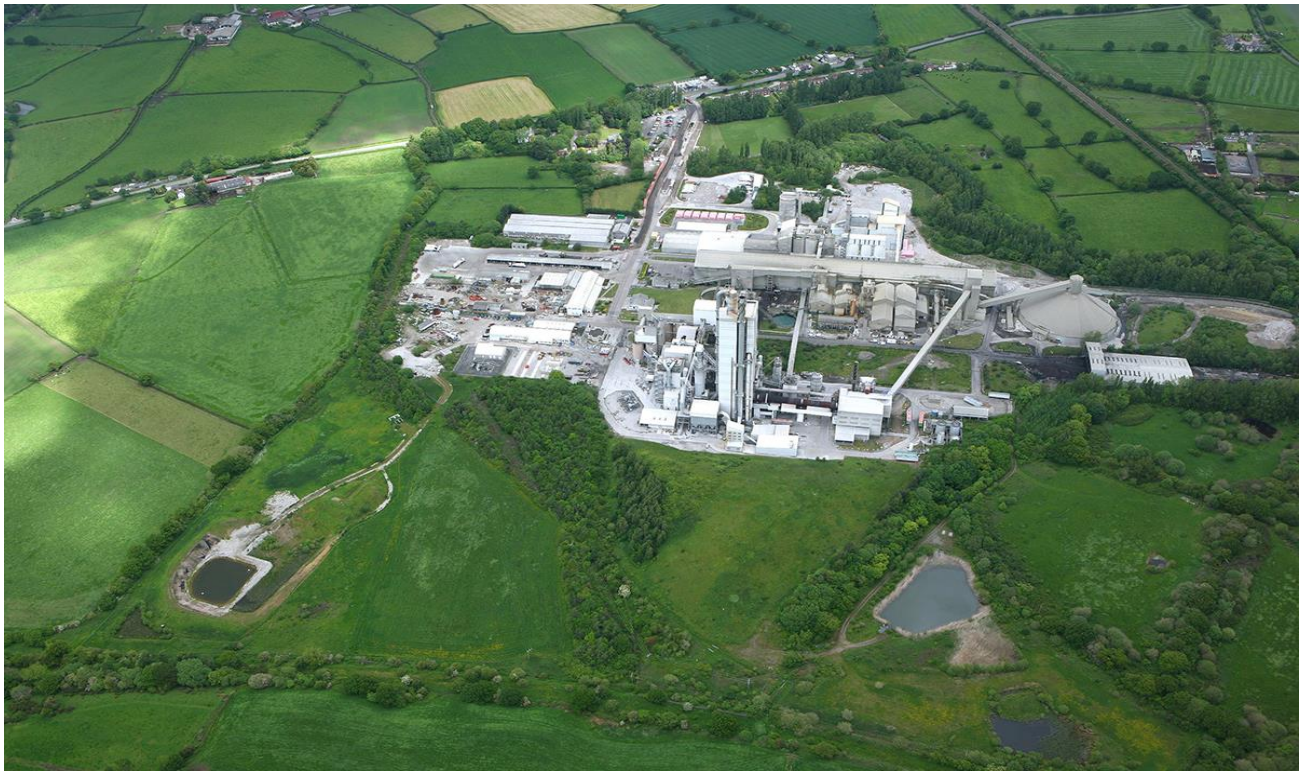
HEIDELBERG MATERIALS

Heidelberg Materials: Padeswood Carbon Capture Plant

Surface Water Management Plan

Document no. Rev 1: 215000-00190-000-CI-REP-00007



31 October 2025

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Rev	Description	Originator	Reviewer	Worley Approver	Revision Date
Rev A	Issued for IDC	J. Weston	N. King	J. Assem	28 May 2025
Rev B	Issued for IFR	J. Weston	N. King	J. Assem	07 July 2025
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Rev 1	Re-Issued for Use	J. Weston Digitally signed by Josephine Weston Date: 10/31/25 4:02:39 PM	N. King Digitally signed by Nicola J. King DN: cn=Nicola J. King, ou=Users, email=Nicola.King@worley.com Date: 2025.10.31 16:13:04	J. Assem James Assem Digitally signed by James Assem DN: cn=James Assem, ou=Users, email=JAMES.ASSEM@worley.com Reason: I am approving this document Date: 2025.10.31 16:04:57	31 October 2025

Revision History

Rev	Status	Section	Description of Change
A	IDC	All	Issued for Inter Discipline Check
B	IFR	All	Issued for Client Review
0	IFU	4.6	Hydrogeology section updated to reflect additional sampling undertaken by Geotechnics
		6	Construction Surface Water Management Plan updated to reflect surface water storage as opposed to infiltration. Water treatment done by a downstream defender
		7	Operation Surface Water Management Plan is updated to remove infiltration and include surface water storage through attenuation tanks and trapezoidal channels. Treatment is achieved by settlement pond in the CCU area.
		9	Water quality section has been updated as all treatment will be achieved via separators, downstream defender and settlement pond across construction and operation phases. Infiltration is no longer feasible.
1	Re-IFU	4	Figures updated to highlight the phases of the SAB application.
		6	Updates to wording to highlight the phases for the SAB application
		8	Added clarifying statement that this section is linking to the operations phase (section 7).
		Appendix D	Updated to include reference to oil-water separators.

Holds

No	Section	Description	Input From	Planned Date

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1. Project Introduction

Heidelberg Materials (HM) has become a partner in the HyNet Northwest consortium, which aims to create the world's first low-carbon industrial cluster in the region of Northwest England. The proposed hydrogen and carbon capture and storage (CCS) industrial cluster will play a critical role in the UK's transition to net zero greenhouse gas emissions and the fight against climate change. As part of 'Making Net Zero Possible', Asset Improvement programme options to decarbonise COMPANY cement plant are being considered. Carbon Capture (CC) is one of the key technologies being developed as a route to decarbonisation. COMPANY cement plant located at Padeswood which currently produces about 110 ton per hour (tph) of clinker, has been selected by DESNZ as a track 1 phase 2 carbon capture project. The PROJECT will enable carbon capture from the existing cement kiln 4 and from a new Combined Heat and Power (CHP) plant designed to provide the heat and electricity required to operate the Carbon Capture and Compression (CCC) plant. Captured CO_2 will be transported by pipeline to the HyNet CO_2 main pipeline at Northop Hall AGI for onward transportation to storage offshore in depleted gas fields operated by Eni UK. The PROJECT will enable the production of net zero cement for use in the UK construction industry.

The pre-FEED study was completed in March 2023 by Worley. Based on the pre-FEED study, an amine-based post combustion CO_2 capture technology has been selected as a suitable technology for capturing 95% of the CO_2 emissions from cement plant.

A consortium between Mitsubishi Heavy Industries (MHI) and Worley delivered the FEED package for the Heidelberg Material (HM) Padeswood CCS Project. The overall FEED package utilizing MHI's Carbon capture technology was completed in November 2024

The capture plant is generally considered a greenfield development, with some elements of brownfield in the integration and tie-ins with the cement plant.

2. Document Purpose

This document has been prepared to set out how surface water, water removed during construction and wastewater will be managed during the works associated with the construction and operation of the proposed Heidelberg Material (HM) Padeswood CCS Project. This Surface Water Management Plan (SWMP) sets out the potential flood risk posed to the site and how that water will be managed, treated and ultimately disposed of so as not to enhance flood risk.

In accordance with Schedule 3 of the Flood and Water Management Act 2010, this SWMP supports the application for approval under the Sustainable Drainage Systems (SuDS) Approval Body (SAB) process, as required for new developments in Wales. The plan outlines the proposed drainage strategy, including runoff rates, attenuation features, and SuDS components, to meet the statutory standards for sustainable drainage set by Welsh Government.

This document should be read in conjunction with the Site Drainage Technical Note, 215000-00190-000-CI-TEN-00001_Rev 1.

3. Abbreviations, Definitions & References

3.1 Abbreviations

Table 3-1. List of Abbreviations

Acronym	Definition
AEP	Annual Exceedance Probability
Bgl	Below ground level
CC	Carbon capture
CCC	Carbon capture and compression
CCS	Carbon Capture and Storage
CCU	Carbon capture unit
DCWW	Dwr Cymry Welsh Water
DDF	Duration-Depth-Frequency
FCA	Flood Consequence Assessment
FoS	Factor of Safety
HM	Heidelberg Materials
LiDAR	Light detection and ranging
MHI	Mitsubishi Heavy Industries
NPPF	National Planning Policy Framework
SAB	SuDS Advisory Body
SuDS	Sustainable Drainage Systems
SWMP	Surface water management plan
TAN	Technical Advice Note

3.2 Definitions

Table 3-2. List of Definitions

Term	Definition
COMPANY	Heidelberg Materials
CONTRACTOR	Consortium of Worley Europe Limited and Mitsubishi Heavy Industries Limited (MHI)
LICENSOR	MHI entering a Licensing Agreement with the CLIENT
PROJECT	Padeswood Carbon Capture Plant
SUPPLIER/ Vendor/ WORKS CONTRACTOR	Company / organisation suppling equipment, materials or services.
SUB-SUPPLIER	The organisation selected by the SUPPLIER/VENDOR/ WORKS CONTRACTOR to supply the part of equipment and services.
WORK	Shall mean all and any of the WORKs and / or services and / or materials required to be provided under the Contract with CLIENT.
shall and must	Indicates mandatory requirements
Should	Indicates that a provision is not mandatory but recommended as good practice.

