

Flood Consequence Assessment

Brunel Way, Port Talbot

For and on behalf of:
Aldustria Ltd

January 2025

Report title:

Flood Consequence Assessment

Site name:

Brunel Way, Port Talbot

For and on behalf of:

Aldustria Ltd

Prepared by:

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1 INTRODUCTION

- 1.1 This Flood Consequence Assessment (FCA) has been prepared by Sustain Environmental (SE) for Aldustria Limited and issued in January 2025.
- 1.2 The site has an area of 4,400m² (0.44ha). The proposed development entails the siting of 30MW battery storage system and associated works including formation of onsite parking area and erection of fencing.
- 1.3 The Local Planning Authority (LPA) and SuDS Approval Body (SAB) are Neath Port Talbot County Borough Council (NPTCBC).

Background

- 1.4 This FCA has been provided for the planning application to the LPA for the proposed development, and also to support the application to the SAB.
- 1.5 In addition to the desk-based investigation that was completed, this FCA also makes reference to the following appendices:
- **Appendix A** – Proposed site layout;
 - **Appendix B** – Topographic survey;
 - **Appendix C** – DCWW public sewer map; and
 - **Appendix D** – Surface water drainage layout and calculations.

Aims and Objectives

- 1.6 The aim of this FCA is to understand the consequence of flooding to the proposed development and show that the site can be developed safely, without adversely affecting flooding at the site and also to surrounding areas.
- 1.7 The objectives of this FCA are to:
- Confirm the local sources of flooding present;
 - Undertake an appraisal of the flood consequences to the proposed use of the site and potential impact of the development on flooding elsewhere; and
 - Provide a strategy for mitigating flooding to or resulting from the proposed development of the site with respect to surface water runoff;

- This will be based on the principles of Sustainable Drainage Systems (SuDS).

Limitations of the Assessment

1.8 The general limitations of this assessment are that:

- A number of sources have been used to compile this FCA. Whilst SE believes them to be trustworthy; SE is unable to guarantee the accuracy of the information provided by others.
- This FCA is based on information available at the time of preparation. Consequently, there is potential for further information to become available. This may lead to future alteration to the conclusions that have been drawn in this report, for which SE cannot be held responsible.

2 PLANNING POLICY

National Planning Policy

- 2.1 Technical Advice Note (TAN 15) on Development and Flood Risk provides guidance to supplement the policy set out within Planning Policy Wales in relation to development and flooding.
- 2.2 The guidance relates to sustainability principles and provides a framework to allow risks arising from river flooding, coastal flooding and additional runoff from developments to be assessed.
- 2.3 In relation to flood risk, TAN 15 indicates that the Assembly has a duty to ensure that development is sustainable and does not create problems for future generations.
- 2.4 Managing flooding has an important role to ensure sustainable development by: guiding developments to locations with little or no risk from river, tidal or coastal flooding, managing consequences of flooding where developments can be justified and making provision for climate change.
- 2.5 TAN 15 confirms that each planning authority in Wales must prepare a Development Plan for its area. The development plans provide locational guidance for development, detailed site-specific policies, and identification of proposals for development.
- 2.6 Catchment Flood Management Plans aim to take a holistic approach to flood management at a catchment scale and can provide guidance on managing risk to future developments.

Requirements of TAN 15

- 2.7 A Flood Consequence Assessment (FCA), to support a development application, should be proportionate to the risk and appropriate to the scale, nature and location of the development. The following should be considered:

- The consequences of flooding on the development, the consequences of the development on flood risk elsewhere and if appropriate mitigation measures can be incorporated into the design.
- Mechanisms of flooding, including sources of floodwater, how floodwater enters and flows across a site, height, and speed of floodwaters.
- Uncertainties in estimating flood events including use of historical records and forecasting.
- Security of proposed developments over their lifetime and ensuring those using the development have an awareness of the potential risks from flooding.
- Description of consequences under a range of extreme events including: mechanisms, sources, depths, speed, rate of rise, overland flood routes, velocity, access and egress, impacts on natural heritage, impact on flood risk in surrounding areas.
- Structural adequacy of defences to contain flows and withstand overtopping and if required the suitability of implementing a buffer zone adjacent to defences.
- Measures required to ensure flooding is managed to acceptable levels and ensure that the impact upon flood risk elsewhere in the flood plain is managed.

Emerging TAN 15

- 2.8 In December 2021, the Welsh Government released a new TAN15 which is due to become adopted policy advice on 1 June 2023. This new national strategy is set to recognise the degrees of flooding in the present day and in the future.
- 2.9 Although the emerging TAN15 is yet to be adopted, reference has been made and the new mapping has been included throughout this FCA.

Planning Policy Wales

- 2.10 Planning Policy Wales sets out the land use planning policies of the Welsh Government. Chapter 13 'Minimising and Managing Environmental Risk and Pollution' outlines the Welsh Government's objectives in terms of addressing flood risk.

2.11 Section 13.4 of Planning Policy Wales states:

"Development proposals in areas designed as being of high flood hazard should only be considered where:

- New development can be justified in that location, even though it is likely to be at risk from flooding; and*
- The development proposal would not result in the intensification of existing development which may itself be at risk; and*
- New development would not increase the potential adverse impacts of a flood event."*

2.12 Planning Policy Wales is supplemented by a series of Technical Advice Notes (TAN). TAN 15 provides technical guidance on Development and Flood Risk.

Neath Port Talbot Local Development Plan

2.13 The Neath Port Talbot Local Development Plan 2011-2026 was published January 2016 and contains the following Policies that are relevant to flood risk and drainage:

2.14 SP1 on Climate Change advises the following:

"In relation to the consequences of climate change: likely increased flood risk will be taken into account and addressed by ensuring that there is greater resilience by avoiding development on land that is at risk from flooding in the first instance in accordance with the sequential approach set out in national guidance or in locations that could increase the risk of flooding elsewhere."

2.15 EN8 on Pollution and Land Stability advises the following:

"Developments will be expected to minimise any adverse effects on water quality, and additional information may be required in cases where there may be issues relating to existing poor water quality or a development has the potential to cause pollution. Developments will be required to ensure that no pollution is caused through drainage."

- 2.16 BE1 on Design advises the following:

"Drainage systems should be designed to ensure that developments have no detrimental effects on the water environment or on food risk. Normally this will involve the use of Sustainable Drainage Systems (SuDS) techniques."

Preliminary Flood Risk Assessment

- 2.17 A Preliminary Flood Risk Assessment (PFRA) was produced in 2011 for NPTCBC.
- 2.18 The PFRA is aimed at providing high level overview of flood risk from all sources of flooding within the local area, including consideration of surface water, groundwater and ordinary watercourses.

Local Flood Risk Management Strategy

- 2.19 A Local Flood Risk Management Strategy (LFRMS) was produced in 2013 by Neath Port Talbot.
- 2.20 The LFRMS aims to understand the risks of various flooding sources that Neath Port Talbot may face, take proactive steps to mitigate these risks, raise awareness across communities and prepare for any such event. Local flood risk is any flood risk that derives from surface runoff, groundwater, or ordinary watercourses.

Sustainable Drainage Systems Standards for Wales

- 2.21 The Sustainable Drainage Systems Standards for Wales are a set of guidelines for designing, building, and maintaining drainage systems for new developments. The standards aim to reduce the risk of flooding and protect the environment. These Standards are summarised as follows:
- Standard S1 (Surface Water Runoff Destination): specifies where surface water runoff should go;
 - Standard S2 (Surface Water Runoff Hydraulic Control): controls how surface water runoff moves;
 - Standard S3 (Water Quality): ensures water quality is maintained;

- Standard S4 (Amenity): considers how the drainage system will benefit the community;
- Standard S5 (Biodiversity): considers how the drainage system will support local wildlife; and
- Standard S6 (Design): considers how the drainage system will be designed, built, and maintained.

