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50683-00 AW2 BESS, Uskmouth

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50683-00 AW2 BESS, Uskmouth

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1.0 Introduction

1.1 Appointment

Burroughs have been commissioned by AW2 Energy Storage Limited to provide multidisciplinary engineering design services for a proposed Battery Energy Storage System (BESS), (hereafter referred to as 'the Scheme') on land at the former Uskmouth Power Station, Newport. Burroughs shall be delivering the surface water drainage design elements and securing SAB Approval from Newport City Council (NCC) associated with the Scheme through their in-house design team.

1.2 Purpose of Report

This Drainage Strategy Report (DSR) has been produced to summarise Burroughs' drainage design philosophy for the scheme's drainage proposals.

The objectives of this DSR are the following:

- To support the planning stage and SAB approval of the proposed Scheme. Pre-SAB application has been submitted on 7th March 2025.
- To illustrate that the proposed scheme provides significant betterment from a surface water discharge and quality perspective.
- To confirm necessary drainage design considerations for the scheme
- To ensure that the proposed drainage is compliant with latest industry standards and the 2018 Welsh Government Statutory Standards for SuDS.

1.3 Scope of Report

This DSR considers the following for the scheme's drainage design:

- ✦ An overview of the existing site (inc. topography, services, drainage etc.);
- ✦ Establishment of drainage design constraints;
- ✦ High-level strategies for managing increased surface water runoff;
- ✦ Consideration SuDS features, attenuation, flow control systems, quality, and pollution control measures.

The following items do NOT form part of the scope of the DSR:

- ✦ Detailed specification relating to the proposed design – to be provided by the drainage specification document in accordance with this drainage strategy at detailed design stage (RIBA Stage 4);
- ✦ Detailed Flood Modelling – A Flood Consequence Assessment (FCA) was undertaken by RPS Group Plc (Ref: ENV-21837) in February 2025. The Burroughs design will comply with all design criteria set out in the agreed report. In addition, the FCA can be made possible upon request.

1.4 Information Review

This DSR has been produced based on the following information:

- ⊕ Topographic Survey – 784-B070326_Uskmouth Power Station
AW2_Topographical Survey_Rev A, SA3611-01 – **Appendix A1.**
- ⊕ Greenfield Run-Off Rate Estimation – HR Wallingford Online Calculations
(Ref: 50683-00-AW2_Greenfield runoff rate estimation - members _ UK
SuDS) – **Appendix A2.**
- ⊕ Site General Arrangement – 50683-BUR-XX-XX-SK-C-
0001_NewDesignLaySK-1.0 – **Appendix A3.**
- ⊕ Existing Drainage – Historic Ash Handling Facility Drainage Layout Sheet 1
to 3 (Ref: 227223/CAR/AH/510, 511, 540) – **Appendix A4.**
- ⊕ Proposed Surface Water Drainage - '50863-BUR-ZZ-XX-M-C-
10501_SWDrainageLay' – **Appendix A5.**
- ⊕ Drainage Hydraulic Calculations – '50863-AW2 BESS_Hydraulic Modelling
Calculations' – **Appendix A6.**

Note: Some of the conclusions and recommendations contained within this report are based upon information provided by others. At this stage, it is assumed that all relevant information received from others is accurate and correct.

2.0 Site Overview

2.1 Site Location

The site lies on an existing brownfield site, the Uskmouth Power Station, located on the south-eastern bank of the River Usk, close to the confluence with the Severn Estuary, around 4 km south of central Newport geographically. It is located within the Gwent Levels, part of the low-lying coastal plan adjacent to the Severn forming a peninsula of land between the Usk Estuary to the north, and the Severn Estuary to the south. It is historically made up of two units, Uskmouth A and Uskmouth B Power Stations. Uskmouth A has been decommissioned in 1981 and demolished in 2022.

The proposed development area would be implemented entirely within the south western part of the site. The site is currently an existing pulverised fuel ash (PFA) storage area and bound by a metal barrier around the perimeter, and existing concrete conduit channels are situated along the southern perimeter of the site.

The site location is presented below in **Figure 1**

- ◆ Site address: Simec Uskmouth Power, West Nash Road, Nash, Newport
- ◆ Nearest Postcode: NP18 2YH.
- ◆ Grid Reference: 332587mE, 183541mN.



Figure 1 – AW2 Site Location Plan

2.2 Proposed Development

The proposed Scheme consists of constructing an elevated platform that accommodates 'yards' of containerised battery units and substation units, along with their corresponding foundation supports. Moreover, it also includes granular access tracks for infrequent maintenance, repair and operation activities, surface water drainage infrastructure, and underground cable connections that link the Battery Energy Storage System (BESS) substation to the pre-existing Uskmouth 132kV Substation.

2.3 Existing Site

2.3.1 Topographical Information

In December 2024, Tetra Tech carried out a topographical survey (Ref: 784-B070326_Uskmouth Power Station AW2_Topographical Survey_Rev A) with the presence of PFA stockpiles. A flat concrete slab is situated beneath the stockpiles where it gradually falls to the south of the site. The levels of the site vary from approx. 8.14m AOD to 9m AOD.

The site will be formed to create a flat plateau. The proposed finished level for the site is currently set at **9.750m AOD**.

2.3.2 Geology and Hydrogeology

On February 2025, RPS Consulting Services conducted Flood Consequence Assessment (FCA) and discovered that there is no public data available from boreholes done by the British Geological Survey for the site vicinity. Additionally, the soil present in the area is characterised as "loamy and clayey soils of coastal flats," and it is known to have naturally high groundwater levels according to the National Soils Research Institute.

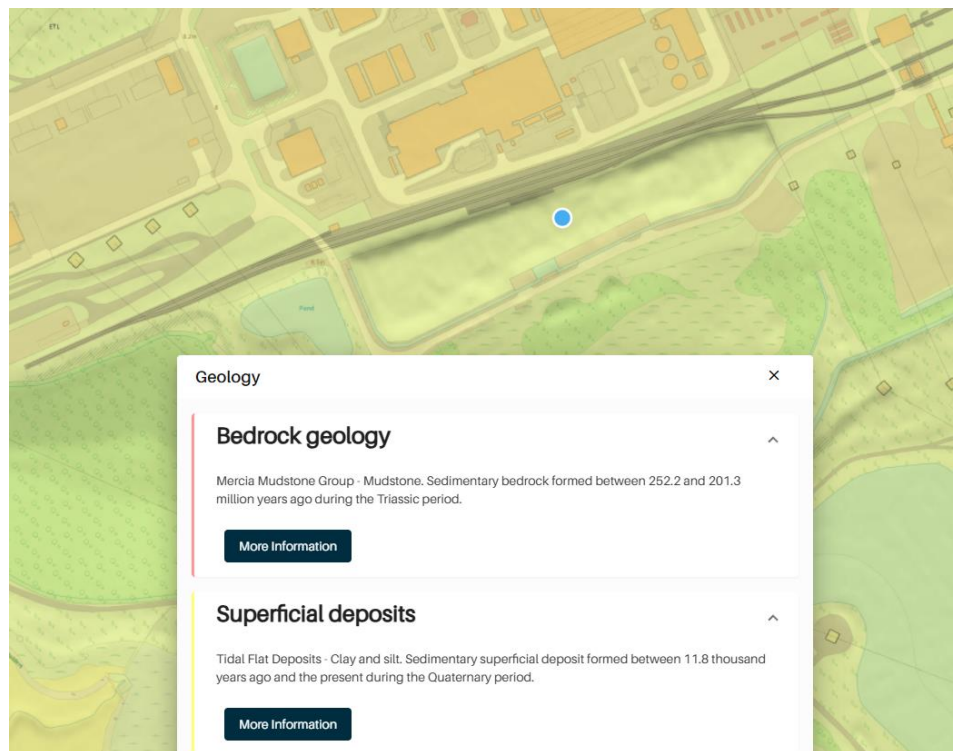


Figure 2 – AW2 Site BGS Geological Mapping '22

Figure 2 shows the online British Geological Survey maps (NTS), which indicate that it is situated on Tidal Flat Deposits comprising clay and silt. This is underlain by Mercia Mudstone Group comprising mudstone.