Term	Definition
May	Used to indicate that optional action is available

3.3 Order of Precedence

The requirements of the standards and publications referenced in this document shall be applied in the following order of precedence:

1. Government Acts, Regulations, and Statutory Requirements
2. Purchase Order
3. Project Data Sheets
4. Project Drawings
5. This Specification
6. Referenced Specifications and Publications
7. Referenced Codes & Standards

Any conflict between the minimum requirements of the above documents shall be brought to the COMPANY attention for resolution.

An alternate specification or design may only be used when it satisfies the government and statutory requirements and offers a benefit to the project. All such alternatives shall require approval from COMPANY.

3.4 References

Table 3-3 List of References

Publisher	Title
BGS, 2025a	British Geological Society, 2025, Aquifer Designation Data. Accessed from: Aquifer designation data - British Geological Survey
BGS, 2025b	British Geological Society, 2025, Soil chemistry for environmental assessments. Accessed from: Soil chemistry for environmental assessments - British Geological Survey
CIRIA, 2023	Woods Ballard, B, Udale-Clarke, H, Illman, S, Scott, T, Ashley, R, Kellagher, R. The SuDS Manual, CIRIA, 2023.
DCWW, 2016	Dwr Cymru Welsh Water, 2016, Flood Incident Register, accessed from: https://www.flintshire.gov.uk/en/PDFFiles/Planning/Evidence-Base-Documents/Natural-Built-Environment/LDP-EBD-EN1-Strategic-Flood-Consequences-Assessment-Final-Report-2018.pdf
ESRI, 2025	ESRI Satellite Imagery, 2025.
FEH, 2025	UK Centre for Ecology and Hydrology, Flood Estimation Handbook web service, 2025. Accessed from: https://fehweb.ceh.ac.uk/Map
Geotechnics, 2025	PN254733 PADESWOOD CARBON CAPTURE PLANT - FEED PHASE GROUND

Publisher	Title
	INVESTIGATION Factual Report), 2025.
Google, 2025	Google Satellite Imagery, 2025
Highways England, 2020	Llywoseaeth Cymru Welsh Government, 2020, Design Manual for Roads and Bridges, Road drainage and the water environment LA 113
HR Wallingford, 2025a	HR Wallingford, 2025, Greenfield Runoff rate estimation calculator, accessed from: Greenfield runoff rate estimation | UK SuDS
HR Wallingford, 2025b	HR Wallingford, 2025, Surface water storage volume estimation calculator, accessed from: Surface water storage volume estimation | UK SuDS
JBA Consulting, 2018	JBA Consulting, 2018, Strategic Flood Consequence Assessment Flintshire. Accessed from: LDP-EBD-EN1 Strategic Flood Consequences Assessment Final Report 2018
Met office, 2025	Met office, 2025, location specific long term average, Hawarden Airport. Access from: https://www.metoffice.gov.uk/research/climate/maps-and-data/location-specific-long-term-averages/gcmys04qu
NRW, 2009	Natural Resources Wales, 2009, River Basin Management Plan Dee River Basin District, Accessed from: https://naturalresourceswales.gov.uk/media/675062/dee-rbmp.pdf
RSKa, 2024	Carbon Capture and Storage Project, Padeswood, North Wales, RSK, 2024.
RSKb, 2024	Padeswood Carbon Capture and Storage Environmental Planning Casework, Chapter 12 Land and Soils, 2024.
RSKc, 2024	Carbon Capture and Storage Project, Padeswood, North Wales, Proposed Development Water Usage – Technical Note, RSK, Volume 4, Technical Appendix 2.2, 2024.
RMW, 2024	Gov.UK, 2024, Wales Regional Geology, Accessed from: https://www.gov.uk/government/publications/wales-regional-geology
Topo, 2025	Topo consulting, 2025, Sediment Pond Design Tool. Accessed from: https://www.topo.com.au/
UK Environmental Agency, 2025	UK Environmental Agency, *Check if you need a license to abstract water,* 2025 Accessed from: https://www.gov.uk/guidance/check-if-you-need-a-licence-to-abstract-water

3.5 Project Documents

Table 3-4 Project Documents

Publisher	Title
215000-00190-000-CI-CRT-00001	Site Drainage Technical Note
215000-00190-000-CM-COS-00001	Construction Execution Plan
215000-00190-000-CM-REP-00003	Traffic Report
215000-00190-000-CI-TEN-00003	Technical Note for Geotechnical Investigation Desktop Study
215000-00190-000-CI-TEN-00004	Technical Note for CIRIA C736 Assessment – Containment systems for the prevention of pollution.

Publisher	Title
215000-00190-000-PR-LST-00004	Chemical and catalyst register
215000-00190-000-PR-PHL-00004	Drainage philosophy
215000-00190-000-CI-TEN-00006	Existing Foul Drainage Diversion
215000-00190-000-EN-BOD-00001	Environment Basis of Design

4. Context and Setting

The Padeswood carbon capture unit (CCU) site is approximately 2.1 km south of Buckley, near Mold, Flintshire, North Wales. The existing cement works has been in operation since 1949. The proposed CCU plant site is located adjacent to the existing Padeswood Cement Works. The existing operation consists of Kilns, grinding mills, silos and supporting infrastructure (office buildings, workshops and car parking).

The CCU plant site area is currently predominantly undeveloped land within the cement works boundary. As part of the project, the site will be developed and used to house a CCU plant. In addition to the CCU, the development will also include flow gas duct work tie-in and additional processing infrastructure within the existing cement plant. This work is outside the scope of this assessment.

In the context of the SAB application, the phase one application comprises of the enabling works, including the carpark, access road and laydown area. The CCU will be in the phase two SAB application.

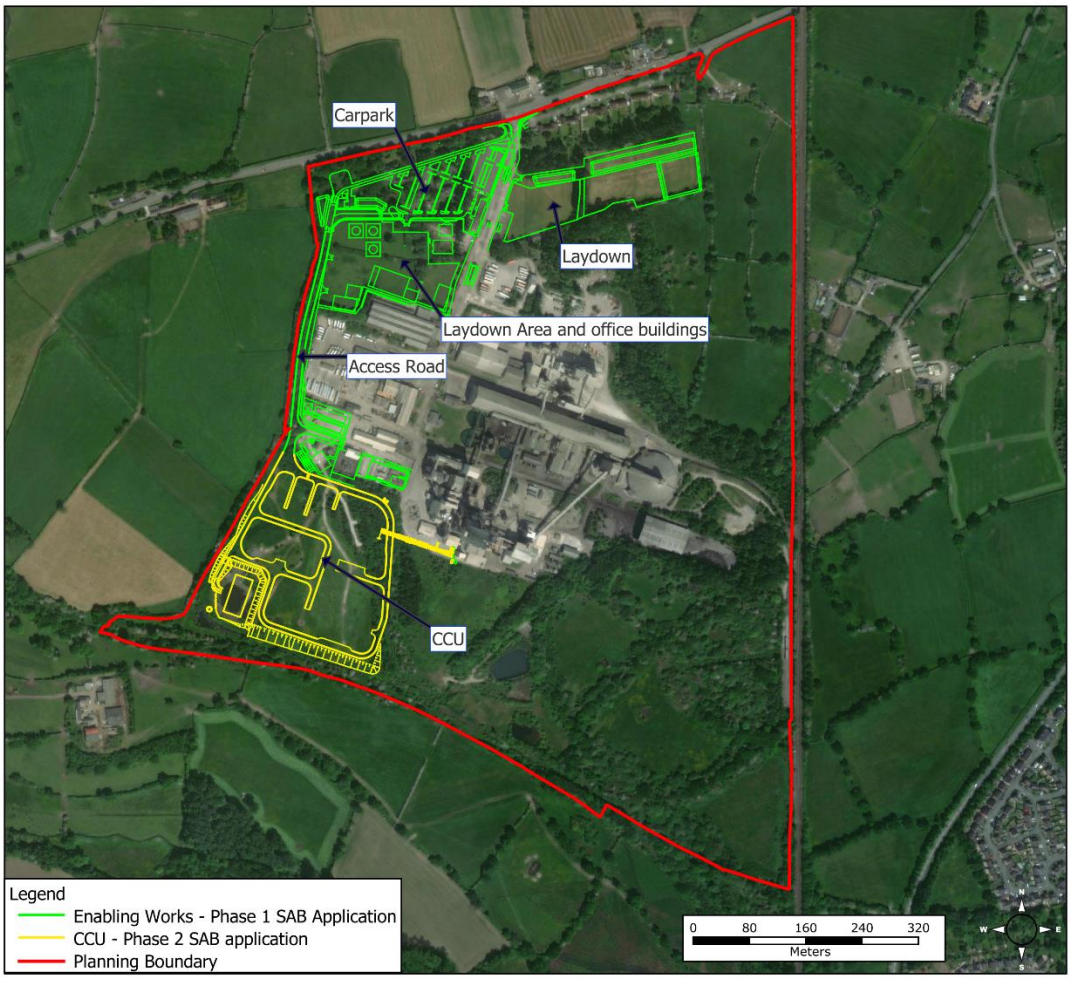


Figure 4-1: Site Plan

4.1 Land use

The land use immediately around Padeswood Cement Works is predominantly agricultural, comprising of fields varying in size and shape, in use for both arable and pastoral farming.