Pre-application Consultation

- 2.22 A preliminary flood and drainage appraisal for the proposed development of the site was prepared and sent to the SAB in November 2024 to set out the background understanding and the suggested approach for the management of flood risk and surface water drainage.
- 2.23 This resulted in some pre-application consultation with the SAB, and the suggestion for a meeting. Unfortunately, due to time constraints in December, it was not possible to have this meeting prior to the planning submission.
- 2.24 The drainage strategy set out in Section 5 of this FCA has therefore been completed in accordance with the national and local planning policies and associated guidance, notably the Sustainable Drainage Systems Standards for Wales, together also with some recent relevant experience.

3 BACKGROUND UNDERSTANDING

- 3.1 The site address is a land area at Baglan Energy Park, Chosen Industrial Park, Briton Ferry, Neath, SA11 2HZ. The site has an area of 4,400m² (0.44ha). A central NGR for the site area is X: 273850, Y: 193645.
- 3.2 The M4 motorway is adjacent to the site to the north-east, which is elevated above the local ground levels. Brunel Way is to the north-west, passing alongside the Outer Basin. The site is adjacent to existing commercial warehouses and storage areas. This includes Units 1 and 2 adjacent to the western boundary and Unit 3 also to the west and adjacent to Brunel Way.
- 3.3 A location plan of the site is provided as **Figure 3.1**.



Figure 3.1 – Site Location Plan

Existing Site and Proposed Development

- 3.4 The site is currently an undeveloped and therefore a greenfield area of land.
- 3.5 The proposed development will be upon this surface. An access track will enter the site from the southern boundary and follow the south-western boundary, with this to be formed and surfaced with gravel.
- 3.6 An initial plan of the proposed development is included as **Appendix A**. It will include rows of battery racks across the centre of the site together also with adjacent inverters and transformers. This equipment will be mounted on concrete foundations. There is also a substation and client switchgear and

control room in the south-eastern part of the site, with two car parking spaces and an on-site turning area.

Topography

- 3.7 A topographical survey of the site has been completed, with this included as **Appendix B**.
- 3.8 This shows ground levels to be highest in the north-eastern part of the site, at around 9.70m and 9.80m. There is a fall in ground levels to the north-west, with ground levels at around 7.60m and 7.90m along the site boundary. Ground levels are also high in the north-western part of the site, at around 8.00m and 8.10m, and fall to the north-east, with ground levels at around 7.60m and 7.70m.
- 3.9 The topographical survey records the majority of the site area to currently be surfaced with grass, although this is understood to be grass on top of hardstanding. There is a narrow strip of gravel along the south-western boundary and an asphalt footpath and narrow gravel strip along the southern boundary. There is a wide strip of rough ground comprised of gravel and grass along the north-eastern boundary. The site was found to be clear of obstacles, with only a few boulders recorded adjacent to parts of the site boundary.

Hydrology

- 3.10 The River Neath is the main watercourse in the area, located approximately 0.50km to the west of the site. This watercourse drains south-west from the Brecon Beacons National Park towards Baglan Bay below Briton Ferry on the east side of Swansea Bay.
- 3.11 There is a tributary that drains into the River Neath, located 0.20km to the west of the site and the Outer Basin which is located to the north-west. There is also Baglan Brook 0.39km to the south of the site, which drains into the River Neath.

Geology

- 3.12 The 1 to 50,000 scale British Geological Survey (BGS) online mapping provides an understanding of bedrock geology and whether any superficial deposits have been recorded.
- 3.13 The bedrock geology under the site is classified by the BGS as the Llynfi Member (sandstone). There are superficial deposits recorded across the site of tidal flat deposits (clay, silt and sand).

Hydrogeology

- 3.14 The BGS also provide a dataset that classifies the aquifer designations that reflect the importance of aquifers in terms of groundwater as a resource and in supporting surface water flows.
- 3.15 The site is located upon a Secondary A Aquifer for the bedrock. These are permeable layer of rock or drift deposits that can support local water supplies and may be an important source of base flow to rivers.

Soils

- 3.16 Local soils will be influenced by the underlying geology and by the historical uses of the land. As the site is in a developed area, it is likely that there would be variations resulting from anthropogenic activities.
- 3.17 Information from the Land Information System (LandIS) available from Cranfield Environment Centre has been used to characterise the local soils. This uses a simplified data-set at 1:250,000 scale to provide a general understanding of the variations between different natural soil types across England and Wales.
- 3.18 The local soils are described as loamy and clayey soils of coastal flats with naturally high groundwater, and which would be naturally wet.
- 3.19 Based on the understanding of the underlying substrate and as the soils are naturally wet, the infiltration of water into the underlying substrate is anticipated to be limited. It is therefore not proposed to complete soakway testing as part of a ground investigation to confirm the potential for infiltration drainage.

Drainage Infrastructure

- 3.20 The public sewerage authority for this area is Dŵr Cymru Welsh Water (DCWW), with a local sewer map included as **Appendix C**.
- 3.21 In addition to the public drainage infrastructure, surface water runoff from the existing commercial warehouses and storage areas adjacent to the western site boundary are drainage by a private drain. Surface water runoff is collected and conveyed from the western side of Units 1 and 2 and from the northern side of Unit 3, in a north-westerly direction and then discharged into the River Neath.
- 3.22 The private drain to the north of Unit 3 is the closest point of connection to the site, with this adjacent to the north-western boundary.

4 ASSESSMENT OF FLOOD SOURCES

- 4.1 The following summarises the assessment of flood sources that has been completed, to determine potential risks and consequences from flooding.
- 4.2 Information from the Flood Risk Assessment Wales (FRAW) map has been reviewed to understand the level of flood risk to the site. This replaced the Development Advice Map (DAM) from December 2021.
- 4.3 The FRAW Map shows flood risk for three different types of flooding:
- Rivers;
 - The sea; and
 - Surface water and small watercourses.
- 4.4 The assessment takes into account flood defences and combines new national-scale modelling with detailed local-scale models to categories risk into 3 bands, labelled 'High', 'Medium' and 'Low' risk.
- 4.5 For Rivers and Surface Water and Small Watercourses:
- 'High' risk means that each year, this area has a chance of flooding of greater than 1 in 30 (3.3%);
 - 'Medium' risk means that each year, an area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%); and
 - 'Low' risk means that each year, an area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%).
- 4.6 For the Sea:
- 'High' risk means that each year, this area has a chance of flooding of greater than 1 in 30 (3.3%);
 - 'Medium' risk means that each year, an area has a chance of flooding of between 1 in 200 (0.5%) and 1 in 30 (3.3%); and
 - 'Low' risk means that each year, an area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 200 (0.5%).

- 4.7 The risk assessment takes into account the effect of flood defences where NRW have information. Flood defences reduce, but do not completely stop the chance of flooding as they can be overtopped or fail.
- 4.8 In addition, the flood risk levels do not take into account the following, and which could increase the risk and extent of flooding in an area:
- The failure of flood defences; and
 - Blockage of river channels, structures and other drainage systems.
- 4.9 As well as flood risk, the FRAW Map shows other information, including:
- The location of flood defences;
 - The areas benefitting from flood defences;
 - The risk of flooding from reservoirs;
 - Coastal erosion; and
 - Shoreline management plans.
- 4.10 The FRAW Map shows the worst-case scenario for the area that could be flooded if a large reservoir were to fail and release the water it holds. A large reservoir is considered to be one that holds over 10,000 cubic metres of water.
- 4.11 The reservoir flood maps do not indicate the likelihood of a flood occurring. Reservoir flooding is extremely unlikely to happen. There has been no loss of life in the UK from reservoir flooding since 1925. All large reservoirs must be inspected and supervised by reservoir panel engineers. As the enforcement authority for the Reservoirs Act 1975 in Wales, NRW ensure that reservoirs are inspected regularly and essential safety work is carried out.

Flood Risk from Rivers

- 4.12 The FRAW Map showing flood risk from rivers is provided as **Figure 4.1**. Areas at risk of flooding are shown in shades of blue (dark blue for high, light blue for low and no shading for no risk).
- 4.13 The site and immediate surrounds are shown on the FRAW Map with no shading, and therefore it is concluded that there is a no flood risk from rivers.



Figure 4.1 – Flood Risk from Rivers

Flood Risk from the Sea

- 4.14 The FRAW Map showing flood risk from the sea is provided as **Figure 4.2**. Areas at risk of flooding are shown in shades of blue (dark blue for high, light blue for low and no shading for no risk).
- 4.15 The site and immediate surrounds are shown on the FRAW Map with no shading, and therefore it is concluded that there is a no flood risk from the sea.



