

L Street Lighting
E Electrical
E LV Electrical LV
E HV Electrical HV

OTHER LINETYPES

EOT End of trace
Services Survey Boundary
Area of No Access

GAS PIPES

G Gas
G LP Gas LP
G MP Gas MP
G IP Gas IP
G HP Gas HP

SERVICE QUALITY LEVEL EXAMPLE

TEL-A Quality Level A
TEL-B1 Quality Level B1
TEL-B1P Quality Level B1P
TEL-B2 Quality Level B2
TEL-B2P Quality Level B2P
TEL-B3 Quality Level B3
TEL-B3P Quality Level B3P
TEL-B4 AR Quality Level B4 AR
TEL-B4 TFR Quality Level B4 TFR

For Quality Level definitions see BSI PAS 128:2022 information below.
For more information go to www.malcolmhughes.co.uk

DISCLAIMERS

Electromagnetic and Ground Penetrating Radar techniques have been used in the detection of underground services, features and anomalies shown on this survey plan. In all cases trial excavations should be undertaken by hand digging. Trial excavations should be undertaken to confirm identification, location and depth of features where these are critical to design or site works.

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Services shown as PAS128 QL- B4 TFR (Taken from records) and QL - B4 AR (Assumed Route) have not been proven on site.

The CAD layering may contain further information.

Collected data from GPR has not been post processed unless specified elsewhere or denoted on the survey drawing by the abbreviation of (P).

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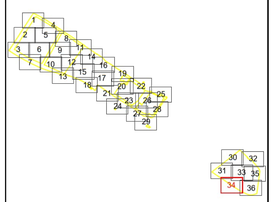
HSG47 safe digging practices should still be adhered to when using these Utility Mapping Survey plans.

Sheet Index



Rev	Date	Description
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Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project

Connah's Quay Power Station

Drawing Title

Utility Mapping Survey
Sheet 34/36

Surveyed by	CAD by	Survey Date
SU,JB	PS	April 2025
Checked by	Approved by	Scale
DJ/SL	AT	1:200 [A0 Sheet]

Drawing No: 62330/UG34
Revision: 00

ACCREDITATIONS

RICS · THE SURVEY ASSOCIATION · chartered ices · PUMA · Constructionline · ISO 9001 Quality Management FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION
APPROX DEPTH TO CENTRE — CABLE/FIBRE OPTIC
GRAVITY DRAIN (VISUAL OBSERVATION)
APPROX DEPTH TO INVERT
GROUND PENETRATING RADAR
APPROX DEPTH TO EXTERNAL CROWN

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SURVEY TYPE		QUALITY LEVEL	POST-PROCESSING (GPR DATA ANALYSIS)	ACCURACY HORIZONTAL	ACCURACY VERTICAL	DESCRIPTION (SUPPORTING DATA)
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		QL-B2	No	±250mm	±40% of detected depth	Horizontal and vertical detection by one geophysical technique only (Electromagnetic Detection/Ground Penetrating Radar). Medium confidence level for position and depth.
		QL-B2P	Yes			
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		QL-B1P	Yes			
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DRAWING INFORMATION

DUCTING LAYOUTS

1W: 1 WAY SINGLE DUCT
2W: 2 WAY FLAT
2W 1/2: 2 WAY 1 HIDE, 2 DEEP
4W: 2/2: 4 WAY 2 HIDE, 2 DEEP
8W: 3/2: 8 WAY, 3 HIDE, 2 DEEP
12W: 4/3: 12 WAY, 4 WIDE, 3 DEEP

STREET FURNITURE

AV Air Valve
BS Box Stop
BU Bollard
Bus Bus
CB Cable Riser
CCTV Circuit TV
CP Down Pipe
D Drain
EB Earth Rod
EP Electricity Pole
FH Fire Hydrant
GR Gas Riser
GV Gas Valve
HY Hydrant
LP Lamp Post
MH Manhole
OF Offset Fill Post
PM Rain Water Pipe
PP Pipe Riser
RE Rodding Eye
RS Road Sign
SP Soil Pipe
ST Stop Tap
SV Stop Valve
TL Traffic Light
TP Telegraph Pole
TLP Traffic Light with Button Post
TLC/P Traffic Light Control
VP Vent Pipe
WM Water Meter
WO Washout
C/BOX Comms Box
MC Meter
EB Electrical Box
JB Junction Box
GOV Gas Governor
TCR Telephone Cell Box
PP Petrol Pump
CO Dish Drainage Channel
SW Slot Drainage Channel
GRP Grate Drainage Channel

ABBREVIATIONS

Assumed Route AR
Backdrop BD
Broken BCK
Depth d
Ground Penetrating Radar GPR
Invert Level IL
Offset Fill OF
Signal Lost SL
Taken From Records TFR
Tank T
Unable To Survey UTS
Unable To Rod UR
Unable To Trace UT
Unable To Lift UTL
Vapour Recovery Point VR

OVERHEAD FEATURES

Electricity Pylon
Electricity
Telephone

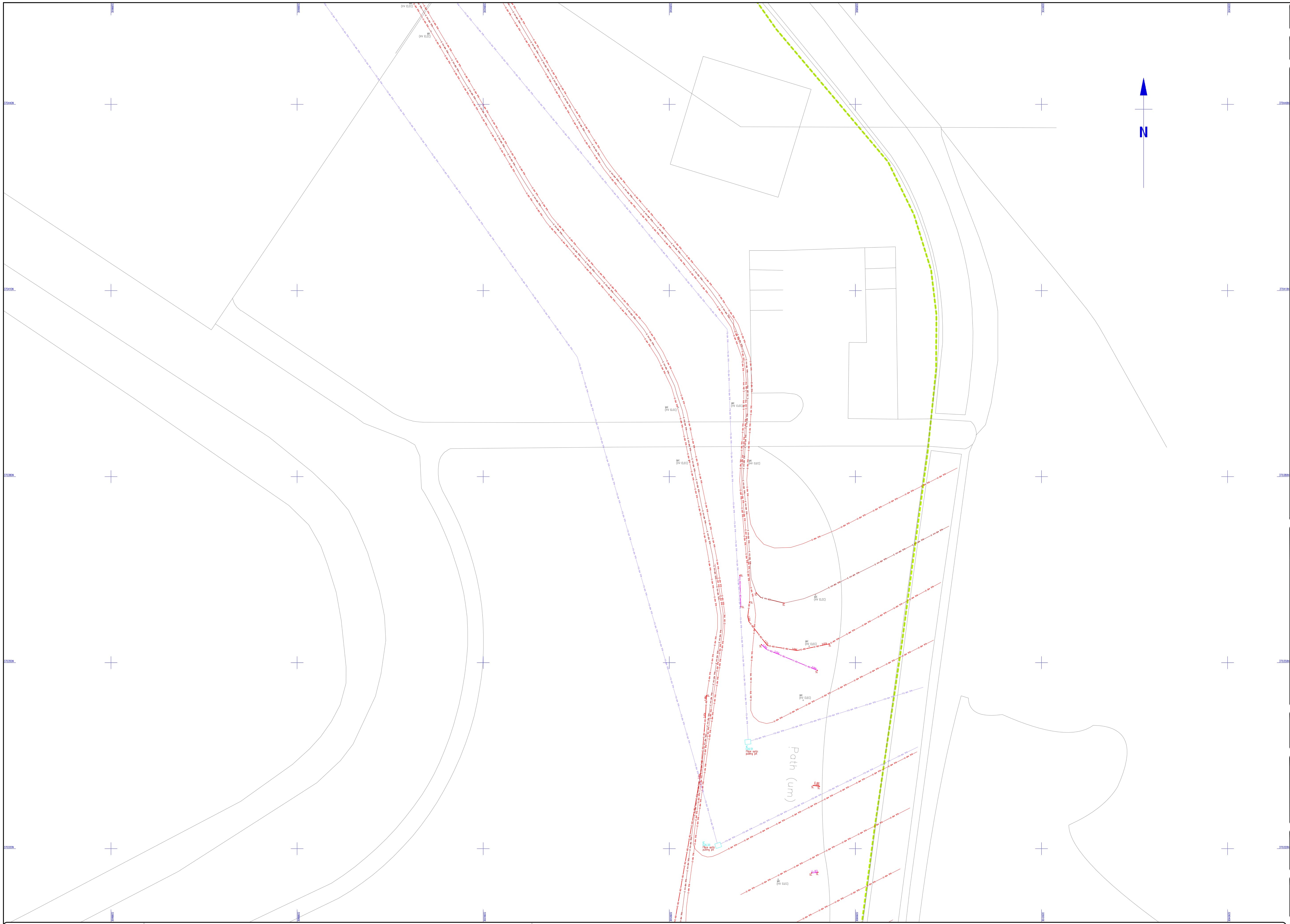
LEVEL AND HEIGHT

Inspection Cover IC
Inspection Cover (Elec) IC (E)
Manhole MH
British Telecom Cover BT
Inspection Cover (Comms) IC/COM
CCTV IC/CTV
Inspection Cover Traffic Signals IC/TL
Gully G
Kerb Outlet KO
Cover Level CL:00.00
Flood Level FL:00.00
Soffit Level SL:00.00
Reducing Slab Level RS:00.00
Sump Level SUMP:00.00
Water Level WL:00.00
Pit Level PIT:00.00
Cover
Chamber Extents

PIPE MATERIAL

Asbestos Cement AC
Brick BR
Cast Iron CI
Concrete CO
Ductile Iron DI
Polyethylene Pipe PE
Polyvinyl Chloride PVC
Spun Iron SI
Steel S
Vitrified Clay VC

ADDITIONAL NOTES



Survey Notes

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Levels: OS Datum from GNSS positioning, converted using the National Geoid Model OSGM15.

Notes

Utility drawing to be read in conjuction with survey report.
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Survey Legend

UNDERGROUND SERVICES KEY

COMMUNICATION CABLES

TV	Cable TV
COM	Communication
COM	Colt Telecom
COM	EU Networks
COM	Instalcom
COM	Neo Network
COM	Nynex
COM	Sky
TEL	Telecom
COM	Veolia
COM	Verizon
COM	Zayo

GROUND PENETRATING RADAR

🟩	GPR Detected Anomaly Area/Point
▨	GPR Detected Rebar
▨	GPR Detected Structural Feature
▨	GPR Detected Structure
▨	GPR Low Data
GPR	GPR
0.79d	GPR Detected Anomaly Point Directional
—	GPR Transect

DRAINAGE PIPES

CW	Chemically Contamined Drains Pumped
CW	Gas Turbine Washdown
CW	Oil Contamined Station Drains System
CW	Sewer Combined
FW	Sewer Foul
SW	Sewer Surface Water

FIBRE OPTICAL CABLES

FO	City Fibre
FO	EXA Fibre Optic
FO	GTT Fibre Optic
FO	Virgin Media
FO	Vodafone

FUEL SERVICES

GA	Fuel Gauge Line
FU	Fuel Line
V	Fuel Vent Line
OF	Offset Fill Pipe
OP	Oil Pipe
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OTHER SERVICES

AD	Acid Drain
AIR	Air Line
AC	Alarm Cable
CCTV	CCTV
CH	Chemical
CA	Compressed Air
EA	Earthing Cables
EF	Effluent
DU	Empty Ducting
H	Heating Pipe
O	Overflow
OX	Oxygen Pipe
/	Rising Main
SM	Sludge Main
STM	Steam Duct
TM	Thermal Main
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V	Vent Pipe
WW	Wash Water
W	Water
W	Cooling Water Return
W	Cooling Water Supply

ELECTRICAL CABLES

L	Street Lighting
E	Electrical
E LV	Electrical LV
E HV	Electrical HV

OTHER LINETYPES

EOT	End of trace
🟩	Services Survey Boundary
🟥	Area of No Access

GAS PIPES

G	Gas
G LP	Gas LP
G MP	Gas MP
G IP	Gas IP
G HP	Gas HP

SERVICE QUALITY LEVEL EXAMPLE

TEL-A	Quality Level A
TEL-B1	Quality Level B1
TEL-B1P	Quality Level B1P
TEL-B2	Quality Level B2
TEL-B2P	Quality Level B2P
TEL-B3	Quality Level B3
TEL-B3P	Quality Level B3P
TEL-B4 AR	Quality Level B4 AR
TEL-B4 TFR	Quality Level B4 TFR

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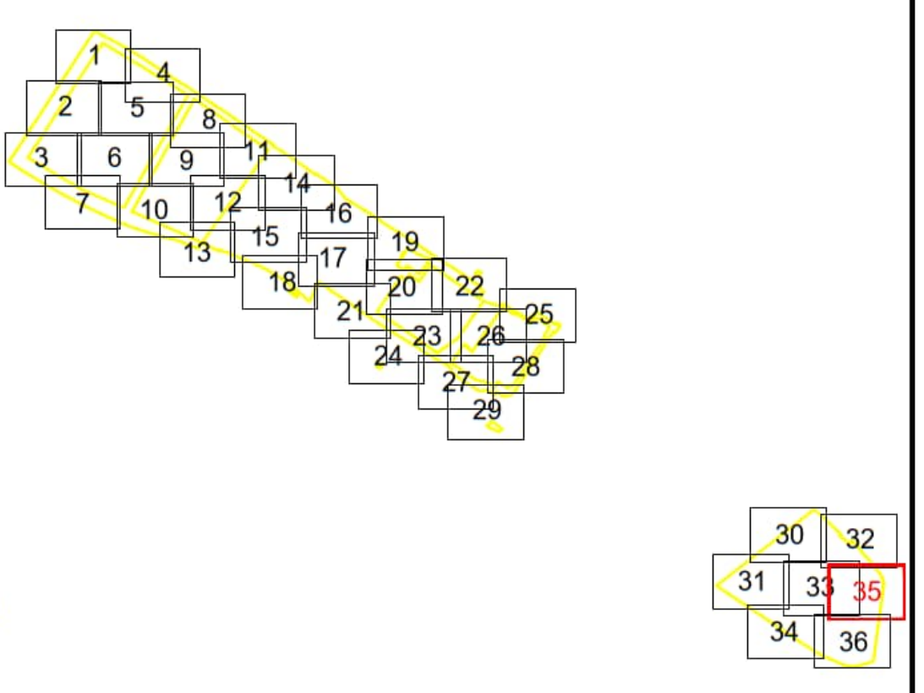
Sheet Index



Rev.	Date	Description
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Client
Uniper Technologies Ltd.
Technology Centre, Ratcliffe on Soar
Nottingham NG11 0EE

Project
Connah's Quay Power Station

Drawing Title
Utility Mapping Survey
Sheet 35/36

Surveyed by SL/JB	CAD by PS	Survey Date April 2025
Checked by DJ/SL	Approved by AT	Scale 1:200 [A0 Sheet]

Drawing No 62330/UG35
Revision 00

ACCREDITATIONS

RICS
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chartered ices
PUMA
ISO 9001 Quality Management
FS 14126

BSI PAS128:2022 INFORMATION

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION: APPROX. DEPTH TO CENTRE, CABLE/FIBRE OPTIC
GRAVITY DRAIN (VISUAL OBSERVATION): APPROX DEPTH TO INVERT
GROUND PENETRATING RADAR: APPROX DEPTH TO EXTERNAL CROWN

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SURVEY TYPE		QUALITY LEVEL	POST-PROCESSING (GPR DATA ANALYSIS)	ACCURACY HORIZONTAL	ACCURACY VERTICAL	DESCRIPTION (SUPPORTING DATA)
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		QL-B1	No	±150mm	±15% of detected depth	Horizontal and vertical detection by multiple geophysical techniques. (Electromagnetic Detection/Ground Penetrating Radar). High confidence level for position and depth.
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DRAWING INFORMATION

DUCTING LAYOUTS

1W:	1 WAY SINGLE DUCT
2W:	2 WAY FLAT
2W: 1/2	2 WAY: 1 WIDE, 2 DEEP
4W: 2/2	4 WAY: 2 WIDE, 2 DEEP
6W: 3/2	6 WAY: 3 WIDE, 2 DEEP
12W: 4/3	12 WAY: 4 WIDE, 3 DEEP

STREET FURNITURE

Air Valve	○ AV
Bus Stop	○ BS
Bollard	○ B
Buchan Trap	○ Buc
Cable Riser	○ CR
Closed Circuit TV	○ CCTV
Down Pipe	○ DP
Drain	○ D
Earth Rod	○ ER
Electricity Pole	○ EP
Flood Light	○ FL
Gas Riser	○ GR
Gas Valve	○ GV
Hydrant	○ FH
Lamp Post	○ LP
Service Marker	○ MK
Offset Fill	○ OF
Post	○ P
Parking Meter	○ PM
Rain Water Pipe	○ PR
Pipe Riser	○ RWP
Rodding Eye	○ RE
Road Sign	○ RS
Soil Pipe	○ SVP
Stop Tap	○ ST
Stop Valve	○ SV
Traffic Light	○ TL
Telegraph Pole	○ TP
Traffic Light Push Button Post	○ TLP
Traffic Light Control	○ TLC/P
Vent Pipe	○ VP
Water Meter	○ WM
Washout	○ WO
Control Box	☐ C/BOX
Car Vacuum	☐ VAC
Car Air	☐ AIR
Electrical Box	☐ EB
Junction Box	☐ JB
Gas Governor	☐ GAS GOV
Telephone Call Box	☐ TCP
Petrol Pump	☐ PP
Dish Drainage Channel	CD
Slot Drainage Channel	SD
Grate Drainage Channel	G.CH

ABBREVIATIONS

Assumed Route	AR
Backdrop	BD
Blocked	BLK
Depth	d
Ground Penetrating Radar	GPR
No Visible Pipes	NVP
Offset Fill	OF
Signal Lost	SL
Taken From Records	TFR
Tank	T
Unable To Survey	UTS
Unable To Rod	UR
Unable To Trace	UT
Unable To Lift	UTL
Vapour Recovery Point	VR

OVERHEAD FEATURES

Electricity Pylon	☒
Electricity	Z—Z
Telephone	T—T

LEVEL AND HEIGHT

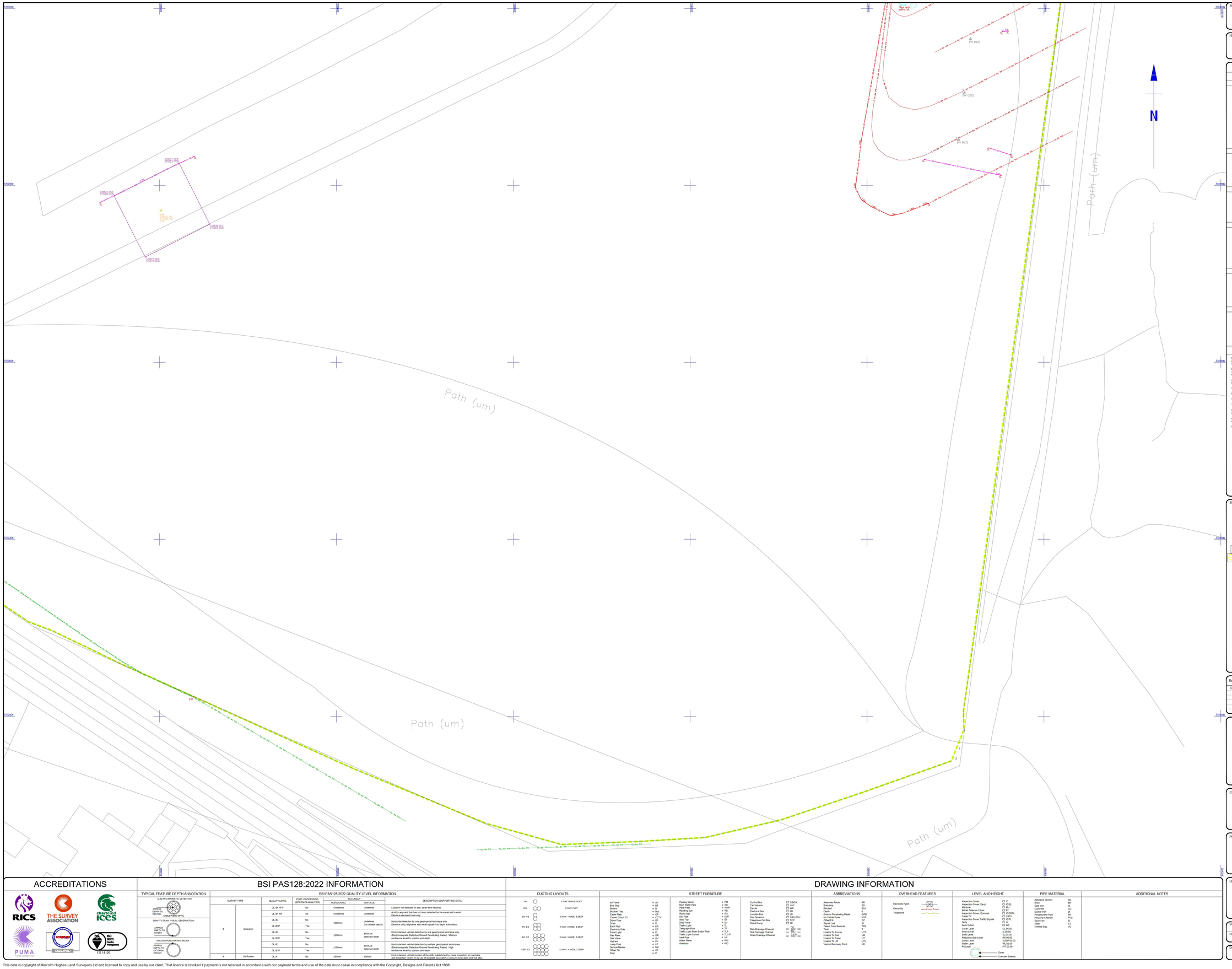
Inspection Cover	☐ IC
Inspection Cover (Elec)	☐ IC/EL
Manhole	☐ MH
British Telecom Cover	☐ BT
Inspection Cover (Comms)	☐ IC/COM
Cable TV	☐ CATV
Inspection Cover Traffic Signals	☐ IC/TL
Gully	☐ G
Kerb Outlet	☐ KO
Cover Level	CL:00.00
Invert Level	IL:00.00
Soffit Level	SL:00.00
Reducing Slab Level	RS:00.00
Sump Level	SUMP:00.00
Water Level	WL:00.00
Pit Level	PIT:00.00

Cover
Chamber Extents

PIPE MATERIAL

Asbestos Cement	AC
Brick	BR
Cast Iron	CI
Concrete	CO
Ductile Iron	DI
Polyethylene Pipe	PE
Polyvinyl Chloride	PVC
Spun Iron	SI
Steel	ST
Vitrified Clay	VC

ADDITIONAL NOTES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Annex D: Existing Drainage Layout drawings

ISO A1 594mm x 841mm

Approver:MT 24.07.2025

Reviewer:CO 24.07.2025

Originator:AB 24.07.2025

Technical Quality Review Initials:

LEGEND

- EXISTING OAKENHOLT BROOK CULVERT
- EXISTING SURFACE WATER
- END OF TRACE
- QUALITY LEVEL A
- QUALITY LEVEL B1
- QUALITY LEVEL B1P
- QUALITY LEVEL B2
- QUALITY LEVEL B2P
- QUALITY LEVEL B3
- QUALITY LEVEL B3P
- QUALITY LEVEL B4 ASSUMED ROUTE
- QUALITY LEVEL B4 TAKEN FROM RECORDS

FOR QUALITY LEVEL DEFINITIONS SEE BSI PAS128:2022

N

ROUTE OF OAKENHOLT BROOK CULVERT

Sluice

KELSTERTON ROAD

KELSTERTON

Wenlo

The Sheiling

MATCHLINE

REFER TO AECOM DRAWING CONQ-ACM-XX-XX-DR-CE-000101

THIRD PARTY INFORMATION	ISSUED BY	REFERENCE	DATE RECEIVED
Topographical Survey	Malcolm Hughes	62330/1 to 62330/22 Rev 00 - Topographical Survey	08/05/2025
GPR Survey	Malcolm Hughes	62330/UG1 to 62330/UG36- Utility Mapping Survey	08/05/2025

THIRD PARTY INFORMATION	ISSUED BY	REFERENCE	DATE RECEIVED
Third Party Information	Issued By	Reference	--/--/----
Third Party Information	Issued By	Reference	--/--/----

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Last saved by: BINDINGA(2025-07-24) Last Plotted: 2025-07-24

Filename:

AECOM

PROJECT

CONNAH'S QUAY POWER AND CCS PRE-FEED

CLIENT

UNIPER

CONSULTANT

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2nd Floor
177 Bothwell Street
Glasgow
G2 7EQ
T:+44-203-692-9900
www.aecom.com

NOTES

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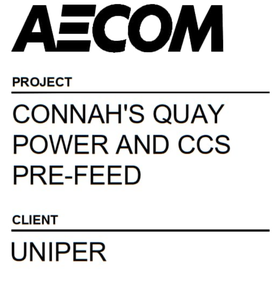
3. THIS DRAWING IS TO BE USED FOR THE STATED PURPOSE OF ISSUE ONLY AND MUST NOT BE USED FOR ANY OTHER PURPOSE THAN THAT INDICATED.
4. BACKGROUND INFORMATION PROVIDED BY THIRD PARTY PROVIDERS. INFORMATION IS SHOWN INDICATIVELY AND TO BE CONFIRMED ON SITE, WITH ANY VARIATIONS REPORTED BACK TO THE ENGINEER PRIOR TO ANY WORKS COMMENCING.