Beyond the eastern boundary of the Carbon Capture Unit (CCU) site there is a section of railway line running between Wrexham and Deeside. The Borderlands railway, running north to south, terminates at Wrexham General to the south and Bidston to the north, for onward connection to Liverpool. The southern boundary is defined by the line of a dismantled railway.

The A5118 runs parallel to the northern boundary of the wider site, where the junction for the adjacent operational cement works main site access is located.

There is an unnamed ditch network spanning the perimeter of the site boundary, with two small ponds located within the southwestern corner of the site. The closest main river (Black Brook) is located approximately 325 m south of the site.

4.2 Hydrology

The site is located within the River Ayln catchment, with the nearest tributary to the site being the Black Brook, located 235 m south of the site boundary. Black Brook is designated a Moderate Overall waterbody under the Water Framework Directive/River Basin Management Plan (Cycle 3 – 2021) (RSK, 2024). The catchment contributing to the site has an area of 9.5 km^2 and is presented in Figure 4-2.

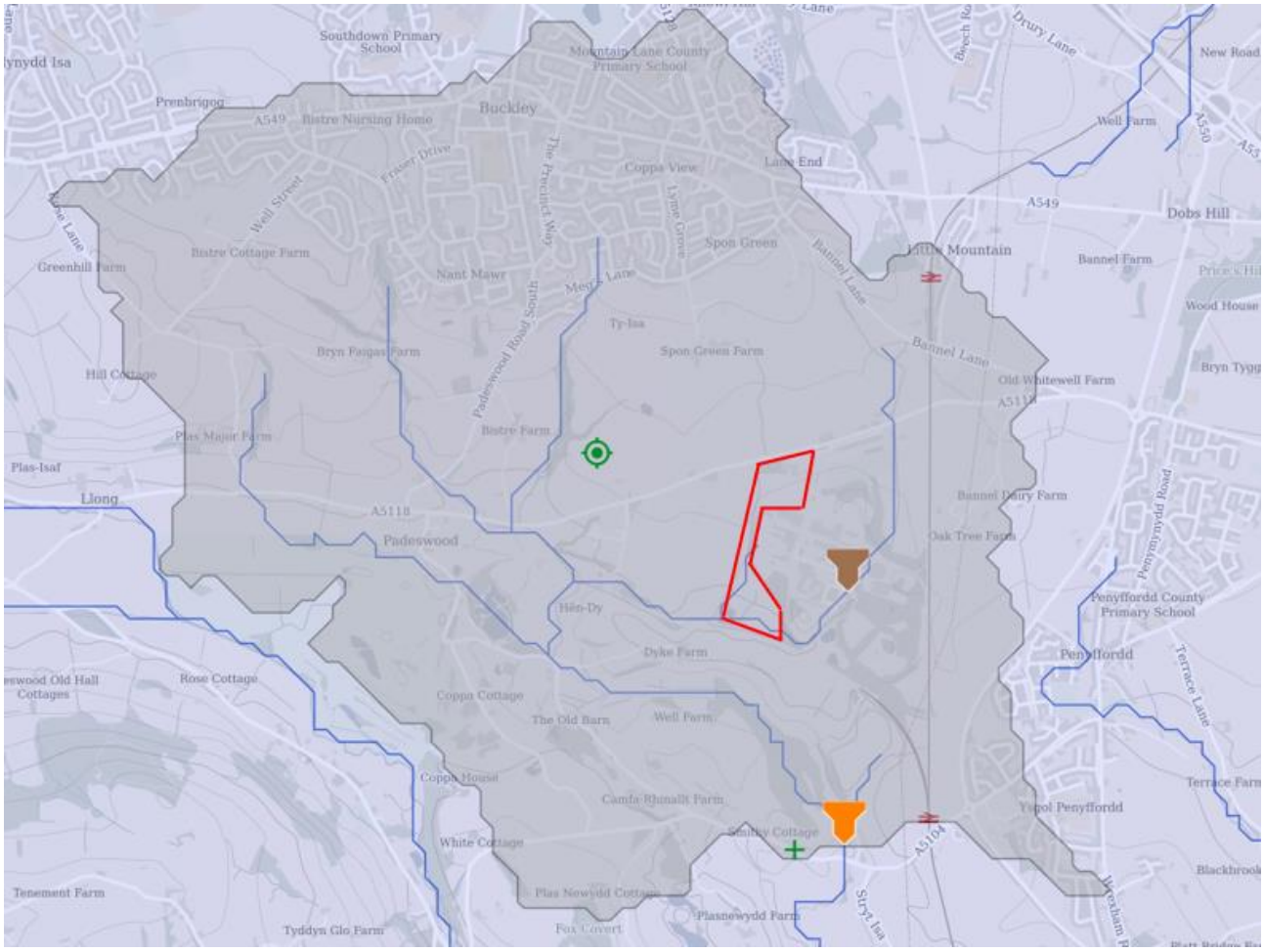


Figure 4-2. Reporting Catchment to the HM Padeswood site, proposed development highlighted in red. (FEH, 2025).

A field ditch runs north-south along the length of the western site boundary. A second surface water feature, an un-named tributary to the Black Brook, flows westward along the length of the southern boundary. The two converge at the south-western corner of the site.

A series of field drains are also located in the non-operational parts of the wider site to the north, east and south of the cement works (RSK, 2024).

Two ponds/wet areas are shown to lie in the southern section of the site; the pond in the south-western corner of the site was a former landfill cell and has been non-operational since its creation, and the remaining pond in the south-eastern corner is a works settling pond used to harvest rainwater and store process water for use in the existing operational cement works (RSK, 2024).

The Duration-Depth-Frequency (DDF) graph for the site is presented in Figure 4-3.

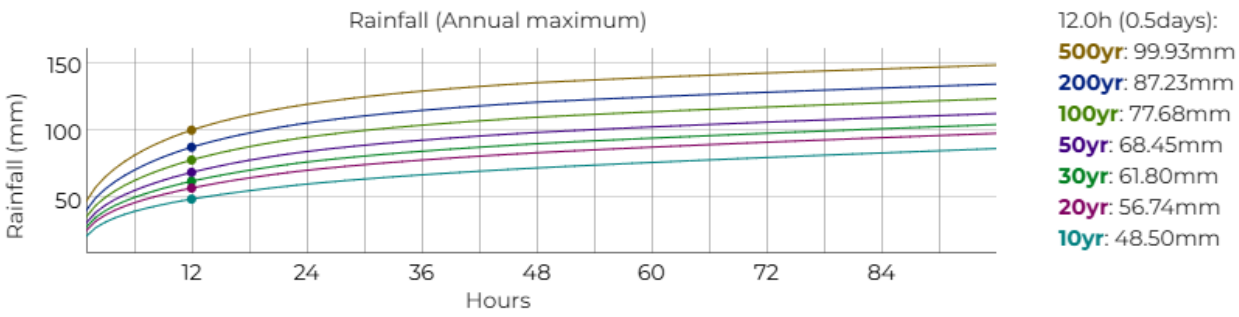


Figure 4-3. Duration-Depth-Frequency (DDF) graph (FEH, 2025).

4.3 Soils

As outlined in 215000-00190000-TEN-0004_Rev 0, the soil type has been recorded as rural soil and sediment. The soil chemistry is presented in Table 4-1.

Table 4-1. Soil Chemistry (BGS, 2024).

Site Name	Arsenic ($mg.kg^{-1}$)	Cadmium ($mg.kg^{-1}$)	Chromium ($mg.kg^{-1}$)	Lead ($mg.kg^{-1}$)	Nickel ($mg.kg^{-1}$)
Rural soil and Sediment	<15	<1.8	60-90	200-300	30-45

4.4 Geology

A review of the geology at the site has been undertaken in the Geotechnical Investigation Desktop Study [215000-00190-000-CI-TEN-00003].

The site is underlain by superficial deposits of Glacial Devenish Till, with localised Head deposits identified at the southern boundary of the CCS site (Figure 4-4). The superficial deposits are in turn are underlain by the Gwespyr Sandstone bedrock in the south-west of the site and the Pennine Lower Coal Measures in the north-east. The geological mapping boundaries, as well as geological faults and coal seams, are referenced in the geotechnical desktop study (215000-00190-000-CI-TEN-00003). The coal seams have been identified from geological maps (Worley 2024, 215000-00190-000-CI-TEN-00003). The overlying Devensian Till is characterized as being a mixture of clay, sand and silt.