Figure 4.2 – Flood Risk from the Sea

Flood Risk from Surface Water and Small Watercourses

- 4.16 The FRAW Map showing flood risk from surface water and small watercourses is provided as **Figure 4.3**. Areas at risk of flooding are shown in shades of purple (dark purple for high, light purple for low and no shading for no risk).
- 4.17 The site and immediate surrounds are shown on the FRAW Map with no shading, and therefore it is concluded that there is no flood risk from surface water and small watercourses.



Figure 4.3 – Flood Risk from Surface Water and Small Watercourses

Flood Risk from Reservoirs

- 4.18 The FRAW Map showing flood risk from large reservoirs is provided as **Figure 4.4**. This indicates the site to be outside the area that could be affected by flooding from large reservoirs.



Figure 4.4 – Flood Risk from Reservoirs

Flood Mitigation

- 4.19 All sources of flooding across the site and surrounds have been identified to be low and specific flood mitigation measures are not therefore required.
- 4.20 However, it is suggested for the finished floor levels of new buildings or structures that could be occupied by operational personnel to be elevated above surrounding ground levels by at least 150mm.
- 4.21 This measure would help to protect against the possibility of shallow ponding, which can sometimes occur after heavy or prolonged periods of rainfall.
- 4.22 A drainage strategy for the surface water runoff would also need to be provided, to ensure that the proposed development does not result in detrimental impact to flooding. This is provided in Section 5 of this FCA.

5 SURFACE WATER DRAINAGE

- 5.1 Guidance on surface water runoff from development is given in TAN15. This advises that all types of land use change will impact on the hydrological cycle in one way or another and flooding is not confined to floodplains, as heavy rain falling on waterlogged ground can cause localised flooding almost anywhere.
- 5.2 In all flood zones, development should not increase the risk of flooding elsewhere. Surface water runoff from developments in these areas can, if not properly controlled, result in flooding at other locations and significantly alter the frequency and extent of floods further down the catchment.
- 5.3 Built development, such as roads, pavements, and roofing, tends to increase the surface area of impermeable ground, thus reducing percolation and increasing rapid surface run-off.
- 5.4 This has the effect of reducing the time it takes for precipitation to enter the watercourse and consequently increasing the peak discharge. SuDS can perform an important role in managing run-off from a site and should be implemented, wherever they will be effective, in all new development proposals, irrespective of the flood zone in which they are located.
- 5.5 Development may increase run-off and hence the risk and consequences of flooding in other areas, therefore, the aim should be for new development not to create additional run-off when compared with the undeveloped situation, and for re-development to reduce run-off where possible.
- 5.6 The objective of the drainage strategy is to ensure that there are no residual adverse impacts on flooding over the site and surrounds as a consequence of the proposed development through provision of a sustainable approach to the management of surface water runoff.
- 5.7 This FCA will therefore define a drainage strategy including the measures to mitigate and manage the changes to surface water runoff.

Proposed Discharge Receptor

- 5.8 Standard S1 (Surface Water Runoff Destination) of the Sustainable Drainage Systems Standards for Wales lists the priority for the hierarchy that drainage strategies should be designed to. This is summarised as follows:

Standard S1 (Surface Water Runoff Destination):

- Priority Level 1: Surface water runoff is collected for use;
 - Priority Level 2: Surface water runoff is infiltrated to ground;
 - Priority Level 3: Surface water runoff is discharged to a surface water body;
 - Priority Level 4: Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system;
 - Priority Level 5: Surface water runoff is discharged to a combined sewer.
- 5.9 This aims to ensure that surface water runoff is treated as a resource and managed in a way that minimises negative impacts of the development on flooding, the morphology and water quality of receiving waters and the associated ecology.
- 5.10 The Sustainable Drainage Systems Standards for Wales states that Priority Levels 4 and 5 should only be used in exceptional circumstances.
- 5.11 In terms of the proposed development, there is no demand for collecting surface water for re-use and so therefore Priority Level 1 has been discounted.
- 5.12 Based on the appraisal of the underlying substrate, it has been assumed that infiltration to ground would be limited and also that there is the potential for a naturally high groundwater table that would restrict the use of infiltration drainage features. Priority Level 2 has therefore been discounted.
- 5.13 The drainage strategy has instead been designed on the assumption that there would be no infiltration into the ground, although also that it would not prevent any naturally occurring soakage. If soakaway testing still needs to be carried out for the SAB submission, it could be done after the planning submission.

- 5.14 The River Neath is the main watercourse in the area, located approximately 0.50km to the west of the site. There is a tributary that drains into the River Neath, located 0.20km to the west of the site and the Outer Basin which is located to the north-west. There is also Baglan Brook 0.39km to the south of the site, which drains into the River Neath. However, as these are no within or immediately adjacent to the site, Priority Level 3 has been discounted.
- 5.15 Priority Level 4 is the discharge of surface water runoff to a surface water sewer, highway drain, or another drainage system. As described in Section 3 of this FCA, the closest point of connection is a private drain to the north of Unit 3, adjacent to the north-western boundary. Surface water runoff is collected and conveyed in a north-westerly direction and discharged into the River Neath.
- 5.16 Surface water from existing drainage infrastructure for the local area already drains into this water feature. The drainage strategy will therefore be designed to discharge to this private drain.

Drainage Strategy

- 5.17 The site has been assessed as an undeveloped and greenfield area of land, and therefore greenfield runoff rates have been used. A series of rainfall events have been summarised, between the 1 in 1-year and the 1 in 100-year plus a 45% allowance for climate change. The drainage strategy will be designed to achieve the Q_{BAR} runoff rate from the site, with this rate used as it would manage the surface water runoff rate and volume.
- 5.18 These runoff rates are summarised in a table on the drainage strategy plan and they have also been used in the drainage calculations, included as **Appendix D**. This is therefore provided in response to Standard S2 (Surface Water Runoff Hydraulic Control) of the Sustainable Drainage Systems Standards for Wales.
- 5.19 A gravel filled attenuation trench would be included, to provide a volume of attenuation to manage the surface water runoff. The site would be surfaced with a permeable material, to provide an additional attenuation volume and other benefits, such as to water quality. A volume of cellular attenuation has also been included in the western part of the site, to achieve the runoff rate.

- 5.20 An attenuation trench has been included along the north-western and south-western site boundaries and also across the centre of the site, as shown on the drainage strategy plan, included as **Appendix D**. An outfall from this attenuation trench to the private drain has been included, in the north-western corner of the site.
- 5.21 As noted on the drainage strategy plan, the exact location and level of this outfall would be confirmed prior to commencement of the works. A flow control chamber is included between the outfall and the attenuation trench, to achieve the runoff rates as summarised in the table on the drainage strategy plan. In addition to the attenuation trench, the site is to include a permeable surface.
- 5.22 Typical details of the attenuation trench and the permeable surface are also included. A volume of cellular attenuation has also been included in the western part of the site.

Exceedance Events

- 5.23 Flows from the surface water drainage strategy in the event of an exceedance event must be managed in conveyance routes that minimise the risk to people and property.
- 5.24 The drainage strategy has been designed to manage the rainfall from the 1 in 100-year +45% climate change allowance, and therefore provides surplus capacity for current day events. It has been designed to achieve the Q_{BAR} runoff rate, compared to the existing situation where there is no management of the runoff.
- 5.25 If there were to be a more extreme rainfall event that exceeds the capacity of the drainage strategy, then water would drain across the site in accordance with the topography, and therefore to the north-west. The existing site would already drain in this direction in a similar exceedance event, albeit with the proposed drainage strategy now providing attenuation to the runoff rate.