KEY PLAN



ISSUE/REVISION

I/R	DATE	DESCRIPTION	BY	CK	AP
P04	24-07-2025	Culvert alignment corrected and transmission zone removed	AB	CO	MT
P03	02-07-2025	Culvert route extended and linetypes amended	AB	CN	MT
P02	16-05-2025	Revised following receipt of GPR survey	MM	CN	AC
P01	05-12-2024	First Issue	MM	CN	CN

SUITABILITY

S2 - Suitable for information

PROJECT NUMBER

SHEET TITLE

CONNAH'S QUAY
EXISTING DRAINAGE LAYOUT
SHEET 1 OF 2

SHEET NUMBER

CONQ-ACM-XX-XX-DR-CE-000100

SCALE 1:1000 @ A1

REVISION P04

ISO A1 594mm x 841mm

Approver:MT 24.07.2025

Reviewer:CO 24.07.2025

Originator:AB 24.07.2025

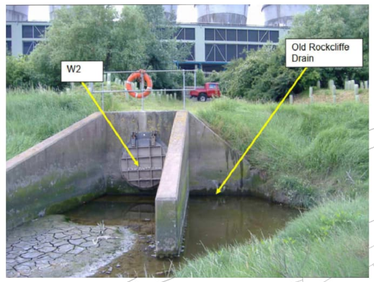
Technical Quality Review Initials:

LEGEND

- SW — SURFACE WATER
- FW — FOUL WATER
- CS — COMBINED SEWER
- OC — OIL CONTAMINATED DRAIN SYSTEM
- CC — CHEMICALLY CONTAMINATED DRAINS PUMPED
- GT — GAS TURBINE WASHDOWN
- SW — ROUTE OF OLD ROCKCLIFFE DRAIN CULVERT
- END OF TRACE
- A — QUALITY LEVEL A
- B1 — QUALITY LEVEL B1
- B1P — QUALITY LEVEL B1P
- B2 — QUALITY LEVEL B2
- B2P — QUALITY LEVEL B2P
- B3 — QUALITY LEVEL B3
- B3P — QUALITY LEVEL B3P
- B4 AR — QUALITY LEVEL B4 ASSUMED ROUTE
- B4 TFR — QUALITY LEVEL B4 TAKEN FROM RECORDS

FOR QUALITY LEVEL DEFINITIONS SEE BSI PAS128:2022

N



OLD ROCKCLIFFE BROOK CULVERT OUTFALL IL 2.57m, APPROX. 900mm Ø (36 INCHES)

OLD ROCKCLIFFE BROOK

ASSUMED ROUTE OF OLD ROCKCLIFFE BROOK CULVERT

900mmØ

1200mmØ

W2 OUTFALL IL 4.33m AOD 1200mm Ø

FB

MATCHLINE

ATTENUATION ZONE

WASTE WATER TANK

WASTE WATER TANK

SLUDGE HOLDING TANK

SLUDGE HOLDING TANK

CW PURGE STORAGE POND

CW PURGE STORAGE POND

ASSUMED LINE OF OLD ROCKCLIFFE BROOK CULVERT (NOT TRACED BY GPR SURVEY)

ROAD

REFER TO AECOM DRAWING CONQ-ACM-XX-XX-DR-CE-000100

THIRD PARTY INFORMATION	ISSUED BY	REFERENCE	DATE RECEIVED
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Last saved by: BINDINGA(2025-07-24) Last Plotted: 2025-07-24

Filename:

AECOM

PROJECT

CONNAH'S QUAY POWER AND CCS PRE-FEED

CLIENT

UNIPER

CONSULTANT

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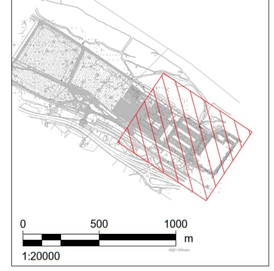
KEY PLAN



ISSUE/REVISION

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P01	05-12-2024	First Issue	MM	CN	CN

SUITABILITY

S2 - Suitable for information

PROJECT NUMBER

SHEET TITLE

CONNAH'S QUAY
EXISTING DRAINAGE LAYOUT
SHEET 2 OF 2

SHEET NUMBER

CONQ-ACM-XX-XX-DR-CE-000101

SCALE 1:1000 @ A1

REVISION P04

Annex E: SAB Meeting Notes

Minutes

Meeting name
Connah's Quay - Discussion with Flintshire County Council (FCC) SuDS Approval Body (SAB)

Meeting date
06/06/2024

Location
Microsoft Teams

AECOM project number
60717119

Ref	Item	Action	Responsible
01	**Introductions** During introductions, KA noted that IRY will be taking over the role of Technical Project Manager for Uniper. PR noted that he has a broad background to the site as he was Regulations Engineer for Natural Resources Wales (NRW, then the Environment Agency) when the site was first developed 30 years ago, and that he has worked with Andy Black of Uniper recently with regards to outfall issues to the Estuary at the west end of the site. CO and KA gave background to the project and site.	None	N/A
02	**Existing surface water drainage arrangements and flood risk**		
	PR reminded the team that FCC is responsible for managing ordinary watercourses (under the Land Drainage Act 1991) and NRW is responsible for managing main rivers (under the Water Resources Act 1991). He requested that both parties be included in discussions relating to flood risk and surface water drainage for this site.	AECOM to consult FCC and NRW on aspects relating to flood risk and surface water drainage.	AECOM & Uniper
	CO explained AECOM's understanding of the existing surface water drainage arrangements, noting that a drawing will follow. She explained that the Old Rockcliffe Brook (which receives flows from the Kelsterton Brook) is culverted through the south-eastern end of the site and receives flows from the site. CO also noted that an existing open concrete channel on the site currently provides surface water attenuation. PR was unsure of the configuration of the current surface water drainage system, particularly regarding the outfall and how watercourses link into the existing site surface water drains. KA noted that this info will be made available by Uniper to support the drainage strategy.	AECOM to scope and Uniper to commission drainage survey to confirm existing drainage arrangements, levels, etc. AECOM to develop and share 'Existing Drainage Layout' drawing/s with FCC when submitting the Application Form for Pre-App SuDS Advice.	AECOM & Uniper
	CO explained that NRW's flood data does not cover the site and so AECOM will be undertaking hydraulic modelling to confirm flood levels. PR requested for FCC to be included in the co-ordination relating to the modelling work.	AECOM to undertake hydraulic flood modelling following consultation with NRW and FCC. (Action from previous meeting.)	AECOM

Ref	Item	Action	Responsible
03	**FCC SuDS Requirements**		
	PR noted the requirement for SuDS (Sustainable Drainage Systems) to be incorporated in the new development and mentioned that there is an advanced draft of a new SuDS guidance document for North Wales. CO asked whether FCC will accept underground attenuation tanks. PR confirmed that FCC would like to see above-ground attenuation features as much as possible, but that underground attenuation tanks are often accepted by FCC.	PR to check the status of the SuDS guidance document with the North Wales team and share it with Uniper and AECOM, including anticipated publication date so that the team understands and can communicate its status in application documents.	Paul Reeves, FCC
04	**Proposed Surface Water Drainage Strategy**		
	CO asked whether surface water can be discharged from the redevelopment site at unrestricted rates to Old Rockcliffe Brook. PR was happy with this but noted that this proposal should be confirmed with NRW as the authority responsible for managing the Dee Estuary.	AECOM to consult NRW with regards to proposed unrestricted discharge.	AECOM
	KA asked whether it would be possible to put in a new surface water outfall closer to the proposed new plant location, or whether the existing outfall point would need to be used. PR noted that FCC do not have a preference, and that FCC are pragmatic in approach.	AECOM to develop surface water drainage strategy, including proposed discharge point and attenuation requirements to protect the site during tide locking scenarios.	AECOM
05	**Pre-App Advice**		Model the site to protect during tidal locking....
	PR encouraged pre-app engagement with the SAB, via the submission of the Application Form for Pre-App SuDS Advice (available on FCC website). PR noted that there will be a charge for the full application and FCC should be able to confirm the charge amount within 2 weeks of receiving the application form (for full approval of SuDS). PR confirmed that Pre-Apps are being dealt with by WaterCo Ltd (based in Ruthin, Denbighshire) on behalf of FCC. Their aim is to respond to the Pre-App form within a 7-week period. (Post-meeting note: There is no FCC charge for SAB Pre-Apps.)	Uniper/ AECOM to submit SAB Pre-App form.	AECOM & Uniper
	PR noted that the Liverpool Bay Coastal Groups meet on a quarterly basis and it might be worth the project team attending one in the future, to present development proposals.	Project team to consider attending Liverpool Bay Coastal Group quarterly meeting.	Uniper

Minutes

Meeting name
Connah's Quay - Discussion with Flintshire County Council (FCC) SuDS Approval Body (SAB)

Meeting date
14/04/2025

Location
Microsoft Teams

AECOM project number
60717119

Ref	Item	Action	Responsible
01	**Introductions** PR noted that he worked for Natural Resources Wales (NRW, then the Environment Agency) for 20 years, managing flood risk. CO explained that she is leading on the Outline Surface Water (SW) Drainage Strategy for the DCO application, with modelling support from AC. PR already aware of background to the project and site, from previous SAB meeting in June 2024.	None	N/A
02	**Proposed surface water drainage strategy** AC shared his screen with Revision P02 of AECOM's Outline Surface Water Drainage Strategy drawing and explained the proposed strategy. For example: • Current proposed SuDS features include swales, reed beds, filter drains, porous or permeable paving, free drainage gravel margins, downstream defenders and an underground attenuation tank. • Area of the Main Development Area (MDA) is approx. 16.5 ha, 11.5 ha of which is deemed impermeable. • Single new outfall is proposed alongside the existing surface water outfall, to drain runoff from the proposed development to Old Rockcliffe Brook which flows across the salt marsh and ultimately into the Dee estuary. • Attenuation has been designed based on a 20% climate change allowance for increases in peak rainfall intensity. This is based on the 'Upper estimate' for the 2040-2069 period, stated in Table 2 of the Welsh climate change guidance document, 'Flood Consequences Assessments: Climate change allowances'. (The design life of the development is 30 years.) • AECOM has developed and run a hydraulic model for free discharge and tide lock scenarios. Results were discussed, with reference to the matrix included on the drawing. • Two tank sizes have been tested. The larger tank size is such that there is no flooding of the surface water network up to and including the 1 in 30-year event with a 20% allowance for increases in rainfall intensity due to climate change, or the 1 in 75 year event with no climate change allowance, for both free discharge and tidal lock scenarios.	None	N/A

Ref	Item	Action	Responsible
	• For 1 in 100 year events with no climate change allowance, there is minor flooding; flood volume is nom. 7m³ for both free discharge and tide lock scenarios. Floodwaters during these events are minimal and can be directed away from infrastructure. PR noted that the principles shared seem reasonable; it's all about being realistic. The no flooding up to and including the 1 in 30 yr + climate change event is based on public sewer standards, so he agrees with this principle.		
03	**SuDS Standards and Guidance** CO noted that we have been referring to the The SuDS Manual (CIRIA C753). PR advised that we should also review and apply the Sustainable Drainage Systems Standards for Wales document: statutory-national-standards-for-sustainable-drainage-systems.pdf PR has received approval to share the draft North Wales SuDS Guide contained at page 183 of the following link: https://committeemeetings.flintshire.gov.uk/mgIssueHistoryHome.aspx?IId=42629&Opt=0&LLL=0	Outline SW Drainage Strategy report to be drafted to refer to the Sustainable Drainage Systems Standards for Wales document and the draft North Wales SuDS Guide, as well as The SuDS Manual (CIRIA C753).	AECOM
04	**Firewater Runoff** PR asked about firewater runoff and noted that given the status of the Dee estuary, NRW will be particularly interested in the firewater strategy. AECOM explained that the firewater strategy has not yet been developed and one solution could be to incorporate penstocks on the new SW system to contain potentially contaminated firewater runoff.	Detailed strategy for firewater runoff to be developed in consultation with NRW and FCC post-DCO application.	Uniper
05	**Oakenholt Brook Culvert** AC noted that the Oakenholt Brook is culverted across the north-west side of the Main Development Area. It is 900mm in diameter, but its condition and levels are unknown. It will either need to be diverted or built over if development around it cannot be avoided. It has potential to serve as a second SW outfall for the development. PR advised that Uniper will need to undertake an asset levels and condition (i.e. CCTV) survey of the culvert. PR noted that the LLFA won't like a build over proposal and advised that a diversion proposal would be more sensible. PR noted that proposals for the culvert should be shown on the SAB pre-app and DCO application, otherwise it will be flagged as an issue. PR confirmed that a simple catchment assessment would need to be undertaken if Oakenholt Brook is proposed to be diverted, to demonstrate no adverse impact. AC shared screen of Google maps, to demonstrate size and type of Oakenholt Brook catchment (predominantly farmland). PR noted that the LLFA & NRW would support daylighting (i.e. de-culverting) the Oakenholt Brook culvert along any diversion route if possible.	PR to check whether FCC have any records for Oakenholt Brook culvert. Outline Surface Water Drainage Strategy drawing to be updated for revised site layout and to show indicative diversion route for Oakenholt Brook culvert, with details TBC. Asset levels and condition (i.e. CCTV) survey of Oakenholt Brook culvert to be undertaken to enable watercourse catchment assessment and diversion design. This will also confirm potential for culvert to serve as a second SW outfall.	FCC AECOM Uniper

Ref	Item	Action	Responsible
06	**Pre-App Advice**		
	PR confirmed that Pre-Apps are still being dealt with by WaterCo Ltd (based in Ruthin, Denbighshire) on behalf of FCC and the standard timeframe for receiving SAB pre-app responses is 7 weeks. He noted that within 2 to 3 weeks of submitting the SAB pre-app form, FCC will confirm whether the SAB needs longer to review.	SAB Pre-App form to be submitted to FCC.	AECOM & Uniper
	PR didn't think the pre-app will require a payment; a payment may only be applicable to the full SAB application (which will need to be made post-DCO consent).		

Annex F: Correspondence with National Resources Wales

[redacted]

From: [redacted]
Sent:
To:
Cc:

Subject: RE: Connah's Quay Power Station - Surface Water Discharge Query

This Message Is From an External Sender

This message came from outside your organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Report Suspicious

Hi [redacted]

Apologies for the delay in responding to this query – I've been gathering the info together from different people.

Surface water discharge is managed by the SAB, as you say. It is my understanding that no consent is needed from NRW for the discharging of surface water; however, the construction of the infrastructure required to discharge surface water is likely to require a FRAP for any outfalls, headwalls etc.

For our Environment team, the main concern is ensuring that all surface water discharges are free of contamination and therefore do not pose a pollution issue for any receiving watercourse. Any discharges should not cause any discolouration or scouring. Attenuation may provide an extra precaution against pollution and scour.

I hope that answers your query, please let me know if you have any other questions.

Best wishes,

[redacted]

Croesewir gohebiaeth yn Gymraeg a byddwn yn ymateb yn Gymraeg, heb i hynny arwain at oedi.
Correspondence in Welsh is welcomed, and we will respond in Welsh without it leading to a delay.

Cyfoeth Naturiol Cymru
Natural Resources Wales

Byd natur a phobl yn ffynnu gyda'n gilydd

Nature and people thriving together

cyfoethnaturiol.cymru
naturalresources.wales

[redacted]

Rhybudd: Deilliodd yr e-bost hwn o'r tu allan i'r sefydliad. Peidiwch â chlicio dolenni, atodiadau agored nac sganio codau QR oni bai eich bod yn cydnabod yr anfonwr ac yn gwybod bod y cynnwys yn ddiogel.

Caution: This email originated from outside of the organisation. Do not click links, open attachments or scan QR Codes unless you recognise the sender and know the content is safe.

Hi [redacted]

I understand that you have been co-ordinating with my colleagu[redacted]ecently with regards to the flood model he is preparing for Uniper's Connah's Quay Power Statio[redacted]nt.

For the Drainage Strategy, we are assuming that surface water can be discharged from the redevelopment site to the Dee Estuary at [redacted] (given that it is located adjacent to the estuary). We agreed this approach with the SA[redacted]intshire County Council) earlier this year, but we need to confirm this with NRW as the authority responsible for managing the Dee Estuary. Please could you confirm?

Whilst attenuation wouldn't be needed to restrict flow rates from the site (if NRW agree to unrestricted discharge), we appreciate that storage will be required to protect the site against tidal flooding and our outline [redacted]ill include for conducting an assessment of tidal storage, based on the flood modelling which [redacted] undertaking.

[redacted]

[redacted]

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Please note that I work part time and my working days are Tuesdays, Wednesdays and Thursdays. Whilst I sometimes check my emails on non-working days, I may take a few days to respond to your email.

Annex G: Proposed Outline Surface Water Drainage Strategy General Arrangement drawing

Results Matrix for Free Discharge & Tidal Lock Conditions

Matrix showing hydraulic test model simulation results																									
										Attenuation Tank 1000m2			Attenuation Tank 2400m2											
	No Surcharge Condition Test Results									Tide Lock			Tide Lock												
Network 1	1 in 30 Year				1:50 yr	1:75 Yr	1 in 100 Year			Comparison 1 in 30 Year			Tank Size Test - 1 in 30 Year				Tank Size Test - 1 in 100 Year								
Pipe Details	All Conditions						Flood Only Conditions			Flood Only Conditions			Flood Only Conditions												Pipe
PN	Dia (mm)	0 CC	20% CC	30%CC	40CC	0 CC	0 CC	0 CC	20% CC	40CC	0 CC	20% CC	40CC	0 CC	20%CC	30%CC	40%CC	0 CC	20% CC	40CC					PN
1.000	Swale	x	x	x	x	x																			1.000
1.001	300	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged															1.001
1.002	750	x	x	x	x	x			Surcharged	Surcharged															1.002
1.003	750	x	x	x	Surcharged	x			Surcharged	Surcharged															1.003
2.000	375	x	x	Surcharged	Surcharged	x	Surcharged	Surcharged	Surcharged	Surcharged															2.000
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4.000	Swale	x	x	x	x																				4.000
4.001	300	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged															4.001
4.002	600	x	x	x	x	x																			4.002
1.005	750	x	Surcharged	Surcharged	Surcharged	x	Surcharged	Surcharged	Surcharged	Surcharged															1.005
5.000	Swale	x	x	x	x	x																			5.000
5.001	300	x	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged															5.001
5.002	900	x	x	x	x	x																			5.002
1.006	1050	x	x	Surcharged	Surcharged	x	Surcharged	Surcharged	Surcharged	Surcharged															1.006
1.007	1050	x	Surcharged	Surcharged	Surcharged	x	Surcharged	Surcharged	Surcharged	Surcharged															1.007
1.008	1050	x	Surcharged	30-120W	30-120 W	x	x	100-120W	100-60W	100-60W	30-960W	30-960W	10-960W			30-120 W	30-960W	100-960S	100-960S	100-720W					1.008
1.009	1050	x	x	x	x	x	x		Surcharged	Surcharged															1.009
6.000	Swale	x	x	x	x	x	x																		6.000
6.001	300	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged															6.001
6.002	300	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged															6.002
6.003	300	x	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged															6.003
7.000	450	x	x	x	x	x	x																		7.000
7.001	450	x	x	Surcharged	Surcharged	x	x		Surcharged	Surcharged															7.001
7.002	450	x	x	Surcharged	Surcharged	x	x		Surcharged	Surcharged															7.002
8.000	300	Surcharged	Surcharged	Surcharged	Flood Risk	Surcharged	Surcharged	Surcharged	Flood Risk	100-15W		Flood Risk	Flood Risk				Flood Risk		Flood Risk	100-15W					8.000
9.000	Swale	x	x	x	x	x	x																		9.000
9.001	300	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged															9.001
6.004	450	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged			30-960W							100-960W					6.004
1.010	1200	x	x	x	x	x	x																		1.010
1.011	1200	x	x	x	x	x	x					Flood Risk	Flood Risk												1.011
10.000	525	x	Surcharged	Surcharged	Surcharged	x	x	Surcharged	Flood Risk	100-15W									Flood Risk	100-15S					10.000
10.001	525	x	Surcharged	Surcharged	Surcharged	x	Surcharged	Surcharged	Flood Risk	100-15W									Flood Risk	100-15S					10.001
10.002	525	x	x	Surcharged	Surcharged	x	Surcharged	Surcharged	Surcharged	Surcharged															10.002
11.000	Swale	x	x	x	x	x	x						Flood Risk							Flood Risk					11.000
11.001	300	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged			Flood Risk							Flood Risk					11.001
11.002	300	x	Surcharged	Surcharged	Surcharged	x	Surcharged	Surcharged	Surcharged	Surcharged		Flood Risk	Flood Risk						Flood Risk	Flood Risk					11.002
10.003	525	x	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged															10.003
10.004	525	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged															10.004
10.005	525	x	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged	Surcharged										Flood Risk					10.005
1.012	1350	x	x	x	x	x	x																		1.012
1.013	1350	x	x	x	x	x	x																		1.013
1.014	1350	x	x	x	x	x	x																		1.014
1.015	1350	x	x	x	x	x	x																		1.015

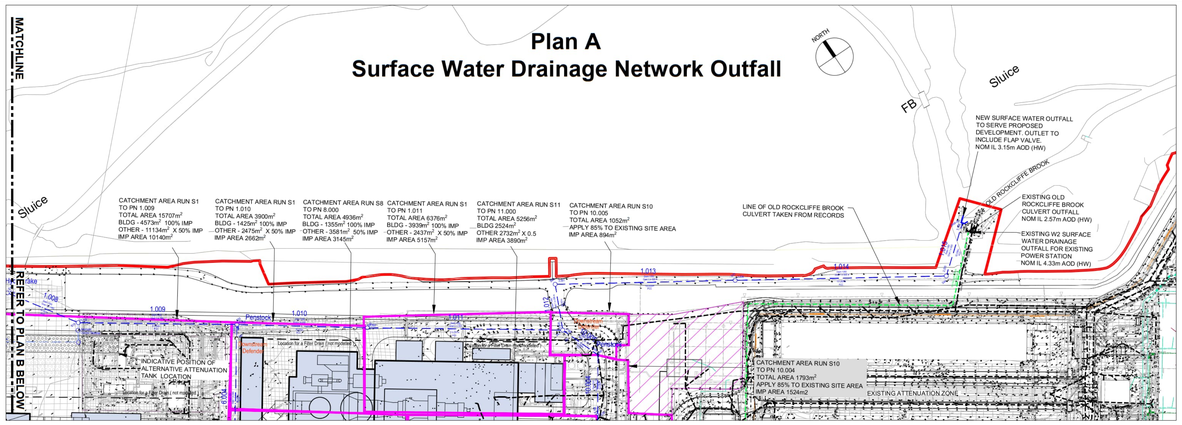
Key to Flood Volumes

- Flood Volume < 5m3
- Flood Volume < 20m3
- Flood Volume < 50m3
- Flood Volume > 50m3

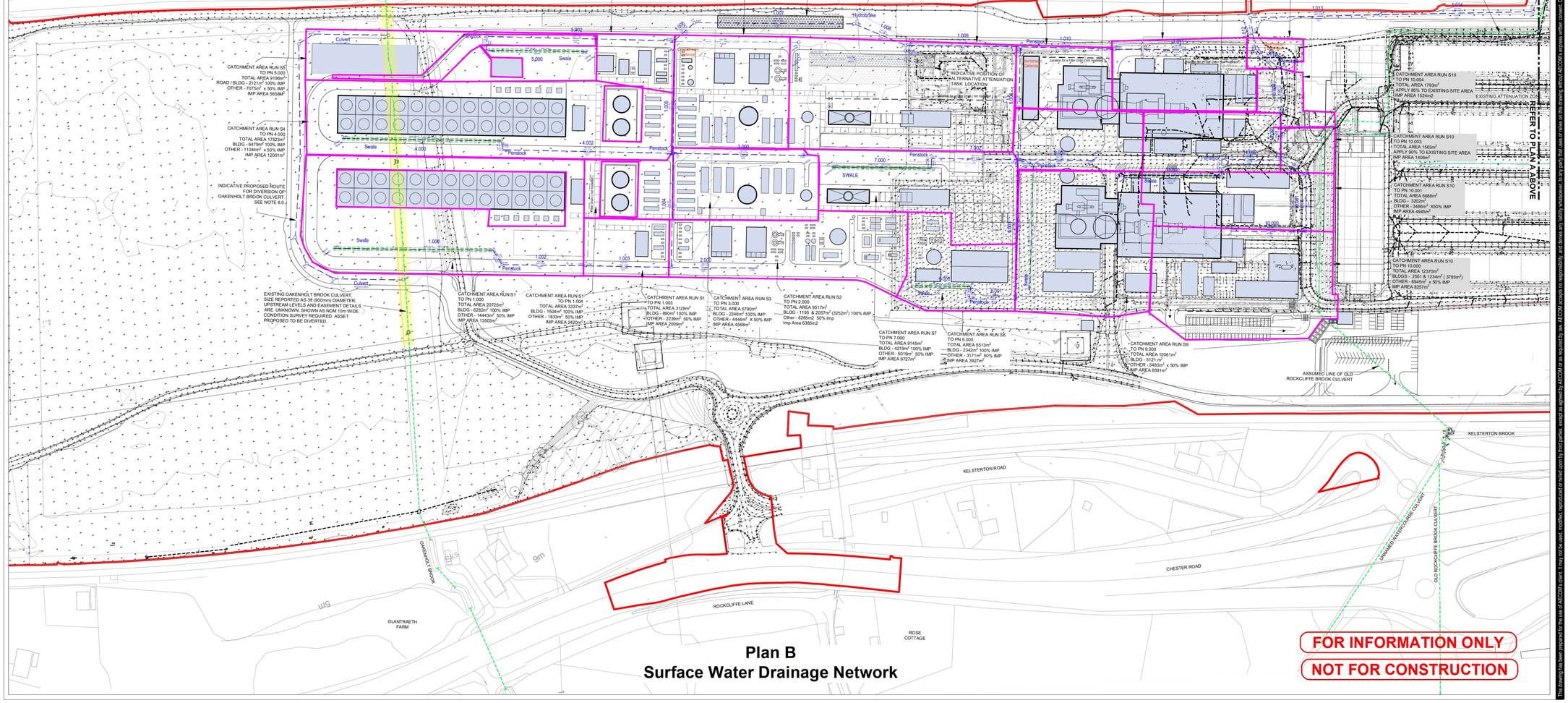
Key for Flooding Event

Flood Risk	Pipe lengths with water level less than 300mm from cover
30-15W	Flood - 1:30 Year Return 15 minute duration Winter
100-15S	Flood - 1:100 Year Return 15 minute duration Summer

Plan A
Surface Water Drainage Network Outfall



Plan B
Surface Water Drainage Network



Key for Provisional Drainage Network

- Order Limits
- Proposed SW piped length with MicroDrainage (MDX) pipe ref. — 11.002
- Proposed SW swales with MicroDrainage (MDX) pipe ref. — 1.000
- Proposed Attenuation Tank
- Proposed Pervious Paving
- Proposed Catchment Areas
- Proposed Downstream Defender or similar Treatment Unit — Downstream Defender
- Proposed Filter Drains — Filter Drain (not modelled)
- Existing W2 Surface Water Drainage Pipe
- Existing Culverted Watercourse

FOR INFORMATION ONLY

NOT FOR CONSTRUCTION

AECOM

PROJECT

CONNAH'S QUAY LOW CARBON POWER

CLIENT

UNIPER

CONSULTANT

AECOM
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NOTES

1. Do not scale from this drawing
2. All dimensions, co-ordinates, and levels are given in metres. Pipe sizes given in mm
3. Existing ground levels based on Topographical Survey ref ; 62330 / 1 undertaken by Malcolm Hughes Land Surveyors, December 2024. Confirmation of existing outfall location profiles and levels provided 13.5.25.
4. Existing utility information based on GPR survey ref ; 6330 / 1 undertaken by Malcolm Hughes Land Surveyors, December 2024.
5. For details of the existing Surface Water (SW) drainage network details refer to Aecom drawings CCHQ-ACM-XX-XX-DR-CE-000100 & 000101
6. Proposed drainage levels and outfall route are provisional and based on the existing ground levels provided by topographic survey. In the event that levels on the Main Development Area are raised for flood protection purposes, the proposed drainage strategy and hydraulic modelling will need to be re-evaluated.
7. **Drainage Philosophy** :
   - 7.1. Proposed development site nominally split into 3 primary catchments and sub catchments thereof defined by pipe runs.
   - 7.2. Provisional drainage layout based on proposed site layout Revision Q, supplied by GSDA.
   - 7.3. Impermeable areas for catchments 1 & 2 (West & Central) are typically based on 100% for buildings and 50% for all remaining spaces. Some impermeable areas in catchment 3 (East) are based on nominal 85% throughout. Catchment analysis is suitable for provisional modeling only as subject to layout and useage change.
   - 7.4. Proposed outfall location coordinates are E327875, 1071263. The provisional design is based on a single outfall. The position coincides with existing site outfall and located within Order limits.
   - 7.5. Some existing surface water drainage network discharging to outfall W2 will be affected by the proposed works. Extent of defunct, remediated or capped drainage to be determined at detailed design stage.
   - 7.6. Sustainable Drainage Systems (SuDS)provision for drainage network could include swales, reed beds, filter drains, pervious paving, underground attenuation tanks, free draining gravel margins, downstream defenders or other similar approved water quality structures. Positions and extent of assets shown on layout and coordinated values in hydraulic model are indicative and subject to change.
   - 7.7. Provisional hydraulic modelling is based on minimum level requirements and set up for validation of the drainage network for both free discharge and tidal lock conditions.
   - 7.8. Provisional drainage model for free discharge analysis ref; MicroDrainage MDX Model rev J (System 1 & Sims dated 15.04.25).
   - 7.9. Provisional drainage model for tidal lock analysis ref; MicroDrainage MDX Model rev K (System 1 & Sims dated 16.04.25).
   - 7.10. Tide lock information based on Fixed Model ref Tidaltee_Def_ACM_2070_TI0200_016.tzd (0.460 Hours)
   - 7.11. Matrix shows results for provisional analysis of free discharge and tidal lock conditions.
   - 7.12. Matrix demonstrates that a tank size of 2,000m³ may ensure no flooding during the 1 in 30 year AEP free draining event, with 20% allowance for increases in rainfall intensity due to climate change, but a larger attenuation volume may be required to accommodate higher climate change allowances and tide locking scenarios. Future design work to inform the Surface Water Drainage Strategy to be prepared pursuant to requirement 6 of the draft DCO (EN010166/APP/3.1), will include the following:
     - Application of the Simple Index Approach set out in The SuDS Manual, to confirm types and locations of SuDS features and to ensure sufficient treatment of surface water runoff from the Main Development Area.
     - Detailed hydraulic modelling using latest Flood Estimation Handbook (FEH) rainfall data.
     - Assessment of observed tidal data.
     - Consultations with NRW to confirm which return periods will be applied to the tide lock analysis.
     - Review of current climate change guidance and project programmes to ensure appropriate climate change allowances are applied to the detailed design and appropriate sensitivity testing is undertaken.
     - Review of soakaway test results to inform infiltration design.
     - Rationalisation of the surface water drainage network and tank size, considering that some runoff may be infiltrated to ground and/or attenuated by SuDS features across the Main Development Area, and/or directed elsewhere.
8. 0 The Oakenholt Brook (ordinary watercourse) traverses the site through the western catchment. The watercourse is culverted throughout this length. Details of diversion or other options are pending future design development and consultation with LLFA. The provisional design excludes using this watercourse as an outfall for the Main Development Area. Asset levels, condition survey and catchment assessments are required to validate any future diversion. If required, detailed design of the diverted culvert shall be carried out following re-assessment of the existing catchment, utilisation, capacity and pipe size. For any proposed diversion ecological mitigation is to be considered as required. For example, to address the known presence of eels.
9. 0 This drawing is supplied solely to support the DCO application and the SuDS Approving Body (SAB) pre application with Flintshire County Council.
10. 0 Provisional drainage network is indicative only and subject to future design development. For purposes of evaluation the provisional drainage network includes a single attenuation tank and control. The proposed surface water network and site layout may benefit from multiple attenuation features and or hydraulic controls.
11. 0 Detailed design to take account of known high water table and seasonal variations.
12. 0 Notional locations of Penstocks shown.
13. 0 Future development of surface water drainage design to consider integration with fire safety and fire water run-off requirements. Locations and sizes of SuDS features shown do not allow for firewater run-off. All details to be confirmed.
14. 0 This drawing is not to be used for any setting out or Construction related purposes.