Three areas of made ground are illustrated in the vicinity of the site. The most western of the three is directly adjacent to the proposed CCS site. This area is associated with a former landfill.

Figure 4-4. Excerpt of BGS Survey showing drift geology at the Padeswood site.

4.5 Topography

The existing ground level within the footprint of the proposed CCS plant, slopes down from north to south from approximately 103 m AOD to 95 m AOD. The site also features an area of dense woodland in its north-eastern portion and an existing lined pond in the south-western corner (Worley 2024, 215000-00190-000-CI-TEN-00003).

The current site earthworks plans show that the CCS site area will be constructed over two main levels, requiring extensive cut and fill construction works Most of the site will be constructed to a level of 99.9 m AOD with the existing ponds, to the sites south-west, constructed at current levels (97 m AOD) (Worley, 2024, 215000-00190-000-CI-TEN-00003).

Pre- construction design levels are presented in drawing PADESWOOD-01-TOPO-001-FIO-100625.dwg. Excavation and post-construction levels are presented in drawings 215000-00190-000-CI-DAL-01000 to 215000-00190-000-CI-DAL-01014.

4.6 Hydrogeology

The site is within the Dee groundwater management catchment, with the groundwater systems at the site characterized as having poor water quality (NRW, 2009). Groundwater within the Dee catchment is a significant drinking water source, with a license for public water supply of 20 million litres per year.

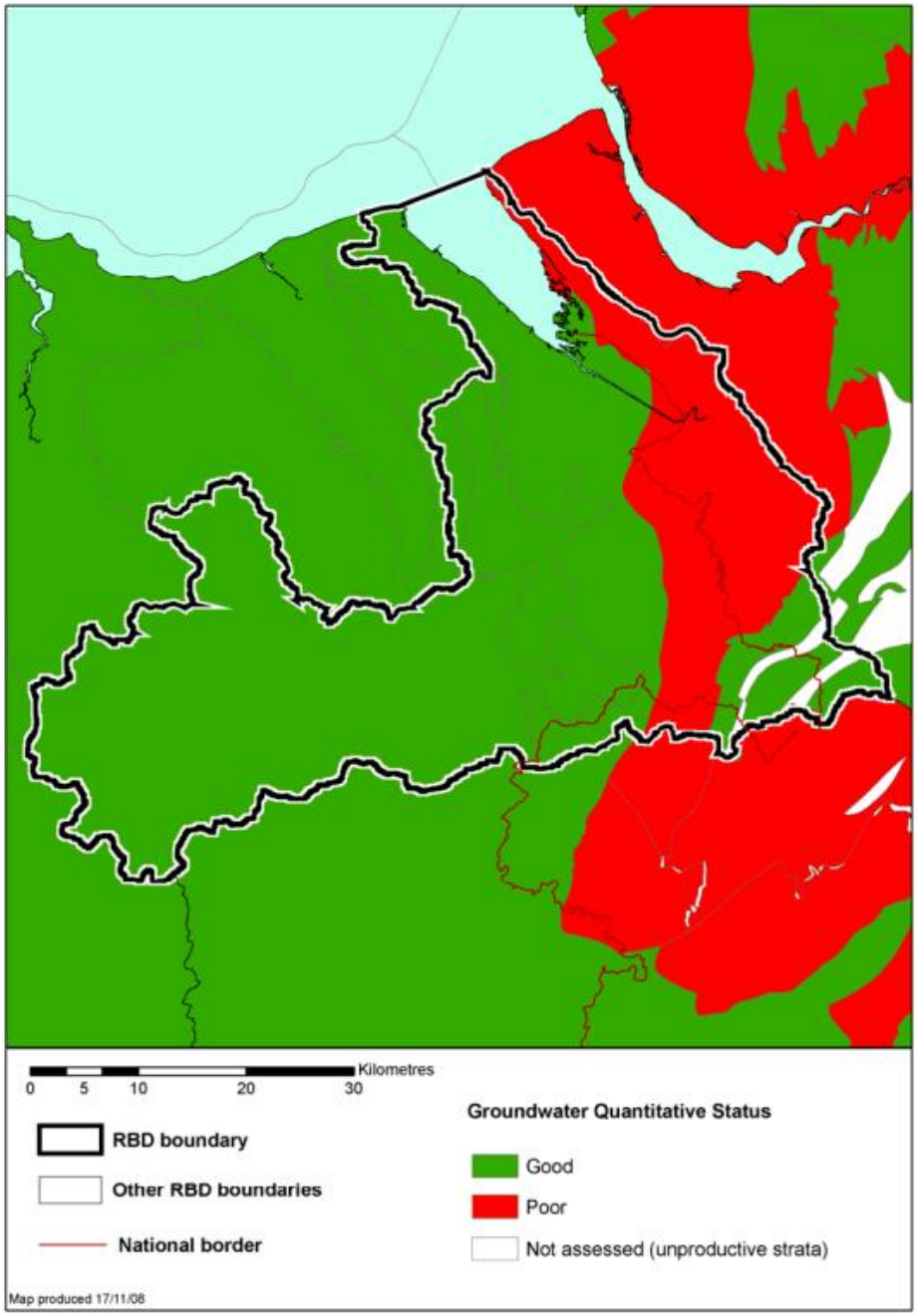


Figure 4-5. Water quality in the Dee catchment system (NRW, 2009).

The superficial deposits (Till and Head) are designated as a *'Secondary Aquifer – undifferentiated'* and the bedrock aquifer (Gwespyr Sandstone and Pennine Lower Coal Measures) is designated as a '*Secondary A Aquifer'*.

Secondary aquifers are split into two groups:

- 'Secondary A Aquifers' comprise permeable layers that can support local water supplies, and may form an important source of base flow to rivers;

- ‘Secondary B Aquifers’ are mainly lower permeability layers that may store and yield limited amounts of groundwater through characteristics like thin cracks (called fissures) and openings or eroded layers.

‘Secondary - Undifferentiated’ are aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type. These have only a minor value (BGS, 2025).

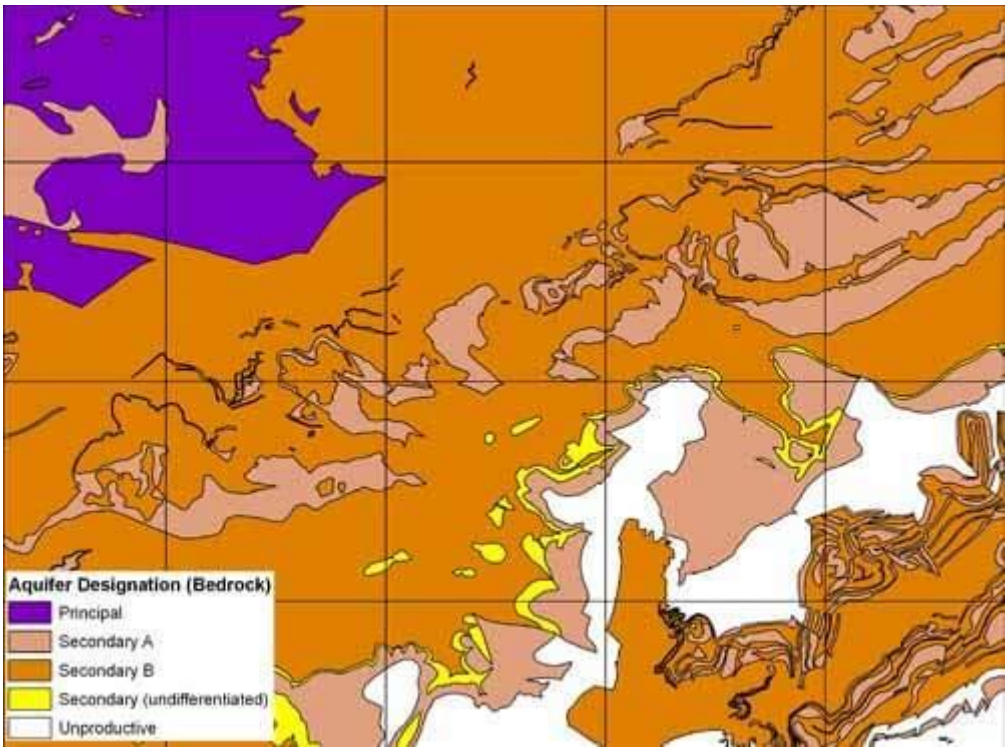


Figure 4-6. Northern Wales Aquifer Designation (BGS, 2025).

Golder Associates undertook an onsite investigation of groundwater levels between 16-17th November 2022 across 14 boreholes at the site. It was noted that groundwater depths decreased towards the north of the site. A depth of 4.2 m bGL was recorded at location GAGW08 and this decreased to 3.1 m bGL at GAGW01 in the access road.

As highlighted in 215000-00190-000-CI-TEN-00004, two groundwater strikes were recorded in rotary boreholes during a previous site visit, location RC1 recorded depths at 7.6 m bgl and RC10 at 19.1 m bgl. These observations were recorded during drilling and are therefore considered unreliable due to flush water being utilised. This data has been used to inform the assessment. The historical Borehole investigation is presented in Figure 4-8.