Water Quality

- 5.26 Water quality has been considered in accordance with the Simple Index Approach, as set out in the CIRIA SuDS Manual.
- 5.27 This advises that a drainage strategy must demonstrate that the hazard index for the particular land use is less than the mitigation index of the proposed SuDS features. This is therefore provided in response to Standard S3 (Water Quality) of the Sustainable Drainage Systems Standards for Wales.
- 5.28 The site includes rows of battery racks across the centre of the site together also with adjacent inverters and transformers. This equipment will be mounted on concrete foundations. There is also a substation and client switchgear and control room in the south-eastern part of the site, with two car parking spaces and an on-site turning area. There will be some limited vehicular movement associated with the operation requirements of the site.
- 5.29 The pollution hazard indices for the site are summarised in **Table 5.2**. This is based on the water quality management section of the CIRIA SuDS Manual (C753) and the guidance on pollution hazard indices for different land uses provided in Table 26.2. The closest match was considered to be a site with low traffic roads and non-residential car parking with infrequent change.

Land Use	Pollution Hazard Indices		
	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Low Traffic Roads and Non-Residential Car Parking with Infrequent Change	0.50	0.40	0.40
Total	0.50	0.40	0.40

Table 5.2 – Pollution Hazard Indices for the Land Use (SuDS Manual)

- 5.30 The mitigation indices provided by the site are summarised in **Table 5.3**. This is based on the water quality management section of the CIRIA SuDS Manual that provides guidance on the indicative SuDS mitigation indices for discharges to surface water bodies provided in Table 26.3 and groundwater in Table 26.4.

Type of SuDS	Mitigation Indices		
	TSS	Metals	Hydrocarbons
Permeable Surfaces	0.70	0.60	0.70
Filter Drain	$0.40 * 0.5 = 0.20$	$0.40 * 0.5 = 0.20$	$0.40 * 0.5 = 0.20$
Total	0.90	0.80	0.90

Table 5.3 – Pollution Mitigation Indices for the Proposed SuDS (SuDS Manual)

- 5.31 The permeable surface has been assessed using the values for a permeable pavement and the attenuation trench using the values for a filter drain.
- 5.32 As advised in the CIRIA SuDS Manual, a factor of 0.5 has been applied to the pollution mitigation values typically associated with a filter drain. This is required to account for the reduced performance of secondary or tertiary components associated with the already reduced inflow concentration.
- 5.33 The assessment of water quality therefore demonstrates that an adequate level of mitigation would be provided by the features included in the drainage strategy for the potential polluting effects resulting from the proposed development.
- 5.34 The project team discussed whether additional features to provide amenity or biodiversity benefit could be included. This would be in accordance with Standard S4 (Amenity) and Standard S5 (Biodiversity) of the Sustainable Drainage Systems Standards for Wales. Details relating to the achievable biodiversity benefits are contained within the Ecology report submitted with the planning application.

Maintenance Requirements

- 5.35 On-site drainage features would be adopted and managed by the site operator as part of the on-site maintenance activities.
- 5.36 It is anticipated that the operation and maintenance of the surface water drainage features would be undertaken in accordance with the recommendations outlined in the CIRIA SuDS Manual, with the extract for pervious surfaces provided as **Figure 5.2** and for filter drains as **Figure 5.3**.

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Figure 5.2 – Operation and Maintenance of Pervious Surfaces (SuDS Manual)

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

Figure 5.3 – Operation and Maintenance of Filter Drains (SuDS Manual)

6 SUMMARY

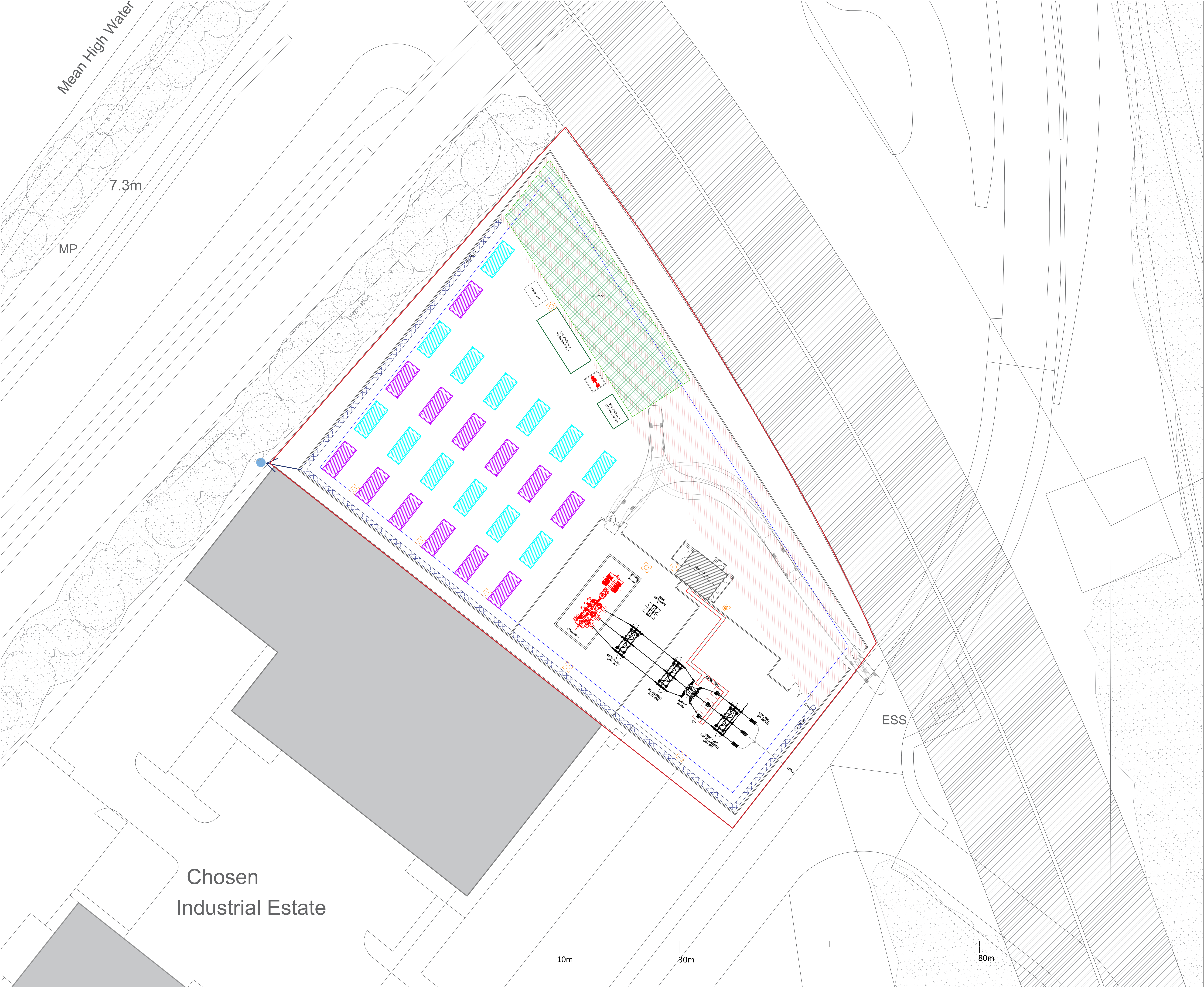
- 6.1 This FCA has been prepared to support the proposed development of a 30MW battery storage system and associated works at a land area at Baglan Energy Park, Chosen Industrial Park, Briton Ferry, Neath, SA11 2HZ.
- 6.2 This FCA aims to understand the consequence of flooding to the proposed development and show that the site can be developed safely, without adversely affecting flooding at the site and also to surrounding areas.
- 6.3 A background understanding from available sources was provided including the site location and land use, the local topography, hydrology, geology, hydrogeology, soils and drainage infrastructure.
- 6.4 A preliminary flood and drainage appraisal for the proposed development was sent to the SAB. This resulted in some pre-application consultation, and the suggestion for a meeting. Unfortunately, due to time constraints, it was not possible to have this meeting prior to the planning submission.
- 6.5 A summary of the relevant flood and drainage planning policy and key design guidance was provided, including at a national and local level. This included the standards in the Sustainable Drainage Systems Standards for Wales, which aim to reduce the risk of flooding and protect the environment.
- 6.6 An assessment of flood sources was provided, to determine flood risk and consequences. This included the potential flood risk from rivers, the sea; from surface water and small watercourses; and from reservoirs.
- 6.7 It was concluded that these flood sources all represented a low level of risk, and therefore that there were no adverse consequences to consider. As such, no specific flood mitigation measures are required.
- 6.8 However, it is suggested for the finished floor levels of new buildings or structures that could be occupied by operational personnel to be elevated above surrounding ground levels by at least 150mm.