ISSUE/REVISION

P6	24.07.25	Minor updates
P5	11.7.25	Order limits, pipe refs & notes updated
P4	19.5.25	Client revisions
P3	16.4.25	Drainage layout & matrix updated
P2	2.4.25	For SAB pre app discussions
P1	27.3.25	For Client Meeting
I/R	DATE	DESCRIPTION

PROJECT NUMBER

60717119

SHEET TITLE

Outline Surface Water Drainage Strategy General Arrangement

SHEET NUMBER

CQLCP-ACM-XX-XX-DR-D-10-0501

Filename: P:\UKBIM2-IE\PROJECTS\CONNAHTS QUAY\900_CAD_GIS\910_CAD\20_SHEETS\CQLCP-ACM-XX-XX-DR-D-10-0501-P05 OUTLINE SW DRAINAGE STRATEGY GA.DWG

Annex H: Proposed Surface Water Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.351	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	150	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Inverts

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.041	8-12	2.065	16-20	1.876	24-28	0.849	32-36	0.035
4-8	2.325	12-16	2.323	20-24	1.661	28-32	0.655		

Total Area Contributing (ha) = 11.830

Total Pipe Volume (m³) = 2546.695

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	126.612	0.200	633.1	1.350	15.00	0.0		0.030	\/	35	Pipe/Conduit	
1.001	13.578	0.100	135.8	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
1.002	66.594	0.116	574.1	0.000	0.00	0.0	0.600		o	750	Pipe/Conduit	
1.003	68.539	0.148	463.1	0.200	0.00	0.0	0.600		o	750	Pipe/Conduit	
2.000	68.060	0.698	97.5	0.638	10.00	0.0	0.600		o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	24.34	17.55	5.500	1.350	0.0	0.0	0.0	0.83	1700.1	89.0
1.001	24.21	17.71	5.300	1.350	0.0	0.0	0.0	1.35	95.3	89.0
1.002	23.48	18.67	5.000	1.350	0.0	0.0	0.0	1.16	512.8	89.0
1.003	22.85	19.55	4.750	1.550	0.0	0.0	0.0	1.29	571.6	95.9
2.000	32.16	10.62	5.300	0.638	0.0	0.0	0.0	1.84	202.7	55.6

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
1.004	91.008	0.100	910.1	0.242	0.00	0.0	0.600		o	750	Pipe/Conduit	
3.000	106.465	0.246	432.8	0.456	10.00	0.0	0.600		o	300	Pipe/Conduit	
4.000	126.692	0.200	633.5	1.200	15.00	0.0		0.030	\/	35	Pipe/Conduit	
4.001	7.109	0.100	71.1	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
4.002	136.015	0.145	938.0	0.000	0.00	0.0	0.600		o	600	Pipe/Conduit	
1.005	89.737	0.148	606.3	0.259	0.00	0.0	0.600		o	750	Pipe/Conduit	
5.000	80.253	0.200	401.3	0.565	15.00	0.0		0.030	\/	35	Pipe/Conduit	
5.001	10.883	0.100	108.8	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
5.002	149.356	0.500	298.7	0.180	0.00	0.0	0.600		o	900	Pipe/Conduit	
1.006	21.646	0.145	149.3	0.000	0.00	0.0	0.600		o	1050	Pipe/Conduit	
1.007	127.456	0.060	2124.3	0.619	0.00	0.0	0.600		o	1050	Pipe/Conduit	
1.008	44.487	0.030	1482.9	0.000	0.00	0.0	0.600		o	1050	Pipe/Conduit	
1.009	91.534	0.119	769.2	1.014	0.00	0.0	0.600		o	1050	Pipe/Conduit	
6.000	43.939	0.200	219.7	0.392	15.00	0.0		0.030	\/	35	Pipe/Conduit	
6.001	9.668	0.100	96.7	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.004	21.78	21.20	4.602	2.430	0.0	0.0	0.0	0.92	406.2	143.4
3.000	29.56	12.37	5.500	0.456	0.0	0.0	0.0	0.75	53.0	36.5
4.000	24.34	17.55	5.800	1.200	0.0	0.0	0.0	0.83	1699.6	79.1
4.001	24.29	17.61	5.600	1.200	0.0	0.0	0.0	1.87	132.0	79.1
4.002	22.23	20.49	5.500	1.200	0.0	0.0	0.0	0.79	222.5	79.1
1.005	21.01	22.53	4.502	4.345	0.0	0.0	0.0	1.13	498.8	247.2
5.000	25.40	16.28	6.000	0.565	0.0	0.0	0.0	1.04	2135.5	38.9
5.001	25.29	16.41	5.800	0.565	0.0	0.0	0.0	1.51	106.5	38.9
5.002	24.15	17.78	5.700	0.745	0.0	0.0	0.0	1.81	1150.0	48.7
1.006	20.94	22.66	4.354	5.090	0.0	0.0	0.0	2.82	2440.5	288.6
1.007	19.47	25.53	4.209	5.709	0.0	0.0	0.0	0.74	639.2	301.1
1.008	19.09	26.37	4.149	5.709	0.0	0.0	0.0	0.89	767.0	301.1
1.009	18.56	27.61	4.119	6.723	0.0	0.0	0.0	1.23	1069.0	337.9
6.000	26.10	15.52	6.300	0.392	0.0	0.0	0.0	1.41	2886.0	27.7
6.001	26.00	15.62	6.100	0.392	0.0	0.0	0.0	1.60	113.0	27.7

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
6.002	37.353	0.125	298.8	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
6.003	111.718	0.221	505.5	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
7.000	78.580	0.350	224.5	0.672	15.00	0.0		0.030	\/	35	Pipe/Conduit	
7.001	8.087	0.055	147.0	0.000	0.00	0.0	0.600		o	450	Pipe/Conduit	
7.002	68.916	0.615	112.1	0.000	0.00	0.0	0.600		o	450	Pipe/Conduit	
8.000	60.625	0.320	189.5	0.314	10.00	0.0	0.600		o	300	Pipe/Conduit	
9.000	101.068	0.200	505.3	0.859	15.00	0.0		0.030	\/	35	Pipe/Conduit	
9.001	12.805	0.100	128.1	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
6.004	90.200	0.247	365.2	0.000	0.00	0.0	0.600		o	450	Pipe/Conduit	
1.010	75.226	0.150	501.5	0.266	0.00	0.0	0.600		o	1200	Pipe/Conduit	
1.011	112.706	0.224	503.2	0.515	0.00	0.0	0.600		o	1200	Pipe/Conduit	
10.000	59.680	0.293	203.7	0.825	10.00	0.0	0.600		o	525	Pipe/Conduit	
10.001	45.096	0.245	184.1	0.494	0.00	0.0	0.600		o	525	Pipe/Conduit	
10.002	23.417	0.250	93.7	0.140	0.00	0.0	0.600		o	525	Pipe/Conduit	
11.000	73.538	0.100	735.4	0.389	15.00	0.0		0.030	\/	35	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
6.002	25.38	16.31	6.000	0.392	0.0	0.0	0.0	0.90	63.9	27.7
6.003	23.24	19.00	5.875	0.392	0.0	0.0	0.0	0.69	49.0	27.7
7.000	25.71	15.94	6.200	0.672	0.0	0.0	0.0	1.39	2854.9	46.8
7.001	25.64	16.02	5.850	0.672	0.0	0.0	0.0	1.67	266.3	46.8
7.002	25.11	16.62	5.795	0.672	0.0	0.0	0.0	1.92	305.4	46.8
8.000	31.73	10.89	5.500	0.314	0.0	0.0	0.0	1.14	80.5	27.0
9.000	24.94	16.82	6.000	0.859	0.0	0.0	0.0	0.93	1902.9	58.0
9.001	24.81	16.97	5.800	0.859	0.0	0.0	0.0	1.39	98.1	58.0
6.004	22.28	20.42	5.180	2.237	0.0	0.0	0.0	1.06	168.3	135.0
1.010	18.25	28.36	4.000	9.226	0.0	0.0	0.0	1.66	1881.6	456.1
1.011	17.81	29.49	3.850	9.741	0.0	0.0	0.0	1.66	1878.5	470.0
10.000	32.14	10.64	5.800	0.825	0.0	0.0	0.0	1.57	338.9	71.8
10.001	31.41	11.09	5.507	1.319	0.0	0.0	0.0	1.65	356.7	112.2
10.002	31.15	11.26	5.262	1.459	0.0	0.0	0.0	2.31	501.1	123.1
11.000	25.13	16.59	5.600	0.389	0.0	0.0	0.0	0.77	1577.4	26.5

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	n	HYD SECT	DIA (mm)	Section Type	Auto Design
11.001	13.385	0.017	787.4	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
11.002	47.175	0.471	100.2	0.000	0.00	0.0	0.600		o	300	Pipe/Conduit	
10.003	38.523	0.224	172.0	0.000	0.00	0.0	0.600		o	525	Pipe/Conduit	
10.004	34.425	0.200	172.1	0.152	0.00	0.0	0.600		o	525	Pipe/Conduit	
10.005	24.860	0.200	124.3	0.089	0.00	0.0	0.600		o	525	Pipe/Conduit	
1.012	26.797	0.045	595.5	0.000	0.00	0.0	0.600		o	1350	Pipe/Conduit	
1.013	103.840	0.173	600.2	0.000	0.00	0.0	0.600		o	1350	Pipe/Conduit	
1.014	121.821	0.203	600.1	0.000	0.00	0.0	0.600		o	1350	Pipe/Conduit	
1.015	32.039	0.053	604.5	0.000	0.00	0.0	0.600		o	1350	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
11.001	24.79	17.00	5.500	0.389	0.0	0.0	0.0	0.55	39.1	26.5
11.002	24.38	17.50	5.483	0.389	0.0	0.0	0.0	1.57	111.0	26.5
10.003	24.08	17.87	5.012	1.848	0.0	0.0	0.0	1.71	369.1	123.1
10.004	23.82	18.21	4.788	2.000	0.0	0.0	0.0	1.70	369.0	129.0
10.005	23.67	18.42	4.588	2.089	0.0	0.0	0.0	2.01	434.7	133.9
1.012	17.71	29.76	3.626	11.830	0.0	0.0	0.0	1.64	2348.4	567.5
1.013	17.63	30.00	3.581	11.830	0.0	0.0	0.0	1.63	2339.0	567.5
1.014	17.63	30.00	3.408	11.830	0.0	0.0	0.0	1.63	2339.3	567.5
1.015	17.63	30.00	3.205	11.830	0.0	0.0	0.0	1.63	2330.7	567.5

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.015	HW-45	5.900	3.152	0.000	1200	0

Datum (m) 2.800 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.000	42	0.000	83	0.000	124	0.000	165	0.000	206	0.000
2	0.000	43	0.000	84	0.000	125	0.000	166	0.000	207	0.000
3	0.000	44	0.000	85	0.000	126	0.000	167	0.000	208	0.000
4	0.000	45	0.000	86	0.000	127	0.000	168	0.000	209	0.000
5	0.000	46	0.000	87	0.000	128	0.000	169	0.000	210	0.000
6	0.000	47	0.000	88	0.000	129	0.000	170	0.000	211	0.000
7	0.000	48	0.000	89	0.000	130	0.000	171	0.000	212	0.000
8	0.000	49	0.000	90	0.000	131	0.000	172	0.000	213	0.000
9	0.000	50	0.000	91	0.000	132	0.000	173	0.000	214	0.000
10	0.000	51	0.000	92	0.000	133	0.000	174	0.000	215	0.000
11	0.000	52	0.000	93	0.000	134	0.000	175	0.000	216	0.000
12	0.000	53	0.000	94	0.000	135	0.000	176	0.000	217	0.000
13	0.000	54	0.000	95	0.000	136	0.000	177	0.000	218	0.000
14	0.000	55	0.000	96	0.000	137	0.000	178	0.000	219	0.000
15	0.000	56	0.000	97	0.000	138	0.000	179	0.000	220	0.000
16	0.000	57	0.000	98	0.000	139	0.000	180	0.000	221	0.000
17	0.000	58	0.000	99	0.000	140	0.000	181	0.000	222	0.000
18	0.000	59	0.000	100	0.000	141	0.000	182	0.000	223	0.000
19	0.000	60	0.000	101	0.000	142	0.000	183	0.000	224	0.000
20	0.000	61	0.000	102	0.000	143	0.000	184	0.000	225	0.000
21	0.000	62	0.000	103	0.000	144	0.000	185	0.000	226	0.000
22	0.000	63	0.000	104	0.000	145	0.000	186	0.000	227	0.000
23	0.000	64	0.000	105	0.000	146	0.000	187	0.000	228	0.000
24	0.000	65	0.000	106	0.000	147	0.000	188	0.000	229	0.000
25	0.000	66	0.000	107	0.000	148	0.000	189	0.000	230	0.000
26	0.000	67	0.000	108	0.000	149	0.000	190	0.000	231	0.000
27	0.000	68	0.000	109	0.000	150	0.000	191	0.000	232	0.000
28	0.000	69	0.000	110	0.000	151	0.000	192	0.000	233	0.000
29	0.000	70	0.000	111	0.000	152	0.000	193	0.000	234	0.000
30	0.000	71	0.000	112	0.000	153	0.000	194	0.000	235	0.000
31	0.000	72	0.000	113	0.000	154	0.000	195	0.000	236	0.000
32	0.000	73	0.000	114	0.000	155	0.000	196	0.000	237	0.000
33	0.000	74	0.000	115	0.000	156	0.000	197	0.000	238	0.000
34	0.000	75	0.000	116	0.000	157	0.000	198	0.000	239	0.000
35	0.000	76	0.000	117	0.000	158	0.000	199	0.000	240	0.000
36	0.000	77	0.000	118	0.000	159	0.000	200	0.000	241	0.000
37	0.000	78	0.000	119	0.000	160	0.000	201	0.000	242	0.000
38	0.000	79	0.000	120	0.000	161	0.000	202	0.000	243	0.000
39	0.000	80	0.000	121	0.000	162	0.000	203	0.000	244	0.000
40	0.000	81	0.000	122	0.000	163	0.000	204	0.000	245	0.000
41	0.000	82	0.000	123	0.000	164	0.000	205	0.000	246	0.000

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
247	0.000	297	0.000	347	0.000	397	0.000	447	0.250	497	2.500
248	0.000	298	0.000	348	0.000	398	0.000	448	0.300	498	2.533
249	0.000	299	0.000	349	0.000	399	0.000	449	0.350	499	2.566
250	0.000	300	0.000	350	0.000	400	0.000	450	0.400	500	2.600
251	0.000	301	0.000	351	0.000	401	0.000	451	0.450	501	2.633
252	0.000	302	0.000	352	0.000	402	0.000	452	0.500	502	2.666
253	0.000	303	0.000	353	0.000	403	0.000	453	0.550	503	2.700
254	0.000	304	0.000	354	0.000	404	0.000	454	0.600	504	2.733
255	0.000	305	0.000	355	0.000	405	0.000	455	0.650	505	2.766
256	0.000	306	0.000	356	0.000	406	0.000	456	0.700	506	2.800
257	0.000	307	0.000	357	0.000	407	0.000	457	0.750	507	2.833
258	0.000	308	0.000	358	0.000	408	0.000	458	0.800	508	2.866
259	0.000	309	0.000	359	0.000	409	0.000	459	0.850	509	2.900
260	0.000	310	0.000	360	0.000	410	0.000	460	0.900	510	2.933
261	0.000	311	0.000	361	0.000	411	0.000	461	0.950	511	2.966
262	0.000	312	0.000	362	0.000	412	0.000	462	1.000	512	3.000
263	0.000	313	0.000	363	0.000	413	0.000	463	1.050	513	3.033
264	0.000	314	0.000	364	0.000	414	0.000	464	1.100	514	3.066
265	0.000	315	0.000	365	0.000	415	0.000	465	1.150	515	3.100
266	0.000	316	0.000	366	0.000	416	0.000	466	1.200	516	3.133
267	0.000	317	0.000	367	0.000	417	0.000	467	1.250	517	3.166
268	0.000	318	0.000	368	0.000	418	0.000	468	1.300	518	3.200
269	0.000	319	0.000	369	0.000	419	0.000	469	1.350	519	3.233
270	0.000	320	0.000	370	0.000	420	0.000	470	1.400	520	3.266
271	0.000	321	0.000	371	0.000	421	0.000	471	1.450	521	3.300
272	0.000	322	0.000	372	0.000	422	0.000	472	1.500	522	3.333
273	0.000	323	0.000	373	0.000	423	0.000	473	1.550	523	3.366
274	0.000	324	0.000	374	0.000	424	0.000	474	1.600	524	3.400
275	0.000	325	0.000	375	0.000	425	0.000	475	1.650	525	3.433
276	0.000	326	0.000	376	0.000	426	0.000	476	1.700	526	3.466
277	0.000	327	0.000	377	0.000	427	0.000	477	1.750	527	3.500
278	0.000	328	0.000	378	0.000	428	0.000	478	1.800	528	3.533
279	0.000	329	0.000	379	0.000	429	0.000	479	1.850	529	3.566
280	0.000	330	0.000	380	0.000	430	0.000	480	1.900	530	3.600
281	0.000	331	0.000	381	0.000	431	0.000	481	1.950	531	3.633
282	0.000	332	0.000	382	0.000	432	0.000	482	2.000	532	3.666
283	0.000	333	0.000	383	0.000	433	0.000	483	2.033	533	3.700
284	0.000	334	0.000	384	0.000	434	0.000	484	2.066	534	3.733
285	0.000	335	0.000	385	0.000	435	0.000	485	2.100	535	3.766
286	0.000	336	0.000	386	0.000	436	0.000	486	2.133	536	3.800
287	0.000	337	0.000	387	0.000	437	0.000	487	2.166	537	3.833
288	0.000	338	0.000	388	0.000	438	0.000	488	2.200	538	3.866
289	0.000	339	0.000	389	0.000	439	0.000	489	2.233	539	3.900
290	0.000	340	0.000	390	0.000	440	0.000	490	2.266	540	3.933
291	0.000	341	0.000	391	0.000	441	0.025	491	2.300	541	3.966
292	0.000	342	0.000	392	0.000	442	0.050	492	2.333	542	4.000
293	0.000	343	0.000	393	0.000	443	0.075	493	2.366	543	4.000
294	0.000	344	0.000	394	0.000	444	0.100	494	2.400	544	4.000
295	0.000	345	0.000	395	0.000	445	0.150	495	2.433	545	4.000
296	0.000	346	0.000	396	0.000	446	0.200	496	2.466	546	4.000

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
547	4.000	597	3.100	647	1.433	697	0.175	747	0.000	797	0.000
548	4.000	598	3.066	648	1.400	698	0.150	748	0.000	798	0.000
549	4.000	599	3.033	649	1.375	699	0.125	749	0.000	799	0.000
550	4.000	600	3.000	650	1.350	700	0.100	750	0.000	800	0.000
551	4.000	601	2.966	651	1.325	701	0.075	751	0.000	801	0.000
552	4.000	602	2.933	652	1.300	702	0.050	752	0.000	802	0.000
553	4.000	603	2.900	653	1.275	703	0.025	753	0.000	803	0.000
554	4.000	604	2.866	654	1.250	704	0.000	754	0.000	804	0.000
555	4.000	605	2.833	655	1.225	705	0.000	755	0.000	805	0.000
556	4.000	606	2.800	656	1.200	706	0.000	756	0.000	806	0.000
557	4.000	607	2.766	657	1.175	707	0.000	757	0.000	807	0.000
558	4.000	608	2.733	658	1.150	708	0.000	758	0.000	808	0.000
559	4.000	609	2.700	659	1.125	709	0.000	759	0.000	809	0.000
560	4.000	610	2.666	660	1.100	710	0.000	760	0.000	810	0.000
561	4.000	611	2.633	661	1.075	711	0.000	761	0.000	811	0.000
562	4.000	612	2.600	662	1.050	712	0.000	762	0.000	812	0.000
563	4.000	613	2.566	663	1.025	713	0.000	763	0.000	813	0.000
564	4.000	614	2.533	664	1.000	714	0.000	764	0.000	814	0.000
565	4.000	615	2.500	665	0.975	715	0.000	765	0.000	815	0.000
566	4.000	616	2.466	666	0.095	716	0.000	766	0.000	816	0.000
567	4.000	617	2.433	667	0.925	717	0.000	767	0.000	817	0.000
568	4.000	618	2.400	668	0.900	718	0.000	768	0.000	818	0.000
569	4.000	619	2.366	669	0.875	719	0.000	769	0.000	819	0.000
570	4.000	620	2.333	670	0.850	720	0.000	770	0.000	820	0.000
571	3.966	621	2.300	671	0.825	721	0.000	771	0.000	821	0.000
572	3.933	622	2.266	672	0.800	722	0.000	772	0.000	822	0.000
573	3.900	623	2.233	673	0.775	723	0.000	773	0.000	823	0.000
574	3.866	624	2.200	674	0.750	724	0.000	774	0.000	824	0.000
575	3.833	625	2.166	675	0.725	725	0.000	775	0.000	825	0.000
576	3.800	626	2.133	676	0.700	726	0.000	776	0.000	826	0.000
577	3.766	627	2.100	677	0.675	727	0.000	777	0.000	827	0.000
578	3.733	628	2.066	678	0.650	728	0.000	778	0.000	828	0.000
579	3.700	629	2.033	679	0.625	729	0.000	779	0.000	829	0.000
580	3.666	630	2.000	680	0.600	730	0.000	780	0.000	830	0.000
581	3.633	631	1.966	681	0.575	731	0.000	781	0.000	831	0.000
582	3.600	632	1.933	682	0.550	732	0.000	782	0.000	832	0.000
583	3.566	633	1.900	683	0.525	733	0.000	783	0.000	833	0.000
584	3.533	634	1.866	684	0.500	734	0.000	784	0.000	834	0.000
585	3.500	635	1.833	685	0.475	735	0.000	785	0.000	835	0.000
586	3.466	636	1.800	686	0.450	736	0.000	786	0.000	836	0.000
587	3.433	637	1.766	687	0.425	737	0.000	787	0.000	837	0.000
588	3.400	638	1.733	688	0.400	738	0.000	788	0.000	838	0.000
589	3.366	639	1.700	689	0.375	739	0.000	789	0.000	839	0.000
590	3.333	640	1.666	690	0.350	740	0.000	790	0.000	840	0.000
591	3.300	641	1.633	691	0.325	741	0.000	791	0.000	841	0.000
592	3.266	642	1.600	692	0.300	742	0.000	792	0.000	842	0.000
593	3.233	643	1.566	693	0.275	743	0.000	793	0.000	843	0.000
594	3.200	644	1.533	694	0.250	744	0.000	794	0.000	844	0.000
595	3.166	645	1.500	695	0.225	745	0.000	795	0.000	845	0.000
596	3.133	646	1.466	696	0.200	746	0.000	796	0.000	846	0.000

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
847	0.000	897	0.000	947	0.000	997	0.000	1047	0.000	1097	0.000
848	0.000	898	0.000	948	0.000	998	0.000	1048	0.000	1098	0.000
849	0.000	899	0.000	949	0.000	999	0.000	1049	0.000	1099	0.000
850	0.000	900	0.000	950	0.000	1000	0.000	1050	0.000	1100	0.000
851	0.000	901	0.000	951	0.000	1001	0.000	1051	0.000	1101	0.000
852	0.000	902	0.000	952	0.000	1002	0.000	1052	0.000	1102	0.000
853	0.000	903	0.000	953	0.000	1003	0.000	1053	0.000	1103	0.000
854	0.000	904	0.000	954	0.000	1004	0.000	1054	0.000	1104	0.000
855	0.000	905	0.000	955	0.000	1005	0.000	1055	0.000	1105	0.000
856	0.000	906	0.000	956	0.000	1006	0.000	1056	0.000	1106	0.000
857	0.000	907	0.000	957	0.000	1007	0.000	1057	0.000	1107	0.000
858	0.000	908	0.000	958	0.000	1008	0.000	1058	0.000	1108	0.000
859	0.000	909	0.000	959	0.000	1009	0.000	1059	0.000	1109	0.000
860	0.000	910	0.000	960	0.000	1010	0.000	1060	0.000	1110	0.000
861	0.000	911	0.000	961	0.000	1011	0.000	1061	0.000	1111	0.000
862	0.000	912	0.000	962	0.000	1012	0.000	1062	0.000	1112	0.000
863	0.000	913	0.000	963	0.000	1013	0.000	1063	0.000	1113	0.000
864	0.000	914	0.000	964	0.000	1014	0.000	1064	0.000	1114	0.000
865	0.000	915	0.000	965	0.000	1015	0.000	1065	0.000	1115	0.000
866	0.000	916	0.000	966	0.000	1016	0.000	1066	0.000	1116	0.000
867	0.000	917	0.000	967	0.000	1017	0.000	1067	0.000	1117	0.000
868	0.000	918	0.000	968	0.000	1018	0.000	1068	0.000	1118	0.000
869	0.000	919	0.000	969	0.000	1019	0.000	1069	0.000	1119	0.000
870	0.000	920	0.000	970	0.000	1020	0.000	1070	0.000	1120	0.000
871	0.000	921	0.000	971	0.000	1021	0.000	1071	0.000	1121	0.000
872	0.000	922	0.000	972	0.000	1022	0.000	1072	0.000	1122	0.000
873	0.000	923	0.000	973	0.000	1023	0.000	1073	0.000	1123	0.000
874	0.000	924	0.000	974	0.000	1024	0.000	1074	0.000	1124	0.000
875	0.000	925	0.000	975	0.000	1025	0.000	1075	0.000	1125	0.000
876	0.000	926	0.000	976	0.000	1026	0.000	1076	0.000	1126	0.000
877	0.000	927	0.000	977	0.000	1027	0.000	1077	0.000	1127	0.000
878	0.000	928	0.000	978	0.000	1028	0.000	1078	0.000	1128	0.000
879	0.000	929	0.000	979	0.000	1029	0.000	1079	0.000	1129	0.000
880	0.000	930	0.000	980	0.000	1030	0.000	1080	0.000	1130	0.000
881	0.000	931	0.000	981	0.000	1031	0.000	1081	0.000	1131	0.000
882	0.000	932	0.000	982	0.000	1032	0.000	1082	0.000	1132	0.000
883	0.000	933	0.000	983	0.000	1033	0.000	1083	0.000	1133	0.000
884	0.000	934	0.000	984	0.000	1034	0.000	1084	0.000	1134	0.000
885	0.000	935	0.000	985	0.000	1035	0.000	1085	0.000	1135	0.000
886	0.000	936	0.000	986	0.000	1036	0.000	1086	0.000	1136	0.000
887	0.000	937	0.000	987	0.000	1037	0.000	1087	0.000	1137	0.000
888	0.000	938	0.000	988	0.000	1038	0.000	1088	0.000	1138	0.000
889	0.000	939	0.000	989	0.000	1039	0.000	1089	0.000	1139	0.000
890	0.000	940	0.000	990	0.000	1040	0.000	1090	0.000	1140	0.000
891	0.000	941	0.000	991	0.000	1041	0.000	1091	0.000	1141	0.000
892	0.000	942	0.000	992	0.000	1042	0.000	1092	0.000	1142	0.000
893	0.000	943	0.000	993	0.000	1043	0.000	1093	0.000	1143	0.000
894	0.000	944	0.000	994	0.000	1044	0.000	1094	0.000	1144	0.000
895	0.000	945	0.000	995	0.000	1045	0.000	1095	0.000	1145	0.000
896	0.000	946	0.000	996	0.000	1046	0.000	1096	0.000	1146	0.000