Shallow groundwater was recorded at windowless sample borehole sites within the proposed access road. Sites WS1 to WS6 recorded water between 2 and 2.6 m bgl. It was noted that groundwater decreased in elevation towards the south. Shallow water was encountered in Devenish Till, which due to it’s partly cohesive properties suggests it is isolated perched water, and not part of a continuous groundwater body.

Groundwater monitoring was completed by Geotechnics between 25 June 2025 – 28 August 2025. Groundwater level data was recorded across nine boreholes, MW25-001 – MW25-009. MW25-003 and MW25-005 were sampled at two different depths. The results presented show that groundwater levels did not change significantly between June to August. Data logger information was collected for selected boreholes between 28th July 2025 and 28th August 2025. The data logger information for MW25-001 is presented in Figure 4-7. A detailed summary of this testing is presented in the Ground Investigation factual Report (Geotechnics, 2025) (PN254733 PADESWOOD CARBON CAPTURE PLANT - FEED PHASE GROUND INVESTIGATION Factual Report).

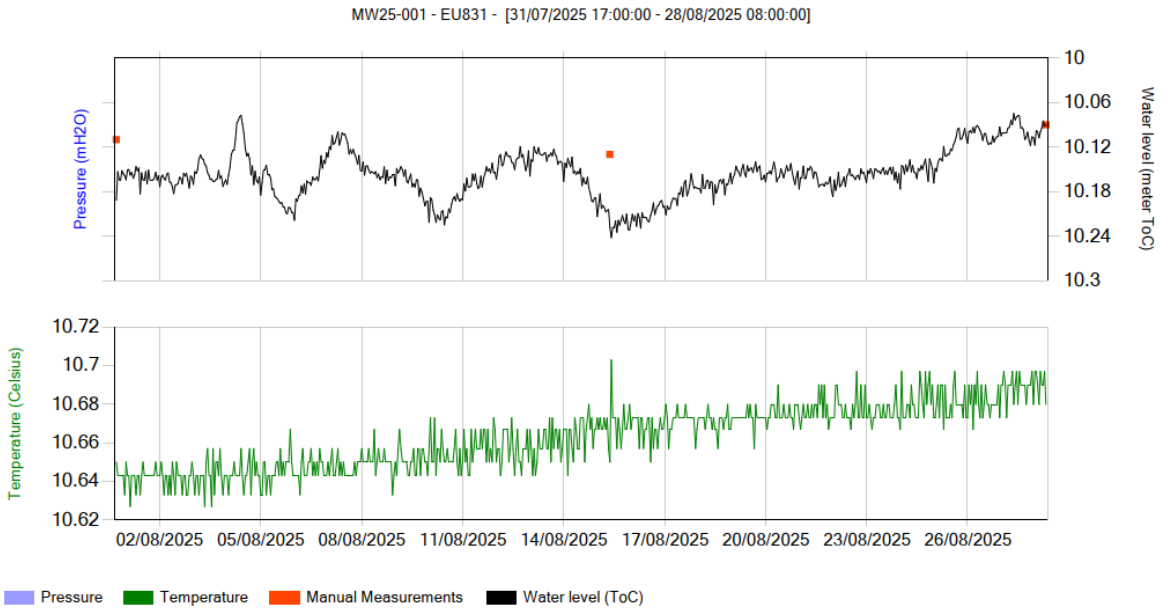


Figure 4-7. Data logger information for MW25-001.

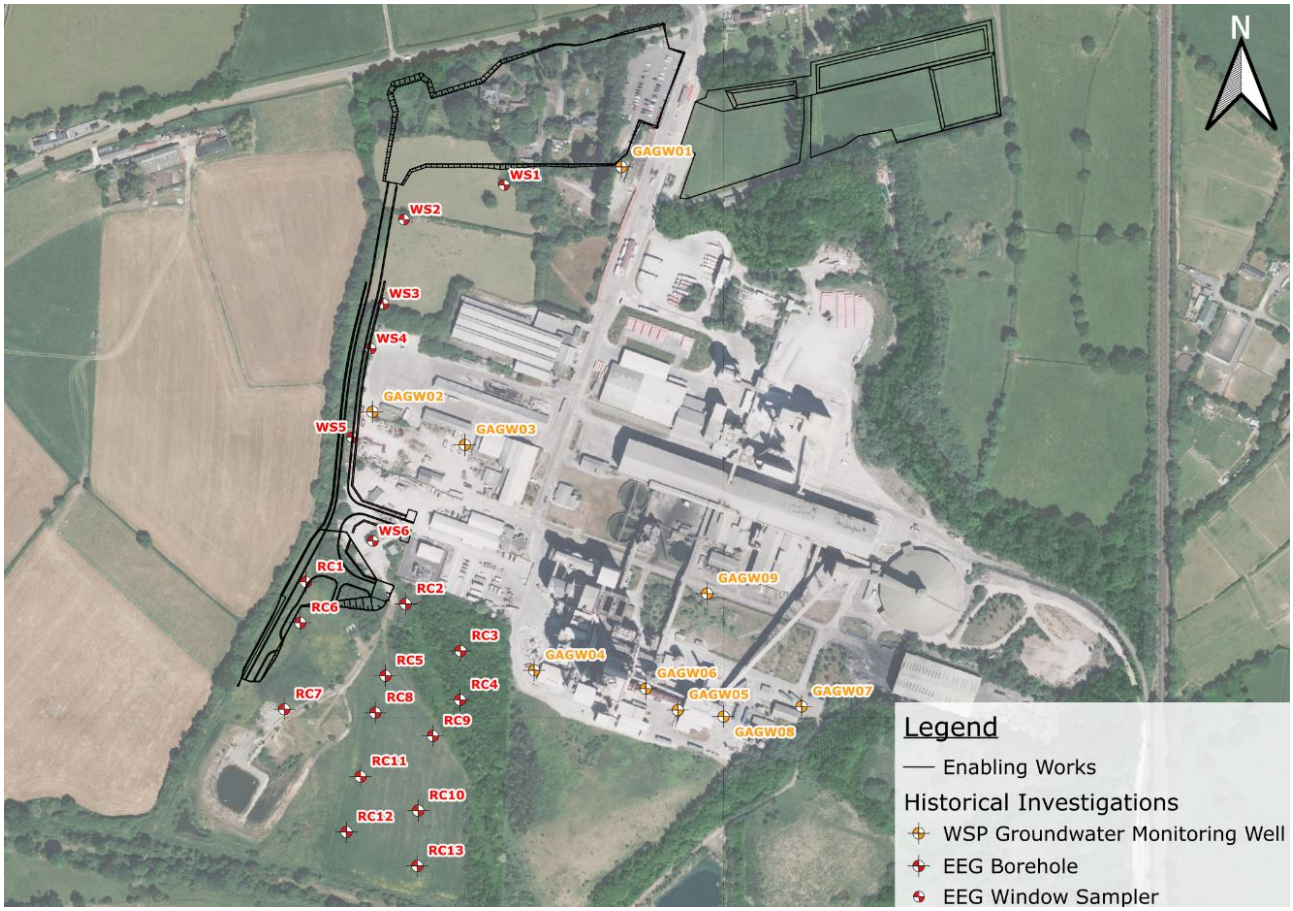


Figure 4-8. Historical groundwater borehole locations.

5. Potential Sources of Flooding

5.1 Flood risk baseline

The flood risk assessment prepared by RSK (2024) has been used as a flood risk baseline and is summarised within this section. Additional information has been added regarding potential sources of breach flooding and groundwater data. The conclusion from the RSK report was that the developed site boundary is at an overall low risk of flooding from fluvial, tidal and artificial sources. During this assessment, analysis from NRW (2025) identified small waterways and surface water across the site which are managed by existing drainage systems. The site boundary is exposed to a small area of Zone B fluvial flooding in the south-west corner, however there is no proposed development in this location.

5.2 Fluvial flood Risk

There are small creek lines which run south of the site. The site is positioned higher in the catchment and therefore the flood risk from river systems is considered low. As highlighted in Figure 5-1, there is a minor encroachment of the Zone B in the southwest corner of the site. The development extent shows that there is no development proposed within this area of Zone B. The Developed site is located in Zone A, and therefore is not at risk of flooding.