- 6.9 A surface water drainage strategy would also be provided, to ensure that the change of land use resulting from the proposed development does not result in detrimental impact to flooding and surface water runoff.
- 6.10 The objective of the surface water drainage strategy is to demonstrate that there would be no residual adverse impacts on flooding over the site and surrounds as a consequence of the proposed development through provision of a sustainable approach to the management of surface water runoff.
- 6.11 The existing surface water drainage regime was described, and then the proposed drainage strategy for managing surface water runoff considered in accordance with the Sustainable Drainage Systems Standards for Wales.
- 6.12 The closest point of connection is a private drain to the north of Unit 3, adjacent to the north-western boundary. Surface water runoff is collected and conveyed in a north-westerly direction and discharged into the River Neath. Surface water from existing drainage infrastructure for the local area already drains into this water feature. The drainage strategy will therefore be designed to discharge to this private drain.
- 6.13 The site has been assessed as an undeveloped and greenfield area of land, and therefore greenfield runoff rates have been used. The drainage strategy will be designed to achieve the QBAR runoff rate from the site, with this rate used as it would manage the surface water runoff rate and volume.
- 6.14 An attenuation trench has been included, along the north-western and south-western site boundaries and also across the centre of the site with an outfall to the private drain. A flow control chamber is included between the outfall and the attenuation trench, to achieve the required runoff rates. The site is also to include a permeable surface and a volume of cellular attenuation.
- 6.15 The drainage strategy has been designed to manage the rainfall from the 1 in 100-year +45% climate change allowance, and therefore provide surplus capacity for current day events. It has been designed to achieve the QBAR runoff rate, compared to the existing situation where there is no management of the runoff.

- 6.16 In the event of an exceedance event, the flows that are above the design standard of the drainage strategy would drain across the site in accordance with the topography, and therefore to the north-west.
- 6.17 Water quality has been considered in accordance with the Simple Index Approach, as set out in the CIRIA SuDS Manual. A drainage strategy must demonstrate that the hazard index for the particular land use is less than the mitigation index of the proposed SuDS features.
- 6.18 The assessment of water quality demonstrates that an adequate level of mitigation would be provided by the features included in the drainage strategy for the potential polluting effects resulting from the proposed development.
- 6.19 On-site drainage features would be adopted and managed by the site operator as part of the on-site maintenance activities. It is anticipated that the operation and maintenance of the surface water drainage features would be undertaken in accordance with the recommendations in the CIRIA SuDS Manual.
- 6.20 In summary, this FCA has concluded that the proposed development of the site is considered to be appropriate in terms of flooding and surface water drainage.

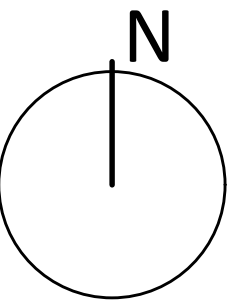
Appendix A

Proposed Site Layout



LEGEND:

- 2.4m galvanised steel palisade fence
- Lamppost / CCTV
- Communications Tower
- Aux Transformer
- BNG Zone
- GRP Box
- Filter Drain
- Battery
- MV Skid
- Land Ownership Boundary
- Drainage Outfall
- Private Drain
- 2.5m Inner Perimeter to Fence
- Adjacent Buildings
- Motorway (M4)



P1	10.01.25	Issue for Information	JK / GD
REV	DATE	COMMENTS	AUTHOR / CHECKED

PROJECT TITLE		
Aldustria Baglan Site		
DETAIL		
Site Layout Diagram		
DRAWING NUMBER (PROJECT-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER)		
24142BAG-LHC - 00 - 00 - DR - AR - 0102		
STATUS		
S2 FOR INFORMATION		
REVISION	DATE	SCALE
P1	19/12/24	1:200 @ A0
CONTRACTORS MUST CHECK ALL DIMENSIONS ON SITE - ONLY FIGURED DIMENSIONS ARE TO BE WORKED FROM - DISCREPANCIES MUST BE REPORTED TO THE ARCHITECT BEFORE PROCEEDING © THIS DRAWING IS COPYRIGHT		LHC PROJECT NUMBER
		24142BAG

☐ EXETER
01392 444334

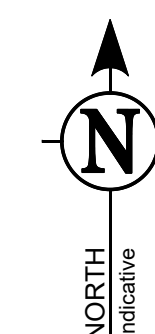
☐ PLYMOUTH
01752 660368

☐ LISKEARD
01579 212102

lhc.net

Appendix B

Topographic Site Survey



TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

ABBREVIATIONS & SYMBOLS			
AB	Air Brick	BT	Brick Transformer
AC	Acoustic	BSU	Brick Solder Gun
AD	Adhesive	BS	Brick Solder
AE	Air Valve	BSL	Brick Solder Lead
AF	Aluminum Foil	BSL	Brick Solder Lead
AG	Aluminum Gasket	BSL	Brick Solder Lead
AH	Air Hole	BSL	Brick Solder Lead
AI	Air Inlet	BSL	Brick Solder Lead
AK	Air Kiosk	BSL	Brick Solder Lead
AL	Aluminum	BSL	Brick Solder Lead
AM	Aluminum Metal	BSL	Brick Solder Lead
AN	Aluminum Net	BSL	Brick Solder Lead
AO	Aluminum Oil	BSL	Brick Solder Lead
AP	Aluminum Pipe	BSL	Brick Solder Lead
AQ	Aluminum Quarter	BSL	Brick Solder Lead
AR	Aluminum Rod	BSL	Brick Solder Lead
AS	Aluminum Sheet	BSL	Brick Solder Lead
AT	Aluminum Tape	BSL	Brick Solder Lead
AV	Aluminum Valve	BSL	Brick Solder Lead
AW	Aluminum Wire	BSL	Brick Solder Lead
AX	Aluminum X	BSL	Brick Solder Lead
AY	Aluminum Y	BSL	Brick Solder Lead
AZ	Aluminum Z	BSL	Brick Solder Lead
BA	Brick Air	BSL	Brick Solder Lead
BB	Brick Block	BSL	Brick Solder Lead
BC	Brick Brick	BSL	Brick Solder Lead
BD	Brick Duct	BSL	Brick Solder Lead
BE	Brick End	BSL	Brick Solder Lead
BF	Brick Face	BSL	Brick Solder Lead
BG	Brick Gasket	BSL	Brick Solder Lead
BH	Brick Hole	BSL	Brick Solder Lead
BI	Brick Inlet	BSL	Brick Solder Lead
BJ	Brick Joint	BSL	Brick Solder Lead
BK	Brick Kiosk	BSL	Brick Solder Lead
BL	Brick Lead	BSL	Brick Solder Lead
BM	Brick Metal	BSL	Brick Solder Lead
BN	Brick Net	BSL	Brick Solder Lead
BO	Brick Oil	BSL	Brick Solder Lead
BP	Brick Pipe	BSL	Brick Solder Lead
BQ	Brick Quarter	BSL	Brick Solder Lead
BR	Brick Rod	BSL	Brick Solder Lead
BS	Brick Sheet	BSL	Brick Solder Lead
BT	Brick Tape	BSL	Brick Solder Lead
BV	Brick Valve	BSL	Brick Solder Lead
BW	Brick Wire	BSL	Brick Solder Lead
BX	Brick X	BSL	Brick Solder Lead
BY	Brick Y	BSL	Brick Solder Lead
BZ	Brick Z	BSL	Brick Solder Lead
CA	Cable Air	BSL	Brick Solder Lead
CB	Cable Block	BSL	Brick Solder Lead
CC	Cable Brick	BSL	Brick Solder Lead
CD	Cable Duct	BSL	Brick Solder Lead
CE	Cable End	BSL	Brick Solder Lead
CF	Cable Face	BSL	Brick Solder Lead
CG	Cable Gasket	BSL	Brick Solder Lead
CH	Cable Hole	BSL	Brick Solder Lead
CI	Cable Inlet	BSL	Brick Solder Lead
CJ	Cable Joint	BSL	Brick Solder Lead
CK	Cable Kiosk	BSL	Brick Solder Lead
CL	Cable Lead	BSL	Brick Solder Lead
CM	Cable Metal	BSL	Brick Solder Lead
CN	Cable Net	BSL	Brick Solder Lead
CO	Cable Oil	BSL	Brick Solder Lead
CP	Cable Pipe	BSL	Brick Solder Lead
CQ	Cable Quarter	BSL	Brick Solder Lead
CR	Cable Rod	BSL	Brick Solder Lead
CS	Cable Sheet	BSL	Brick Solder Lead
CT	Cable Tape	BSL	Brick Solder Lead
CV	Cable Valve	BSL	Brick Solder Lead
CW	Cable Wire	BSL	Brick Solder Lead
CX	Cable X	BSL	Brick Solder Lead
CY	Cable Y	BSL	Brick Solder Lead
CZ	Cable Z	BSL	Brick Solder Lead
DA	Duct Air	BSL	Brick Solder Lead
DB	Duct Block	BSL	Brick Solder Lead
DC	Duct Brick	BSL	Brick Solder Lead
DD	Duct Duct	BSL	Brick Solder Lead
DE	Duct End	BSL	Brick Solder Lead
DF	Duct Face	BSL	Brick Solder Lead
DG	Duct Gasket	BSL	Brick Solder Lead
DH	Duct Hole	BSL	Brick Solder Lead
DI	Duct Inlet	BSL	Brick Solder Lead
DJ	Duct Joint	BSL	Brick Solder Lead
DK	Duct Kiosk	BSL	Brick Solder Lead
DL	Duct Lead	BSL	Brick Solder Lead
DM	Duct Metal	BSL	Brick Solder Lead
DN	Duct Net	BSL	Brick Solder Lead
DO	Duct Oil	BSL	Brick Solder Lead
DP	Duct Pipe	BSL	Brick Solder Lead
DQ	Duct Quarter	BSL	Brick Solder Lead
DR	Duct Rod	BSL	Brick Solder Lead
DS	Duct Sheet	BSL	Brick Solder Lead
DT	Duct Tape	BSL	Brick Solder Lead
DV	Duct Valve	BSL	Brick Solder Lead
DW	Duct Wire	BSL	Brick Solder Lead
DX	Duct X	BSL	Brick Solder Lead
DY	Duct Y	BSL	Brick Solder Lead
DZ	Duct Z	BSL	Brick Solder Lead