According to the mapping done by BGS Geo Index Aquifer Designation, the surface deposits of Tidal Flat are categorised as Unproductive Strata. These formations possess low permeability and are not significant for water supply or base flow. The bedrock deposits are classified as Secondary B Aquifer. These formations are mostly composed of layers with low permeability, which might store and yield a limited quantity of groundwater owing to specific characteristics like fissures, thin, porous layers and weathering.

According to National Resources Wales (NRW) online groundwater Source Protection Zone (SPZ), the site is not situated within a groundwater SPZ. Furthermore, the site is considered at 'Medium to Low' vulnerability and the south-eastern corner of the site is considered at 'Low' vulnerability as reported by NRW online groundwater vulnerability mapping.

The LandIS soil scape Map, indicates the following for the site:

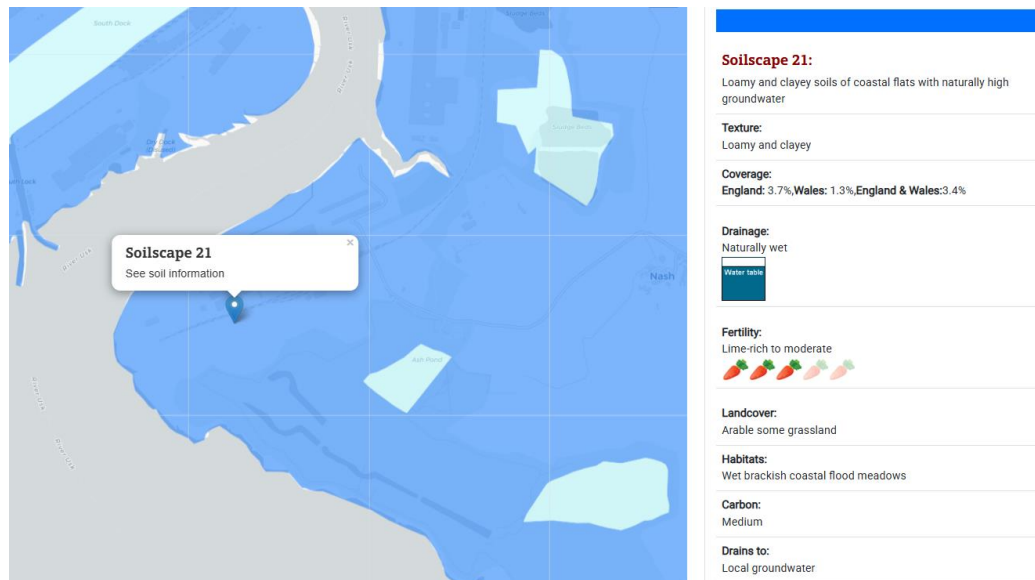


Figure 3 – AW2 Site Soil Scapes Map (LandIS)

As shown on **Figure 3** above, the development area has is classified as soil scape 21 which consists of loamy and clayey soils of coastal flats with naturally high groundwater. This has also been confirmed through initial site investigation listed in the FCA by RPS Group Plc.

2.3.2.1 Intrusive Ground Investigation

An intrusive Ground Investigation (GI) survey has not yet been undertaken at the proposed AW2 site. This section will be updated in due course and the detailed drainage design will be based on the findings of the GI report.

According to preceding intrusive GI conducted on respective adjacent BESS sites (Uskmouth and Afon Wysg), it was concluded that contamination has been encountered on both BESS sites and infiltration testing has been unsuccessful.

2.3.3 Hydrology and Flood Risk

The River Usk is approximately 230 m north-west of the Site. The River Usk is designated as a Special Area of Conservation (SAC) and a Site of Special Scientific Interest (SSSI). It flows in a south to south-western direction until it enters the Bristol Channel approximately 1.8km south of the site. There are also series of drainage channels and reens situated southeast of the development which are the Caldicot and Wentlooge levels.

According to the NRW Development Advice Map presented in **Figure 4**, majority of the site is found in Zone C1 in which it is served with significant infrastructure, including flood defences. In addition, both southeast and northeast parts of the site are situated in Zone B, that are classified as land that has been flooded in the past.

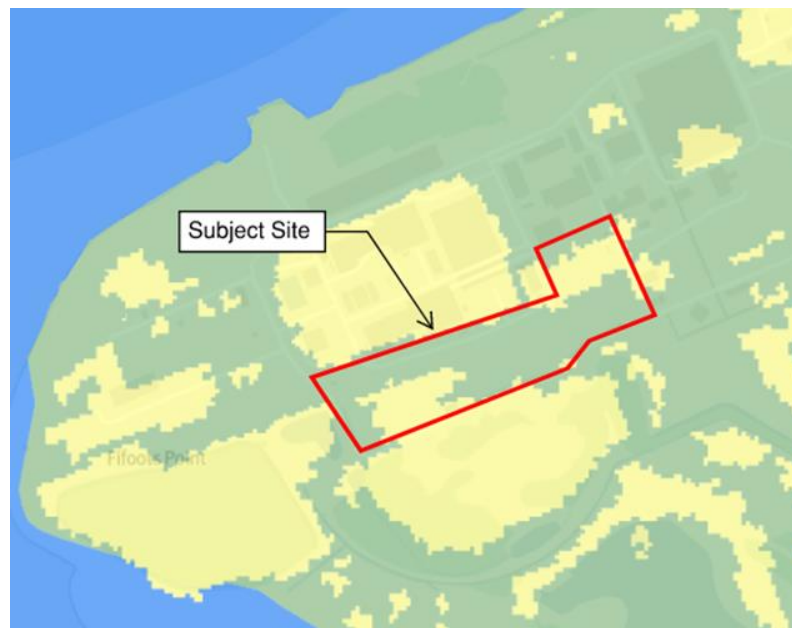


Figure 4 – AW2 Site NRW Development Advice Map

There are 2no. key sources of flooding in the development site which are fluvial flooding and tidal flooding. The River Usk is located approximately 230m from the site and according to NRW Flood Map shown in **Figure 5**, the site is categorised as Flood Zone 1, which indicates negligible risk of flooding from fluvial sources.