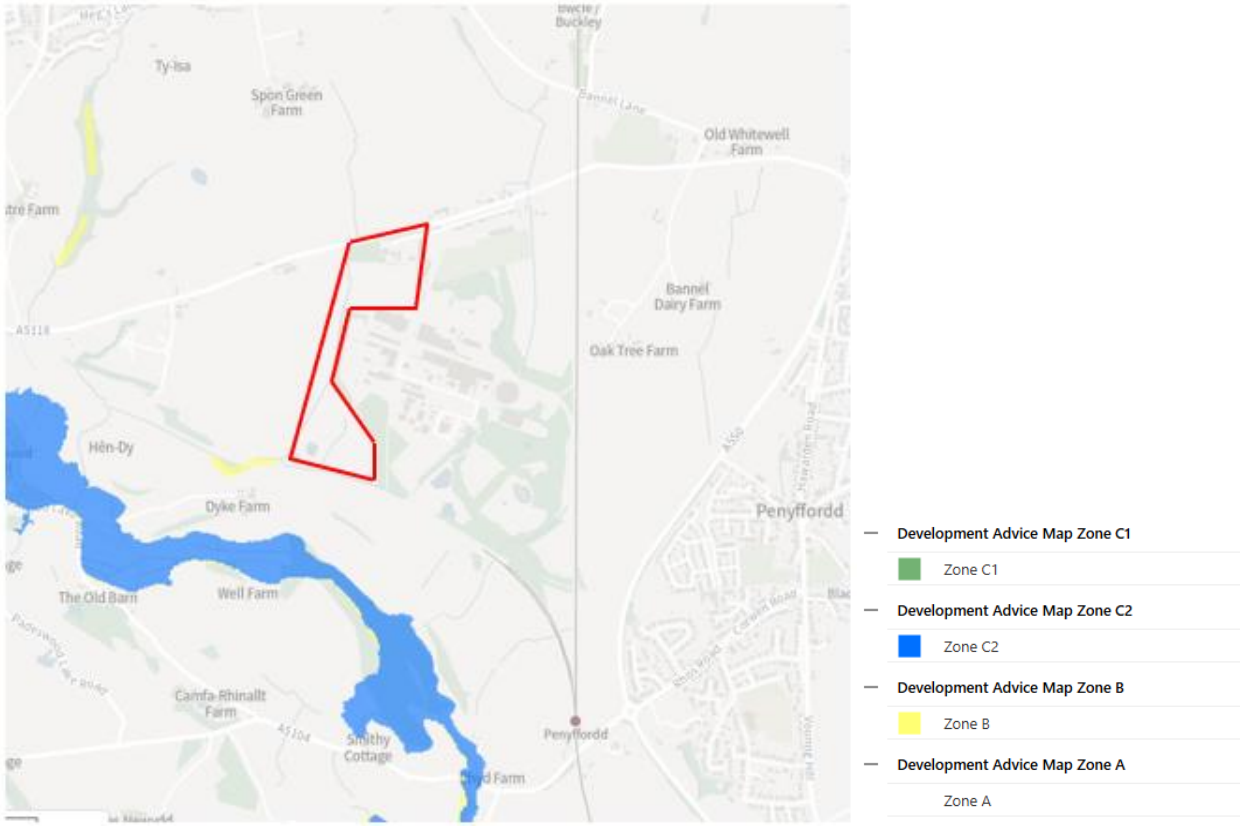


Figure 5-1. Welsh Government Advice Flood mapping (NRW, 2024).

The flood map for planning highlights that there are likely to be areas across the site which are within Flood zone 2 and 3. These are defined by small surface water and watercourses.

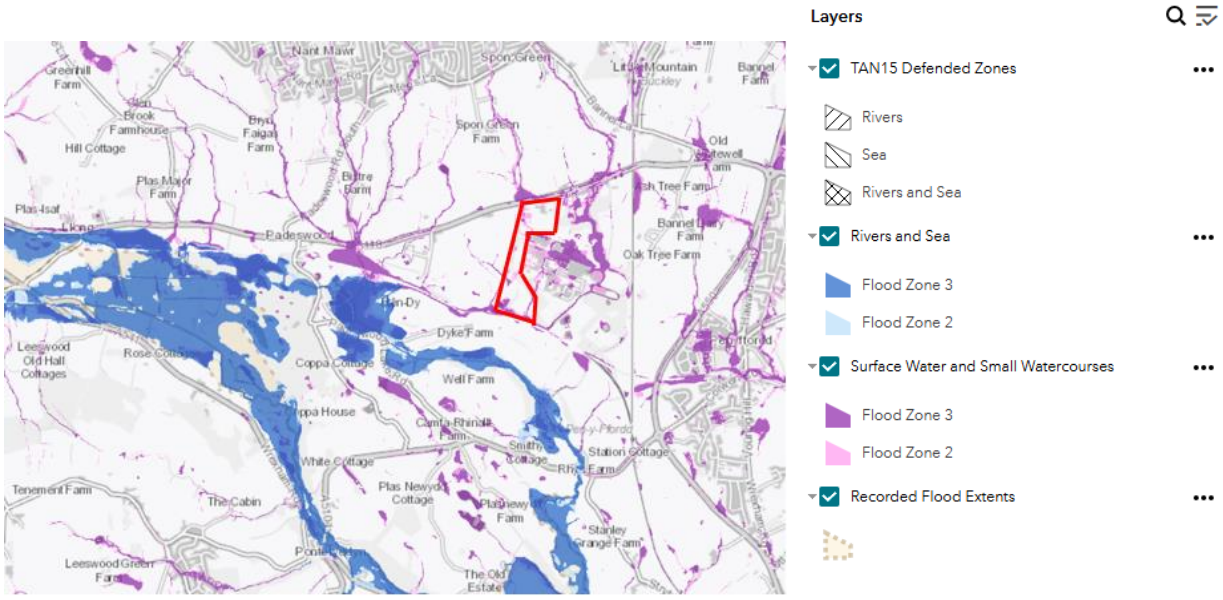


Figure 5-2. Flood map for planning (NRW, 2025)

Figure 5-2 highlights the flooding risk from rivers classified as 'Main Rivers' by Natural Resources Wales. The flood map indicates that parts of the site is located within Flood zone 2 and 3 of Surface Water and small watercourses. This is a low risk and is managed by drainage infrastructure.

It is likely that climate change will lead to an increased fluvial flood risk at the site. The site is located at a high elevation and as a result, it is not expected that increased risk due to climate change will significantly impact the site.

5.3 Tidal flood risk

The site is located 11.2 km from the Estuary inlet of the River Dee and as a result there is not expected to be a tidal flood risk. Mapping from Natural Resources Wales indicates that there is no risk to the site from coastal erosion or tidal flooding.

The impact of climate change is likely to be negligible due to the elevation and distance from the Estuary inlet.

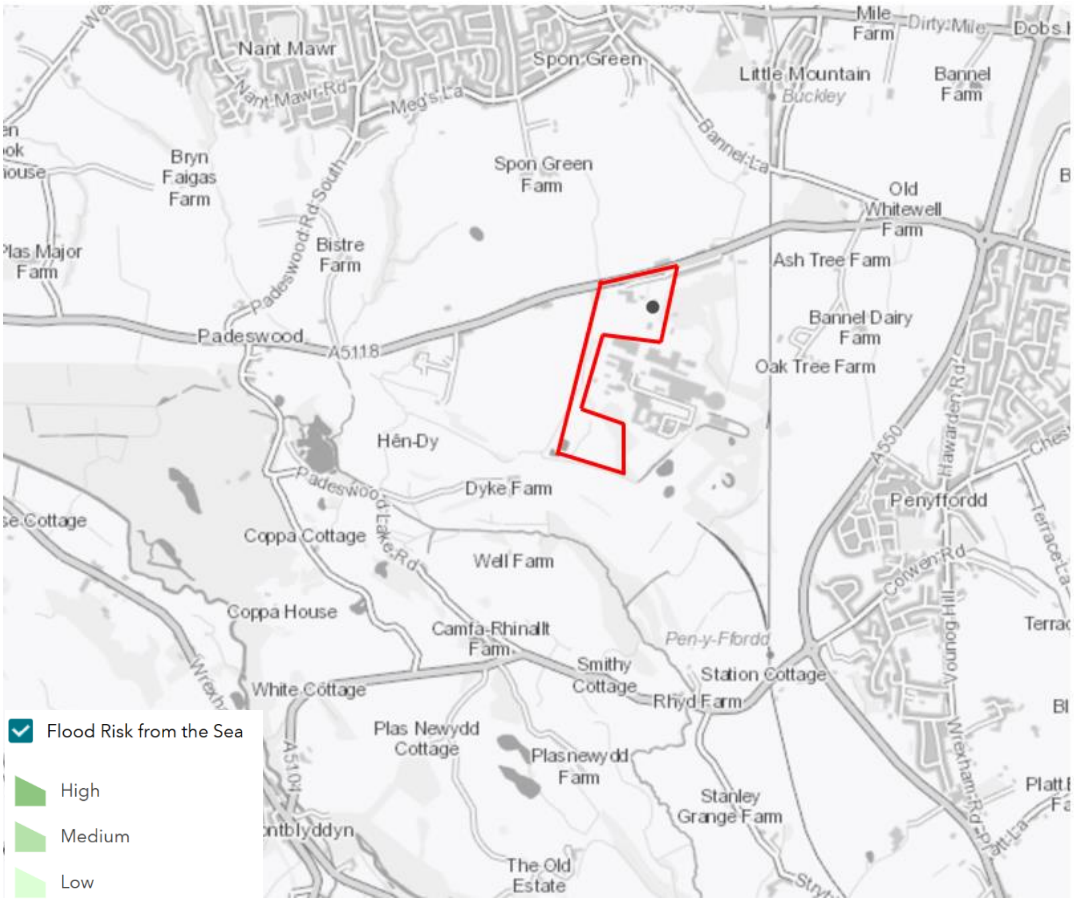


Figure 5-3. Tidal flood risk (NRW, 2025).