DRAWING NOTES

Topographical Surveys

Trees are drawn to scale showing the average canopy spread. Descriptions and heights should be used as a guide only.

All building names, descriptions, number of storeys, construction type including roof line details are indicative only and taken externally from ground level.

All below ground details including drainage, voids and services have been identified from above ground and therefore all details relating to these features including: sizes, depth, description etc will be approximate only. All critical dimensions and connections should be checked and verified prior to starting work.

Detail, services and features may not have been surveyed if obstructed or not reasonably visible at the time of the survey.

Surveyed physical features may not necessarily represent the legal boundary.

Measured Building Surveys

Measurements to internal walls are taken to the wall finishes at approx 1m above the floor level and the wall assumed to be vertical.

General

General

The contractor must check and verify all site and building dimensions, levels, utilities and drainage details and connections prior to commencing work. Any errors or discrepancies must be notified to Survey Solutions immediately.

The accuracy of the digital data is the same as the plotting scale implies. All dimensions are in metres unless otherwise stated.

The survey control listed is only to be used for topographical surveys at the stated scale. All control must be checked and verified prior to use.

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contained within this document and their written consent must be obtained before copying or using the data other than for the purpose it was originally supplied.

This drawing should only be scaled using digital methods.

SURVEY CONTROL CO-ORDINATES				
STATIONS	EASTINGS	NORTHINGS	LEVEL	DESCRIPTION
ST01	273878.213	193576.327	9.529	PK Nail
ST02	273877.028	193632.081	8.402	Peg & Nail
ST03	273866.229	193601.320	8.200	PK Nail

SURVEY GRID AND LEVEL DATUM

SURVEY GRID AND LEVEL DATUM

The coordinate system established for this survey is related to Ordnance Survey (OS) National Grid at multiple points using GNSS with a scale factor of 1.000.

The level datum established for this survey is related to Ordnance Survey (OS) using GPS Smartnet.

To avoid discrepancies within the survey, adding to the survey or setting out points from the survey, any coordinated data must be directly derived from the original survey control. Survey Solutions are not responsible for any third-party adding survey data to the existing information.

REV	DESCRIPTION	ISSUED BY	DATE
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PROJECT TITLE
SITE OFF BRUNEL WAY,
PORT TALBOT, SA11 2GG

PORT TALBOT, SA11 2GG

DRAWING DETAIL
TOPOGRAPHICAL SURVEY
Sheet 1 of 1

Sheet 1 of 1				
CLIENT ALDUSTRIA LTD				SCALE 1:200
SURVEYOR RRH & JM	SURVEY DATE 16/10/2024	CHECKED BY RAH	APPROVED BY RAH	DWG STATUS FINAL
DRAWING NUMBER 68933YQLS-01			REVISION	ISSUE DATE 22/10/2024