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1147	0.000	1196	0.000	1245	0.000	1294	0.000	1343	0.000	1392	0.000
1148	0.000	1197	0.000	1246	0.000	1295	0.000	1344	0.000	1393	0.000
1149	0.000	1198	0.000	1247	0.000	1296	0.000	1345	0.000	1394	0.000
1150	0.000	1199	0.000	1248	0.000	1297	0.000	1346	0.000	1395	0.000
1151	0.000	1200	0.000	1249	0.000	1298	0.000	1347	0.000	1396	0.000
1152	0.000	1201	0.000	1250	0.000	1299	0.000	1348	0.000	1397	0.000
1153	0.000	1202	0.000	1251	0.000	1300	0.000	1349	0.000	1398	0.000
1154	0.000	1203	0.000	1252	0.000	1301	0.000	1350	0.000	1399	0.000
1155	0.000	1204	0.000	1253	0.000	1302	0.000	1351	0.000	1400	0.000
1156	0.000	1205	0.000	1254	0.000	1303	0.000	1352	0.000	1401	0.000
1157	0.000	1206	0.000	1255	0.000	1304	0.000	1353	0.000	1402	0.000
1158	0.000	1207	0.000	1256	0.000	1305	0.000	1354	0.000	1403	0.000
1159	0.000	1208	0.000	1257	0.000	1306	0.000	1355	0.000	1404	0.000
1160	0.000	1209	0.000	1258	0.000	1307	0.000	1356	0.000	1405	0.000
1161	0.000	1210	0.000	1259	0.000	1308	0.000	1357	0.000	1406	0.000
1162	0.000	1211	0.000	1260	0.000	1309	0.000	1358	0.000	1407	0.000
1163	0.000	1212	0.000	1261	0.000	1310	0.000	1359	0.000	1408	0.000
1164	0.000	1213	0.000	1262	0.000	1311	0.000	1360	0.000	1409	0.000
1165	0.000	1214	0.000	1263	0.000	1312	0.000	1361	0.000	1410	0.000
1166	0.000	1215	0.000	1264	0.000	1313	0.000	1362	0.000	1411	0.000
1167	0.000	1216	0.000	1265	0.000	1314	0.000	1363	0.000	1412	0.000
1168	0.000	1217	0.000	1266	0.000	1315	0.000	1364	0.000	1413	0.000
1169	0.000	1218	0.000	1267	0.000	1316	0.000	1365	0.000	1414	0.000
1170	0.000	1219	0.000	1268	0.000	1317	0.000	1366	0.000	1415	0.000
1171	0.000	1220	0.000	1269	0.000	1318	0.000	1367	0.000	1416	0.000
1172	0.000	1221	0.000	1270	0.000	1319	0.000	1368	0.000	1417	0.000
1173	0.000	1222	0.000	1271	0.000	1320	0.000	1369	0.000	1418	0.000
1174	0.000	1223	0.000	1272	0.000	1321	0.000	1370	0.000	1419	0.000
1175	0.000	1224	0.000	1273	0.000	1322	0.000	1371	0.000	1420	0.000
1176	0.000	1225	0.000	1274	0.000	1323	0.000	1372	0.000	1421	0.000
1177	0.000	1226	0.000	1275	0.000	1324	0.000	1373	0.000	1422	0.000
1178	0.000	1227	0.000	1276	0.000	1325	0.000	1374	0.000	1423	0.000
1179	0.000	1228	0.000	1277	0.000	1326	0.000	1375	0.000	1424	0.000
1180	0.000	1229	0.000	1278	0.000	1327	0.000	1376	0.000	1425	0.000
1181	0.000	1230	0.000	1279	0.000	1328	0.000	1377	0.000	1426	0.000
1182	0.000	1231	0.000	1280	0.000	1329	0.000	1378	0.000	1427	0.000
1183	0.000	1232	0.000	1281	0.000	1330	0.000	1379	0.000	1428	0.000
1184	0.000	1233	0.000	1282	0.000	1331	0.000	1380	0.000	1429	0.000
1185	0.000	1234	0.000	1283	0.000	1332	0.000	1381	0.000	1430	0.000
1186	0.000	1235	0.000	1284	0.000	1333	0.000	1382	0.000	1431	0.000
1187	0.000	1236	0.000	1285	0.000	1334	0.000	1383	0.000	1432	0.000
1188	0.000	1237	0.000	1286	0.000	1335	0.000	1384	0.000	1433	0.000
1189	0.000	1238	0.000	1287	0.000	1336	0.000	1385	0.000	1434	0.000
1190	0.000	1239	0.000	1288	0.000	1337	0.000	1386	0.000	1435	0.000
1191	0.000	1240	0.000	1289	0.000	1338	0.000	1387	0.000	1436	0.000
1192	0.000	1241	0.000	1290	0.000	1339	0.000	1388	0.000	1437	0.000
1193	0.000	1242	0.000	1291	0.000	1340	0.000	1389	0.000	1438	0.000
1194	0.000	1243	0.000	1292	0.000	1341	0.000	1390	0.000	1439	0.000
1195	0.000	1244	0.000	1293	0.000	1342	0.000	1391	0.000	1440	0.000

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	720
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	6

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	360
Ratio R	0.351		

Online Controls for Storm

Hydro Brake® Optimum Manhole: 17, DS/PN: 1.008, Volume (m³): 121.2

Unit Reference	MD-SFP-0486-2000-2500-2000
Design Head (m)	2.500
Design Flow (l/s)	200.0
Flush-Flo™	Calculated
Objective	Future Proof
Application	Surface
Sump Available	Yes
Diameter (mm)	486
Invert Level (m)	4.149
Minimum Outlet Pipe Diameter (mm)	500
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.500	200.0
Flush-Flo™	0.727	199.8
Kick-Flo®	1.631	162.4
Mean Flow over Head Range	-	165.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	13.1	1.200	189.8	3.000	218.6	7.000	331.0
0.200	48.0	1.400	181.3	3.500	235.7	7.500	342.4
0.300	96.8	1.600	166.0	4.000	251.6	8.000	353.4
0.400	148.9	1.800	170.4	4.500	266.5	8.500	364.1
0.500	190.8	2.000	179.4	5.000	280.6	9.000	374.5
0.600	198.3	2.200	187.9	5.500	294.1	9.500	384.5
0.800	199.4	2.400	196.0	6.000	306.9		
1.000	195.7	2.600	203.8	6.500	319.2		

Storage Structures for Storm

Tank or Pond Manhole: 16, DS/PN: 1.007

Invert Level (m) 4.209

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	1000.0	1.400	1000.0	2.800	0.0	4.200	0.0
0.200	1000.0	1.600	1000.0	3.000	0.0	4.400	0.0
0.400	1000.0	1.800	1000.0	3.200	0.0	4.600	0.0
0.600	1000.0	2.000	1000.0	3.400	0.0	4.800	0.0
0.800	1000.0	2.200	0.0	3.600	0.0	5.000	0.0
1.000	1000.0	2.400	0.0	3.800	0.0		
1.200	1000.0	2.600	0.0	4.000	0.0		

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.355
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	400.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 30
Climate Change (%)	20, 20

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	Swale-1	30 Winter	30	+20%				
1.001	2	30 Winter	30	+20%	30/15 Summer			
1.002	3	960 Summer	30	+20%	30/960 Summer			
1.003	4	960 Summer	30	+20%	30/960 Summer			
2.000	5	960 Summer	30	+20%	30/960 Summer			
1.004	6	960 Summer	30	+20%	30/960 Summer			
3.000	7	15 Winter	30	+20%	30/15 Summer			
4.000	Swale-8	30 Winter	30	+20%				
4.001	9	30 Winter	30	+20%	30/15 Summer			
4.002	10	960 Summer	30	+20%				
1.005	11	960 Summer	30	+20%	30/120 Winter			
5.000	Swale-12	30 Winter	30	+20%				
5.001	13	30 Winter	30	+20%	30/15 Winter			
5.002	14	960 Summer	30	+20%				
1.006	15	960 Summer	30	+20%	30/960 Summer			
1.007	16	960 Summer	30	+20%	30/120 Winter			
1.008	17	960 Summer	30	+20%	30/120 Winter	30/960 Summer		
1.009	18	960 Summer	30	+20%	1/960 Winter			
6.000	Swale-19	30 Winter	30	+20%				
6.001	20	30 Winter	30	+20%	30/15 Winter			
6.002	21	960 Summer	30	+20%	30/15 Summer			

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	Swale-1	5.977	-0.514	0.000	0.15			250.0	OK
1.001	2	5.933	0.333	0.000	2.12			166.4	SURCHARGED
1.002	3	5.930	0.180	0.000	0.10			46.9	SURCHARGED
1.003	4	5.947	0.447	0.000	0.10			52.7	SURCHARGED
2.000	5	5.944	0.269	0.000	0.12			22.2	SURCHARGED
1.004	6	5.944	0.592	0.000	0.21			79.0	SURCHARGED
3.000	7	6.656	0.856	0.000	2.13			109.5	FLOOD RISK
4.000	Swale-8	6.240	-0.551	0.000	0.13			222.3	OK
4.001	9	6.196	0.296	0.000	1.82			144.2	SURCHARGED
4.002	10	5.926	-0.174	0.000	0.20			41.7	OK
1.005	11	5.939	0.687	0.000	0.31			138.6	SURCHARGED
5.000	Swale-12	6.251	-0.740	0.000	0.05			107.8	OK
5.001	13	6.131	0.031	0.000	1.21			95.7	SURCHARGED
5.002	14	5.946	-0.654	0.000	0.02			25.9	OK
1.006	15	5.945	0.541	0.000	0.11			154.8	SURCHARGED
1.007	16	5.940	0.681	0.000	0.29			244.1	SURCHARGED
1.008	17	7.012	1.813	35.726	0.28			187.9	FLOOD
1.009	18	6.465	1.296	0.000	0.21			192.6	SURCHARGED
6.000	Swale-19	6.546	-0.745	0.000	0.03			75.0	OK
6.001	20	6.531	0.131	0.000	0.75			59.2	SURCHARGED
6.002	21	6.592	0.292	0.000	0.23			13.6	SURCHARGED

PN	US/MH Name	Level Exceeded
1.000	Swale-1	
1.001	2	
1.002	3	
1.003	4	
2.000	5	
1.004	6	
3.000	7	
4.000	Swale-8	
4.001	9	
4.002	10	
1.005	11	
5.000	Swale-12	
5.001	13	
5.002	14	
1.006	15	
1.007	16	
1.008	17	2
1.009	18	
6.000	Swale-19	
6.001	20	
6.002	21	

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
6.003	22	960 Summer	30	+20%	30/15 Summer			
7.000	Swale-23	30 Winter	30	+20%				
7.001	24	960 Summer	30	+20%	30/960 Summer			
7.002	25	960 Winter	30	+20%	30/960 Summer			
8.000	26	960 Summer	30	+20%	30/15 Summer			
9.000	Swale-27	960 Summer	30	+20%				
9.001	28	960 Summer	30	+20%	30/15 Summer			
6.004	29	960 Summer	30	+20%	30/15 Summer			
1.010	30	960 Winter	30	+20%	1/960 Winter			
1.011	31	960 Winter	30	+20%	1/960 Summer			
10.000	32	960 Summer	30	+20%	30/960 Summer			
10.001	33	960 Summer	30	+20%	30/15 Winter			
10.002	34	960 Summer	30	+20%	30/15 Winter			
11.000	Swale-35	960 Summer	30	+20%				
11.001	36	960 Summer	30	+20%	30/15 Summer			
11.002	37	960 Summer	30	+20%	30/30 Winter			
10.003	38	960 Summer	30	+20%	1/960 Winter			
10.004	39	960 Summer	30	+20%	1/960 Winter			
10.005	40	960 Summer	30	+20%	1/960 Summer			
1.012	41	960 Winter	30	+20%	1/960 Summer			
1.013	42	960 Winter	30	+20%	1/960 Summer			
1.014	43	960 Summer	30	+20%	1/960 Summer			
1.015	44	960 Winter	30	+20%	1/720 Summer	30/720 Summer		

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
6.003	22	6.547	0.372	0.000	0.29			13.6	SURCHARGED
7.000	Swale-23	6.413	-0.778	0.000	0.05			129.0	OK
7.001	24	6.381	0.081	0.000	0.19			32.8	SURCHARGED
7.002	25	6.411	0.166	0.000	0.12			32.8	SURCHARGED
8.000	26	6.550	0.750	0.000	0.14			10.9	FLOOD RISK
9.000	Swale-27	6.388	-0.603	0.000	0.02			29.9	OK
9.001	28	6.388	0.288	0.000	0.58			46.3	SURCHARGED
6.004	29	6.540	0.910	0.000	0.64			102.5	SURCHARGED
1.010	30	6.493	1.293	0.000	0.15			237.5	SURCHARGED
1.011	31	6.506	1.456	0.000	0.17			283.8	FLOOD RISK
10.000	32	6.502	0.177	0.000	0.09			28.7	SURCHARGED
10.001	33	6.496	0.464	0.000	0.15			45.9	SURCHARGED
10.002	34	6.489	0.702	0.000	0.15			55.8	SURCHARGED
11.000	Swale-35	6.315	-0.276	0.000	0.01			13.5	OK
11.001	36	6.315	0.515	0.000	2.43			57.0	SURCHARGED
11.002	37	6.378	0.595	0.000	0.58			60.1	FLOOD RISK
10.003	38	6.483	0.946	0.000	0.31			99.1	SURCHARGED
10.004	39	6.498	1.185	0.000	0.32			100.9	SURCHARGED
10.005	40	6.508	1.395	0.000	0.30			103.4	SURCHARGED
1.012	41	6.513	1.537	0.000	0.26			367.4	SURCHARGED

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.013	42	6.515	1.584	0.000	0.19			376.1	SURCHARGED
1.014	43	6.527	1.769	0.000	0.19			386.8	SURCHARGED
1.015	44	6.536	1.981	42.629	0.30			461.7	FLOOD

PN	US/MH Name	Level Exceeded
6.003	22	
7.000	Swale-23	
7.001	24	
7.002	25	
8.000	26	
9.000	Swale-27	
9.001	28	
6.004	29	
1.010	30	
1.011	31	
10.000	32	
10.001	33	
10.002	34	
11.000	Swale-35	
11.001	36	
11.002	37	
10.003	38	
10.004	39	
10.005	40	
1.012	41	
1.013	42	
1.014	43	
1.015	44	3

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.015	HW-45	5.900	3.152	0.000	1200	0

Datum (m) 2.800 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.000	42	0.000	83	0.000	124	0.000	165	0.000	206	0.000
2	0.000	43	0.000	84	0.000	125	0.000	166	0.000	207	0.000
3	0.000	44	0.000	85	0.000	126	0.000	167	0.000	208	0.000
4	0.000	45	0.000	86	0.000	127	0.000	168	0.000	209	0.000
5	0.000	46	0.000	87	0.000	128	0.000	169	0.000	210	0.000
6	0.000	47	0.000	88	0.000	129	0.000	170	0.000	211	0.000
7	0.000	48	0.000	89	0.000	130	0.000	171	0.000	212	0.000
8	0.000	49	0.000	90	0.000	131	0.000	172	0.000	213	0.000
9	0.000	50	0.000	91	0.000	132	0.000	173	0.000	214	0.000
10	0.000	51	0.000	92	0.000	133	0.000	174	0.000	215	0.000
11	0.000	52	0.000	93	0.000	134	0.000	175	0.000	216	0.000
12	0.000	53	0.000	94	0.000	135	0.000	176	0.000	217	0.000
13	0.000	54	0.000	95	0.000	136	0.000	177	0.000	218	0.000
14	0.000	55	0.000	96	0.000	137	0.000	178	0.000	219	0.000
15	0.000	56	0.000	97	0.000	138	0.000	179	0.000	220	0.000
16	0.000	57	0.000	98	0.000	139	0.000	180	0.000	221	0.000
17	0.000	58	0.000	99	0.000	140	0.000	181	0.000	222	0.000
18	0.000	59	0.000	100	0.000	141	0.000	182	0.000	223	0.000
19	0.000	60	0.000	101	0.000	142	0.000	183	0.000	224	0.000
20	0.000	61	0.000	102	0.000	143	0.000	184	0.000	225	0.000
21	0.000	62	0.000	103	0.000	144	0.000	185	0.000	226	0.000
22	0.000	63	0.000	104	0.000	145	0.000	186	0.000	227	0.000
23	0.000	64	0.000	105	0.000	146	0.000	187	0.000	228	0.000
24	0.000	65	0.000	106	0.000	147	0.000	188	0.000	229	0.000
25	0.000	66	0.000	107	0.000	148	0.000	189	0.000	230	0.000
26	0.000	67	0.000	108	0.000	149	0.000	190	0.000	231	0.000
27	0.000	68	0.000	109	0.000	150	0.000	191	0.000	232	0.000
28	0.000	69	0.000	110	0.000	151	0.000	192	0.000	233	0.000
29	0.000	70	0.000	111	0.000	152	0.000	193	0.000	234	0.000
30	0.000	71	0.000	112	0.000	153	0.000	194	0.000	235	0.000
31	0.000	72	0.000	113	0.000	154	0.000	195	0.000	236	0.000
32	0.000	73	0.000	114	0.000	155	0.000	196	0.000	237	0.000
33	0.000	74	0.000	115	0.000	156	0.000	197	0.000	238	0.000
34	0.000	75	0.000	116	0.000	157	0.000	198	0.000	239	0.000
35	0.000	76	0.000	117	0.000	158	0.000	199	0.000	240	0.000
36	0.000	77	0.000	118	0.000	159	0.000	200	0.000	241	0.000
37	0.000	78	0.000	119	0.000	160	0.000	201	0.000	242	0.000
38	0.000	79	0.000	120	0.000	161	0.000	202	0.000	243	0.000
39	0.000	80	0.000	121	0.000	162	0.000	203	0.000	244	0.000
40	0.000	81	0.000	122	0.000	163	0.000	204	0.000	245	0.000
41	0.000	82	0.000	123	0.000	164	0.000	205	0.000	246	0.000

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
247	0.000	297	0.000	347	0.000	397	0.000	447	0.250	497	2.500
248	0.000	298	0.000	348	0.000	398	0.000	448	0.300	498	2.533
249	0.000	299	0.000	349	0.000	399	0.000	449	0.350	499	2.566
250	0.000	300	0.000	350	0.000	400	0.000	450	0.400	500	2.600
251	0.000	301	0.000	351	0.000	401	0.000	451	0.450	501	2.633
252	0.000	302	0.000	352	0.000	402	0.000	452	0.500	502	2.666
253	0.000	303	0.000	353	0.000	403	0.000	453	0.550	503	2.700
254	0.000	304	0.000	354	0.000	404	0.000	454	0.600	504	2.733
255	0.000	305	0.000	355	0.000	405	0.000	455	0.650	505	2.766
256	0.000	306	0.000	356	0.000	406	0.000	456	0.700	506	2.800
257	0.000	307	0.000	357	0.000	407	0.000	457	0.750	507	2.833
258	0.000	308	0.000	358	0.000	408	0.000	458	0.800	508	2.866
259	0.000	309	0.000	359	0.000	409	0.000	459	0.850	509	2.900
260	0.000	310	0.000	360	0.000	410	0.000	460	0.900	510	2.933
261	0.000	311	0.000	361	0.000	411	0.000	461	0.950	511	2.966
262	0.000	312	0.000	362	0.000	412	0.000	462	1.000	512	3.000
263	0.000	313	0.000	363	0.000	413	0.000	463	1.050	513	3.033
264	0.000	314	0.000	364	0.000	414	0.000	464	1.100	514	3.066
265	0.000	315	0.000	365	0.000	415	0.000	465	1.150	515	3.100
266	0.000	316	0.000	366	0.000	416	0.000	466	1.200	516	3.133
267	0.000	317	0.000	367	0.000	417	0.000	467	1.250	517	3.166
268	0.000	318	0.000	368	0.000	418	0.000	468	1.300	518	3.200
269	0.000	319	0.000	369	0.000	419	0.000	469	1.350	519	3.233
270	0.000	320	0.000	370	0.000	420	0.000	470	1.400	520	3.266
271	0.000	321	0.000	371	0.000	421	0.000	471	1.450	521	3.300
272	0.000	322	0.000	372	0.000	422	0.000	472	1.500	522	3.333
273	0.000	323	0.000	373	0.000	423	0.000	473	1.550	523	3.366
274	0.000	324	0.000	374	0.000	424	0.000	474	1.600	524	3.400
275	0.000	325	0.000	375	0.000	425	0.000	475	1.650	525	3.433
276	0.000	326	0.000	376	0.000	426	0.000	476	1.700	526	3.466
277	0.000	327	0.000	377	0.000	427	0.000	477	1.750	527	3.500
278	0.000	328	0.000	378	0.000	428	0.000	478	1.800	528	3.533
279	0.000	329	0.000	379	0.000	429	0.000	479	1.850	529	3.566
280	0.000	330	0.000	380	0.000	430	0.000	480	1.900	530	3.600
281	0.000	331	0.000	381	0.000	431	0.000	481	1.950	531	3.633
282	0.000	332	0.000	382	0.000	432	0.000	482	2.000	532	3.666
283	0.000	333	0.000	383	0.000	433	0.000	483	2.033	533	3.700
284	0.000	334	0.000	384	0.000	434	0.000	484	2.066	534	3.733
285	0.000	335	0.000	385	0.000	435	0.000	485	2.100	535	3.766
286	0.000	336	0.000	386	0.000	436	0.000	486	2.133	536	3.800
287	0.000	337	0.000	387	0.000	437	0.000	487	2.166	537	3.833
288	0.000	338	0.000	388	0.000	438	0.000	488	2.200	538	3.866
289	0.000	339	0.000	389	0.000	439	0.000	489	2.233	539	3.900
290	0.000	340	0.000	390	0.000	440	0.000	490	2.266	540	3.933
291	0.000	341	0.000	391	0.000	441	0.025	491	2.300	541	3.966
292	0.000	342	0.000	392	0.000	442	0.050	492	2.333	542	4.000
293	0.000	343	0.000	393	0.000	443	0.075	493	2.366	543	4.000
294	0.000	344	0.000	394	0.000	444	0.100	494	2.400	544	4.000
295	0.000	345	0.000	395	0.000	445	0.150	495	2.433	545	4.000
296	0.000	346	0.000	396	0.000	446	0.200	496	2.466	546	4.000

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
547	4.000	597	3.100	647	1.433	697	0.175	747	0.000	797	0.000
548	4.000	598	3.066	648	1.400	698	0.150	748	0.000	798	0.000
549	4.000	599	3.033	649	1.375	699	0.125	749	0.000	799	0.000
550	4.000	600	3.000	650	1.350	700	0.100	750	0.000	800	0.000
551	4.000	601	2.966	651	1.325	701	0.075	751	0.000	801	0.000
552	4.000	602	2.933	652	1.300	702	0.050	752	0.000	802	0.000
553	4.000	603	2.900	653	1.275	703	0.025	753	0.000	803	0.000
554	4.000	604	2.866	654	1.250	704	0.000	754	0.000	804	0.000
555	4.000	605	2.833	655	1.225	705	0.000	755	0.000	805	0.000
556	4.000	606	2.800	656	1.200	706	0.000	756	0.000	806	0.000
557	4.000	607	2.766	657	1.175	707	0.000	757	0.000	807	0.000
558	4.000	608	2.733	658	1.150	708	0.000	758	0.000	808	0.000
559	4.000	609	2.700	659	1.125	709	0.000	759	0.000	809	0.000
560	4.000	610	2.666	660	1.100	710	0.000	760	0.000	810	0.000
561	4.000	611	2.633	661	1.075	711	0.000	761	0.000	811	0.000
562	4.000	612	2.600	662	1.050	712	0.000	762	0.000	812	0.000
563	4.000	613	2.566	663	1.025	713	0.000	763	0.000	813	0.000
564	4.000	614	2.533	664	1.000	714	0.000	764	0.000	814	0.000
565	4.000	615	2.500	665	0.975	715	0.000	765	0.000	815	0.000
566	4.000	616	2.466	666	0.095	716	0.000	766	0.000	816	0.000
567	4.000	617	2.433	667	0.925	717	0.000	767	0.000	817	0.000
568	4.000	618	2.400	668	0.900	718	0.000	768	0.000	818	0.000
569	4.000	619	2.366	669	0.875	719	0.000	769	0.000	819	0.000
570	4.000	620	2.333	670	0.850	720	0.000	770	0.000	820	0.000
571	3.966	621	2.300	671	0.825	721	0.000	771	0.000	821	0.000
572	3.933	622	2.266	672	0.800	722	0.000	772	0.000	822	0.000
573	3.900	623	2.233	673	0.775	723	0.000	773	0.000	823	0.000
574	3.866	624	2.200	674	0.750	724	0.000	774	0.000	824	0.000
575	3.833	625	2.166	675	0.725	725	0.000	775	0.000	825	0.000
576	3.800	626	2.133	676	0.700	726	0.000	776	0.000	826	0.000
577	3.766	627	2.100	677	0.675	727	0.000	777	0.000	827	0.000
578	3.733	628	2.066	678	0.650	728	0.000	778	0.000	828	0.000
579	3.700	629	2.033	679	0.625	729	0.000	779	0.000	829	0.000
580	3.666	630	2.000	680	0.600	730	0.000	780	0.000	830	0.000
581	3.633	631	1.966	681	0.575	731	0.000	781	0.000	831	0.000
582	3.600	632	1.933	682	0.550	732	0.000	782	0.000	832	0.000
583	3.566	633	1.900	683	0.525	733	0.000	783	0.000	833	0.000
584	3.533	634	1.866	684	0.500	734	0.000	784	0.000	834	0.000
585	3.500	635	1.833	685	0.475	735	0.000	785	0.000	835	0.000
586	3.466	636	1.800	686	0.450	736	0.000	786	0.000	836	0.000
587	3.433	637	1.766	687	0.425	737	0.000	787	0.000	837	0.000
588	3.400	638	1.733	688	0.400	738	0.000	788	0.000	838	0.000
589	3.366	639	1.700	689	0.375	739	0.000	789	0.000	839	0.000
590	3.333	640	1.666	690	0.350	740	0.000	790	0.000	840	0.000
591	3.300	641	1.633	691	0.325	741	0.000	791	0.000	841	0.000
592	3.266	642	1.600	692	0.300	742	0.000	792	0.000	842	0.000
593	3.233	643	1.566	693	0.275	743	0.000	793	0.000	843	0.000
594	3.200	644	1.533	694	0.250	744	0.000	794	0.000	844	0.000
595	3.166	645	1.500	695	0.225	745	0.000	795	0.000	845	0.000
596	3.133	646	1.466	696	0.200	746	0.000	796	0.000	846	0.000