5.4 Groundwater flood risk

Groundwater flooding is caused when the water table of underground aquifers increases to a level where it is exposed at ground level (JBA Consulting, 2018). Groundwater flooding is generally slow and as a result of significant and prolonged rainfall events. The risk of flooding from groundwater is more significant in areas of low elevation, as groundwater flows from high elevation to low elevation. The Flintshire Strategic Flood Consequence Assessment (JBA, 2024) highlights that the site does not lie in a potential flood risk zone.

The site investigation undertaken by WSP in 2023 identified isolated pockets of shallow groundwater at between 0.52 and 4.21 mBGL across the site. Based on field sampling results, it is considered likely that the shallow groundwater is confined to small, isolated permeable sand/gravel lenses based on observations of the ground conditions, therefore, groundwater is considered to pose a low flood risk to the site.

5.5 Pluvial flood risk

Mean annual rainfall across Wales varies significantly. The closest rainfall gauge to the site is Hawarden Airport, located 6.8 km from the site. The airport records average annual rainfall of 728.7 mm (Met office 2025). As a result, the flood risk caused by large rainfall events may

pose a risk to the site, particularly as the site becomes more developed. Larger areas of hardstand or compacted ground will lead to increased runoff which will require drainage management

Natural Resources Wales's surface water and small water courses flood map (Figure 5-4) shows that the site lies within zone 2 and 3 surface water flood risk areas. This modelling is based on overland flow pathways using LiDAR datasets and does not include site-specific drainage (RSK, 2024).

There is some surface water flooding at the southern site boundary, where the proposed CCU is to be located. To the north of the site, the carpark and temporary site laydown areas lie within flood zones 2 and 3.

Overall, given that the site is not classified as a residential area and that there are drainage mitigation strategies in place under construction and operations phase (see section 6.2 and 7.4), the overall surface water flood risk is considered to be low (RSK, 2024).

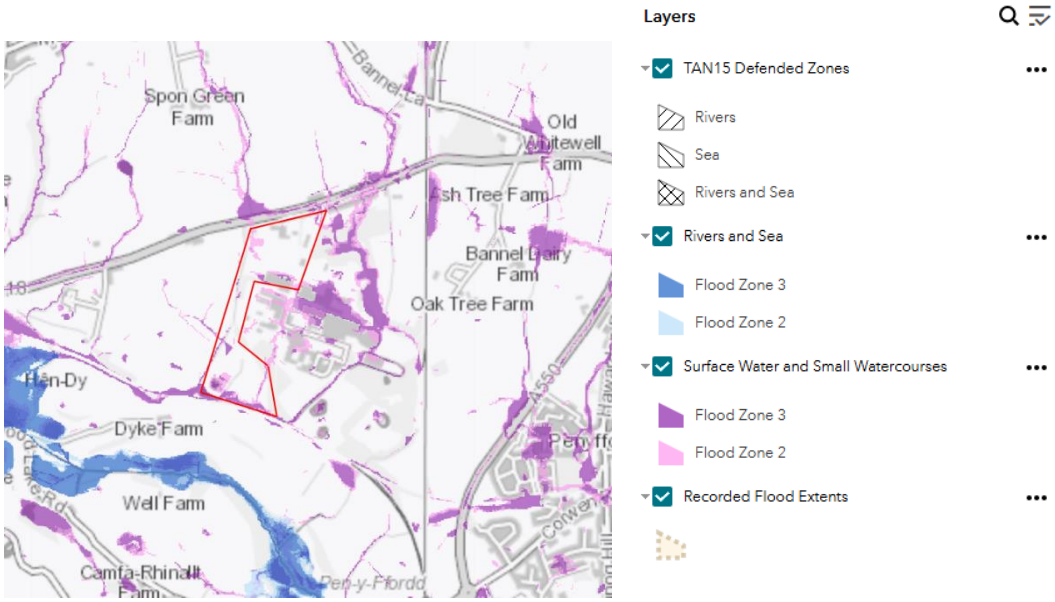


Figure 5-4. Surface Water Flood map for planning (NRW, 2025)

5.6 Artificial flood risk

The presence of foul water drainage system on site presents a low artificial flood risk to the site. (215000-00190-000-CI-TEN-00006, Existing Foul Drainage Diversion) highlights the need to reassess the existing foul main on site, to withstand increased loads of waste during construction and operation of the site.

The existing foul mains is required to be rerouted to bypass a proposed retaining wall on the site. If the system is identified as being unsuitable, additional pumping systems and foul mains are required.

The site is not within the catchment of a reservoir and therefore there is no risk of flooding from a large reservoir source.

Ongoing maintenance is required to onsite sewerage systems to ensure they are compliant and do not increase the overall flood risk.

Dwr Cymry Welsh Water (DCWW) provided the flood incident register within RSK's FCA (2024). This mapping is presented in Figure 5-5 Most locations are associated with private properties, with some external locations such as highways, fields and carparks.

The register captures all incidents between 1990 to 2016, with a total of 891 incidents within the area. Most incidents are located in more built-up areas. There are no incidents in direct proximity to the CCU site.

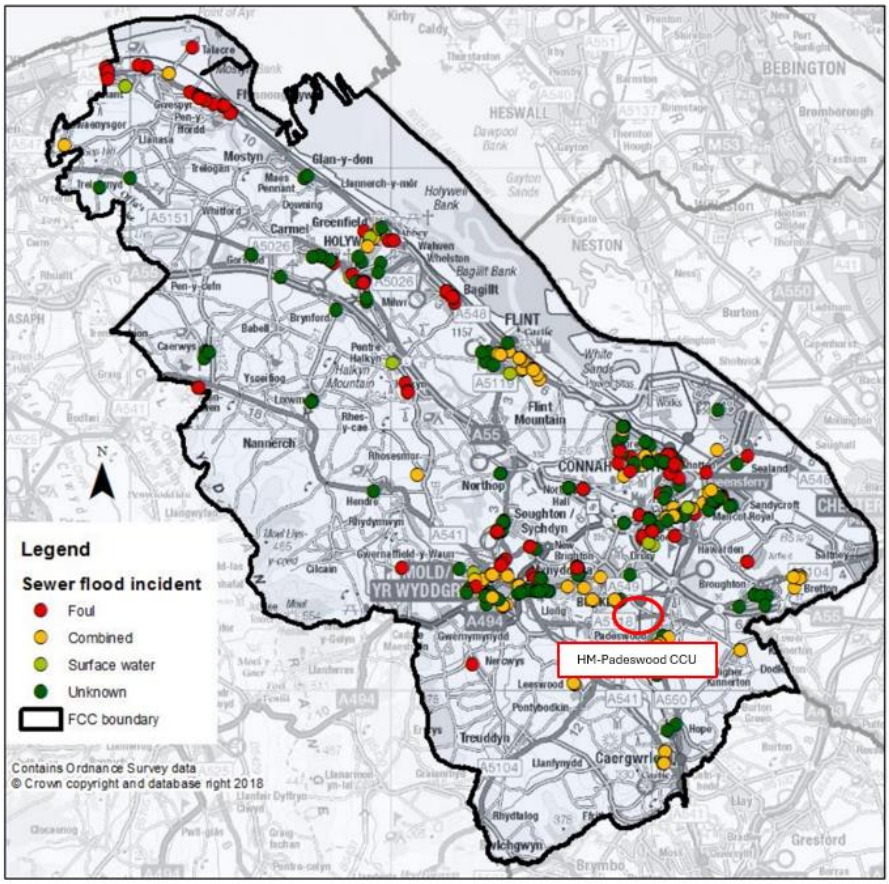


Figure 5-5. DCWW (2016) flood incident register 1990 - 2016

5.7 Breach flood risk

A review of aerial imagery (google, 2025) and ESRI mapping (ESRI, 2025) has not identified potential sources of breach flooding. The nearest river system at the closest point is 6.8 km away. No dams have been identified within a 100 km radius, based on google imagery (2025). Based on the available data, it is therefore considered that there is a low risk of breach flooding during construction.

6. Construction Surface Water Management Plan

6.1 Overview of Construction Plan

During the construction phase, there will be a CCU construction area, where a downstream defender or silt busters in parallel shall be located, a temporary carpark in the northern part of the site with a foul water pipeline leading from it and an access road which shall link CCU to temporary carpark. These features are shown in Figure 6-1 and are divided into Areas A, B, C and D respectively.

The primary construction works to support the development include two phases, the Enabling works(Area B, C and D) and CCU (Area A). An initial SAB application will be made for the enabling works, with a subsequent application to be made for the CCU compound after the enabling works are complete. Area A is for information only and is not included in the phase 1 SAB application These are divided as follows:

- The CCU construction compound, including downstream defender (Area A).
- Enabling works (Area B, C and D), including:
  - Temporary laydown areas.
  - Site Preparation and Clearance
  - Temporary topsoil storage
  - Access road, constructed during temporary works and retained for operations.
  - Drainage of temporary carpark.
  - Excavations for permanent infrastructure (pipework); and
  - Excavation and removal of redundant infrastructure, in the carpark (e.g. existing farm buildings).