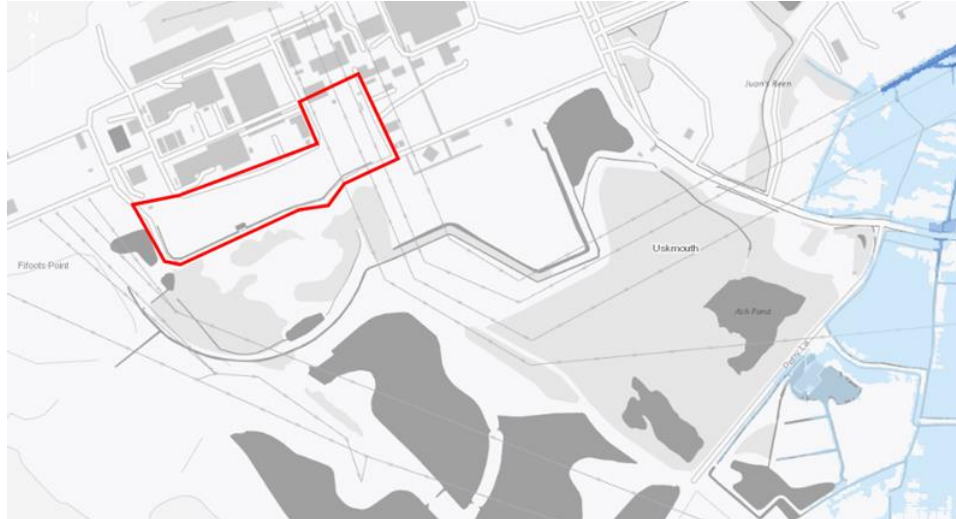


Figure 5 – AW2 Site NRW (DAM) River Flood Risk

However, tidal flooding is the main flood risk source to this site. Based on the data from NRW Flood Risk from Sea Map and shown in **Figure 6** below, majority of the development is at 'low' risk of tidal flooding, while isolated portions can be considered to have negligible risk of coastal flooding.

NRW has been consulted to obtain additional information regarding tidal flood risk at the site. They provided the Caldicot and Wentlooge (2016) model, which was processed by RPS Group Plc to generate flood level mapping. The key findings relevant to this assessment are summarised in the FCA. The key points are:

1. The site is not located within an area where historic flooding has been recorded.

2. The coastal flood defences south of the site are identified as Embankments. They provide a design standard of protection of 200 years.

For further information regarding flood risk across the AW2 site and proposed finished levels to mitigate the risks, please refer to the FCA by RPS Group Plc (ref: ENV-21837, February 2025).



Figure 6 – AW2 Site NRW (DAM) Sea Flood Risk

In addition, from those 2no. key flooding figures, **Figure 7** below shows the NRW Flood Risk from Surface Water Map, where a small portion of the site are susceptible to Flood Zone 3. This indicates areas with more than 1% (1 in 100) chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change.



Figure 7 – AW2 Site NRW (DAM) Surface Water Flood Risk

2.3.4 Existing Services

A Ground Penetrating Radar (GPR) survey has not yet been undertaken at the proposed AW2 site. This section will be updated in due course, and it is currently assumed that several private utilities will be present in or situated within close proximity to the AW2 site.

2.3.5 *Existing Surface Water Drainage*

As mentioned previously in Section 2.3.1, there is currently a flat concrete slab beneath the PFA stockpiles that fall gradually towards the south of the AW2 site where the existing concrete conduit channels are situated. The concrete conduit channels direct the surface water runoff towards a primary settlement tank, roughly 6.95 m in width and 30 m in length according to the 'Primary Settlement Tank Layout & Sections' drawing received from Mott Macdonald (Ref: 227223/CAR/AH/591).

The runoff is then conveyed via a connection pipe beneath the carriageway to the final settlement tank that comprises of a Lamella Plate Clarifier to remove suspended solids in the runoff. The final settlement tank is roughly 1.8 m in width and 6.4 m in length in accordance with the 'Final Settlement Tank Details' drawing received from Mott Macdonald (Ref: 227223/CAR/AH/575). The runoff then flows into an oil interceptor to separate potential oil and fuel in the runoff before discharging into the existing detention basin west of the site, and eventually outfall into an existing ditch via discharge point W1b at the southwest corner of the basin. Burroughs have conducted a site visit and concluded that the existing detention basin only collects the runoff from the existing PFA storage yard, and no additional connections or outfalls have been identified.

According to the Discharge Consent by NRW (Ref: 20151223_SUP_LP3131SW_Var002 signed), no maximum discharge flow for discharge point W1b is specified. Precautionary approach should be taken by adopting the GRR as the discharge flow in the absence of specific discharge flow, or a consultation with NRW might be required to clarify the allowable discharge limits at discharge point W1b. Although Ecology surveys have not yet been undertaken, it is estimated that the detention basin is likely to be rich in biodiversity due to dense vegetation.

2.3.6 *Existing Foul Water Drainage*

No existing foul water drainage has been identified within the AW2 site and there is currently no demand for foul drainage to be considered in the course of the proposed site development.

3.0 Surface Water Drainage Strategy

The objective of the proposed SuDS drainage design is to achieve a sustainable and low-impact surface water solution that provides additional benefit to local wildlife and ecology, whilst also enriching the lives of people who interact with the development.

3.1 Design Standards

The following codes of practice, design standards and guidance documents have informed the surface water drainage design, and shall be adhered to throughout the development of the detailed design:

- ✦ CIRIA. (2015) Report C753, The SuDS Manual
- ✦ DMRB, CD 532 – Vegetated Drainage Systems for Highway Runoff
- ✦ MCHW Volume 1, Specification for Highway Works
- ✦ MCHW Volume 2, Notes for Guidance on the Specification for Highway Works
- ✦ Water UK. (2021) Sewerage Sector Guidance Appendix C – Design and Construction Guidance for Foul and Surface Water Sewers. WRc PLC
- ✦ Water UK. (2012) Sewers for Adoption. 7th Edition. WRc PLC
- ✦ Welsh Government (2010) Building Regulations – Approved Document H;
- ✦ Welsh Government (2018) Guidance and Information Relating to Sustainable Drainage Systems on New Developments;
- ✦ Welsh Government (2018) Statutory standards for Sustainable Drainage Systems (SuDS) – designing, constructing, operating and maintaining surface water drainage systems.

3.1.1 Rainfall Data and Modelling Parameters

Rainfall data from the Flood Studies Report (FSR IH-124) shall be used within InfoDrainage software to obtain the site-specific hydrological parameters, such as rainfall intensities, necessary for the design of the scheme's proposed SuDS and drainage systems. **Table 1** shows the design parameters to be used within InfoDrainage modelling at the detailed design stage.

Table 1 – Drainage Modelling Design Parameters

Design Parameter	Input Value	Design Rationale
Design Return Periods	1-year, 30-years, 100-years	Industry standard return periods: 'No Surcharging', 'No Flooding', and 'Flood Exceedance'.
M5-60 (mm)	19.9	Site specific criteria
Ratio R	0.332	Site specific criteria
Global Entry Time	4 mins	Industry standard value.
Min. Self-Cleansing Velocity (m/s)	0.750	Industry standard value.
Climate Change (%)	+40	Industry standard value / WG Statutory Standards
Modelled Storm Event Durations (mins)	15, 30, 60, 120, 240, 360, 480, 960, and 1440	Industry standard / Default modelling storm durations.
Infiltration Rate (m/s)	0 m/s	Assumed as currently GI report not available

Note: Rainfall Simulation shall be in accordance with the Flood Studies Report (FSR IH-124).

3.1.2 Climate Change Allowance

During the lifetime of the proposed scheme, surface water runoff volumes may increase as a result of the expected rise in rainfall intensities due to climate change. The effects of climate change shall be mitigated through design to minimise the risk of future surface water flooding. Although climate change shall be typically accounted for by incorporating a

40% increase in rainfall intensity for the design of proposed drainage systems, confirmation with NCC Lead Local Flooding Authority (LLFA) or SAB Authority will be required to consider any additional parameters.

3.1.3 Surface Water Network Design

Section G2.34 of the Welsh Government (2018) Statutory standards for Sustainable Drainage Systems (SuDS) states '*flood protection to a suitable level of service should be provided to people and property on (or adjacent to) the site*'.