Surcharged Outfall Details for Storm

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847	0.000	897	0.000	947	0.000	997	0.000	1047	0.000	1097	0.000
848	0.000	898	0.000	948	0.000	998	0.000	1048	0.000	1098	0.000
849	0.000	899	0.000	949	0.000	999	0.000	1049	0.000	1099	0.000
850	0.000	900	0.000	950	0.000	1000	0.000	1050	0.000	1100	0.000
851	0.000	901	0.000	951	0.000	1001	0.000	1051	0.000	1101	0.000
852	0.000	902	0.000	952	0.000	1002	0.000	1052	0.000	1102	0.000
853	0.000	903	0.000	953	0.000	1003	0.000	1053	0.000	1103	0.000
854	0.000	904	0.000	954	0.000	1004	0.000	1054	0.000	1104	0.000
855	0.000	905	0.000	955	0.000	1005	0.000	1055	0.000	1105	0.000
856	0.000	906	0.000	956	0.000	1006	0.000	1056	0.000	1106	0.000
857	0.000	907	0.000	957	0.000	1007	0.000	1057	0.000	1107	0.000
858	0.000	908	0.000	958	0.000	1008	0.000	1058	0.000	1108	0.000
859	0.000	909	0.000	959	0.000	1009	0.000	1059	0.000	1109	0.000
860	0.000	910	0.000	960	0.000	1010	0.000	1060	0.000	1110	0.000
861	0.000	911	0.000	961	0.000	1011	0.000	1061	0.000	1111	0.000
862	0.000	912	0.000	962	0.000	1012	0.000	1062	0.000	1112	0.000
863	0.000	913	0.000	963	0.000	1013	0.000	1063	0.000	1113	0.000
864	0.000	914	0.000	964	0.000	1014	0.000	1064	0.000	1114	0.000
865	0.000	915	0.000	965	0.000	1015	0.000	1065	0.000	1115	0.000
866	0.000	916	0.000	966	0.000	1016	0.000	1066	0.000	1116	0.000
867	0.000	917	0.000	967	0.000	1017	0.000	1067	0.000	1117	0.000
868	0.000	918	0.000	968	0.000	1018	0.000	1068	0.000	1118	0.000
869	0.000	919	0.000	969	0.000	1019	0.000	1069	0.000	1119	0.000
870	0.000	920	0.000	970	0.000	1020	0.000	1070	0.000	1120	0.000
871	0.000	921	0.000	971	0.000	1021	0.000	1071	0.000	1121	0.000
872	0.000	922	0.000	972	0.000	1022	0.000	1072	0.000	1122	0.000
873	0.000	923	0.000	973	0.000	1023	0.000	1073	0.000	1123	0.000
874	0.000	924	0.000	974	0.000	1024	0.000	1074	0.000	1124	0.000
875	0.000	925	0.000	975	0.000	1025	0.000	1075	0.000	1125	0.000
876	0.000	926	0.000	976	0.000	1026	0.000	1076	0.000	1126	0.000
877	0.000	927	0.000	977	0.000	1027	0.000	1077	0.000	1127	0.000
878	0.000	928	0.000	978	0.000	1028	0.000	1078	0.000	1128	0.000
879	0.000	929	0.000	979	0.000	1029	0.000	1079	0.000	1129	0.000
880	0.000	930	0.000	980	0.000	1030	0.000	1080	0.000	1130	0.000
881	0.000	931	0.000	981	0.000	1031	0.000	1081	0.000	1131	0.000
882	0.000	932	0.000	982	0.000	1032	0.000	1082	0.000	1132	0.000
883	0.000	933	0.000	983	0.000	1033	0.000	1083	0.000	1133	0.000
884	0.000	934	0.000	984	0.000	1034	0.000	1084	0.000	1134	0.000
885	0.000	935	0.000	985	0.000	1035	0.000	1085	0.000	1135	0.000
886	0.000	936	0.000	986	0.000	1036	0.000	1086	0.000	1136	0.000
887	0.000	937	0.000	987	0.000	1037	0.000	1087	0.000	1137	0.000
888	0.000	938	0.000	988	0.000	1038	0.000	1088	0.000	1138	0.000
889	0.000	939	0.000	989	0.000	1039	0.000	1089	0.000	1139	0.000
890	0.000	940	0.000	990	0.000	1040	0.000	1090	0.000	1140	0.000
891	0.000	941	0.000	991	0.000	1041	0.000	1091	0.000	1141	0.000
892	0.000	942	0.000	992	0.000	1042	0.000	1092	0.000	1142	0.000
893	0.000	943	0.000	993	0.000	1043	0.000	1093	0.000	1143	0.000
894	0.000	944	0.000	994	0.000	1044	0.000	1094	0.000	1144	0.000
895	0.000	945	0.000	995	0.000	1045	0.000	1095	0.000	1145	0.000
896	0.000	946	0.000	996	0.000	1046	0.000	1096	0.000	1146	0.000

Surcharged Outfall Details for Storm

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1147	0.000	1196	0.000	1245	0.000	1294	0.000	1343	0.000	1392	0.000
1148	0.000	1197	0.000	1246	0.000	1295	0.000	1344	0.000	1393	0.000
1149	0.000	1198	0.000	1247	0.000	1296	0.000	1345	0.000	1394	0.000
1150	0.000	1199	0.000	1248	0.000	1297	0.000	1346	0.000	1395	0.000
1151	0.000	1200	0.000	1249	0.000	1298	0.000	1347	0.000	1396	0.000
1152	0.000	1201	0.000	1250	0.000	1299	0.000	1348	0.000	1397	0.000
1153	0.000	1202	0.000	1251	0.000	1300	0.000	1349	0.000	1398	0.000
1154	0.000	1203	0.000	1252	0.000	1301	0.000	1350	0.000	1399	0.000
1155	0.000	1204	0.000	1253	0.000	1302	0.000	1351	0.000	1400	0.000
1156	0.000	1205	0.000	1254	0.000	1303	0.000	1352	0.000	1401	0.000
1157	0.000	1206	0.000	1255	0.000	1304	0.000	1353	0.000	1402	0.000
1158	0.000	1207	0.000	1256	0.000	1305	0.000	1354	0.000	1403	0.000
1159	0.000	1208	0.000	1257	0.000	1306	0.000	1355	0.000	1404	0.000
1160	0.000	1209	0.000	1258	0.000	1307	0.000	1356	0.000	1405	0.000
1161	0.000	1210	0.000	1259	0.000	1308	0.000	1357	0.000	1406	0.000
1162	0.000	1211	0.000	1260	0.000	1309	0.000	1358	0.000	1407	0.000
1163	0.000	1212	0.000	1261	0.000	1310	0.000	1359	0.000	1408	0.000
1164	0.000	1213	0.000	1262	0.000	1311	0.000	1360	0.000	1409	0.000
1165	0.000	1214	0.000	1263	0.000	1312	0.000	1361	0.000	1410	0.000
1166	0.000	1215	0.000	1264	0.000	1313	0.000	1362	0.000	1411	0.000
1167	0.000	1216	0.000	1265	0.000	1314	0.000	1363	0.000	1412	0.000
1168	0.000	1217	0.000	1266	0.000	1315	0.000	1364	0.000	1413	0.000
1169	0.000	1218	0.000	1267	0.000	1316	0.000	1365	0.000	1414	0.000
1170	0.000	1219	0.000	1268	0.000	1317	0.000	1366	0.000	1415	0.000
1171	0.000	1220	0.000	1269	0.000	1318	0.000	1367	0.000	1416	0.000
1172	0.000	1221	0.000	1270	0.000	1319	0.000	1368	0.000	1417	0.000
1173	0.000	1222	0.000	1271	0.000	1320	0.000	1369	0.000	1418	0.000
1174	0.000	1223	0.000	1272	0.000	1321	0.000	1370	0.000	1419	0.000
1175	0.000	1224	0.000	1273	0.000	1322	0.000	1371	0.000	1420	0.000
1176	0.000	1225	0.000	1274	0.000	1323	0.000	1372	0.000	1421	0.000
1177	0.000	1226	0.000	1275	0.000	1324	0.000	1373	0.000	1422	0.000
1178	0.000	1227	0.000	1276	0.000	1325	0.000	1374	0.000	1423	0.000
1179	0.000	1228	0.000	1277	0.000	1326	0.000	1375	0.000	1424	0.000
1180	0.000	1229	0.000	1278	0.000	1327	0.000	1376	0.000	1425	0.000
1181	0.000	1230	0.000	1279	0.000	1328	0.000	1377	0.000	1426	0.000
1182	0.000	1231	0.000	1280	0.000	1329	0.000	1378	0.000	1427	0.000
1183	0.000	1232	0.000	1281	0.000	1330	0.000	1379	0.000	1428	0.000
1184	0.000	1233	0.000	1282	0.000	1331	0.000	1380	0.000	1429	0.000
1185	0.000	1234	0.000	1283	0.000	1332	0.000	1381	0.000	1430	0.000
1186	0.000	1235	0.000	1284	0.000	1333	0.000	1382	0.000	1431	0.000
1187	0.000	1236	0.000	1285	0.000	1334	0.000	1383	0.000	1432	0.000
1188	0.000	1237	0.000	1286	0.000	1335	0.000	1384	0.000	1433	0.000
1189	0.000	1238	0.000	1287	0.000	1336	0.000	1385	0.000	1434	0.000
1190	0.000	1239	0.000	1288	0.000	1337	0.000	1386	0.000	1435	0.000
1191	0.000	1240	0.000	1289	0.000	1338	0.000	1387	0.000	1436	0.000
1192	0.000	1241	0.000	1290	0.000	1339	0.000	1388	0.000	1437	0.000
1193	0.000	1242	0.000	1291	0.000	1340	0.000	1389	0.000	1438	0.000
1194	0.000	1243	0.000	1292	0.000	1341	0.000	1390	0.000	1439	0.000
1195	0.000	1244	0.000	1293	0.000	1342	0.000	1391	0.000	1440	0.000

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	720
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	6

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	360
Ratio R	0.351		

Online Controls for Storm

Hydro Brake® Optimum Manhole: 17, DS/PN: 1.008, Volume (m³): 121.2

Unit Reference	MD-SFP-0486-2000-2500-2000
Design Head (m)	2.500
Design Flow (l/s)	200.0
Flush-Flo™	Calculated
Objective	Future Proof
Application	Surface
Sump Available	Yes
Diameter (mm)	486
Invert Level (m)	4.149
Minimum Outlet Pipe Diameter (mm)	500
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.500	200.0
Flush-Flo™	0.727	199.8
Kick-Flo®	1.631	162.4
Mean Flow over Head Range	-	165.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	13.1	1.200	189.8	3.000	218.6	7.000	331.0
0.200	48.0	1.400	181.3	3.500	235.7	7.500	342.4
0.300	96.8	1.600	166.0	4.000	251.6	8.000	353.4
0.400	148.9	1.800	170.4	4.500	266.5	8.500	364.1
0.500	190.8	2.000	179.4	5.000	280.6	9.000	374.5
0.600	198.3	2.200	187.9	5.500	294.1	9.500	384.5
0.800	199.4	2.400	196.0	6.000	306.9		
1.000	195.7	2.600	203.8	6.500	319.2		

Storage Structures for Storm

Tank or Pond Manhole: 16, DS/PN: 1.007

Invert Level (m) 4.209

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2400.0	1.400	2400.0	2.800	0.0	4.200	0.0
0.200	2400.0	1.600	2400.0	3.000	0.0	4.400	0.0
0.400	2400.0	1.800	2400.0	3.200	0.0	4.600	0.0
0.600	2400.0	2.000	2400.0	3.400	0.0	4.800	0.0
0.800	2400.0	2.200	0.0	3.600	0.0	5.000	0.0
1.000	2400.0	2.400	0.0	3.800	0.0		
1.200	2400.0	2.600	0.0	4.000	0.0		

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.355
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	400.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 5, 10, 30
Climate Change (%)	20, 20, 20, 20

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	Swale-1	30 Winter	30	+20%				
1.001	2	30 Winter	30	+20%	5/15 Summer			
1.002	3	30 Winter	30	+20%				
1.003	4	30 Winter	30	+20%				
2.000	5	30 Winter	30	+20%				
1.004	6	30 Winter	30	+20%				
3.000	7	15 Winter	30	+20%	5/15 Summer			
4.000	Swale-8	30 Winter	30	+20%				
4.001	9	30 Winter	30	+20%	5/15 Summer			
4.002	10	30 Winter	30	+20%				
1.005	11	960 Winter	30	+20%	30/960 Winter			
5.000	Swale-12	30 Winter	30	+20%				
5.001	13	30 Winter	30	+20%	30/15 Winter			
5.002	14	30 Winter	30	+20%				
1.006	15	960 Winter	30	+20%				
1.007	16	960 Winter	30	+20%				
1.008	17	960 Winter	30	+20%	30/960 Summer			
1.009	18	960 Summer	30	+20%	5/960 Summer			
6.000	Swale-19	30 Winter	30	+20%				
6.001	20	30 Winter	30	+20%	30/15 Winter			
6.002	21	30 Winter	30	+20%	10/30 Winter			

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	Swale-1	5.977	-0.514	0.000	0.15			250.0	OK
1.001	2	5.933	0.333	0.000	2.12			166.4	SURCHARGED
1.002	3	5.426	-0.324	0.000	0.37			167.4	OK
1.003	4	5.375	-0.125	0.000	0.38			193.0	OK
2.000	5	5.668	-0.007	0.000	0.78			148.3	OK
1.004	6	5.349	-0.003	0.000	0.72			265.9	OK
3.000	7	6.656	0.856	0.000	2.13			109.5	FLOOD RISK
4.000	Swale-8	6.240	-0.551	0.000	0.13			222.3	OK
4.001	9	6.196	0.296	0.000	1.82			144.2	SURCHARGED
4.002	10	5.865	-0.235	0.000	0.68			144.2	OK
1.005	11	5.265	0.013	0.000	0.25			110.7	SURCHARGED
5.000	Swale-12	6.251	-0.740	0.000	0.05			107.8	OK
5.001	13	6.131	0.031	0.000	1.21			95.7	SURCHARGED
5.002	14	5.899	-0.701	0.000	0.11			116.0	OK
1.006	15	5.254	-0.150	0.000	0.09			127.0	OK
1.007	16	5.250	-0.009	0.000	0.23			195.1	OK
1.008	17	5.303	0.104	0.000	0.29			197.9	SURCHARGED
1.009	18	6.463	1.294	0.000	0.23			208.7	SURCHARGED
6.000	Swale-19	6.546	-0.745	0.000	0.03			75.0	OK
6.001	20	6.531	0.131	0.000	0.75			59.2	SURCHARGED
6.002	21	6.498	0.198	0.000	0.93			55.3	SURCHARGED

PN	US/MH Name	Level Exceeded
1.000	Swale-1	
1.001	2	
1.002	3	
1.003	4	
2.000	5	
1.004	6	
3.000	7	
4.000	Swale-8	
4.001	9	
4.002	10	
1.005	11	
5.000	Swale-12	
5.001	13	
5.002	14	
1.006	15	
1.007	16	
1.008	17	
1.009	18	
6.000	Swale-19	
6.001	20	
6.002	21	

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
6.003	22	30 Winter	30	+20%	10/15 Winter			
7.000	Swale-23	30 Winter	30	+20%				
7.001	24	30 Winter	30	+20%				
7.002	25	30 Winter	30	+20%				
8.000	26	30 Winter	30	+20%	5/15 Summer			
9.000	Swale-27	30 Winter	30	+20%				
9.001	28	30 Winter	30	+20%	5/15 Winter			
6.004	29	960 Summer	30	+20%	5/15 Summer			
1.010	30	960 Summer	30	+20%	5/960 Summer			
1.011	31	960 Summer	30	+20%	5/960 Summer			
10.000	32	960 Summer	30	+20%				
10.001	33	960 Summer	30	+20%	30/15 Winter			
10.002	34	960 Summer	30	+20%	5/960 Summer			
11.000	Swale-35	960 Summer	30	+20%				
11.001	36	960 Summer	30	+20%	5/15 Summer			
11.002	37	960 Summer	30	+20%	5/960 Summer			
10.003	38	960 Winter	10	+20%	5/960 Summer			
10.004	39	960 Summer	30	+20%	5/960 Summer			
10.005	40	960 Summer	10	+20%	5/960 Summer			
1.012	41	960 Summer	30	+20%	5/960 Summer			
1.013	42	960 Summer	30	+20%	5/960 Summer			
1.014	43	960 Summer	10	+20%	1/960 Summer			
1.015	44	960 Summer	30	+20%	1/720 Winter	5/960 Summer		

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
6.003	22	6.405	0.230	0.000	1.07			50.8	SURCHARGED
7.000	Swale-23	6.413	-0.778	0.000	0.05			129.0	OK
7.001	24	6.264	-0.036	0.000	0.66			111.7	OK
7.002	25	6.241	-0.004	0.000	0.37			104.4	OK
8.000	26	6.344	0.544	0.000	0.92			70.4	SURCHARGED
9.000	Swale-27	6.381	-0.610	0.000	0.09			161.9	OK
9.001	28	6.345	0.245	0.000	1.52			120.6	SURCHARGED
6.004	29	6.238	0.608	0.000	0.49			77.8	SURCHARGED
1.010	30	6.413	1.213	0.000	0.16			245.8	SURCHARGED
1.011	31	6.438	1.388	0.000	0.17			278.8	SURCHARGED
10.000	32	6.261	-0.064	0.000	0.09			28.7	OK
10.001	33	6.257	0.225	0.000	0.15			45.9	SURCHARGED
10.002	34	6.251	0.464	0.000	0.13			50.7	SURCHARGED
11.000	Swale-35	5.947	-0.644	0.000	0.01			13.5	OK
11.001	36	5.947	0.147	0.000	1.09			25.4	SURCHARGED
11.002	37	6.061	0.278	0.000	0.23			23.6	SURCHARGED
10.003	38	6.292	0.755	0.000	0.19			61.5	SURCHARGED
10.004	39	6.353	1.040	0.000	0.26			82.0	SURCHARGED
10.005	40	6.478	1.365	0.000	0.17			57.8	SURCHARGED
1.012	41	6.475	1.499	0.000	0.25			348.3	SURCHARGED

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.013	42	6.502	1.571	0.000	0.18			357.7	SURCHARGED
1.014	43	6.504	1.746	0.000	0.18			372.6	SURCHARGED
1.015	44	6.513	1.958	16.498	0.31			473.2	FLOOD

PN	US/MH Name	Level Exceeded
6.003	22	
7.000	Swale-23	
7.001	24	
7.002	25	
8.000	26	
9.000	Swale-27	
9.001	28	
6.004	29	
1.010	30	
1.011	31	
10.000	32	
10.001	33	
10.002	34	
11.000	Swale-35	
11.001	36	
11.002	37	
10.003	38	
10.004	39	
10.005	40	
1.012	41	
1.013	42	
1.014	43	
1.015	44	6

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.015	HW-45	5.900	3.152	0.000	1200	0

Datum (m) 2.800 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.000	42	0.000	83	0.000	124	0.000	165	0.000	206	0.000
2	0.000	43	0.000	84	0.000	125	0.000	166	0.000	207	0.000
3	0.000	44	0.000	85	0.000	126	0.000	167	0.000	208	0.000
4	0.000	45	0.000	86	0.000	127	0.000	168	0.000	209	0.000
5	0.000	46	0.000	87	0.000	128	0.000	169	0.000	210	0.000
6	0.000	47	0.000	88	0.000	129	0.000	170	0.000	211	0.000
7	0.000	48	0.000	89	0.000	130	0.000	171	0.000	212	0.000
8	0.000	49	0.000	90	0.000	131	0.000	172	0.000	213	0.000
9	0.000	50	0.000	91	0.000	132	0.000	173	0.000	214	0.000
10	0.000	51	0.000	92	0.000	133	0.000	174	0.000	215	0.000
11	0.000	52	0.000	93	0.000	134	0.000	175	0.000	216	0.000
12	0.000	53	0.000	94	0.000	135	0.000	176	0.000	217	0.000
13	0.000	54	0.000	95	0.000	136	0.000	177	0.000	218	0.000
14	0.000	55	0.000	96	0.000	137	0.000	178	0.000	219	0.000
15	0.000	56	0.000	97	0.000	138	0.000	179	0.000	220	0.000
16	0.000	57	0.000	98	0.000	139	0.000	180	0.000	221	0.000
17	0.000	58	0.000	99	0.000	140	0.000	181	0.000	222	0.000
18	0.000	59	0.000	100	0.000	141	0.000	182	0.000	223	0.000
19	0.000	60	0.000	101	0.000	142	0.000	183	0.000	224	0.000
20	0.000	61	0.000	102	0.000	143	0.000	184	0.000	225	0.000
21	0.000	62	0.000	103	0.000	144	0.000	185	0.000	226	0.000
22	0.000	63	0.000	104	0.000	145	0.000	186	0.000	227	0.000
23	0.000	64	0.000	105	0.000	146	0.000	187	0.000	228	0.000
24	0.000	65	0.000	106	0.000	147	0.000	188	0.000	229	0.000
25	0.000	66	0.000	107	0.000	148	0.000	189	0.000	230	0.000
26	0.000	67	0.000	108	0.000	149	0.000	190	0.000	231	0.000
27	0.000	68	0.000	109	0.000	150	0.000	191	0.000	232	0.000
28	0.000	69	0.000	110	0.000	151	0.000	192	0.000	233	0.000
29	0.000	70	0.000	111	0.000	152	0.000	193	0.000	234	0.000
30	0.000	71	0.000	112	0.000	153	0.000	194	0.000	235	0.000
31	0.000	72	0.000	113	0.000	154	0.000	195	0.000	236	0.000
32	0.000	73	0.000	114	0.000	155	0.000	196	0.000	237	0.000
33	0.000	74	0.000	115	0.000	156	0.000	197	0.000	238	0.000
34	0.000	75	0.000	116	0.000	157	0.000	198	0.000	239	0.000
35	0.000	76	0.000	117	0.000	158	0.000	199	0.000	240	0.000
36	0.000	77	0.000	118	0.000	159	0.000	200	0.000	241	0.000
37	0.000	78	0.000	119	0.000	160	0.000	201	0.000	242	0.000
38	0.000	79	0.000	120	0.000	161	0.000	202	0.000	243	0.000
39	0.000	80	0.000	121	0.000	162	0.000	203	0.000	244	0.000
40	0.000	81	0.000	122	0.000	163	0.000	204	0.000	245	0.000
41	0.000	82	0.000	123	0.000	164	0.000	205	0.000	246	0.000

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
247	0.000	297	0.000	347	0.000	397	0.000	447	0.250	497	2.500
248	0.000	298	0.000	348	0.000	398	0.000	448	0.300	498	2.533
249	0.000	299	0.000	349	0.000	399	0.000	449	0.350	499	2.566
250	0.000	300	0.000	350	0.000	400	0.000	450	0.400	500	2.600
251	0.000	301	0.000	351	0.000	401	0.000	451	0.450	501	2.633
252	0.000	302	0.000	352	0.000	402	0.000	452	0.500	502	2.666
253	0.000	303	0.000	353	0.000	403	0.000	453	0.550	503	2.700
254	0.000	304	0.000	354	0.000	404	0.000	454	0.600	504	2.733
255	0.000	305	0.000	355	0.000	405	0.000	455	0.650	505	2.766
256	0.000	306	0.000	356	0.000	406	0.000	456	0.700	506	2.800
257	0.000	307	0.000	357	0.000	407	0.000	457	0.750	507	2.833
258	0.000	308	0.000	358	0.000	408	0.000	458	0.800	508	2.866
259	0.000	309	0.000	359	0.000	409	0.000	459	0.850	509	2.900
260	0.000	310	0.000	360	0.000	410	0.000	460	0.900	510	2.933
261	0.000	311	0.000	361	0.000	411	0.000	461	0.950	511	2.966
262	0.000	312	0.000	362	0.000	412	0.000	462	1.000	512	3.000
263	0.000	313	0.000	363	0.000	413	0.000	463	1.050	513	3.033
264	0.000	314	0.000	364	0.000	414	0.000	464	1.100	514	3.066
265	0.000	315	0.000	365	0.000	415	0.000	465	1.150	515	3.100
266	0.000	316	0.000	366	0.000	416	0.000	466	1.200	516	3.133
267	0.000	317	0.000	367	0.000	417	0.000	467	1.250	517	3.166
268	0.000	318	0.000	368	0.000	418	0.000	468	1.300	518	3.200
269	0.000	319	0.000	369	0.000	419	0.000	469	1.350	519	3.233
270	0.000	320	0.000	370	0.000	420	0.000	470	1.400	520	3.266
271	0.000	321	0.000	371	0.000	421	0.000	471	1.450	521	3.300
272	0.000	322	0.000	372	0.000	422	0.000	472	1.500	522	3.333
273	0.000	323	0.000	373	0.000	423	0.000	473	1.550	523	3.366
274	0.000	324	0.000	374	0.000	424	0.000	474	1.600	524	3.400
275	0.000	325	0.000	375	0.000	425	0.000	475	1.650	525	3.433
276	0.000	326	0.000	376	0.000	426	0.000	476	1.700	526	3.466
277	0.000	327	0.000	377	0.000	427	0.000	477	1.750	527	3.500
278	0.000	328	0.000	378	0.000	428	0.000	478	1.800	528	3.533
279	0.000	329	0.000	379	0.000	429	0.000	479	1.850	529	3.566
280	0.000	330	0.000	380	0.000	430	0.000	480	1.900	530	3.600
281	0.000	331	0.000	381	0.000	431	0.000	481	1.950	531	3.633
282	0.000	332	0.000	382	0.000	432	0.000	482	2.000	532	3.666
283	0.000	333	0.000	383	0.000	433	0.000	483	2.033	533	3.700
284	0.000	334	0.000	384	0.000	434	0.000	484	2.066	534	3.733
285	0.000	335	0.000	385	0.000	435	0.000	485	2.100	535	3.766
286	0.000	336	0.000	386	0.000	436	0.000	486	2.133	536	3.800
287	0.000	337	0.000	387	0.000	437	0.000	487	2.166	537	3.833
288	0.000	338	0.000	388	0.000	438	0.000	488	2.200	538	3.866
289	0.000	339	0.000	389	0.000	439	0.000	489	2.233	539	3.900
290	0.000	340	0.000	390	0.000	440	0.000	490	2.266	540	3.933
291	0.000	341	0.000	391	0.000	441	0.025	491	2.300	541	3.966
292	0.000	342	0.000	392	0.000	442	0.050	492	2.333	542	4.000
293	0.000	343	0.000	393	0.000	443	0.075	493	2.366	543	4.000
294	0.000	344	0.000	394	0.000	444	0.100	494	2.400	544	4.000
295	0.000	345	0.000	395	0.000	445	0.150	495	2.433	545	4.000
296	0.000	346	0.000	396	0.000	446	0.200	496	2.466	546	4.000