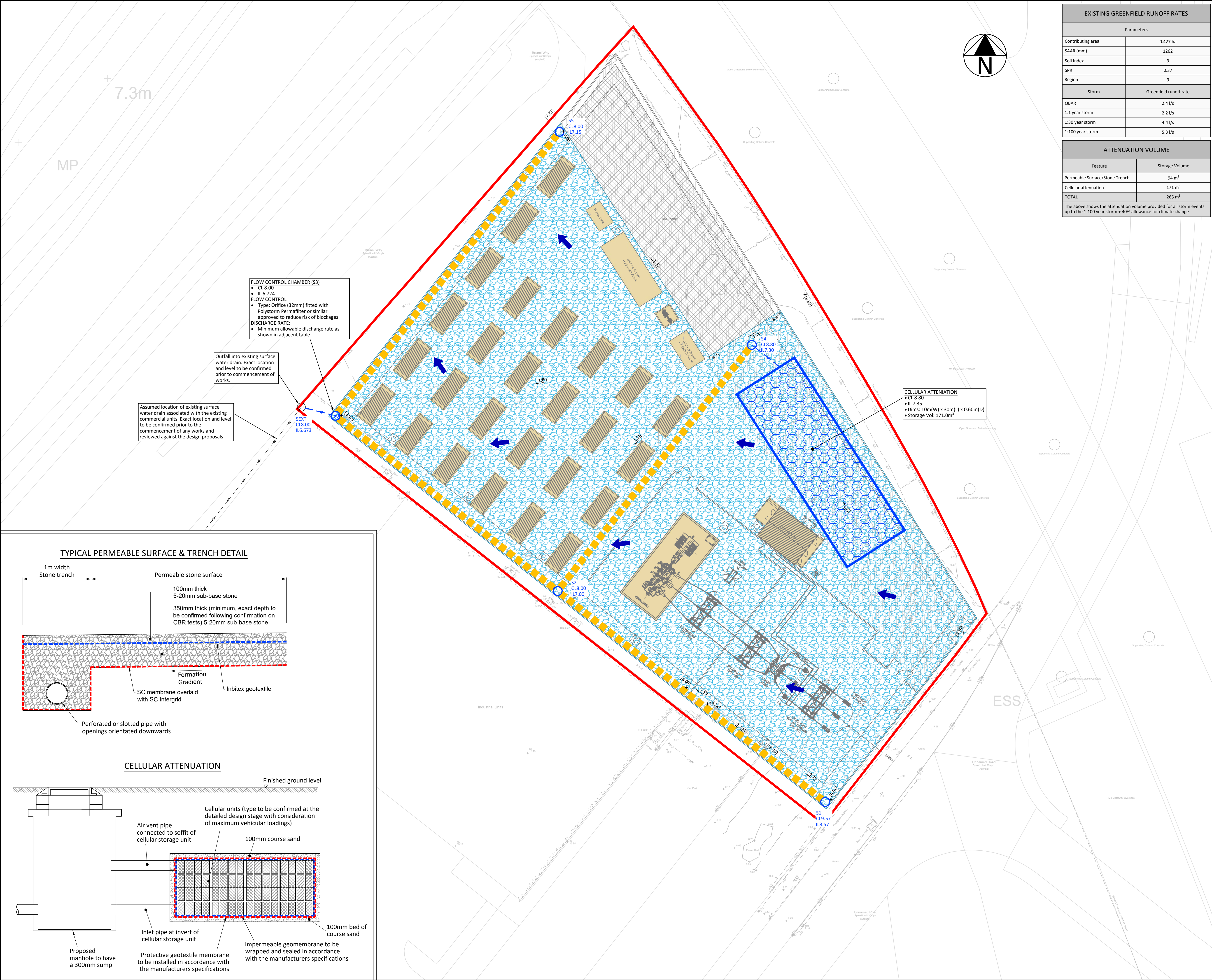


Appendix C

DCWW Public Sewer Map

Appendix D

Drainage Layout and Calculations

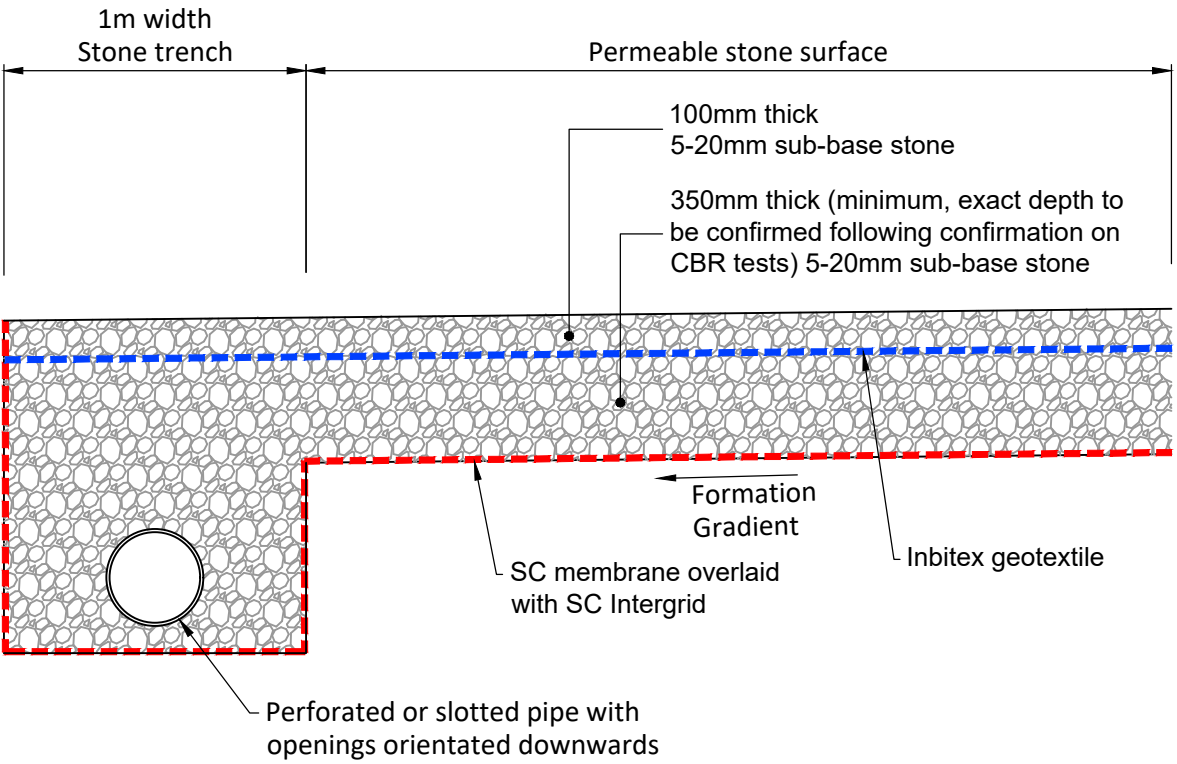


EXISTING GREENFIELD RUNOFF RATES	
Parameters	
Contributing area	0.427 ha
SAAR (mm)	1262
Soil Index	3
SPR	0.37
Region	9
Storm	Greenfield runoff rate
QBAR	2.4 l/s
1:1 year storm	2.2 l/s
1:30 year storm	4.4 l/s
1:100 year storm	5.3 l/s

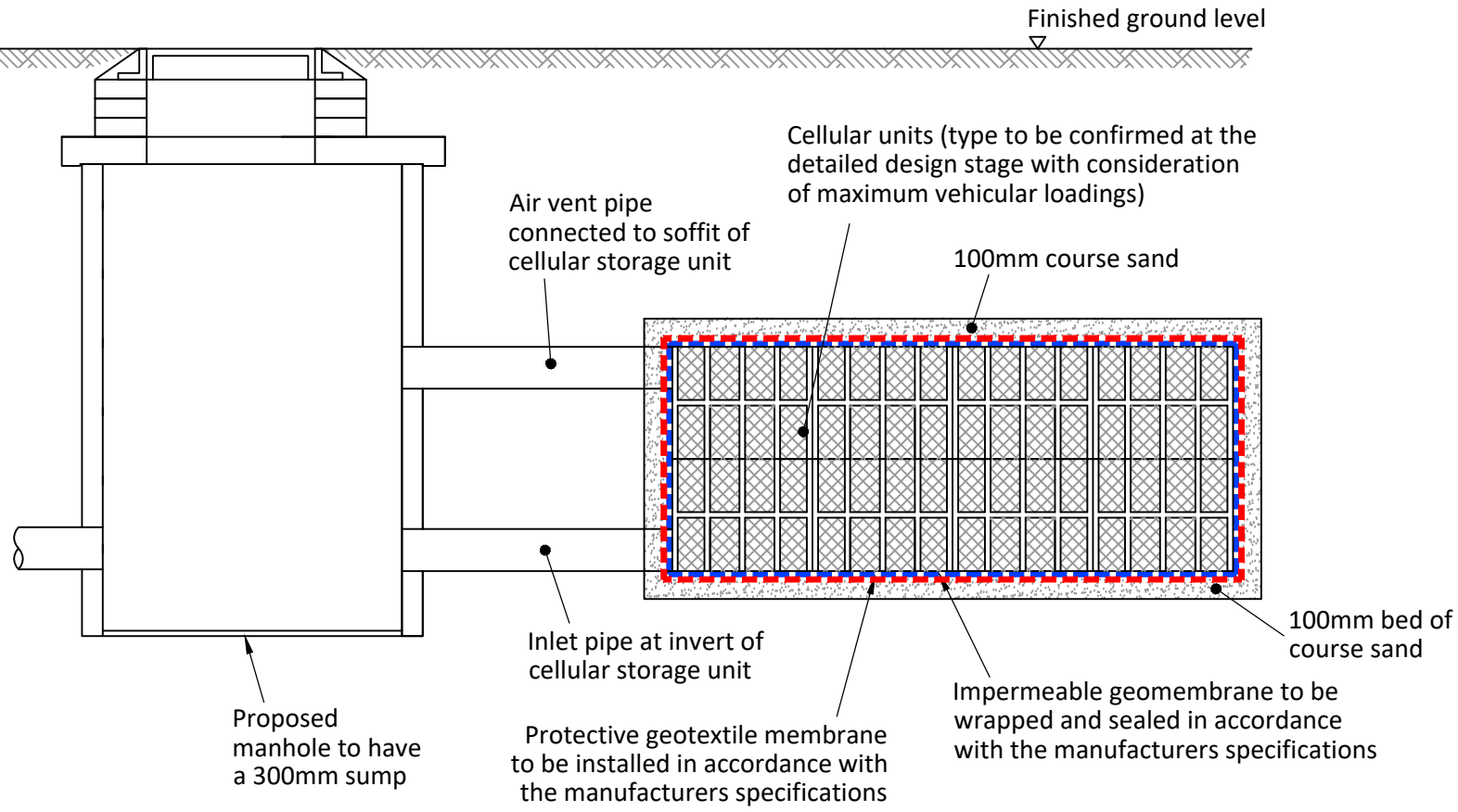
ATTENUATION VOLUME	
Feature	Storage Volume
Permeable Surface/Stone Trench	94 m³
Cellular attenuation	171 m³
TOTAL	265 m³
The above shows the attenuation volume provided for all storm events up to the 1:100 year storm + 40% allowance for climate change	