In accordance with the criteria of G2.34, the proposed surface water network design shall ensure the following with a +40% allowance for climate change (C/C):

- ⊕ No flooding of the site in a 1 in 30-year return period design storm event.
- ⊕ No flooding of any critical infrastructure in a 1 in 100-year return period design storm event.
- ⊕ Suitable freeboard to ensure protection of critical infrastructure.

Furthermore, routine maintenance will be required for the correct operation of surface water drainage systems. A separate SuDS Management Plan that details suitable access arrangements for maintenance and inspection of the SuDS and drainage networks will be provided during detailed design. Pipework gradients shall be designed and laid at self-cleansing velocities to mitigate unnecessary blockage risk.

3.1.4 SuDS Attenuation and Flow Control Design

In accordance with the SuDS Manual (CIRIA, 2015), attenuation features shall be designed to ensure that no flooding of the attenuation feature occurs during the 1 in 30-year return period storm event plus climate change. This shall include the design of a suitable freeboard. In addition, a simulation of the 1 in 100-year + 40% C/C event and beyond shall be undertaken to examine potential impacts upon attenuation features. This is to establish whether any additional measures are required to mitigate detrimental effects or significant downstream flooding.

In addition, there is a requirement to manage flows from any proposed attenuation features by ensuring the following:

- ⊕ Safe overflows and exceedance conveyance routes from surface water storage locations are provided;
- ⊕ Outgoing discharge rate remains within the specified allowable discharge rate to manage flood risk downstream of the site.

Design and sizing of flow control devices shall be determined using both the manufacturers' guidance and InfoDrainage hydraulic analysis. Flow control devices shall be designed to ensure that peak discharge rates are controlled and limited to the maximum agreed pre-development flow rate(s). This is to ensure that there shall be no detriment to the existing downstream drainage ditches / watercourses.

All flow control devices are to be installed within suitable chambers (or affixed to headwalls) to ensure suitable access arrangements for routine inspection and maintenance. Flow control devices shall also be designed to mitigate blockage risk, limited to a minimum outflow of 2 l/s/ha (**Statutory Standards for SuDS Guidance, 2018**) and a minimum orifice diameter of 50mm.

The isolation penstock chambers situated in the granular 'yards' are particularly important for the surface water drainage design. In the unlikely event of a fire, the penstock chambers can be closed and the runoff containing fire suppression chemicals / foam can be compartmentalised and isolate from the rest of the site. This approach will need to be

agreed with NCC SAB Authority to further improve the water quality benefits associated with this design.

3.1.5 Allowable Discharge Rates

As stated in **Welsh Government (2018) Statutory standards for Sustainable Drainage Systems (SuDS)**, and as agreed with NCC SAB in previous meetings and pre-SAB feedback:

- ⊕ The volume of runoff from the development area does not exceed the volume of runoff from the equivalent area in its natural undeveloped or “greenfield” state (for the same design rainfall event);

To provide a more conservative solution, the surface water design for Uskmouth has been developed such that peak discharge rates entering the perimeter swale during storms up to and including the 1 in 100-year storm + 40% C/C do not exceed GRR Q_{bar} . Hydraulic calculations justifying this are presented in **Appendix A6**. **Table 2** below shows the GRR estimations of typical storm events for the AW2 site.

Table 2 – Greenfield Runoff Rate Estimations (WHS '23)

IH124 Greenfield Runoff Rate - WHS	
Q_{bar} (l/s)	9.38
1 in 1-year (l/s)	8.26
1 in 30-year (l/s)	16.7
1 in 100-year (l/s)	20.45

Note: In any cases where it is not possible to limit on-site water runoff to match the greenfield rates, efforts should still be made to reduce the runoff as much as possible. Any excess water should be stored and gradually released to prevent an increase in the risk of downstream flooding.

3.2 Proposed SuDS Design Strategy

The following SuDS features are currently proposed across the Scheme to intercept, treat, attenuate, and discharge surface water runoff:

- ⊕ **Porous paving** (in the form of compacted gravel) with minimum voids of 30% throughout the battery ‘yards’ housing the containerised batteries and associated transformers, substations and inverters;
- ⊕ **Dry swale** within existing perimeter concrete conduit channel. Dry swale to have cellular attenuation crates and finished with permeable geotextile and topsoil.
- ⊕ **Detention basin** used to provide additional storage. Extensive vegetation and habitats around basin perimeter. Flow control chamber to be installed on outlet from detention basin.

It is proposed that surface water from the Scheme will largely be managed by porous granular stone ‘yards’ across the containerised battery unit bays. The granular stone yards will be impermeably lined at both the base and side, which will be used to convey surface water runoff to the proposed perimeter swale and cellular storage tank in the existing perimeter concrete conduit channel along the southern boundary of site. In addition to providing sufficient attenuation and infiltration, the perimeter dry swale also provides opportunity for incorporating landscaping/planting, enhancing both amenity and biodiversity benefits. The surface water will be discharged from the perimeter dry swale and be directed to the existing detention basin. Peak discharge rates from the basin will be limited to 9.38 l/s, which corresponds to the GRR Q_{bar} . Please refer to **Appendix A5** for the Proposed Surface Water Drainage Drawing.

Compliance interception in accordance with Table G2.1 will be provided via the extensive areas of granular porous paving and perimeter swale / cellular storage.

3.2.1 *Surface Water Runoff Destination*

There are 2no. proposed ways for the discharge of surface water runoff in the development.

In accordance with Table G2.1 from the 2018 Welsh Government Statutory Standards for Sustainable Drainage Systems, compliant interception of runoff will be provided for the AW2 site via the porous surfacing, infiltration basin / bioretention area and perimeter swale.

There are different priority levels of water runoff destinations (Level 1 is the preferred and highest while 4 and 5 are only used in exceptional purposes) as elaborated on the Welsh Government guidance of SuDS which are the following:

- ⊕ Level 1: **Rainwater collected for reuse** – There is currently no opportunity for rainwater harvesting (RWH) to be incorporated into the AW2 site. RWH does not align with the nature / operation of a Battery Energy Storage System facility and there is no foreseeable demand for non-potable water on the proposed site throughout its design life.
- ⊕ Level 2: **Discharge of surface water into the ground** – BGS mapping indicates the site is underlain by clay, silt and mudstone. The site has historically been used to stockpile PFA adjacent to the Uskmouth Power Station, as such the in-situ contamination of the ground is unlikely to support an infiltration design, and due to the stockpiling of coal the ground is likely to be compacted with poor permeability / infiltration rates. Given the historic use of the site, the likely strata according to BGS and the intrusive GI report is still currently pending receipt, soakaways or other infiltration-based SuDS are assumed unlikely to be feasible for the Uskmouth BESS site. It is instead proposed that all proposed SuDS features as part of the Uskmouth BESS are impermeably lined, to ensure acceptable water quality.
- ⊕ Level 3: **Discharge to a surface water body** – It is proposed that all surface water from the AW2 site will discharge to the proposed existing perimeter swale along the southern boundary of the site. Surface water exits the perimeter swale and is ultimately discharged into the existing detention basin. The runoff will then be discharged into the existing ditch via a retained existing outfall, which is named as discharge point W1b on NRW's Discharge Consent (Ref: 20151223_SUP_LP3131SW_Var002 signed).
- ⊕ Level 4: **Discharge to a surface water sewer** – This is not proposed.
- ⊕ Level 5: **Discharge to a combined sewer** – This is not proposed.