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
547	4.000	597	3.100	647	1.433	697	0.175	747	0.000	797	0.000
548	4.000	598	3.066	648	1.400	698	0.150	748	0.000	798	0.000
549	4.000	599	3.033	649	1.375	699	0.125	749	0.000	799	0.000
550	4.000	600	3.000	650	1.350	700	0.100	750	0.000	800	0.000
551	4.000	601	2.966	651	1.325	701	0.075	751	0.000	801	0.000
552	4.000	602	2.933	652	1.300	702	0.050	752	0.000	802	0.000
553	4.000	603	2.900	653	1.275	703	0.025	753	0.000	803	0.000
554	4.000	604	2.866	654	1.250	704	0.000	754	0.000	804	0.000
555	4.000	605	2.833	655	1.225	705	0.000	755	0.000	805	0.000
556	4.000	606	2.800	656	1.200	706	0.000	756	0.000	806	0.000
557	4.000	607	2.766	657	1.175	707	0.000	757	0.000	807	0.000
558	4.000	608	2.733	658	1.150	708	0.000	758	0.000	808	0.000
559	4.000	609	2.700	659	1.125	709	0.000	759	0.000	809	0.000
560	4.000	610	2.666	660	1.100	710	0.000	760	0.000	810	0.000
561	4.000	611	2.633	661	1.075	711	0.000	761	0.000	811	0.000
562	4.000	612	2.600	662	1.050	712	0.000	762	0.000	812	0.000
563	4.000	613	2.566	663	1.025	713	0.000	763	0.000	813	0.000
564	4.000	614	2.533	664	1.000	714	0.000	764	0.000	814	0.000
565	4.000	615	2.500	665	0.975	715	0.000	765	0.000	815	0.000
566	4.000	616	2.466	666	0.095	716	0.000	766	0.000	816	0.000
567	4.000	617	2.433	667	0.925	717	0.000	767	0.000	817	0.000
568	4.000	618	2.400	668	0.900	718	0.000	768	0.000	818	0.000
569	4.000	619	2.366	669	0.875	719	0.000	769	0.000	819	0.000
570	4.000	620	2.333	670	0.850	720	0.000	770	0.000	820	0.000
571	3.966	621	2.300	671	0.825	721	0.000	771	0.000	821	0.000
572	3.933	622	2.266	672	0.800	722	0.000	772	0.000	822	0.000
573	3.900	623	2.233	673	0.775	723	0.000	773	0.000	823	0.000
574	3.866	624	2.200	674	0.750	724	0.000	774	0.000	824	0.000
575	3.833	625	2.166	675	0.725	725	0.000	775	0.000	825	0.000
576	3.800	626	2.133	676	0.700	726	0.000	776	0.000	826	0.000
577	3.766	627	2.100	677	0.675	727	0.000	777	0.000	827	0.000
578	3.733	628	2.066	678	0.650	728	0.000	778	0.000	828	0.000
579	3.700	629	2.033	679	0.625	729	0.000	779	0.000	829	0.000
580	3.666	630	2.000	680	0.600	730	0.000	780	0.000	830	0.000
581	3.633	631	1.966	681	0.575	731	0.000	781	0.000	831	0.000
582	3.600	632	1.933	682	0.550	732	0.000	782	0.000	832	0.000
583	3.566	633	1.900	683	0.525	733	0.000	783	0.000	833	0.000
584	3.533	634	1.866	684	0.500	734	0.000	784	0.000	834	0.000
585	3.500	635	1.833	685	0.475	735	0.000	785	0.000	835	0.000
586	3.466	636	1.800	686	0.450	736	0.000	786	0.000	836	0.000
587	3.433	637	1.766	687	0.425	737	0.000	787	0.000	837	0.000
588	3.400	638	1.733	688	0.400	738	0.000	788	0.000	838	0.000
589	3.366	639	1.700	689	0.375	739	0.000	789	0.000	839	0.000
590	3.333	640	1.666	690	0.350	740	0.000	790	0.000	840	0.000
591	3.300	641	1.633	691	0.325	741	0.000	791	0.000	841	0.000
592	3.266	642	1.600	692	0.300	742	0.000	792	0.000	842	0.000
593	3.233	643	1.566	693	0.275	743	0.000	793	0.000	843	0.000
594	3.200	644	1.533	694	0.250	744	0.000	794	0.000	844	0.000
595	3.166	645	1.500	695	0.225	745	0.000	795	0.000	845	0.000
596	3.133	646	1.466	696	0.200	746	0.000	796	0.000	846	0.000

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
847	0.000	897	0.000	947	0.000	997	0.000	1047	0.000	1097	0.000
848	0.000	898	0.000	948	0.000	998	0.000	1048	0.000	1098	0.000
849	0.000	899	0.000	949	0.000	999	0.000	1049	0.000	1099	0.000
850	0.000	900	0.000	950	0.000	1000	0.000	1050	0.000	1100	0.000
851	0.000	901	0.000	951	0.000	1001	0.000	1051	0.000	1101	0.000
852	0.000	902	0.000	952	0.000	1002	0.000	1052	0.000	1102	0.000
853	0.000	903	0.000	953	0.000	1003	0.000	1053	0.000	1103	0.000
854	0.000	904	0.000	954	0.000	1004	0.000	1054	0.000	1104	0.000
855	0.000	905	0.000	955	0.000	1005	0.000	1055	0.000	1105	0.000
856	0.000	906	0.000	956	0.000	1006	0.000	1056	0.000	1106	0.000
857	0.000	907	0.000	957	0.000	1007	0.000	1057	0.000	1107	0.000
858	0.000	908	0.000	958	0.000	1008	0.000	1058	0.000	1108	0.000
859	0.000	909	0.000	959	0.000	1009	0.000	1059	0.000	1109	0.000
860	0.000	910	0.000	960	0.000	1010	0.000	1060	0.000	1110	0.000
861	0.000	911	0.000	961	0.000	1011	0.000	1061	0.000	1111	0.000
862	0.000	912	0.000	962	0.000	1012	0.000	1062	0.000	1112	0.000
863	0.000	913	0.000	963	0.000	1013	0.000	1063	0.000	1113	0.000
864	0.000	914	0.000	964	0.000	1014	0.000	1064	0.000	1114	0.000
865	0.000	915	0.000	965	0.000	1015	0.000	1065	0.000	1115	0.000
866	0.000	916	0.000	966	0.000	1016	0.000	1066	0.000	1116	0.000
867	0.000	917	0.000	967	0.000	1017	0.000	1067	0.000	1117	0.000
868	0.000	918	0.000	968	0.000	1018	0.000	1068	0.000	1118	0.000
869	0.000	919	0.000	969	0.000	1019	0.000	1069	0.000	1119	0.000
870	0.000	920	0.000	970	0.000	1020	0.000	1070	0.000	1120	0.000
871	0.000	921	0.000	971	0.000	1021	0.000	1071	0.000	1121	0.000
872	0.000	922	0.000	972	0.000	1022	0.000	1072	0.000	1122	0.000
873	0.000	923	0.000	973	0.000	1023	0.000	1073	0.000	1123	0.000
874	0.000	924	0.000	974	0.000	1024	0.000	1074	0.000	1124	0.000
875	0.000	925	0.000	975	0.000	1025	0.000	1075	0.000	1125	0.000
876	0.000	926	0.000	976	0.000	1026	0.000	1076	0.000	1126	0.000
877	0.000	927	0.000	977	0.000	1027	0.000	1077	0.000	1127	0.000
878	0.000	928	0.000	978	0.000	1028	0.000	1078	0.000	1128	0.000
879	0.000	929	0.000	979	0.000	1029	0.000	1079	0.000	1129	0.000
880	0.000	930	0.000	980	0.000	1030	0.000	1080	0.000	1130	0.000
881	0.000	931	0.000	981	0.000	1031	0.000	1081	0.000	1131	0.000
882	0.000	932	0.000	982	0.000	1032	0.000	1082	0.000	1132	0.000
883	0.000	933	0.000	983	0.000	1033	0.000	1083	0.000	1133	0.000
884	0.000	934	0.000	984	0.000	1034	0.000	1084	0.000	1134	0.000
885	0.000	935	0.000	985	0.000	1035	0.000	1085	0.000	1135	0.000
886	0.000	936	0.000	986	0.000	1036	0.000	1086	0.000	1136	0.000
887	0.000	937	0.000	987	0.000	1037	0.000	1087	0.000	1137	0.000
888	0.000	938	0.000	988	0.000	1038	0.000	1088	0.000	1138	0.000
889	0.000	939	0.000	989	0.000	1039	0.000	1089	0.000	1139	0.000
890	0.000	940	0.000	990	0.000	1040	0.000	1090	0.000	1140	0.000
891	0.000	941	0.000	991	0.000	1041	0.000	1091	0.000	1141	0.000
892	0.000	942	0.000	992	0.000	1042	0.000	1092	0.000	1142	0.000
893	0.000	943	0.000	993	0.000	1043	0.000	1093	0.000	1143	0.000
894	0.000	944	0.000	994	0.000	1044	0.000	1094	0.000	1144	0.000
895	0.000	945	0.000	995	0.000	1045	0.000	1095	0.000	1145	0.000
896	0.000	946	0.000	996	0.000	1046	0.000	1096	0.000	1146	0.000

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1147	0.000	1196	0.000	1245	0.000	1294	0.000	1343	0.000	1392	0.000
1148	0.000	1197	0.000	1246	0.000	1295	0.000	1344	0.000	1393	0.000
1149	0.000	1198	0.000	1247	0.000	1296	0.000	1345	0.000	1394	0.000
1150	0.000	1199	0.000	1248	0.000	1297	0.000	1346	0.000	1395	0.000
1151	0.000	1200	0.000	1249	0.000	1298	0.000	1347	0.000	1396	0.000
1152	0.000	1201	0.000	1250	0.000	1299	0.000	1348	0.000	1397	0.000
1153	0.000	1202	0.000	1251	0.000	1300	0.000	1349	0.000	1398	0.000
1154	0.000	1203	0.000	1252	0.000	1301	0.000	1350	0.000	1399	0.000
1155	0.000	1204	0.000	1253	0.000	1302	0.000	1351	0.000	1400	0.000
1156	0.000	1205	0.000	1254	0.000	1303	0.000	1352	0.000	1401	0.000
1157	0.000	1206	0.000	1255	0.000	1304	0.000	1353	0.000	1402	0.000
1158	0.000	1207	0.000	1256	0.000	1305	0.000	1354	0.000	1403	0.000
1159	0.000	1208	0.000	1257	0.000	1306	0.000	1355	0.000	1404	0.000
1160	0.000	1209	0.000	1258	0.000	1307	0.000	1356	0.000	1405	0.000
1161	0.000	1210	0.000	1259	0.000	1308	0.000	1357	0.000	1406	0.000
1162	0.000	1211	0.000	1260	0.000	1309	0.000	1358	0.000	1407	0.000
1163	0.000	1212	0.000	1261	0.000	1310	0.000	1359	0.000	1408	0.000
1164	0.000	1213	0.000	1262	0.000	1311	0.000	1360	0.000	1409	0.000
1165	0.000	1214	0.000	1263	0.000	1312	0.000	1361	0.000	1410	0.000
1166	0.000	1215	0.000	1264	0.000	1313	0.000	1362	0.000	1411	0.000
1167	0.000	1216	0.000	1265	0.000	1314	0.000	1363	0.000	1412	0.000
1168	0.000	1217	0.000	1266	0.000	1315	0.000	1364	0.000	1413	0.000
1169	0.000	1218	0.000	1267	0.000	1316	0.000	1365	0.000	1414	0.000
1170	0.000	1219	0.000	1268	0.000	1317	0.000	1366	0.000	1415	0.000
1171	0.000	1220	0.000	1269	0.000	1318	0.000	1367	0.000	1416	0.000
1172	0.000	1221	0.000	1270	0.000	1319	0.000	1368	0.000	1417	0.000
1173	0.000	1222	0.000	1271	0.000	1320	0.000	1369	0.000	1418	0.000
1174	0.000	1223	0.000	1272	0.000	1321	0.000	1370	0.000	1419	0.000
1175	0.000	1224	0.000	1273	0.000	1322	0.000	1371	0.000	1420	0.000
1176	0.000	1225	0.000	1274	0.000	1323	0.000	1372	0.000	1421	0.000
1177	0.000	1226	0.000	1275	0.000	1324	0.000	1373	0.000	1422	0.000
1178	0.000	1227	0.000	1276	0.000	1325	0.000	1374	0.000	1423	0.000
1179	0.000	1228	0.000	1277	0.000	1326	0.000	1375	0.000	1424	0.000
1180	0.000	1229	0.000	1278	0.000	1327	0.000	1376	0.000	1425	0.000
1181	0.000	1230	0.000	1279	0.000	1328	0.000	1377	0.000	1426	0.000
1182	0.000	1231	0.000	1280	0.000	1329	0.000	1378	0.000	1427	0.000
1183	0.000	1232	0.000	1281	0.000	1330	0.000	1379	0.000	1428	0.000
1184	0.000	1233	0.000	1282	0.000	1331	0.000	1380	0.000	1429	0.000
1185	0.000	1234	0.000	1283	0.000	1332	0.000	1381	0.000	1430	0.000
1186	0.000	1235	0.000	1284	0.000	1333	0.000	1382	0.000	1431	0.000
1187	0.000	1236	0.000	1285	0.000	1334	0.000	1383	0.000	1432	0.000
1188	0.000	1237	0.000	1286	0.000	1335	0.000	1384	0.000	1433	0.000
1189	0.000	1238	0.000	1287	0.000	1336	0.000	1385	0.000	1434	0.000
1190	0.000	1239	0.000	1288	0.000	1337	0.000	1386	0.000	1435	0.000
1191	0.000	1240	0.000	1289	0.000	1338	0.000	1387	0.000	1436	0.000
1192	0.000	1241	0.000	1290	0.000	1339	0.000	1388	0.000	1437	0.000
1193	0.000	1242	0.000	1291	0.000	1340	0.000	1389	0.000	1438	0.000
1194	0.000	1243	0.000	1292	0.000	1341	0.000	1390	0.000	1439	0.000
1195	0.000	1244	0.000	1293	0.000	1342	0.000	1391	0.000	1440	0.000

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	720
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	6

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	360
Ratio R	0.351		

Online Controls for Storm

Hydro Brake® Optimum Manhole: 17, DS/PN: 1.008, Volume (m³): 121.2

Unit Reference	MD-SFP-0486-2000-2500-2000
Design Head (m)	2.500
Design Flow (l/s)	200.0
Flush-Flo™	Calculated
Objective	Future Proof
Application	Surface
Sump Available	Yes
Diameter (mm)	486
Invert Level (m)	4.149
Minimum Outlet Pipe Diameter (mm)	500
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.500	200.0
Flush-Flo™	0.727	199.8
Kick-Flo®	1.631	162.4
Mean Flow over Head Range	-	165.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	13.1	1.200	189.8	3.000	218.6	7.000	331.0
0.200	48.0	1.400	181.3	3.500	235.7	7.500	342.4
0.300	96.8	1.600	166.0	4.000	251.6	8.000	353.4
0.400	148.9	1.800	170.4	4.500	266.5	8.500	364.1
0.500	190.8	2.000	179.4	5.000	280.6	9.000	374.5
0.600	198.3	2.200	187.9	5.500	294.1	9.500	384.5
0.800	199.4	2.400	196.0	6.000	306.9		
1.000	195.7	2.600	203.8	6.500	319.2		

Storage Structures for Storm

Tank or Pond Manhole: 16, DS/PN: 1.007

Invert Level (m) 4.209

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2400.0	1.400	2400.0	2.800	0.0	4.200	0.0
0.200	2400.0	1.600	2400.0	3.000	0.0	4.400	0.0
0.400	2400.0	1.800	2400.0	3.200	0.0	4.600	0.0
0.600	2400.0	2.000	2400.0	3.400	0.0	4.800	0.0
0.800	2400.0	2.200	0.0	3.600	0.0	5.000	0.0
1.000	2400.0	2.400	0.0	3.800	0.0		
1.200	2400.0	2.600	0.0	4.000	0.0		

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.355
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	400.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 5, 10, 30
Climate Change (%)	40, 40, 40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	Swale-1	30 Winter	30	+40%				
1.001	2	30 Winter	30	+40%	1/15 Winter			
1.002	3	960 Winter	30	+40%				
1.003	4	960 Winter	30	+40%				
2.000	5	30 Winter	30	+40%	30/15 Summer			
1.004	6	960 Winter	30	+40%	30/30 Winter			
3.000	7	15 Winter	30	+40%	5/15 Summer	30/15 Winter		
4.000	Swale-8	30 Winter	30	+40%				
4.001	9	30 Winter	30	+40%	1/30 Winter			
4.002	10	30 Winter	30	+40%				
1.005	11	960 Winter	30	+40%	30/15 Winter			
5.000	Swale-12	30 Winter	30	+40%				
5.001	13	30 Winter	30	+40%	10/30 Winter			
5.002	14	15 Winter	30	+40%				
1.006	15	960 Winter	30	+40%	30/960 Summer			
1.007	16	960 Winter	30	+40%	30/960 Summer			
1.008	17	960 Summer	30	+40%	10/960 Summer	30/960 Summer		
1.009	18	960 Summer	30	+40%	5/960 Summer			
6.000	Swale-19	30 Winter	30	+40%				
6.001	20	30 Winter	30	+40%	10/15 Winter			
6.002	21	30 Winter	30	+40%	5/30 Winter			

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	Swale-1	6.045	-0.446	0.000	0.17			291.5	OK
1.001	2	6.022	0.422	0.000	2.32			182.1	SURCHARGED
1.002	3	5.468	-0.282	0.000	0.09			40.8	OK
1.003	4	5.468	-0.032	0.000	0.09			46.6	OK
2.000	5	5.929	0.254	0.000	0.90			171.9	SURCHARGED
1.004	6	5.445	0.093	0.000	0.20			72.3	SURCHARGED
3.000	7	7.000	1.200	0.333	2.44			125.5	FLOOD
4.000	Swale-8	6.306	-0.485	0.000	0.15			259.2	OK
4.001	9	6.281	0.381	0.000	1.98			157.2	SURCHARGED
4.002	10	5.887	-0.213	0.000	0.74			157.2	OK
1.005	11	5.437	0.185	0.000	0.28			128.1	SURCHARGED
5.000	Swale-12	6.286	-0.705	0.000	0.06			125.8	OK
5.001	13	6.180	0.080	0.000	1.39			110.4	SURCHARGED
5.002	14	5.912	-0.688	0.000	0.12			130.7	OK
1.006	15	5.421	0.017	0.000	0.10			147.6	SURCHARGED
1.007	16	5.416	0.157	0.000	0.28			237.2	SURCHARGED
1.008	17	7.015	1.816	16.567	0.27			186.8	FLOOD
1.009	18	6.424	1.255	0.000	0.21			192.1	SURCHARGED
6.000	Swale-19	6.654	-0.637	0.000	0.03			87.2	OK
6.001	20	6.650	0.250	0.000	0.76			60.5	SURCHARGED
6.002	21	6.614	0.314	0.000	0.95			56.3	SURCHARGED

PN	US/MH Name	Level Exceeded
1.000	Swale-1	
1.001	2	
1.002	3	
1.003	4	
2.000	5	
1.004	6	
3.000	7	1
4.000	Swale-8	
4.001	9	
4.002	10	
1.005	11	
5.000	Swale-12	
5.001	13	
5.002	14	
1.006	15	
1.007	16	
1.008	17	1
1.009	18	
6.000	Swale-19	
6.001	20	
6.002	21	

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
6.003	22	30 Winter	30	+40%	5/15 Winter			
7.000	Swale-23	30 Winter	30	+40%				
7.001	24	30 Winter	30	+40%	30/30 Summer			
7.002	25	30 Winter	30	+40%	30/15 Winter			
8.000	26	30 Winter	30	+40%	5/15 Summer			
9.000	Swale-27	30 Winter	30	+40%				
9.001	28	30 Winter	30	+40%	5/15 Summer			
6.004	29	960 Summer	30	+40%	1/15 Winter			
1.010	30	960 Summer	30	+40%	5/960 Summer			
1.011	31	960 Summer	30	+40%	5/960 Summer			
10.000	32	15 Winter	30	+40%	30/15 Summer			
10.001	33	15 Winter	30	+40%	10/960 Summer			
10.002	34	960 Summer	30	+40%	5/960 Summer			
11.000	Swale-35	960 Summer	30	+40%				
11.001	36	960 Summer	30	+40%	5/15 Summer			
11.002	37	960 Winter	30	+40%	5/960 Summer			
10.003	38	960 Summer	30	+40%	5/960 Summer			
10.004	39	960 Summer	5	+40%	5/960 Summer			
10.005	40	960 Summer	30	+40%	5/960 Summer			
1.012	41	960 Summer	30	+40%	1/960 Winter			
1.013	42	960 Winter	10	+40%	1/960 Summer			
1.014	43	960 Summer	10	+40%	1/960 Summer			
1.015	44	960 Winter	30	+40%	1/720 Summer	5/960 Summer		

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
6.003	22	6.515	0.340	0.000	1.11			53.0	SURCHARGED
7.000	Swale-23	6.462	-0.729	0.000	0.05			150.2	OK
7.001	24	6.373	0.073	0.000	0.67			113.5	SURCHARGED
7.002	25	6.349	0.104	0.000	0.40			113.4	SURCHARGED
8.000	26	6.512	0.712	0.000	1.08			82.6	FLOOD RISK
9.000	Swale-27	6.470	-0.521	0.000	0.10			188.5	OK
9.001	28	6.454	0.354	0.000	1.62			128.4	SURCHARGED
6.004	29	6.298	0.668	0.000	0.57			90.7	SURCHARGED
1.010	30	6.456	1.256	0.000	0.14			211.4	SURCHARGED
1.011	31	6.467	1.417	0.000	0.15			252.7	SURCHARGED
10.000	32	6.632	0.307	0.000	0.78			238.9	SURCHARGED
10.001	33	6.484	0.452	0.000	1.14			358.0	SURCHARGED
10.002	34	6.323	0.536	0.000	0.15			59.2	SURCHARGED
11.000	Swale-35	6.114	-0.477	0.000	0.01			15.8	OK
11.001	36	6.114	0.314	0.000	1.77			41.4	SURCHARGED
11.002	37	6.197	0.414	0.000	0.50			51.7	SURCHARGED
10.003	38	6.321	0.784	0.000	0.26			83.5	SURCHARGED
10.004	39	6.393	1.080	0.000	0.18			56.1	SURCHARGED
10.005	40	6.403	1.290	0.000	0.25			87.3	SURCHARGED
1.012	41	6.470	1.494	0.000	0.24			329.9	SURCHARGED

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.013	42	6.481	1.550	0.000	0.19			372.1	SURCHARGED
1.014	43	6.504	1.746	0.000	0.20			405.2	SURCHARGED
1.015	44	6.522	1.967	25.833	0.30			464.1	FLOOD

PN	US/MH Name	Level Exceeded
6.003	22	
7.000	Swale-23	
7.001	24	
7.002	25	
8.000	26	
9.000	Swale-27	
9.001	28	
6.004	29	
1.010	30	
1.011	31	
10.000	32	
10.001	33	
10.002	34	
11.000	Swale-35	
11.001	36	
11.002	37	
10.003	38	
10.004	39	
10.005	40	
1.012	41	
1.013	42	
1.014	43	
1.015	44	8

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.015	HW-45	5.900	3.152	0.000	1200	0

Datum (m) 2.800 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.000	42	0.000	83	0.000	124	0.000	165	0.000	206	0.000
2	0.000	43	0.000	84	0.000	125	0.000	166	0.000	207	0.000
3	0.000	44	0.000	85	0.000	126	0.000	167	0.000	208	0.000
4	0.000	45	0.000	86	0.000	127	0.000	168	0.000	209	0.000
5	0.000	46	0.000	87	0.000	128	0.000	169	0.000	210	0.000
6	0.000	47	0.000	88	0.000	129	0.000	170	0.000	211	0.000
7	0.000	48	0.000	89	0.000	130	0.000	171	0.000	212	0.000
8	0.000	49	0.000	90	0.000	131	0.000	172	0.000	213	0.000
9	0.000	50	0.000	91	0.000	132	0.000	173	0.000	214	0.000
10	0.000	51	0.000	92	0.000	133	0.000	174	0.000	215	0.000
11	0.000	52	0.000	93	0.000	134	0.000	175	0.000	216	0.000
12	0.000	53	0.000	94	0.000	135	0.000	176	0.000	217	0.000
13	0.000	54	0.000	95	0.000	136	0.000	177	0.000	218	0.000
14	0.000	55	0.000	96	0.000	137	0.000	178	0.000	219	0.000
15	0.000	56	0.000	97	0.000	138	0.000	179	0.000	220	0.000
16	0.000	57	0.000	98	0.000	139	0.000	180	0.000	221	0.000
17	0.000	58	0.000	99	0.000	140	0.000	181	0.000	222	0.000
18	0.000	59	0.000	100	0.000	141	0.000	182	0.000	223	0.000
19	0.000	60	0.000	101	0.000	142	0.000	183	0.000	224	0.000
20	0.000	61	0.000	102	0.000	143	0.000	184	0.000	225	0.000
21	0.000	62	0.000	103	0.000	144	0.000	185	0.000	226	0.000
22	0.000	63	0.000	104	0.000	145	0.000	186	0.000	227	0.000
23	0.000	64	0.000	105	0.000	146	0.000	187	0.000	228	0.000
24	0.000	65	0.000	106	0.000	147	0.000	188	0.000	229	0.000
25	0.000	66	0.000	107	0.000	148	0.000	189	0.000	230	0.000
26	0.000	67	0.000	108	0.000	149	0.000	190	0.000	231	0.000
27	0.000	68	0.000	109	0.000	150	0.000	191	0.000	232	0.000
28	0.000	69	0.000	110	0.000	151	0.000	192	0.000	233	0.000
29	0.000	70	0.000	111	0.000	152	0.000	193	0.000	234	0.000
30	0.000	71	0.000	112	0.000	153	0.000	194	0.000	235	0.000
31	0.000	72	0.000	113	0.000	154	0.000	195	0.000	236	0.000
32	0.000	73	0.000	114	0.000	155	0.000	196	0.000	237	0.000
33	0.000	74	0.000	115	0.000	156	0.000	197	0.000	238	0.000
34	0.000	75	0.000	116	0.000	157	0.000	198	0.000	239	0.000
35	0.000	76	0.000	117	0.000	158	0.000	199	0.000	240	0.000
36	0.000	77	0.000	118	0.000	159	0.000	200	0.000	241	0.000
37	0.000	78	0.000	119	0.000	160	0.000	201	0.000	242	0.000
38	0.000	79	0.000	120	0.000	161	0.000	202	0.000	243	0.000
39	0.000	80	0.000	121	0.000	162	0.000	203	0.000	244	0.000
40	0.000	81	0.000	122	0.000	163	0.000	204	0.000	245	0.000
41	0.000	82	0.000	123	0.000	164	0.000	205	0.000	246	0.000

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
247	0.000	297	0.000	347	0.000	397	0.000	447	0.250	497	2.500
248	0.000	298	0.000	348	0.000	398	0.000	448	0.300	498	2.533
249	0.000	299	0.000	349	0.000	399	0.000	449	0.350	499	2.566
250	0.000	300	0.000	350	0.000	400	0.000	450	0.400	500	2.600
251	0.000	301	0.000	351	0.000	401	0.000	451	0.450	501	2.633
252	0.000	302	0.000	352	0.000	402	0.000	452	0.500	502	2.666
253	0.000	303	0.000	353	0.000	403	0.000	453	0.550	503	2.700
254	0.000	304	0.000	354	0.000	404	0.000	454	0.600	504	2.733
255	0.000	305	0.000	355	0.000	405	0.000	455	0.650	505	2.766
256	0.000	306	0.000	356	0.000	406	0.000	456	0.700	506	2.800
257	0.000	307	0.000	357	0.000	407	0.000	457	0.750	507	2.833
258	0.000	308	0.000	358	0.000	408	0.000	458	0.800	508	2.866
259	0.000	309	0.000	359	0.000	409	0.000	459	0.850	509	2.900
260	0.000	310	0.000	360	0.000	410	0.000	460	0.900	510	2.933
261	0.000	311	0.000	361	0.000	411	0.000	461	0.950	511	2.966
262	0.000	312	0.000	362	0.000	412	0.000	462	1.000	512	3.000
263	0.000	313	0.000	363	0.000	413	0.000	463	1.050	513	3.033
264	0.000	314	0.000	364	0.000	414	0.000	464	1.100	514	3.066
265	0.000	315	0.000	365	0.000	415	0.000	465	1.150	515	3.100
266	0.000	316	0.000	366	0.000	416	0.000	466	1.200	516	3.133
267	0.000	317	0.000	367	0.000	417	0.000	467	1.250	517	3.166
268	0.000	318	0.000	368	0.000	418	0.000	468	1.300	518	3.200
269	0.000	319	0.000	369	0.000	419	0.000	469	1.350	519	3.233
270	0.000	320	0.000	370	0.000	420	0.000	470	1.400	520	3.266
271	0.000	321	0.000	371	0.000	421	0.000	471	1.450	521	3.300
272	0.000	322	0.000	372	0.000	422	0.000	472	1.500	522	3.333
273	0.000	323	0.000	373	0.000	423	0.000	473	1.550	523	3.366
274	0.000	324	0.000	374	0.000	424	0.000	474	1.600	524	3.400
275	0.000	325	0.000	375	0.000	425	0.000	475	1.650	525	3.433
276	0.000	326	0.000	376	0.000	426	0.000	476	1.700	526	3.466
277	0.000	327	0.000	377	0.000	427	0.000	477	1.750	527	3.500
278	0.000	328	0.000	378	0.000	428	0.000	478	1.800	528	3.533
279	0.000	329	0.000	379	0.000	429	0.000	479	1.850	529	3.566
280	0.000	330	0.000	380	0.000	430	0.000	480	1.900	530	3.600
281	0.000	331	0.000	381	0.000	431	0.000	481	1.950	531	3.633
282	0.000	332	0.000	382	0.000	432	0.000	482	2.000	532	3.666
283	0.000	333	0.000	383	0.000	433	0.000	483	2.033	533	3.700
284	0.000	334	0.000	384	0.000	434	0.000	484	2.066	534	3.733
285	0.000	335	0.000	385	0.000	435	0.000	485	2.100	535	3.766
286	0.000	336	0.000	386	0.000	436	0.000	486	2.133	536	3.800
287	0.000	337	0.000	387	0.000	437	0.000	487	2.166	537	3.833
288	0.000	338	0.000	388	0.000	438	0.000	488	2.200	538	3.866
289	0.000	339	0.000	389	0.000	439	0.000	489	2.233	539	3.900
290	0.000	340	0.000	390	0.000	440	0.000	490	2.266	540	3.933
291	0.000	341	0.000	391	0.000	441	0.025	491	2.300	541	3.966
292	0.000	342	0.000	392	0.000	442	0.050	492	2.333	542	4.000
293	0.000	343	0.000	393	0.000	443	0.075	493	2.366	543	4.000
294	0.000	344	0.000	394	0.000	444	0.100	494	2.400	544	4.000
295	0.000	345	0.000	395	0.000	445	0.150	495	2.433	545	4.000
296	0.000	346	0.000	396	0.000	446	0.200	496	2.466	546	4.000