- KEY**
- Site boundary
 - Overland flow route
 - [8.87] Existing ground level
 - 8.87 Proposed ground level
 - 1:80 Gradient
- Note: Proposed are shown indicatively and intended to aid the development of the drainage strategy. All levels are to be developed by others. Once confirmed the drainage proposals are to be reviewed and updated as required at a later design stage.
- PROPOSED CATCHMENT AREAS**
- Proposed buildings/battery storage units
Area = 615m²
 - Proposed permeable surface
Area = 3655m²
 - TOTAL AREA = 4270m² (0.427 ha)
- EXISTING DRAINAGE**
- Private surface water sewer
- PROPOSED DRAINAGE**
- Surface water drain
 - Flow control chamber
 - Headwall
 - Cellular attenuation tank
 - Permeable stone surface
 - Attenuation stone filled trench
- NOTES:**
- This drawing is intended to assist with gaining planning approval only and subject to confirmation at the detailed design stage.
 - Contractor to verify locations of all existing services prior to commencement and arrange for any necessary protection, diversion or lowering works as required.
 - Proposed finished levels are to be confirmed by other. Once establish drainage proposals are to be reviewed and updated to suit.
 - Prior to the commencement of any works all required agreements must be in place (i.e. Land Drainage Consent, Build-over agreement, etc)

TYPICAL PERMEABLE SURFACE & TRENCH DETAIL



CELLULAR ATTENUATION



A		First issue	22/01/25	JH	AC
REV.		DESCRIPTION	Date	BY	CHK
DRAWING STATUS: FOR INFORMATION ONLY					
DESIGN BY: 					
CLIENT: -					
ARCHITECT: Ihc design					
PROJECT: Brunel Way, Port Talbot					
TITLE: Drainage Strategy					
SCALE @ A1: 0 1:250 12.5 metres					
PROJECT No: 23124		DRAWING No: PDL-01		REV: A	



Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	17.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1		5.00	9.570	1200	273882.354	193587.516	1.000
4		5.00	8.800	1200	273871.609	193654.473	1.500
2	0.214	5.00	8.000	1200	273843.173	193618.419	1.000
5		5.00	8.000	1200	273843.437	193685.685	0.850
3	0.214	5.00	8.000	1200	273810.628	193644.088	1.276
EXT			8.000	1200	273805.642	193645.367	1.327

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	49.901	0.600	8.570	7.000	1.570	31.8	150	5.46	39.0
2.000	4	2	45.918	0.600	7.300	7.000	0.300	153.1	225	5.73	38.2
1.001	2	3	41.450	0.600	7.000	6.724	0.276	150.0	225	6.37	36.5
3.000	5	3	52.979	0.600	7.150	6.724	0.426	124.4	150	5.98	37.5
1.002	3	EXT	5.147	0.600	6.724	6.673	0.051	100.0	100	6.49	36.2

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)
1.000	1.792	31.7	0.0	0.850	0.850	0.000	0.0
2.000	1.054	41.9	0.0	1.275	0.775	0.000	0.0
1.001	1.065	42.3	21.2	0.775	1.051	0.214	0.0
3.000	0.900	15.9	0.0	0.700	1.126	0.000	0.0
1.002	0.769	6.0	42.0	1.176	1.227	0.428	0.0

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	✓
M5-60 (mm)	17.000	Drain Down Time (mins)	240
Ratio-R	0.300	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	------

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0
30	0	0	0
100	40	0	0

Node 3 Online Orifice Control

Flap Valve	x	Invert Level (m)	6.724	Discharge Coefficient	0.600
Replaces Downstream Link	✓	Diameter (m)	0.032		

Node 2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	7.520	Slope (1:X)	56.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.350
Safety Factor	2.0	Width (m)	36.000	Inf Depth (m)	
Porosity	0.30	Length (m)	62.000		

Node 2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	7.000	Slope (1:X)	32.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	
Safety Factor	2.0	Width (m)	1.000	Inf Depth (m)	
Porosity	0.30	Length (m)	49.000		

Node 2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	7.000	Slope (1:X)	57.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	
Safety Factor	2.0	Width (m)	1.000	Inf Depth (m)	
Porosity	0.30	Length (m)	45.000		

Node 3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	7.520	Slope (1:X)	58.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.350
Safety Factor	2.0	Width (m)	42.000	Inf Depth (m)	
Porosity	0.30	Length (m)	48.500		

Node 3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	6.724	Slope (1:X)	150.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	
Safety Factor	2.0	Width (m)	1.000	Inf Depth (m)	
Porosity	0.30	Length (m)	41.000		

Node 3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	6.724	Slope (1:X)	124.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	
Safety Factor	2.0	Width (m)	1.000	Inf Depth (m)	
Porosity	0.30	Length (m)	52.000		

Node 4 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	7.350
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	



Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	300.0	0.0	0.600	300.0	0.0	0.601	0.0	0.0

Results for 1 year Critical Storm Duration. Lowest mass balance: 94.26%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	1	8.570	0.000	0.0	0.0000	0.0000	OK
480 minute winter	4	368	7.429	0.129	5.0	22.8777	0.0000	OK
480 minute winter	2	368	7.429	0.429	5.2	3.0133	0.0000	SURCHARGED
480 minute winter	5	360	7.429	0.279	0.4	0.3152	0.0000	SURCHARGED
480 minute winter	3	368	7.429	0.705	5.0	15.5493	0.0000	SURCHARGED
15 minute summer	EXT	1	6.673	0.000	1.6	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	0.0	0.000	0.000	0.4393	
480 minute winter	4	2.000	2	-5.0	-0.170	-0.119	1.4547	
480 minute winter	2	1.001	3	1.8	0.165	0.043	1.6485	
480 minute winter	5	3.000	3	-0.4	-0.040	-0.027	0.9327	
480 minute winter	3	Orifice	EXT	1.8				63.8

Results for 30 year Critical Storm Duration. Lowest mass balance: 94.26%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	1	8.570	0.000	0.0	0.0000	0.0000	OK
600 minute winter	4	570	7.677	0.377	10.0	93.6564	0.0000	SURCHARGED
60 minute winter	2	40	7.678	0.678	40.3	9.3762	0.0000	SURCHARGED
60 minute winter	5	42	7.716	0.566	4.0	0.6400	0.0000	FLOOD RISK
60 minute winter	3	42	7.715	0.991	31.9	29.7024	0.0000	FLOOD RISK
15 minute summer	EXT	1	6.673	0.000	2.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	0.0	0.000	0.000	0.4393	
600 minute winter	4	2.000	2	-10.0	-0.254	-0.238	1.8262	
60 minute winter	2	1.001	3	-17.0	-0.428	-0.402	1.6485	
60 minute winter	5	3.000	3	-4.0	-0.236	-0.250	0.9327	
60 minute winter	3	Orifice	EXT	2.1				32.5

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 94.26%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	1	1	8.570	0.000	0.0	0.0000	0.0000	OK
600 minute winter	4	525	7.986	0.686	14.7	172.0603	0.0000	SURCHARGED
960 minute winter	2	690	7.963	0.963	12.2	32.0789	0.0000	FLOOD RISK
960 minute winter	5	705	7.963	0.813	0.2	0.9193	0.0000	FLOOD RISK
960 minute winter	3	705	7.963	1.239	8.7	61.0631	0.0000	FLOOD RISK
15 minute summer	EXT	1	6.673	0.000	2.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	1	1.000	2	0.0	0.000	0.000	0.4393	
600 minute winter	4	2.000	2	-14.7	-0.371	-0.352	1.8262	
960 minute winter	2	1.001	3	-3.6	0.142	-0.085	1.6485	
960 minute winter	5	3.000	3	-0.2	-0.013	-0.011	0.9327	
960 minute winter	3	Orifice	EXT	2.4				143.0