3.2.2 *Surface Water Runoff Hydraulic Control*

Compliant interception (in accordance with Table G2.1 from the 2018 Welsh Government Statutory Standards for Sustainable Drainage Systems) will be achieved across the site via the extensive porous granular yards, the perimeter swale / cellular storage and the. The ratio of proposed hardstanding: proposed SuDS areas far exceed 1:5 as part of the full-SAB submission to NCC, a catchment / interception plan will be developed.

The proposed perimeter dry swale will attenuate surface water and control the peak discharge rate entering the existing detention basin to the GRR Q_{bar} of 9.38 l/s (as per the

GRR Estimation of HR Wallingford, please refer to [Appendix A2](#)) for all storm events up to 1 in 100-year storm year event with 40% climate change. This will be achieved using flow control on the outgoing headwall to the existing detention basin.

Regarding hydraulic control, the proposed AW2 site surface water drainage solution offers significant betterment. A large volume of redundant / contingency storage will be present in the proposed granular plateau.

A Flood Exceedance Plan will be developed during the detailed design phase to identify and manage potential flood risks that exceed the design capacity of the drainage and flood management systems.

3.2.3 *Water Quality*

The overall risk to water quality across the AW2 site will be very low. The site will remain largely unoccupied for the majority of its operation with no traffic through the site. Access roads through the site are purely for Maintenance, Repair and Operation (MRO) purposes.

The SuDS manual simple index approach has been undertaken to prove the proposed SuDS features provide adequate water quality treatment. Calculations will be provided as part of the full-SAB application.

The porous granular stone yards and perimeter swale SuDS features will facilitate effective management of sediments and pollutants within the surface water. The porous surfacing, geotextile liners and chamber catchpits will serve as a primary silt removal / treatment mechanism before surface water discharges to the swale. With reference to the ***Environment Agency's Approach to Groundwater Protection (Feb 2018)***, it is acknowledged that any infiltration systems that bypass the soil layer limit the ability of the ground to remove pollutants. Therefore, surface water will be discharged to the vegetated swale above the surface level. Burroughs have engaged with AW2 Energy Storage Limited and requested that future buggies / vehicles used to maintain the site during operation be EV vehicles. This would reduce the water quality risk from very low to almost negligible.

3.2.4 *Amenity*

Due to the nature of the Scheme, the site will have a secure perimeter fence, and only authorised personnel will have access to the facility. Although maximising amenity does not align with the nature of the proposed AW2 site, the proposed drainage solution will significantly increase the area of soft landscaping across the external perimeter of the site.

The design will look to improve existing landscaping in the western extent of the site adjacent to 2No detention basins. The existing walkways is to be improved and there is also an opportunity for street furniture (e.g. benches) for future BESS operatives.

3.2.5 *Biodiversity*

It is essential to retain the perimeter swale within the surface water management proposal as it naturally provides biodiversity benefits across the site and provide habitats to local wildlife.

Established vegetation and habitats have been identified around the perimeter of the existing detention basin. The proposed SuDS design, whilst utilising the basin, will not have any adverse impact on the existing habitats. Tir Collective will be developing the proposed landscaping and biodiversity enhancement proposals across the AW2 site. This section will be refined during detailed design phase.

3.2.6 *Design of Drainage for Construction, Operation and Maintenance*

The proposed surface water drainage for the Scheme has been designed to maximise the safety of workers and staff during operation and MRO activities. Where practically possible, step rungs have been installed within the perforated manhole chambers to provide maintenance access. Additionally, depths have been rationalised where possible to reduce unnecessary excavation depths.

For further information on the required MRO activities for the surface water drainage and SuDS features, please refer to the Burroughs SuDS Management Plan.

Prior to the commencement of works, a Construction Environmental Management Plan (CEMP) will also be prepared by the elected contractor and submitted to NCC SAB to supplement the full-SAB application. In addition, a construction programme will be submitted to NCC SAB prior to commencement of works to inform site visits at key milestones.

3.3 Flood Exceedance Plan

The proposed surface water drainage network will be designed such that no flooding of the site will occur for a 1 in 100-year return period storm event with 40% climate change. Furthermore, in accordance with the Welsh Government Statutory Standards, no flooding of critical infrastructure or internal areas will occur during the 1 in 100-year return period storm event with 40% climate change considerations. The above statements are to be approved by both the Client and Newport SAB Authority.

Surface water flows resulting from exceedance storm events (i.e. > 1 in 100-year storm with 40% climate change) will flow overland toward the proposed perimeter swale and existing detention basin at the western parcel of site.

By raising the platform level to 9.75m AOD, as advised in the FCA by RPS Group Plc (Ref: ENV-21837, can be made available upon request), great consideration has been given to ensure that the proposed development and its surface water runoff does not have a negative impact or adversely affect the flood risk downstream through installation of porous granular paving, perforated piping, creation of the infiltration basin, and utilisation of proposed perimeter swale.

As an added level of protection, the pad foundations for each containerised battery unit will sit 150mm above the finished floor level of the site. As such, for any return period storm event, exceedance flows will always flow overland and away from the critical infrastructure on site.

4.0 Drainage Strategy – Further Considerations

4.1 Drainage Consents and Approvals

Throughout the development of the scheme's drainage proposals, the designer shall collaborate with the following key stakeholders and statutory consultees presented in Section 4.1.1 and 4.1.2 below to gain the required consents, agreements, and approvals in relation to the proposed drainage design.

4.1.1 Surface Water Design – NCC SAB Approval

Table 3 outlines the relevant stakeholders from NCC, including Newport City Council SuDS Approval Body (SAB) and Lead Local Planning Authority (LLFA). Collaborative approach between designer and mentioned stakeholders will facilitate the integration of sustainable drainage solutions, address site-specific constraints, and ensure alignment with statutory approvals and technical guidance.

Table 3 – Surface Water Drainage: Anticipated Consents and Approvals from NCC SAB Authority

Stakeholder / Consultee	Consent / Approval
Newport City Council SuDS Approval Body (SAB), Lead Local Flood Authority (LLFA)	Approvals for SuDS, Drainage, Ordinary Watercourses and Flood Risk <i>Contacts:</i> <i>sab@newport.gov.uk</i> <i>(01633) 656656</i>