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
547	4.000	597	3.100	647	1.433	697	0.175	747	0.000	797	0.000
548	4.000	598	3.066	648	1.400	698	0.150	748	0.000	798	0.000
549	4.000	599	3.033	649	1.375	699	0.125	749	0.000	799	0.000
550	4.000	600	3.000	650	1.350	700	0.100	750	0.000	800	0.000
551	4.000	601	2.966	651	1.325	701	0.075	751	0.000	801	0.000
552	4.000	602	2.933	652	1.300	702	0.050	752	0.000	802	0.000
553	4.000	603	2.900	653	1.275	703	0.025	753	0.000	803	0.000
554	4.000	604	2.866	654	1.250	704	0.000	754	0.000	804	0.000
555	4.000	605	2.833	655	1.225	705	0.000	755	0.000	805	0.000
556	4.000	606	2.800	656	1.200	706	0.000	756	0.000	806	0.000
557	4.000	607	2.766	657	1.175	707	0.000	757	0.000	807	0.000
558	4.000	608	2.733	658	1.150	708	0.000	758	0.000	808	0.000
559	4.000	609	2.700	659	1.125	709	0.000	759	0.000	809	0.000
560	4.000	610	2.666	660	1.100	710	0.000	760	0.000	810	0.000
561	4.000	611	2.633	661	1.075	711	0.000	761	0.000	811	0.000
562	4.000	612	2.600	662	1.050	712	0.000	762	0.000	812	0.000
563	4.000	613	2.566	663	1.025	713	0.000	763	0.000	813	0.000
564	4.000	614	2.533	664	1.000	714	0.000	764	0.000	814	0.000
565	4.000	615	2.500	665	0.975	715	0.000	765	0.000	815	0.000
566	4.000	616	2.466	666	0.095	716	0.000	766	0.000	816	0.000
567	4.000	617	2.433	667	0.925	717	0.000	767	0.000	817	0.000
568	4.000	618	2.400	668	0.900	718	0.000	768	0.000	818	0.000
569	4.000	619	2.366	669	0.875	719	0.000	769	0.000	819	0.000
570	4.000	620	2.333	670	0.850	720	0.000	770	0.000	820	0.000
571	3.966	621	2.300	671	0.825	721	0.000	771	0.000	821	0.000
572	3.933	622	2.266	672	0.800	722	0.000	772	0.000	822	0.000
573	3.900	623	2.233	673	0.775	723	0.000	773	0.000	823	0.000
574	3.866	624	2.200	674	0.750	724	0.000	774	0.000	824	0.000
575	3.833	625	2.166	675	0.725	725	0.000	775	0.000	825	0.000
576	3.800	626	2.133	676	0.700	726	0.000	776	0.000	826	0.000
577	3.766	627	2.100	677	0.675	727	0.000	777	0.000	827	0.000
578	3.733	628	2.066	678	0.650	728	0.000	778	0.000	828	0.000
579	3.700	629	2.033	679	0.625	729	0.000	779	0.000	829	0.000
580	3.666	630	2.000	680	0.600	730	0.000	780	0.000	830	0.000
581	3.633	631	1.966	681	0.575	731	0.000	781	0.000	831	0.000
582	3.600	632	1.933	682	0.550	732	0.000	782	0.000	832	0.000
583	3.566	633	1.900	683	0.525	733	0.000	783	0.000	833	0.000
584	3.533	634	1.866	684	0.500	734	0.000	784	0.000	834	0.000
585	3.500	635	1.833	685	0.475	735	0.000	785	0.000	835	0.000
586	3.466	636	1.800	686	0.450	736	0.000	786	0.000	836	0.000
587	3.433	637	1.766	687	0.425	737	0.000	787	0.000	837	0.000
588	3.400	638	1.733	688	0.400	738	0.000	788	0.000	838	0.000
589	3.366	639	1.700	689	0.375	739	0.000	789	0.000	839	0.000
590	3.333	640	1.666	690	0.350	740	0.000	790	0.000	840	0.000
591	3.300	641	1.633	691	0.325	741	0.000	791	0.000	841	0.000
592	3.266	642	1.600	692	0.300	742	0.000	792	0.000	842	0.000
593	3.233	643	1.566	693	0.275	743	0.000	793	0.000	843	0.000
594	3.200	644	1.533	694	0.250	744	0.000	794	0.000	844	0.000
595	3.166	645	1.500	695	0.225	745	0.000	795	0.000	845	0.000
596	3.133	646	1.466	696	0.200	746	0.000	796	0.000	846	0.000

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
847	0.000	897	0.000	947	0.000	997	0.000	1047	0.000	1097	0.000
848	0.000	898	0.000	948	0.000	998	0.000	1048	0.000	1098	0.000
849	0.000	899	0.000	949	0.000	999	0.000	1049	0.000	1099	0.000
850	0.000	900	0.000	950	0.000	1000	0.000	1050	0.000	1100	0.000
851	0.000	901	0.000	951	0.000	1001	0.000	1051	0.000	1101	0.000
852	0.000	902	0.000	952	0.000	1002	0.000	1052	0.000	1102	0.000
853	0.000	903	0.000	953	0.000	1003	0.000	1053	0.000	1103	0.000
854	0.000	904	0.000	954	0.000	1004	0.000	1054	0.000	1104	0.000
855	0.000	905	0.000	955	0.000	1005	0.000	1055	0.000	1105	0.000
856	0.000	906	0.000	956	0.000	1006	0.000	1056	0.000	1106	0.000
857	0.000	907	0.000	957	0.000	1007	0.000	1057	0.000	1107	0.000
858	0.000	908	0.000	958	0.000	1008	0.000	1058	0.000	1108	0.000
859	0.000	909	0.000	959	0.000	1009	0.000	1059	0.000	1109	0.000
860	0.000	910	0.000	960	0.000	1010	0.000	1060	0.000	1110	0.000
861	0.000	911	0.000	961	0.000	1011	0.000	1061	0.000	1111	0.000
862	0.000	912	0.000	962	0.000	1012	0.000	1062	0.000	1112	0.000
863	0.000	913	0.000	963	0.000	1013	0.000	1063	0.000	1113	0.000
864	0.000	914	0.000	964	0.000	1014	0.000	1064	0.000	1114	0.000
865	0.000	915	0.000	965	0.000	1015	0.000	1065	0.000	1115	0.000
866	0.000	916	0.000	966	0.000	1016	0.000	1066	0.000	1116	0.000
867	0.000	917	0.000	967	0.000	1017	0.000	1067	0.000	1117	0.000
868	0.000	918	0.000	968	0.000	1018	0.000	1068	0.000	1118	0.000
869	0.000	919	0.000	969	0.000	1019	0.000	1069	0.000	1119	0.000
870	0.000	920	0.000	970	0.000	1020	0.000	1070	0.000	1120	0.000
871	0.000	921	0.000	971	0.000	1021	0.000	1071	0.000	1121	0.000
872	0.000	922	0.000	972	0.000	1022	0.000	1072	0.000	1122	0.000
873	0.000	923	0.000	973	0.000	1023	0.000	1073	0.000	1123	0.000
874	0.000	924	0.000	974	0.000	1024	0.000	1074	0.000	1124	0.000
875	0.000	925	0.000	975	0.000	1025	0.000	1075	0.000	1125	0.000
876	0.000	926	0.000	976	0.000	1026	0.000	1076	0.000	1126	0.000
877	0.000	927	0.000	977	0.000	1027	0.000	1077	0.000	1127	0.000
878	0.000	928	0.000	978	0.000	1028	0.000	1078	0.000	1128	0.000
879	0.000	929	0.000	979	0.000	1029	0.000	1079	0.000	1129	0.000
880	0.000	930	0.000	980	0.000	1030	0.000	1080	0.000	1130	0.000
881	0.000	931	0.000	981	0.000	1031	0.000	1081	0.000	1131	0.000
882	0.000	932	0.000	982	0.000	1032	0.000	1082	0.000	1132	0.000
883	0.000	933	0.000	983	0.000	1033	0.000	1083	0.000	1133	0.000
884	0.000	934	0.000	984	0.000	1034	0.000	1084	0.000	1134	0.000
885	0.000	935	0.000	985	0.000	1035	0.000	1085	0.000	1135	0.000
886	0.000	936	0.000	986	0.000	1036	0.000	1086	0.000	1136	0.000
887	0.000	937	0.000	987	0.000	1037	0.000	1087	0.000	1137	0.000
888	0.000	938	0.000	988	0.000	1038	0.000	1088	0.000	1138	0.000
889	0.000	939	0.000	989	0.000	1039	0.000	1089	0.000	1139	0.000
890	0.000	940	0.000	990	0.000	1040	0.000	1090	0.000	1140	0.000
891	0.000	941	0.000	991	0.000	1041	0.000	1091	0.000	1141	0.000
892	0.000	942	0.000	992	0.000	1042	0.000	1092	0.000	1142	0.000
893	0.000	943	0.000	993	0.000	1043	0.000	1093	0.000	1143	0.000
894	0.000	944	0.000	994	0.000	1044	0.000	1094	0.000	1144	0.000
895	0.000	945	0.000	995	0.000	1045	0.000	1095	0.000	1145	0.000
896	0.000	946	0.000	996	0.000	1046	0.000	1096	0.000	1146	0.000

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1147	0.000	1196	0.000	1245	0.000	1294	0.000	1343	0.000	1392	0.000
1148	0.000	1197	0.000	1246	0.000	1295	0.000	1344	0.000	1393	0.000
1149	0.000	1198	0.000	1247	0.000	1296	0.000	1345	0.000	1394	0.000
1150	0.000	1199	0.000	1248	0.000	1297	0.000	1346	0.000	1395	0.000
1151	0.000	1200	0.000	1249	0.000	1298	0.000	1347	0.000	1396	0.000
1152	0.000	1201	0.000	1250	0.000	1299	0.000	1348	0.000	1397	0.000
1153	0.000	1202	0.000	1251	0.000	1300	0.000	1349	0.000	1398	0.000
1154	0.000	1203	0.000	1252	0.000	1301	0.000	1350	0.000	1399	0.000
1155	0.000	1204	0.000	1253	0.000	1302	0.000	1351	0.000	1400	0.000
1156	0.000	1205	0.000	1254	0.000	1303	0.000	1352	0.000	1401	0.000
1157	0.000	1206	0.000	1255	0.000	1304	0.000	1353	0.000	1402	0.000
1158	0.000	1207	0.000	1256	0.000	1305	0.000	1354	0.000	1403	0.000
1159	0.000	1208	0.000	1257	0.000	1306	0.000	1355	0.000	1404	0.000
1160	0.000	1209	0.000	1258	0.000	1307	0.000	1356	0.000	1405	0.000
1161	0.000	1210	0.000	1259	0.000	1308	0.000	1357	0.000	1406	0.000
1162	0.000	1211	0.000	1260	0.000	1309	0.000	1358	0.000	1407	0.000
1163	0.000	1212	0.000	1261	0.000	1310	0.000	1359	0.000	1408	0.000
1164	0.000	1213	0.000	1262	0.000	1311	0.000	1360	0.000	1409	0.000
1165	0.000	1214	0.000	1263	0.000	1312	0.000	1361	0.000	1410	0.000
1166	0.000	1215	0.000	1264	0.000	1313	0.000	1362	0.000	1411	0.000
1167	0.000	1216	0.000	1265	0.000	1314	0.000	1363	0.000	1412	0.000
1168	0.000	1217	0.000	1266	0.000	1315	0.000	1364	0.000	1413	0.000
1169	0.000	1218	0.000	1267	0.000	1316	0.000	1365	0.000	1414	0.000
1170	0.000	1219	0.000	1268	0.000	1317	0.000	1366	0.000	1415	0.000
1171	0.000	1220	0.000	1269	0.000	1318	0.000	1367	0.000	1416	0.000
1172	0.000	1221	0.000	1270	0.000	1319	0.000	1368	0.000	1417	0.000
1173	0.000	1222	0.000	1271	0.000	1320	0.000	1369	0.000	1418	0.000
1174	0.000	1223	0.000	1272	0.000	1321	0.000	1370	0.000	1419	0.000
1175	0.000	1224	0.000	1273	0.000	1322	0.000	1371	0.000	1420	0.000
1176	0.000	1225	0.000	1274	0.000	1323	0.000	1372	0.000	1421	0.000
1177	0.000	1226	0.000	1275	0.000	1324	0.000	1373	0.000	1422	0.000
1178	0.000	1227	0.000	1276	0.000	1325	0.000	1374	0.000	1423	0.000
1179	0.000	1228	0.000	1277	0.000	1326	0.000	1375	0.000	1424	0.000
1180	0.000	1229	0.000	1278	0.000	1327	0.000	1376	0.000	1425	0.000
1181	0.000	1230	0.000	1279	0.000	1328	0.000	1377	0.000	1426	0.000
1182	0.000	1231	0.000	1280	0.000	1329	0.000	1378	0.000	1427	0.000
1183	0.000	1232	0.000	1281	0.000	1330	0.000	1379	0.000	1428	0.000
1184	0.000	1233	0.000	1282	0.000	1331	0.000	1380	0.000	1429	0.000
1185	0.000	1234	0.000	1283	0.000	1332	0.000	1381	0.000	1430	0.000
1186	0.000	1235	0.000	1284	0.000	1333	0.000	1382	0.000	1431	0.000
1187	0.000	1236	0.000	1285	0.000	1334	0.000	1383	0.000	1432	0.000
1188	0.000	1237	0.000	1286	0.000	1335	0.000	1384	0.000	1433	0.000
1189	0.000	1238	0.000	1287	0.000	1336	0.000	1385	0.000	1434	0.000
1190	0.000	1239	0.000	1288	0.000	1337	0.000	1386	0.000	1435	0.000
1191	0.000	1240	0.000	1289	0.000	1338	0.000	1387	0.000	1436	0.000
1192	0.000	1241	0.000	1290	0.000	1339	0.000	1388	0.000	1437	0.000
1193	0.000	1242	0.000	1291	0.000	1340	0.000	1389	0.000	1438	0.000
1194	0.000	1243	0.000	1292	0.000	1341	0.000	1390	0.000	1439	0.000
1195	0.000	1244	0.000	1293	0.000	1342	0.000	1391	0.000	1440	0.000

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	720
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	6

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	360
Ratio R	0.351		

Online Controls for Storm

Hydro Brake® Optimum Manhole: 17, DS/PN: 1.008, Volume (m³): 121.2

Unit Reference	MD-SFP-0486-2000-2500-2000
Design Head (m)	2.500
Design Flow (l/s)	200.0
Flush-Flo™	Calculated
Objective	Future Proof
Application	Surface
Sump Available	Yes
Diameter (mm)	486
Invert Level (m)	4.149
Minimum Outlet Pipe Diameter (mm)	500
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.500	200.0
Flush-Flo™	0.727	199.8
Kick-Flo®	1.631	162.4
Mean Flow over Head Range	-	165.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	13.1	1.200	189.8	3.000	218.6	7.000	331.0
0.200	48.0	1.400	181.3	3.500	235.7	7.500	342.4
0.300	96.8	1.600	166.0	4.000	251.6	8.000	353.4
0.400	148.9	1.800	170.4	4.500	266.5	8.500	364.1
0.500	190.8	2.000	179.4	5.000	280.6	9.000	374.5
0.600	198.3	2.200	187.9	5.500	294.1	9.500	384.5
0.800	199.4	2.400	196.0	6.000	306.9		
1.000	195.7	2.600	203.8	6.500	319.2		

Storage Structures for Storm

Tank or Pond Manhole: 16, DS/PN: 1.007

Invert Level (m) 4.209

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2400.0	1.400	2400.0	2.800	0.0	4.200	0.0
0.200	2400.0	1.600	2400.0	3.000	0.0	4.400	0.0
0.400	2400.0	1.800	2400.0	3.200	0.0	4.600	0.0
0.600	2400.0	2.000	2400.0	3.400	0.0	4.800	0.0
0.800	2400.0	2.200	0.0	3.600	0.0	5.000	0.0
1.000	2400.0	2.400	0.0	3.800	0.0		
1.200	2400.0	2.600	0.0	4.000	0.0		

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.355
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	400.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 100
Climate Change (%)	20, 20

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	Swale-1	30 Winter	100	+20%				
1.001	2	30 Winter	100	+20%	100/15 Summer			
1.002	3	960 Winter	100	+20%				
1.003	4	960 Winter	100	+20%	100/960 Summer			
2.000	5	30 Winter	100	+20%	100/15 Summer			
1.004	6	960 Winter	100	+20%	100/15 Winter			
3.000	7	15 Winter	100	+20%	100/15 Summer	100/15 Summer		
4.000	Swale-8	30 Winter	100	+20%				
4.001	9	30 Winter	100	+20%	100/15 Summer			
4.002	10	30 Winter	100	+20%				
1.005	11	960 Winter	100	+20%	100/15 Summer			
5.000	Swale-12	30 Winter	100	+20%				
5.001	13	30 Winter	100	+20%	100/15 Summer			
5.002	14	15 Winter	100	+20%				
1.006	15	960 Winter	100	+20%	100/960 Summer			
1.007	16	960 Winter	100	+20%	100/960 Summer			
1.008	17	960 Summer	100	+20%	100/720 Winter	100/960 Summer		
1.009	18	960 Summer	100	+20%	100/600 Winter			
6.000	Swale-19	30 Winter	100	+20%				
6.001	20	30 Winter	100	+20%	100/15 Summer			
6.002	21	30 Winter	100	+20%	100/15 Summer			

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	Swale-1	6.109	-0.382	0.000	0.19			325.7	OK
1.001	2	6.096	0.496	0.000	2.47			194.3	SURCHARGED
1.002	3	5.544	-0.206	0.000	0.10			44.7	OK
1.003	4	5.544	0.044	0.000	0.10			51.0	SURCHARGED
2.000	5	6.140	0.465	0.000	1.01			192.8	SURCHARGED
1.004	6	5.537	0.185	0.000	0.21			78.7	SURCHARGED
3.000	7	7.004	1.204	4.206	2.44			125.6	FLOOD
4.000	Swale-8	6.362	-0.429	0.000	0.17			289.6	OK
4.001	9	6.348	0.448	0.000	2.11			166.9	SURCHARGED
4.002	10	5.904	-0.196	0.000	0.79			166.9	OK
1.005	11	5.531	0.279	0.000	0.31			139.5	SURCHARGED
5.000	Swale-12	6.311	-0.680	0.000	0.07			140.6	OK
5.001	13	6.220	0.120	0.000	1.53			121.3	SURCHARGED
5.002	14	5.923	-0.677	0.000	0.13			143.5	OK
1.006	15	5.513	0.109	0.000	0.11			161.3	SURCHARGED
1.007	16	5.509	0.250	0.000	0.27			231.2	SURCHARGED
1.008	17	7.012	1.813	24.796	0.27			185.5	FLOOD
1.009	18	6.452	1.283	0.000	0.20			189.3	SURCHARGED
6.000	Swale-19	6.742	-0.549	0.000	0.03			97.2	OK
6.001	20	6.740	0.340	0.000	0.77			61.0	SURCHARGED
6.002	21	6.702	0.402	0.000	0.97			57.5	SURCHARGED

PN	US/MH Name	Level Exceeded
1.000	Swale-1	
1.001	2	
1.002	3	
1.003	4	
2.000	5	
1.004	6	
3.000	7	4
4.000	Swale-8	
4.001	9	
4.002	10	
1.005	11	
5.000	Swale-12	
5.001	13	
5.002	14	
1.006	15	
1.007	16	
1.008	17	2
1.009	18	
6.000	Swale-19	
6.001	20	
6.002	21	

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
6.003	22	30 Winter	100	+20%	100/15 Summer		
7.000	Swale-23	30 Winter	100	+20%			
7.001	24	30 Winter	100	+20%	100/15 Winter		
7.002	25	960 Winter	100	+20%	100/15 Summer		
8.000	26	30 Winter	100	+20%	100/15 Summer		
9.000	Swale-27	30 Winter	100	+20%			
9.001	28	30 Winter	100	+20%	100/15 Summer		
6.004	29	960 Summer	100	+20%	100/15 Summer		
1.010	30	960 Summer	100	+20%	100/600 Winter		
1.011	31	960 Summer	100	+20%	100/600 Winter		
10.000	32	15 Winter	100	+20%	100/15 Summer		
10.001	33	15 Winter	100	+20%	100/15 Summer		
10.002	34	960 Summer	100	+20%	100/15 Summer		
11.000	Swale-35	960 Summer	100	+20%			
11.001	36	960 Summer	100	+20%	100/15 Summer		
11.002	37	960 Summer	100	+20%	100/15 Summer		
10.003	38	960 Summer	100	+20%	100/15 Summer		
10.004	39	960 Summer	100	+20%	100/15 Summer		
10.005	40	960 Summer	100	+20%	100/15 Summer		
1.012	41	960 Summer	100	+20%	100/600 Summer		
1.013	42	960 Winter	100	+20%	100/600 Summer		
1.014	43	960 Winter	100	+20%	1/960 Summer		
1.015	44	960 Summer	100	+20%	1/720 Winter	100/720 Summer	

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
6.003	22		6.598	0.423	0.000	1.15			54.9
7.000	Swale-23		6.511	-0.680	0.000	0.06			167.4
7.001	24		6.459	0.159	0.000	0.71			120.7
7.002	25		6.441	0.196	0.000	0.11			31.4
8.000	26		6.658	0.858	0.000	1.21			92.7
9.000	Swale-27		6.547	-0.444	0.000	0.11			210.5
9.001	28		6.540	0.440	0.000	1.69			134.0
6.004	29		6.374	0.744	0.000	0.66			105.4
1.010	30		6.487	1.287	0.000	0.14			219.4
1.011	31		6.493	1.443	0.000	0.16			265.0
10.000	32		7.040	0.715	0.000	0.87			267.8
10.001	33		6.868	0.836	0.000	1.27			399.6
10.002	34		6.478	0.691	0.000	0.17			64.7
11.000	Swale-35		6.291	-0.300	0.000	0.01			17.3
11.001	36		6.290	0.490	0.000	2.40			56.2
11.002	37		6.366	0.583	0.000	0.57			59.4
10.003	38		6.470	0.933	0.000	0.32			102.8
10.004	39		6.479	1.166	0.000	0.33			105.1
10.005	40		6.479	1.366	0.000	0.31			107.8
1.012	41		6.508	1.532	0.000	0.25			345.4

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
1.013	42		6.518	1.587	0.000	0.20			390.6
1.014	43		6.520	1.762	0.000	0.21			420.2
1.015	44		6.529	1.974	32.138	0.28			435.5

PN	US/MH Name	Status	Level Exceeded
6.003	22	SURCHARGED	
7.000	Swale-23	OK	
7.001	24	SURCHARGED	
7.002	25	SURCHARGED	
8.000	26	FLOOD RISK	
9.000	Swale-27	OK	
9.001	28	SURCHARGED	
6.004	29	SURCHARGED	
1.010	30	SURCHARGED	
1.011	31	SURCHARGED	
10.000	32	FLOOD RISK	
10.001	33	FLOOD RISK	
10.002	34	SURCHARGED	
11.000	Swale-35	OK	
11.001	36	SURCHARGED	
11.002	37	FLOOD RISK	
10.003	38	SURCHARGED	
10.004	39	SURCHARGED	
10.005	40	SURCHARGED	
1.012	41	SURCHARGED	
1.013	42	SURCHARGED	
1.014	43	SURCHARGED	
1.015	44	FLOOD	3

Surcharged Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.015	HW-45	5.900	3.152	0.000	1200	0

Datum (m) 2.800 Offset (mins) 0

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1	0.000	42	0.000	83	0.000	124	0.000	165	0.000	206	0.000
2	0.000	43	0.000	84	0.000	125	0.000	166	0.000	207	0.000
3	0.000	44	0.000	85	0.000	126	0.000	167	0.000	208	0.000
4	0.000	45	0.000	86	0.000	127	0.000	168	0.000	209	0.000
5	0.000	46	0.000	87	0.000	128	0.000	169	0.000	210	0.000
6	0.000	47	0.000	88	0.000	129	0.000	170	0.000	211	0.000
7	0.000	48	0.000	89	0.000	130	0.000	171	0.000	212	0.000
8	0.000	49	0.000	90	0.000	131	0.000	172	0.000	213	0.000
9	0.000	50	0.000	91	0.000	132	0.000	173	0.000	214	0.000
10	0.000	51	0.000	92	0.000	133	0.000	174	0.000	215	0.000
11	0.000	52	0.000	93	0.000	134	0.000	175	0.000	216	0.000
12	0.000	53	0.000	94	0.000	135	0.000	176	0.000	217	0.000
13	0.000	54	0.000	95	0.000	136	0.000	177	0.000	218	0.000
14	0.000	55	0.000	96	0.000	137	0.000	178	0.000	219	0.000
15	0.000	56	0.000	97	0.000	138	0.000	179	0.000	220	0.000
16	0.000	57	0.000	98	0.000	139	0.000	180	0.000	221	0.000
17	0.000	58	0.000	99	0.000	140	0.000	181	0.000	222	0.000
18	0.000	59	0.000	100	0.000	141	0.000	182	0.000	223	0.000
19	0.000	60	0.000	101	0.000	142	0.000	183	0.000	224	0.000
20	0.000	61	0.000	102	0.000	143	0.000	184	0.000	225	0.000
21	0.000	62	0.000	103	0.000	144	0.000	185	0.000	226	0.000
22	0.000	63	0.000	104	0.000	145	0.000	186	0.000	227	0.000
23	0.000	64	0.000	105	0.000	146	0.000	187	0.000	228	0.000
24	0.000	65	0.000	106	0.000	147	0.000	188	0.000	229	0.000
25	0.000	66	0.000	107	0.000	148	0.000	189	0.000	230	0.000
26	0.000	67	0.000	108	0.000	149	0.000	190	0.000	231	0.000
27	0.000	68	0.000	109	0.000	150	0.000	191	0.000	232	0.000
28	0.000	69	0.000	110	0.000	151	0.000	192	0.000	233	0.000
29	0.000	70	0.000	111	0.000	152	0.000	193	0.000	234	0.000
30	0.000	71	0.000	112	0.000	153	0.000	194	0.000	235	0.000
31	0.000	72	0.000	113	0.000	154	0.000	195	0.000	236	0.000
32	0.000	73	0.000	114	0.000	155	0.000	196	0.000	237	0.000
33	0.000	74	0.000	115	0.000	156	0.000	197	0.000	238	0.000
34	0.000	75	0.000	116	0.000	157	0.000	198	0.000	239	0.000
35	0.000	76	0.000	117	0.000	158	0.000	199	0.000	240	0.000
36	0.000	77	0.000	118	0.000	159	0.000	200	0.000	241	0.000
37	0.000	78	0.000	119	0.000	160	0.000	201	0.000	242	0.000
38	0.000	79	0.000	120	0.000	161	0.000	202	0.000	243	0.000
39	0.000	80	0.000	121	0.000	162	0.000	203	0.000	244	0.000
40	0.000	81	0.000	122	0.000	163	0.000	204	0.000	245	0.000
41	0.000	82	0.000	123	0.000	164	0.000	205	0.000	246	0.000