4.1.2 Surface Water Design – NRW Discharge Consent

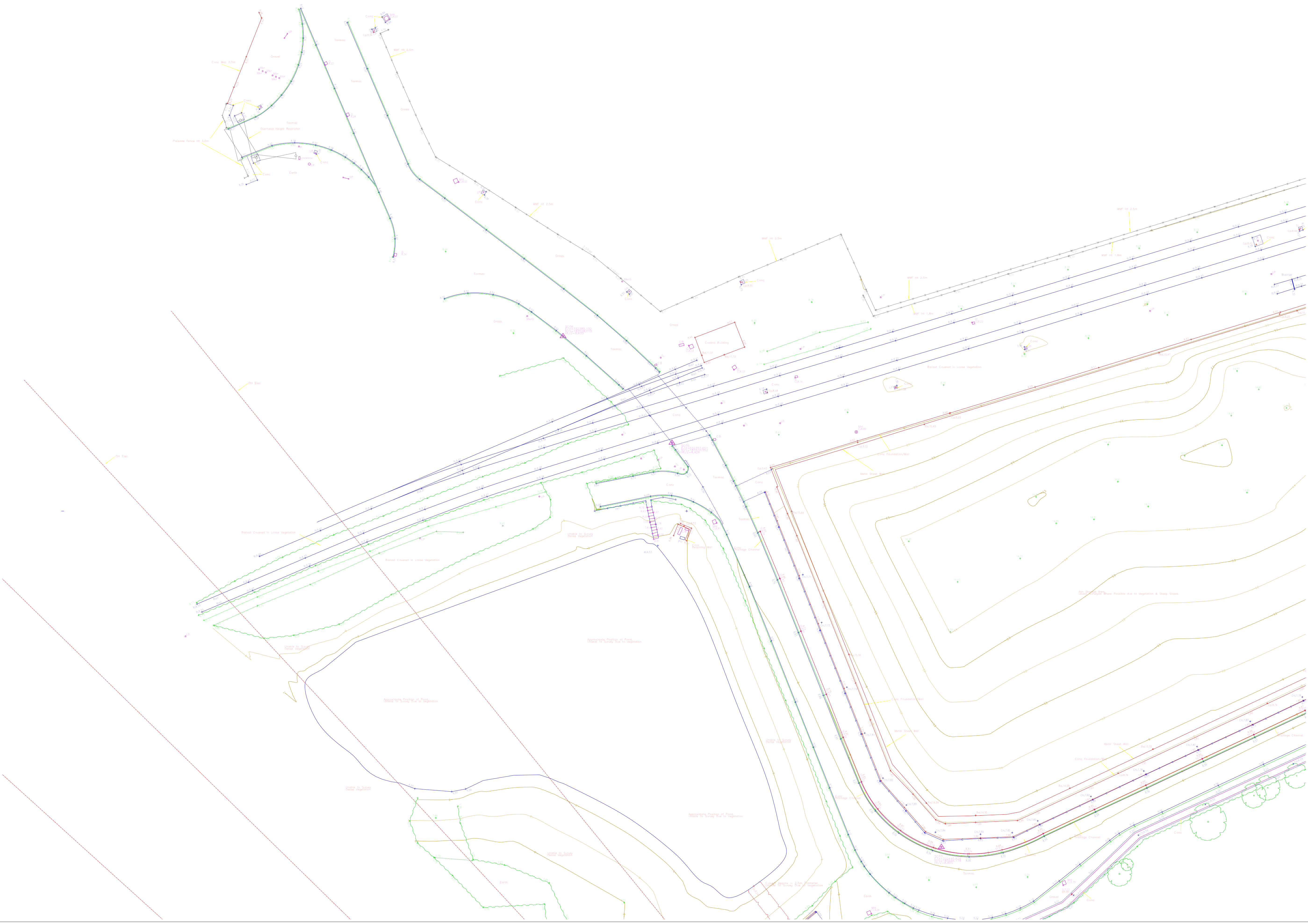
Similar to Section 4.1.1, Table 4 below shows the relevant stakeholders from NRW. Designer shall comply with the allowable discharge to waterbodies set out in the NRW Discharge Consent (Ref: 20151223_SUP_LP3131SW_Var002 signed) which includes maximum flow, pH level, and temperature to prevent causing adverse impact to the surrounding environment.

Table 4 – Surface Water Drainage: Anticipated Consents and Approvals from NRW

Stakeholder / Consultee	Consent / Approval
Natural Resources Wales (NRW)	Approvals for Main Rivers, Flood Risk and Groundwater Discharges <i>Contacts:</i> <i>enquiries@naturalresourceswales.gov.uk</i>

Appendix A1

Topographical Information



NOTES

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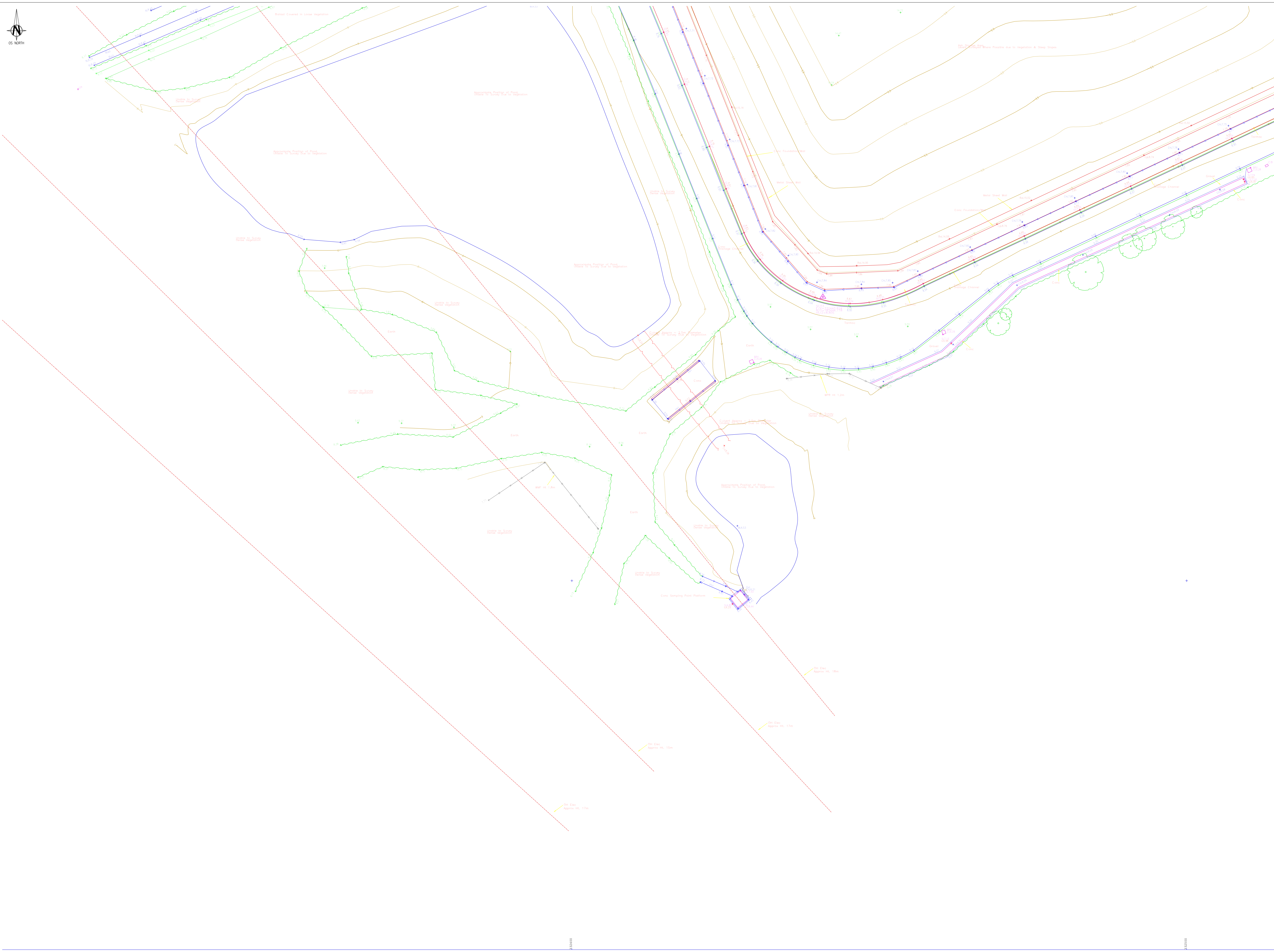
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AV	AIR VALVE	LP	LAMP POST
BB	BELLOWS BEACON	MB	MOORING BOLLARD
BH	BUILDING HEIGHT	MT	MISCELLANEOUS FENCING
BL	BUILDING EAVES LEVEL	MW	MANHOLE
BM	BENCH MARK	MP	MOORING PILE
BOL	BOLLARD	MRF	METAL RAILING FENCE
BRK	BRICKWORK	MS	MILE STONE
BS	BUS STOP	NS	NOTICE BOARD
BW	BRICK WALL	NB	NOTICE BOARD
BWF	BARRIED WIRE FENCE	NBA	NATURAL DROPS AUTHORITY
CB	CONTROL BOX	OCC	OVERGROUND CONDUIT
CF	CORRUGATED IRON FENCE	OCG	OVERHEAD CANTY
CL	COVER LEVEL	OPR	OPEN STEEL RAILINGS
CLF	CHAIN LINK FENCE	P	POST
CP	SECURITY CAMERA POST	PB	PILLAR BOX
CPL	CORING LEVEL	PM	PARKING METER
CPT	CABLE PIT COVER	PRF	CONC. POST & RAIL FENCE
CR	CYCLE RACK	PTM	PARKING TICKET MACHINE
CTV	CABLE T.V. MANHOLE	PV	VERTICAL PIPE
CUL	CULVERT	RC	ROOFING EYE COVER
DK	DECK LEVEL	RP	REFLECTIVE POST
D	DECK LEVEL	RS	ROAD SIGN
DP	DOWNPIPE	RTB	RETAINING WALL
DPC	DAMP PROOF COURSE	RWP	RANWATER PIPE
DR	GRAN	SC	STOP CODE
DWB	DOG WASTE BIN	SSP	STAND PIPE
EA	ENVIRONMENT AGENCY	SK	SKAMMAY
EB	ELECTRICITY BOX	SL	SOFT LEVEL
ECP	ELECTRIC CABLE FENCE	SMH	SURFACE WATER MANHOLE
ECP	ELECTRICITY CABLE PIT	SMP	SHEET METAL PLING
EMH	ELECTRICITY MANHOLE	SP	SON POST
EP	ELECTRICITY POLE	STU	STUMP
ER	EARTHING ROD	SV	SLEEVE VALVE
ETL	ELEC. TRANSMISSION LINE	SVP	SOL VENT PIPE
FB	FOOTBRIDGE	SWF	SHEEP WIRE FENCE
FH	FIRE HYDRANT	TBM	TEMPORARY BENCH MARK
FHM	FIRE HYDRANT MARKER	TC	TELECOM CABINET
FL	FLOOR LEVEL	TGB	TELEPHONE CALL BOX
FP	FENCE POST	TGP	TELEPHONE CALL POST
FWM	FULL WATER MANHOLE	TDL	TELECOM MANHOLE
G	GULLY	TAL	THRESHOLD LEVEL
GL	GROUND LIGHT	TL	TRAFFIC LIGHT
GM	GATE POST	TLD	TRAFFIC LIGHT BOX
GP	GATE POST	TP	TELEGRAPH POLE
GV	GAS VALVE	TYS	TIMER RABBING SHIP
H	HANDRAIL	TSL	TUBULAR STEEL RAILINGS
HRL	INSPECTION CHAMBER	WB	WASTE BIN
IC	INSERT LEVEL	WL	WATER LEVEL/WATER LINE
IRF	IRON RAILING FENCE	WM	WATER METER
IRF	IRON RAILING FENCE	WMF	WIRE MESH FENCE
JO	JUNCTION BOX	WP	WOODEN POST
KO	KERB OUTLET	WPP	WOODEN POST & RAIL FENCE
LDR	LADDER	WV	WATER VALVE

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Project Name		Uskmouth Power Station AW2						
Sheet Title		Uskmouth Power Station AW2 2D Topographical Survey Sheet 1 of 4						
TTE Project Number	Drawn By	Date	Checked By	Date	Approved By	Date	Scale @ A0	Subsidiary
784-8070326	BRS	13/12/24	C.M.	13/12/24	G.P.	13/12/24	1:200	S3
Client Project Number	Coordinate	Value	Dimension	Symbol	Point	Code	Value	Number
784-8070326	TTE	- ZZ	- ZZ	- DR	- G	- 001	A	
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TOPO LEGEND

AB	AIR BRICK	LFB	LITERARY
AV	AIR VALVE	LP	LAMP POST
BB	BELLOUS BEACON	MB	MOORING BOLLARD
BHL	BUILDING HEIGHT	MT	MISCELLANEOUS FENCING
BH	BORERHOLE	MH	MANHOLE
BL	BUILDING EAVES LEVEL	MKR	MANICURE
BM	BENCH MARK	MP	MOORING PILE
BOL	BOLLARD	MRF	METAL RAILING FENCE
BRK	BRICKWORK	MS	MILE STONE
BS	BUS STOP	NS	NOTICE BOARD
BW	BRICK WALL	NP	NOTICE PLATE
BWF	BARRIED WIRE FENCE	NRA	NATURAL RIVERS AUTHORITY
CB	CONTROL BOX	OGC	OVERGROUND CONDUIT
CF	CORRUGATED IRON FENCE	ONG	OVERHEAD CANTY
CL	COVER LEVEL	OPR	OPEN STEEL RAILINGS
CL	CHAIN LINK FENCE	P	POST
CP	SECURITY CAMERA POST	PB	PILLAR BOX
CS	CORING LEVEL	PM	PARKING METER
CPT	CABLE PIT COVER	PRF	CONC. POST & RAIL FENCE
CR	CYCLE RACK	PTM	PARKING TICKET MACHINE
CTV	CABLE T.V. MANHOLE	PV	VERTICAL PIPE
CUL	CULVERT	RE	ROOFING EYE COVER
DK	DECK LEVEL	RP	REFLECTIVE POST
D	DOWNPIPE	RS	ROAD SIGN
DPC	DAMP PROOF COURSE	RTB	RETAINING WALL
DR	DRAIN	RWP	RANWATER PIPE
DWB	DOOR WASTE BIN	S	STOP
EA	ENVIRONMENT AGENCY	SSP	STAND PIPE
EB	ELECTRICITY BOX	SV	SOFT LEVEL
ECP	ELECTRIC CABLE FENCE	SMH	SURFACE WATER MANHOLE
ECP	ELECTRICITY CABLE PIT	SMP	SHEET METAL PILING
EM	ELECTRICITY MANHOLE	SP	SOIL POST
ER	EARTHING ROD	STU	STUMP
ETL	ELEC. TRANSMISSION LINE	SV	SOL VENT PIPE
FB	FOOTBRIDGE	SMT	SHEEP WIRE FENCE
FH	FIRE HYDRANT	TBM	TEMPORARY BENCH MARK
FHM	FIRE HYDRANT MARKER	TC	TELECOM CABINET
FL	FLOOR LEVEL	TGB	TELEPHONE CALL BOX
FP	FENCE POST	TGP	TELEPHONE CALL POST
FWM	FOLI WATER MANHOLE	TIL	TELECOM MANHOLE
G	GULLY	TL	THRESHOLD LEVEL
GL	GROUND LIGHT	TL	TRAFFIC LIGHT
GM	GATE POST	TLD	TRAFFIC LIGHT BOX
GP	GAS MARKER	TP	TELEGRAPH POLE
GV	GAS VALVE	TPS	TIMBER PILING SHIP
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IRF	IRON RAILING FENCE	WM	WATER METER
IRF	IRON RAILING FENCE	WM	WIRE MESH FENCE
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LDR	LADDER	WV	WATER VALVE