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
247	0.000	297	0.000	347	0.000	397	0.000	447	0.250	497	2.500
248	0.000	298	0.000	348	0.000	398	0.000	448	0.300	498	2.533
249	0.000	299	0.000	349	0.000	399	0.000	449	0.350	499	2.566
250	0.000	300	0.000	350	0.000	400	0.000	450	0.400	500	2.600
251	0.000	301	0.000	351	0.000	401	0.000	451	0.450	501	2.633
252	0.000	302	0.000	352	0.000	402	0.000	452	0.500	502	2.666
253	0.000	303	0.000	353	0.000	403	0.000	453	0.550	503	2.700
254	0.000	304	0.000	354	0.000	404	0.000	454	0.600	504	2.733
255	0.000	305	0.000	355	0.000	405	0.000	455	0.650	505	2.766
256	0.000	306	0.000	356	0.000	406	0.000	456	0.700	506	2.800
257	0.000	307	0.000	357	0.000	407	0.000	457	0.750	507	2.833
258	0.000	308	0.000	358	0.000	408	0.000	458	0.800	508	2.866
259	0.000	309	0.000	359	0.000	409	0.000	459	0.850	509	2.900
260	0.000	310	0.000	360	0.000	410	0.000	460	0.900	510	2.933
261	0.000	311	0.000	361	0.000	411	0.000	461	0.950	511	2.966
262	0.000	312	0.000	362	0.000	412	0.000	462	1.000	512	3.000
263	0.000	313	0.000	363	0.000	413	0.000	463	1.050	513	3.033
264	0.000	314	0.000	364	0.000	414	0.000	464	1.100	514	3.066
265	0.000	315	0.000	365	0.000	415	0.000	465	1.150	515	3.100
266	0.000	316	0.000	366	0.000	416	0.000	466	1.200	516	3.133
267	0.000	317	0.000	367	0.000	417	0.000	467	1.250	517	3.166
268	0.000	318	0.000	368	0.000	418	0.000	468	1.300	518	3.200
269	0.000	319	0.000	369	0.000	419	0.000	469	1.350	519	3.233
270	0.000	320	0.000	370	0.000	420	0.000	470	1.400	520	3.266
271	0.000	321	0.000	371	0.000	421	0.000	471	1.450	521	3.300
272	0.000	322	0.000	372	0.000	422	0.000	472	1.500	522	3.333
273	0.000	323	0.000	373	0.000	423	0.000	473	1.550	523	3.366
274	0.000	324	0.000	374	0.000	424	0.000	474	1.600	524	3.400
275	0.000	325	0.000	375	0.000	425	0.000	475	1.650	525	3.433
276	0.000	326	0.000	376	0.000	426	0.000	476	1.700	526	3.466
277	0.000	327	0.000	377	0.000	427	0.000	477	1.750	527	3.500
278	0.000	328	0.000	378	0.000	428	0.000	478	1.800	528	3.533
279	0.000	329	0.000	379	0.000	429	0.000	479	1.850	529	3.566
280	0.000	330	0.000	380	0.000	430	0.000	480	1.900	530	3.600
281	0.000	331	0.000	381	0.000	431	0.000	481	1.950	531	3.633
282	0.000	332	0.000	382	0.000	432	0.000	482	2.000	532	3.666
283	0.000	333	0.000	383	0.000	433	0.000	483	2.033	533	3.700
284	0.000	334	0.000	384	0.000	434	0.000	484	2.066	534	3.733
285	0.000	335	0.000	385	0.000	435	0.000	485	2.100	535	3.766
286	0.000	336	0.000	386	0.000	436	0.000	486	2.133	536	3.800
287	0.000	337	0.000	387	0.000	437	0.000	487	2.166	537	3.833
288	0.000	338	0.000	388	0.000	438	0.000	488	2.200	538	3.866
289	0.000	339	0.000	389	0.000	439	0.000	489	2.233	539	3.900
290	0.000	340	0.000	390	0.000	440	0.000	490	2.266	540	3.933
291	0.000	341	0.000	391	0.000	441	0.025	491	2.300	541	3.966
292	0.000	342	0.000	392	0.000	442	0.050	492	2.333	542	4.000
293	0.000	343	0.000	393	0.000	443	0.075	493	2.366	543	4.000
294	0.000	344	0.000	394	0.000	444	0.100	494	2.400	544	4.000
295	0.000	345	0.000	395	0.000	445	0.150	495	2.433	545	4.000
296	0.000	346	0.000	396	0.000	446	0.200	496	2.466	546	4.000

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
547	4.000	597	3.100	647	1.433	697	0.175	747	0.000	797	0.000
548	4.000	598	3.066	648	1.400	698	0.150	748	0.000	798	0.000
549	4.000	599	3.033	649	1.375	699	0.125	749	0.000	799	0.000
550	4.000	600	3.000	650	1.350	700	0.100	750	0.000	800	0.000
551	4.000	601	2.966	651	1.325	701	0.075	751	0.000	801	0.000
552	4.000	602	2.933	652	1.300	702	0.050	752	0.000	802	0.000
553	4.000	603	2.900	653	1.275	703	0.025	753	0.000	803	0.000
554	4.000	604	2.866	654	1.250	704	0.000	754	0.000	804	0.000
555	4.000	605	2.833	655	1.225	705	0.000	755	0.000	805	0.000
556	4.000	606	2.800	656	1.200	706	0.000	756	0.000	806	0.000
557	4.000	607	2.766	657	1.175	707	0.000	757	0.000	807	0.000
558	4.000	608	2.733	658	1.150	708	0.000	758	0.000	808	0.000
559	4.000	609	2.700	659	1.125	709	0.000	759	0.000	809	0.000
560	4.000	610	2.666	660	1.100	710	0.000	760	0.000	810	0.000
561	4.000	611	2.633	661	1.075	711	0.000	761	0.000	811	0.000
562	4.000	612	2.600	662	1.050	712	0.000	762	0.000	812	0.000
563	4.000	613	2.566	663	1.025	713	0.000	763	0.000	813	0.000
564	4.000	614	2.533	664	1.000	714	0.000	764	0.000	814	0.000
565	4.000	615	2.500	665	0.975	715	0.000	765	0.000	815	0.000
566	4.000	616	2.466	666	0.095	716	0.000	766	0.000	816	0.000
567	4.000	617	2.433	667	0.925	717	0.000	767	0.000	817	0.000
568	4.000	618	2.400	668	0.900	718	0.000	768	0.000	818	0.000
569	4.000	619	2.366	669	0.875	719	0.000	769	0.000	819	0.000
570	4.000	620	2.333	670	0.850	720	0.000	770	0.000	820	0.000
571	3.966	621	2.300	671	0.825	721	0.000	771	0.000	821	0.000
572	3.933	622	2.266	672	0.800	722	0.000	772	0.000	822	0.000
573	3.900	623	2.233	673	0.775	723	0.000	773	0.000	823	0.000
574	3.866	624	2.200	674	0.750	724	0.000	774	0.000	824	0.000
575	3.833	625	2.166	675	0.725	725	0.000	775	0.000	825	0.000
576	3.800	626	2.133	676	0.700	726	0.000	776	0.000	826	0.000
577	3.766	627	2.100	677	0.675	727	0.000	777	0.000	827	0.000
578	3.733	628	2.066	678	0.650	728	0.000	778	0.000	828	0.000
579	3.700	629	2.033	679	0.625	729	0.000	779	0.000	829	0.000
580	3.666	630	2.000	680	0.600	730	0.000	780	0.000	830	0.000
581	3.633	631	1.966	681	0.575	731	0.000	781	0.000	831	0.000
582	3.600	632	1.933	682	0.550	732	0.000	782	0.000	832	0.000
583	3.566	633	1.900	683	0.525	733	0.000	783	0.000	833	0.000
584	3.533	634	1.866	684	0.500	734	0.000	784	0.000	834	0.000
585	3.500	635	1.833	685	0.475	735	0.000	785	0.000	835	0.000
586	3.466	636	1.800	686	0.450	736	0.000	786	0.000	836	0.000
587	3.433	637	1.766	687	0.425	737	0.000	787	0.000	837	0.000
588	3.400	638	1.733	688	0.400	738	0.000	788	0.000	838	0.000
589	3.366	639	1.700	689	0.375	739	0.000	789	0.000	839	0.000
590	3.333	640	1.666	690	0.350	740	0.000	790	0.000	840	0.000
591	3.300	641	1.633	691	0.325	741	0.000	791	0.000	841	0.000
592	3.266	642	1.600	692	0.300	742	0.000	792	0.000	842	0.000
593	3.233	643	1.566	693	0.275	743	0.000	793	0.000	843	0.000
594	3.200	644	1.533	694	0.250	744	0.000	794	0.000	844	0.000
595	3.166	645	1.500	695	0.225	745	0.000	795	0.000	845	0.000
596	3.133	646	1.466	696	0.200	746	0.000	796	0.000	846	0.000

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
847	0.000	897	0.000	947	0.000	997	0.000	1047	0.000	1097	0.000
848	0.000	898	0.000	948	0.000	998	0.000	1048	0.000	1098	0.000
849	0.000	899	0.000	949	0.000	999	0.000	1049	0.000	1099	0.000
850	0.000	900	0.000	950	0.000	1000	0.000	1050	0.000	1100	0.000
851	0.000	901	0.000	951	0.000	1001	0.000	1051	0.000	1101	0.000
852	0.000	902	0.000	952	0.000	1002	0.000	1052	0.000	1102	0.000
853	0.000	903	0.000	953	0.000	1003	0.000	1053	0.000	1103	0.000
854	0.000	904	0.000	954	0.000	1004	0.000	1054	0.000	1104	0.000
855	0.000	905	0.000	955	0.000	1005	0.000	1055	0.000	1105	0.000
856	0.000	906	0.000	956	0.000	1006	0.000	1056	0.000	1106	0.000
857	0.000	907	0.000	957	0.000	1007	0.000	1057	0.000	1107	0.000
858	0.000	908	0.000	958	0.000	1008	0.000	1058	0.000	1108	0.000
859	0.000	909	0.000	959	0.000	1009	0.000	1059	0.000	1109	0.000
860	0.000	910	0.000	960	0.000	1010	0.000	1060	0.000	1110	0.000
861	0.000	911	0.000	961	0.000	1011	0.000	1061	0.000	1111	0.000
862	0.000	912	0.000	962	0.000	1012	0.000	1062	0.000	1112	0.000
863	0.000	913	0.000	963	0.000	1013	0.000	1063	0.000	1113	0.000
864	0.000	914	0.000	964	0.000	1014	0.000	1064	0.000	1114	0.000
865	0.000	915	0.000	965	0.000	1015	0.000	1065	0.000	1115	0.000
866	0.000	916	0.000	966	0.000	1016	0.000	1066	0.000	1116	0.000
867	0.000	917	0.000	967	0.000	1017	0.000	1067	0.000	1117	0.000
868	0.000	918	0.000	968	0.000	1018	0.000	1068	0.000	1118	0.000
869	0.000	919	0.000	969	0.000	1019	0.000	1069	0.000	1119	0.000
870	0.000	920	0.000	970	0.000	1020	0.000	1070	0.000	1120	0.000
871	0.000	921	0.000	971	0.000	1021	0.000	1071	0.000	1121	0.000
872	0.000	922	0.000	972	0.000	1022	0.000	1072	0.000	1122	0.000
873	0.000	923	0.000	973	0.000	1023	0.000	1073	0.000	1123	0.000
874	0.000	924	0.000	974	0.000	1024	0.000	1074	0.000	1124	0.000
875	0.000	925	0.000	975	0.000	1025	0.000	1075	0.000	1125	0.000
876	0.000	926	0.000	976	0.000	1026	0.000	1076	0.000	1126	0.000
877	0.000	927	0.000	977	0.000	1027	0.000	1077	0.000	1127	0.000
878	0.000	928	0.000	978	0.000	1028	0.000	1078	0.000	1128	0.000
879	0.000	929	0.000	979	0.000	1029	0.000	1079	0.000	1129	0.000
880	0.000	930	0.000	980	0.000	1030	0.000	1080	0.000	1130	0.000
881	0.000	931	0.000	981	0.000	1031	0.000	1081	0.000	1131	0.000
882	0.000	932	0.000	982	0.000	1032	0.000	1082	0.000	1132	0.000
883	0.000	933	0.000	983	0.000	1033	0.000	1083	0.000	1133	0.000
884	0.000	934	0.000	984	0.000	1034	0.000	1084	0.000	1134	0.000
885	0.000	935	0.000	985	0.000	1035	0.000	1085	0.000	1135	0.000
886	0.000	936	0.000	986	0.000	1036	0.000	1086	0.000	1136	0.000
887	0.000	937	0.000	987	0.000	1037	0.000	1087	0.000	1137	0.000
888	0.000	938	0.000	988	0.000	1038	0.000	1088	0.000	1138	0.000
889	0.000	939	0.000	989	0.000	1039	0.000	1089	0.000	1139	0.000
890	0.000	940	0.000	990	0.000	1040	0.000	1090	0.000	1140	0.000
891	0.000	941	0.000	991	0.000	1041	0.000	1091	0.000	1141	0.000
892	0.000	942	0.000	992	0.000	1042	0.000	1092	0.000	1142	0.000
893	0.000	943	0.000	993	0.000	1043	0.000	1093	0.000	1143	0.000
894	0.000	944	0.000	994	0.000	1044	0.000	1094	0.000	1144	0.000
895	0.000	945	0.000	995	0.000	1045	0.000	1095	0.000	1145	0.000
896	0.000	946	0.000	996	0.000	1046	0.000	1096	0.000	1146	0.000

Surcharged Outfall Details for Storm

Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
1147	0.000	1196	0.000	1245	0.000	1294	0.000	1343	0.000	1392	0.000
1148	0.000	1197	0.000	1246	0.000	1295	0.000	1344	0.000	1393	0.000
1149	0.000	1198	0.000	1247	0.000	1296	0.000	1345	0.000	1394	0.000
1150	0.000	1199	0.000	1248	0.000	1297	0.000	1346	0.000	1395	0.000
1151	0.000	1200	0.000	1249	0.000	1298	0.000	1347	0.000	1396	0.000
1152	0.000	1201	0.000	1250	0.000	1299	0.000	1348	0.000	1397	0.000
1153	0.000	1202	0.000	1251	0.000	1300	0.000	1349	0.000	1398	0.000
1154	0.000	1203	0.000	1252	0.000	1301	0.000	1350	0.000	1399	0.000
1155	0.000	1204	0.000	1253	0.000	1302	0.000	1351	0.000	1400	0.000
1156	0.000	1205	0.000	1254	0.000	1303	0.000	1352	0.000	1401	0.000
1157	0.000	1206	0.000	1255	0.000	1304	0.000	1353	0.000	1402	0.000
1158	0.000	1207	0.000	1256	0.000	1305	0.000	1354	0.000	1403	0.000
1159	0.000	1208	0.000	1257	0.000	1306	0.000	1355	0.000	1404	0.000
1160	0.000	1209	0.000	1258	0.000	1307	0.000	1356	0.000	1405	0.000
1161	0.000	1210	0.000	1259	0.000	1308	0.000	1357	0.000	1406	0.000
1162	0.000	1211	0.000	1260	0.000	1309	0.000	1358	0.000	1407	0.000
1163	0.000	1212	0.000	1261	0.000	1310	0.000	1359	0.000	1408	0.000
1164	0.000	1213	0.000	1262	0.000	1311	0.000	1360	0.000	1409	0.000
1165	0.000	1214	0.000	1263	0.000	1312	0.000	1361	0.000	1410	0.000
1166	0.000	1215	0.000	1264	0.000	1313	0.000	1362	0.000	1411	0.000
1167	0.000	1216	0.000	1265	0.000	1314	0.000	1363	0.000	1412	0.000
1168	0.000	1217	0.000	1266	0.000	1315	0.000	1364	0.000	1413	0.000
1169	0.000	1218	0.000	1267	0.000	1316	0.000	1365	0.000	1414	0.000
1170	0.000	1219	0.000	1268	0.000	1317	0.000	1366	0.000	1415	0.000
1171	0.000	1220	0.000	1269	0.000	1318	0.000	1367	0.000	1416	0.000
1172	0.000	1221	0.000	1270	0.000	1319	0.000	1368	0.000	1417	0.000
1173	0.000	1222	0.000	1271	0.000	1320	0.000	1369	0.000	1418	0.000
1174	0.000	1223	0.000	1272	0.000	1321	0.000	1370	0.000	1419	0.000
1175	0.000	1224	0.000	1273	0.000	1322	0.000	1371	0.000	1420	0.000
1176	0.000	1225	0.000	1274	0.000	1323	0.000	1372	0.000	1421	0.000
1177	0.000	1226	0.000	1275	0.000	1324	0.000	1373	0.000	1422	0.000
1178	0.000	1227	0.000	1276	0.000	1325	0.000	1374	0.000	1423	0.000
1179	0.000	1228	0.000	1277	0.000	1326	0.000	1375	0.000	1424	0.000
1180	0.000	1229	0.000	1278	0.000	1327	0.000	1376	0.000	1425	0.000
1181	0.000	1230	0.000	1279	0.000	1328	0.000	1377	0.000	1426	0.000
1182	0.000	1231	0.000	1280	0.000	1329	0.000	1378	0.000	1427	0.000
1183	0.000	1232	0.000	1281	0.000	1330	0.000	1379	0.000	1428	0.000
1184	0.000	1233	0.000	1282	0.000	1331	0.000	1380	0.000	1429	0.000
1185	0.000	1234	0.000	1283	0.000	1332	0.000	1381	0.000	1430	0.000
1186	0.000	1235	0.000	1284	0.000	1333	0.000	1382	0.000	1431	0.000
1187	0.000	1236	0.000	1285	0.000	1334	0.000	1383	0.000	1432	0.000
1188	0.000	1237	0.000	1286	0.000	1335	0.000	1384	0.000	1433	0.000
1189	0.000	1238	0.000	1287	0.000	1336	0.000	1385	0.000	1434	0.000
1190	0.000	1239	0.000	1288	0.000	1337	0.000	1386	0.000	1435	0.000
1191	0.000	1240	0.000	1289	0.000	1338	0.000	1387	0.000	1436	0.000
1192	0.000	1241	0.000	1290	0.000	1339	0.000	1388	0.000	1437	0.000
1193	0.000	1242	0.000	1291	0.000	1340	0.000	1389	0.000	1438	0.000
1194	0.000	1243	0.000	1292	0.000	1341	0.000	1390	0.000	1439	0.000
1195	0.000	1244	0.000	1293	0.000	1342	0.000	1391	0.000	1440	0.000

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.840	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	0.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	720
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	6

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Winter
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	360
Ratio R	0.351		

Online Controls for Storm

Hydro Brake® Optimum Manhole: 17, DS/PN: 1.008, Volume (m³): 121.2

Unit Reference	MD-SFP-0486-2000-2500-2000
Design Head (m)	2.500
Design Flow (l/s)	200.0
Flush-Flo™	Calculated
Objective	Future Proof
Application	Surface
Sump Available	Yes
Diameter (mm)	486
Invert Level (m)	4.149
Minimum Outlet Pipe Diameter (mm)	500
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.500	200.0
Flush-Flo™	0.727	199.8
Kick-Flo®	1.631	162.4
Mean Flow over Head Range	-	165.3

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	13.1	1.200	189.8	3.000	218.6	7.000	331.0
0.200	48.0	1.400	181.3	3.500	235.7	7.500	342.4
0.300	96.8	1.600	166.0	4.000	251.6	8.000	353.4
0.400	148.9	1.800	170.4	4.500	266.5	8.500	364.1
0.500	190.8	2.000	179.4	5.000	280.6	9.000	374.5
0.600	198.3	2.200	187.9	5.500	294.1	9.500	384.5
0.800	199.4	2.400	196.0	6.000	306.9		
1.000	195.7	2.600	203.8	6.500	319.2		

Storage Structures for Storm

Tank or Pond Manhole: 16, DS/PN: 1.007

Invert Level (m) 4.209

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2400.0	1.400	2400.0	2.800	0.0	4.200	0.0
0.200	2400.0	1.600	2400.0	3.000	0.0	4.400	0.0
0.400	2400.0	1.800	2400.0	3.200	0.0	4.600	0.0
0.600	2400.0	2.000	2400.0	3.400	0.0	4.800	0.0
0.800	2400.0	2.200	0.0	3.600	0.0	5.000	0.0
1.000	2400.0	2.400	0.0	3.800	0.0		
1.200	2400.0	2.600	0.0	4.000	0.0		

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	0.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model		FSR	Ratio R 0.355
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	400.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 100
Climate Change (%)	40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
1.000	Swale-1	30 Winter	100	+40%				
1.001	2	30 Winter	100	+40%	1/15 Winter			
1.002	3	960 Winter	100	+40%				
1.003	4	960 Winter	100	+40%	100/30 Summer			
2.000	5	30 Winter	100	+40%	100/15 Summer			
1.004	6	960 Winter	100	+40%	100/15 Summer			
3.000	7	15 Winter	100	+40%	100/15 Summer	100/15 Summer		
4.000	Swale-8	30 Winter	100	+40%				
4.001	9	30 Winter	100	+40%	1/30 Winter			
4.002	10	30 Winter	100	+40%				
1.005	11	960 Winter	100	+40%	100/15 Summer			
5.000	Swale-12	30 Winter	100	+40%				
5.001	13	30 Winter	100	+40%	100/15 Summer			
5.002	14	15 Winter	100	+40%				
1.006	15	960 Winter	100	+40%	100/960 Summer			
1.007	16	960 Winter	100	+40%	100/720 Winter			
1.008	17	960 Summer	100	+40%	100/600 Winter	100/720 Winter		
1.009	18	960 Summer	100	+40%	100/600 Winter			
6.000	Swale-19	30 Winter	100	+40%				
6.001	20	30 Winter	100	+40%	100/15 Summer			
6.002	21	960 Winter	100	+40%	100/15 Summer			

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status
1.000	Swale-1	6.231	-0.260	0.000	0.22			379.6	OK
1.001	2	6.222	0.622	0.000	2.71			213.3	SURCHARGED
1.002	3	5.723	-0.027	0.000	0.12			52.1	OK
1.003	4	5.723	0.223	0.000	0.12			59.1	SURCHARGED
2.000	5	6.515	0.840	0.000	1.18			225.0	SURCHARGED
1.004	6	5.719	0.367	0.000	0.25			91.1	SURCHARGED
3.000	7	7.014	1.214	13.542	2.45			125.9	FLOOD
4.000	Swale-8	6.458	-0.333	0.000	0.20			337.8	OK
4.001	9	6.451	0.551	0.000	2.28			181.0	SURCHARGED
4.002	10	5.928	-0.172	0.000	0.86			181.0	OK
1.005	11	5.708	0.456	0.000	0.36			161.8	SURCHARGED
5.000	Swale-12	6.350	-0.641	0.000	0.08			164.0	OK
5.001	13	6.284	0.184	0.000	1.73			136.9	SURCHARGED
5.002	14	5.940	-0.660	0.000	0.15			164.6	OK
1.006	15	5.695	0.291	0.000	0.13			186.6	SURCHARGED
1.007	16	5.690	0.431	0.000	0.30			256.0	SURCHARGED
1.008	17	7.031	1.832	30.956	0.27			184.6	FLOOD
1.009	18	6.591	1.422	0.000	0.20			189.8	SURCHARGED
6.000	Swale-19	6.873	-0.418	0.000	0.04			113.3	OK
6.001	20	6.870	0.470	0.000	0.77			61.0	SURCHARGED
6.002	21	6.836	0.536	0.000	0.38			22.2	SURCHARGED

PN	US/MH Name	Level Exceeded
1.000	Swale-1	
1.001	2	
1.002	3	
1.003	4	
2.000	5	
1.004	6	
3.000	7	5
4.000	Swale-8	
4.001	9	
4.002	10	
1.005	11	
5.000	Swale-12	
5.001	13	
5.002	14	
1.006	15	
1.007	16	
1.008	17	2
1.009	18	
6.000	Swale-19	
6.001	20	
6.002	21	

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow
6.003	22	30 Winter	100	+40%	100/15 Summer		
7.000	Swale-23	30 Winter	100	+40%			
7.001	24	30 Winter	100	+40%	100/15 Summer		
7.002	25	960 Winter	100	+40%	100/15 Summer		
8.000	26	30 Winter	100	+40%	100/15 Summer	100/15 Winter	
9.000	Swale-27	30 Winter	100	+40%			
9.001	28	30 Winter	100	+40%	100/15 Summer		
6.004	29	960 Winter	100	+40%	1/15 Winter	100/960 Summer	
1.010	30	960 Summer	100	+40%	100/600 Winter		
1.011	31	960 Summer	100	+40%	100/600 Summer		
10.000	32	15 Winter	100	+40%	100/15 Summer	100/15 Summer	
10.001	33	15 Winter	100	+40%	100/15 Summer	100/15 Summer	
10.002	34	15 Winter	100	+40%	100/15 Summer		
11.000	Swale-35	960 Summer	100	+40%			
11.001	36	960 Summer	100	+40%	100/15 Summer		
11.002	37	960 Summer	100	+40%	100/15 Summer		
10.003	38	960 Summer	100	+40%	100/15 Summer		
10.004	39	960 Summer	100	+40%	100/15 Summer		
10.005	40	960 Summer	100	+40%	100/15 Summer		
1.012	41	960 Summer	100	+40%	1/960 Winter		
1.013	42	960 Summer	100	+40%	1/960 Summer		
1.014	43	960 Summer	100	+40%	1/960 Summer		
1.015	44	960 Summer	100	+40%	1/720 Summer	100/600 Winter	

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
6.003	22		6.720	0.545	0.000	1.20			57.2
7.000	Swale-23		6.601	-0.590	0.000	0.07			195.2
7.001	24		6.582	0.282	0.000	0.76			129.1
7.002	25		6.768	0.523	0.000	0.22			63.7
8.000	26		6.851	1.051	0.650	1.40			107.0
9.000	Swale-27		6.669	-0.322	0.000	0.13			245.3
9.001	28		6.663	0.563	0.000	1.78			140.8
6.004	29		6.864	1.234	0.107	1.23			196.0
1.010	30		6.565	1.365	0.000	0.15			233.2
1.011	31		6.552	1.502	0.000	0.17			276.7
10.000	32		7.309	0.984	8.877	1.14			349.7
10.001	33		7.162	1.130	2.278	1.40			440.4
10.002	34		6.710	0.923	0.000	1.30			499.7
11.000	Swale-35		6.526	-0.065	0.000	0.01			20.2
11.001	36		6.524	0.724	0.000	3.04			71.2
11.002	37		6.531	0.748	0.000	0.71			73.9
10.003	38		6.544	1.007	0.000	0.37			118.0
10.004	39		6.543	1.230	0.000	0.38			120.7
10.005	40		6.556	1.443	0.000	0.36			123.8
1.012	41		6.539	1.563	0.000	0.26			361.4

Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)
1.013	42		6.534	1.603	0.000	0.19			370.4
1.014	43		6.522	1.764	0.000	0.20			400.3
1.015	44		6.517	1.962	45.587	0.29			447.7

PN	US/MH Name	Status	Level Exceeded
6.003	22	SURCHARGED	
7.000	Swale-23	OK	
7.001	24	SURCHARGED	
7.002	25	SURCHARGED	
8.000	26	FLOOD	2
9.000	Swale-27	OK	
9.001	28	SURCHARGED	
6.004	29	FLOOD	
1.010	30	SURCHARGED	
1.011	31	FLOOD RISK	
10.000	32	FLOOD	4
10.001	33	FLOOD	2
10.002	34	SURCHARGED	
11.000	Swale-35	FLOOD RISK*	
11.001	36	FLOOD RISK	
11.002	37	FLOOD RISK	
10.003	38	SURCHARGED	
10.004	39	SURCHARGED	
10.005	40	FLOOD RISK	
1.012	41	SURCHARGED	
1.013	42	SURCHARGED	
1.014	43	SURCHARGED	
1.015	44	FLOOD	3