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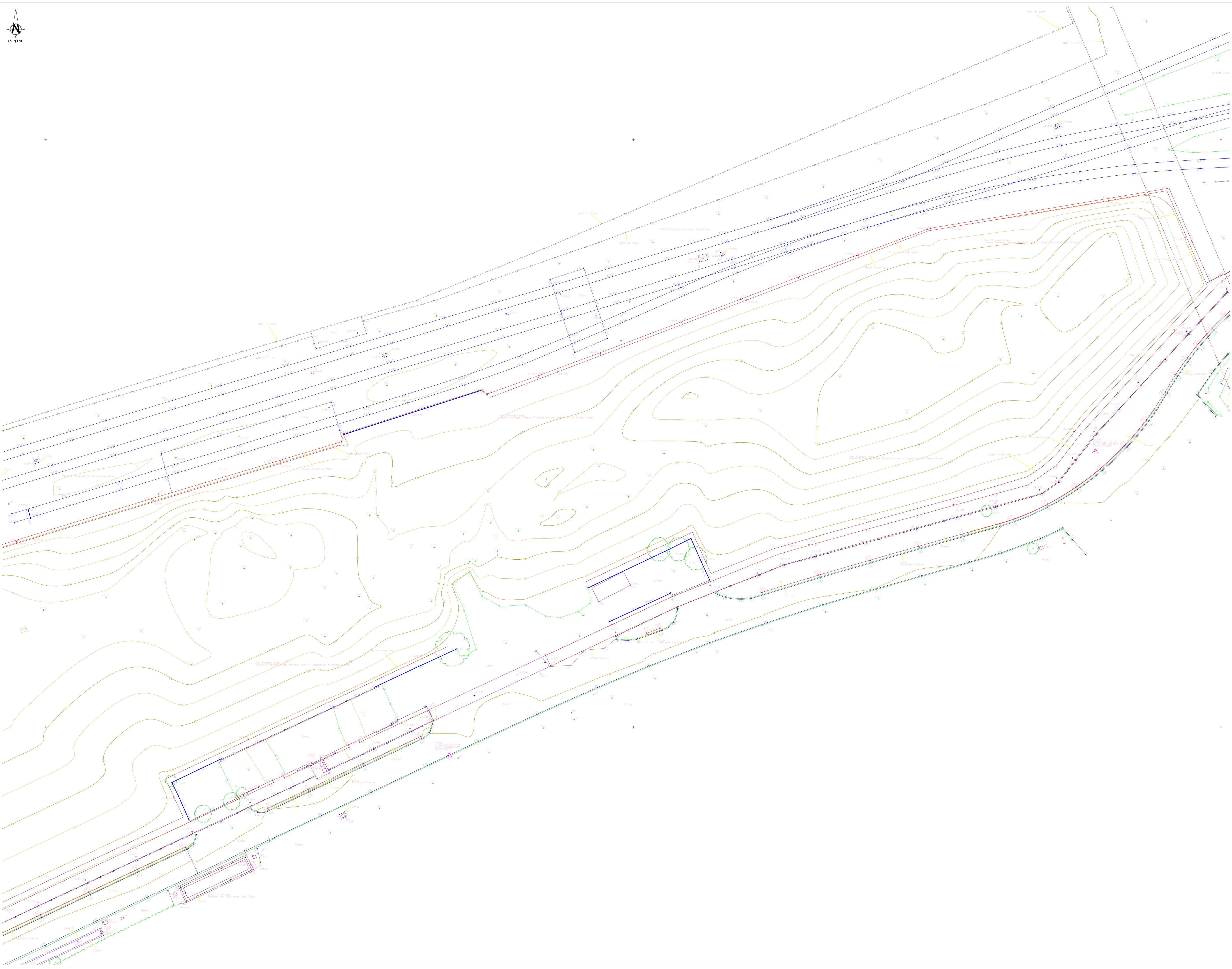
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Sheet Title		Uskmouth Power Station AW2 2D Topographical Survey Sheet 2 of 4						
TTE Project Number	Drawn By	Date	Checked By	Date	Approved By	Date	Scale @ A3	Subsidiary
784-8070326	JBS	13/12/24	C.M.	13/12/24	G.P.	13/12/24	1:200	53
Client Project Number	Company	Version	Revision	Drawn	Checked	Approved	Scale	Subsidiary
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TOPO LEGEND

AB	AIR BRICK	LFB	LITERITY
AV	AIR VALVE	LP	LAMP POST
BB	BELLOU BEACON	MB	MOORING BOLLARD
BH	BUILDING HEIGHT	MT	MISCELLANEOUS FENCING
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JO	JOB	WPP	WOODEN POST & RAIL FENCE
KO	KERB OUTLET	WV	WATER VALVE
LDR	LADDER		

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Sheet Title Uskmouth Power Station AW2 2D Topographical Survey Sheet 3 of 4		Sheet Title Uskmouth Power Station AW2 2D Topographical Survey Sheet 3 of 4	
TTE Project Number 784-8070326	Drawn By JBS	Date 13/12/24	Checked By C.M.
Client Project Number 784-8070326	Drawn By TTE	Date 13/12/24	Checked By G.P.
Scale @ A3 1:200		Scale @ A4 1:200	
Suitability A		Suitability A	

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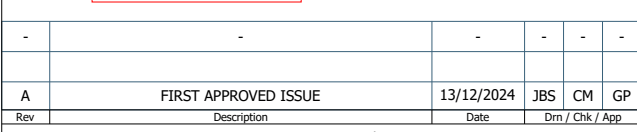
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Client: **SAE**

Project Name: Uskmouth Power Station AW2

Sheet Title
Uskmouth Power Station AW2
2D Topographical Survey
Sheet 4 of 4

TE Project Number	Drawn By	Date	Checked By	Date	Approved By	Date	Scale @ A0	Suitability		
784-B070326	JBS	13/12/24	C.M.	13/12/24	G.P.	13/12/24	1:200	S3		
Client Project Number	Originator	Volume	System	Level	Location	Type	Code	Role	Number	Revision
784-B070326	- TTE	- ZZ	- ZZ	- DR	- G	-	004			A

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Appendix A2

GRR Estimations, HR Wallingford

Calculated by: Lee Galsworthy

Site name: Uskmouth AW2 BESS

Site location: NP18 2YH

Site Details

Latitude: 51.54822° N

Longitude: 2.96983° W

Reference: 3047056519

Date: Dec 23 2024 14:10

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 2.7

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Notes

(1) Is $Q_{\text{BAR}} < 2.0 \text{ l/s/ha}$?

When Q_{BAR} is $< 2.0 \text{ l/s/ha}$ then limiting discharge rates are set at 2.0 l/s/ha .

Soil characteristics

	Default	Edited
SOIL type:	3	3
HOST class:	N/A	N/A
SPR/SPRHOST:	0.37	0.37

(2) Are flow rates $< 5.0 \text{ l/s}$?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	915	915
Hydrological region:	9	9
Growth curve factor 1 year:	0.88	0.88
Growth curve factor 30 years:	1.78	1.78
Growth curve factor 100 years:	2.18	2.18
Growth curve factor 200 years:	2.46	2.46

(3) Is $\text{SPR/SPRHOST} \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
-------------------------	---------	--------

Q_{BAR} (l/s):	10.61	10.61
1 in 1 year (l/s):	9.34	9.34
1 in 30 years (l/s):	18.89	18.89
1 in 100 year (l/s):	23.13	23.13
1 in 200 years (l/s):	26.1	26.1

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Appendix A3

Site General Arrangement Drawing