Area A CCU – This is comprised of a construction area, where runoff will be captured by two ditches running north-west to south-east of the CCU. A downstream defender shall also be constructed to intercept surface water runoff and used as a means of primary water treatment. The area at the entrance to the CCU will be restricted to a greenfield runoff rate of 5 L/s. Storage is provided with trapezoidal drains, as shown in drawing 215000-00190-000-CI-DAL-02005.

Water quality will be maintained by a class-1 retention two chamber oil separator. This will be installed upstream of the settlement pond.

Area B Carpark – Located in the northern part of the site. This is split into two areas, the eastern section is an asphalt covered carpark, which will then be retained for permanent use and the western section will have a gravel cover with Bodpave overlying natural ground.

Runoff from the east of the car park will be restricted to a greenfield runoff rate of 7 L/s and treated via an oil separator, located upstream. Storage will be provided in attenuation crates, as shown in drawing 215000-00190-000-CI-DAL-02005.

A foul water pipeline leads from the car park area and connects to the site's internal drainage and pumping station which then ties into the municipal mains line at the access road.

Area C Access Road- This is joining areas A and B. The Permanent drainage system will be constructed and used for the access road during the construction phase. Runoff will be drained via gullies into a piped network, shown in drawings 215000-00190-000-CI-DAL-02003 to 02006. The network is divided into two sections. The north portion of the access road will discharge directly to the existing drainage ditch to the west of the site. This discharge will be restricted to the rate of 46.5 L/s, which includes area from the carpark, using a hydro break (or equivalent flow control device). This flowrate includes discharge from the car park and laydown area.

The south portion will connect to existing surface water sewer diversion, at a controlled rate of 9 L/s. This will connect to the existing ditch to the west, further downstream. Over pump of excess rainfall runoff will be redirected towards the western ditch and to the downstream defender at the CCU in area A. Silt busters will treat runoff prior to discharge.

Area D Temporary Laydown areas – These are located south of the carpark and east of the carpark and will be used for construction materials and machinery. This area will be restricted to a greenfield runoff rate of 30 L/s and storage will be in the form of trapezoidal drains.

The laydown areas will be stripped back to topsoil and re-seeded to promote vegetation growth after the construction phase.

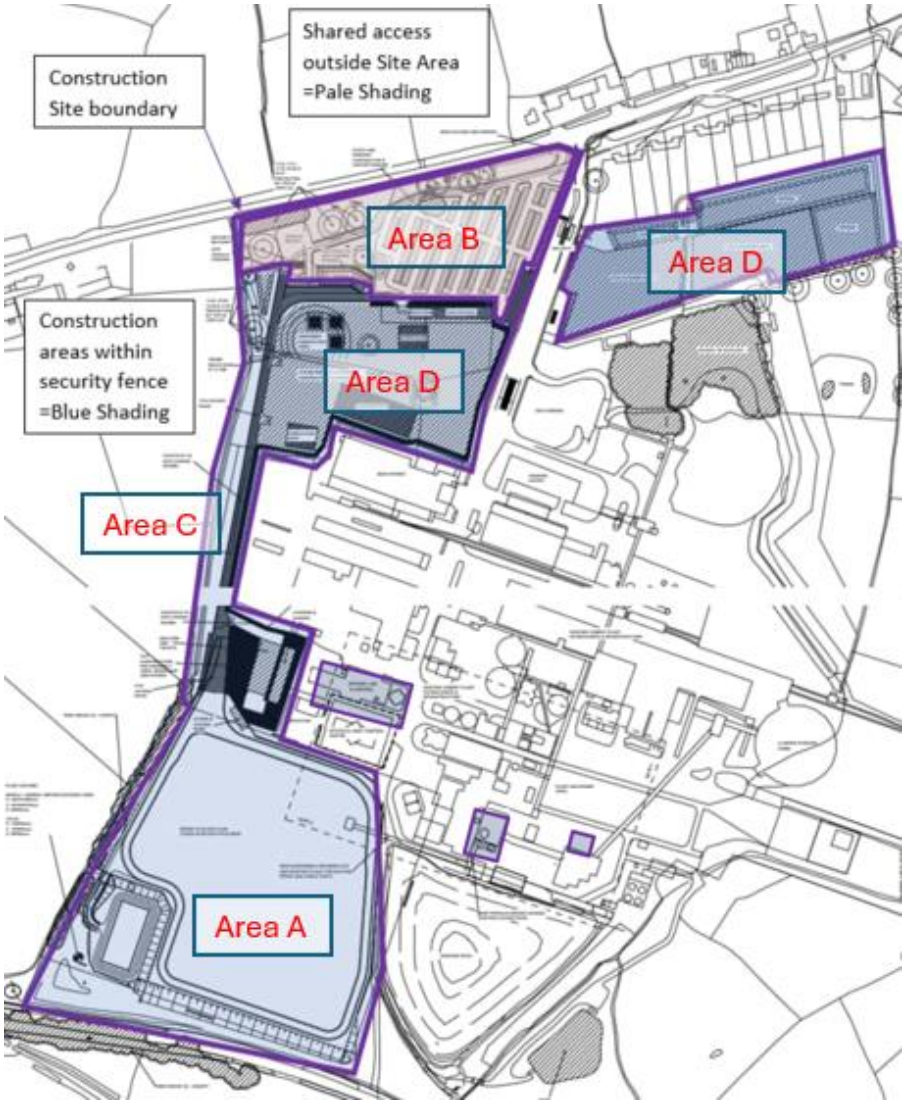


Figure 6-1. Construction and laydown areas (215000-00190-000-CM-COS-00001)

Works shall involve the excavation of the carpark, downstream defender and pipeline corridor. and the installation of temporary carpark, preparation of laydown areas for storing equipment and materials, and constructing temporary site facilities to accommodate offices, welfare areas and other essential functions during the construction phase. This is summarized in 215000-00190-000-CM-COS-00001, the construction execution plan.

Site Preparation and Vegetation Clearance

During construction, where possible, trees and vegetation will be retained. Surplus excavated soils will be disposed of offsite.

Temporary Topsoil Storage

Topsoil will be removed from the west pre-assembly laydown areas and east laydown areas.

The stripped topsoil will be temporarily stockpiled to the east of site, adjacent to the eastern laydown areas, as depicted in Figure 6-2. Good stockpile management, such as bunding and slope maintenance will be adopted to prevent the mobilization of sediments within rainfall run-off.

Figure 6-2. Temporary Laydown and topsoil storage areas (215000-00190-000-COS-00001)

Temporary Access Road

A temporary access road (Area C), with a wheel cleaning facility, will connect the construction compound (Areas B and C) with the development site (Area A). The access road will be constructed from imported granular (Type 1 material or similar). The road will be constructed at a 6% gradient to allow safe movement of loads.

Excavations for Permanent Structures

The majority of proposed structures are likely to be founded at shallow depths within the Devensian Till. The deepest excavations (required for pipework) will extend up to 5 m below the existing cement plan.

Excavations and Removal of Redundant Pipework

Tie in points locations will be excavated to expose the existing lines and to cut and temporary cap to allow the redundant pipework sections to be excavated, removed and backfilled. This operation is anticipated to be done in a progressive open excavation. Excavation details are provided within Drawings in Appendix D.

Hydrotest

Hydrotesting will be undertaken with demineralised water. Stainless steel pipelines and the regenerator vessel will be tested with demineralized water which will be delivered and removed by tanker. As a result, there is no discharge of demineralized water to the site (215000-00190-000-CM-COS). Carbon Steel pipes will be hydrotested with potable water and will be discharged to storm water drains (215000-00190-000-CM-COS).

Dewatering

Where localised groundwater may be present, surface water run-off or direct rainfall enters deep excavations, provision has been made to capture this water. This will be done through sump pumping the water from the excavation and discharging to a cut off drain to the south of site and transported to the settling facility as highlighted in the construction execution plan (215000-00190-000-CI-REP-00007). This water will be treated with a silt buster prior to disposal to the downstream defender. Due to the isolated nature of the groundwater table (WSP, 2023), dewatering is not expected to exceed 20 m3/day which is the maximum abstraction volume which does not require additional permitting (UK Environmental Agency, 2025).

6.2 Proposed Sustainable Drainage Solutions

Proposed SuDS are a variety of surface water management techniques used to reduce the velocity of surface water and partially treat it prior to discharge to a watercourse, water body or sewer. SuDs have been incorporated into the drainage scheme summarized in Section 5.1, where possible.

Table 6-1 appraises constraints and opportunities for the use of SuDS techniques within the site and it adopts a hierarchical approach outlined in CIRIA C753.

Table 6-1. C753 SuDS, Site Assessment - Construction.

Type	**Green Roof (Source Control)**
Opportunities	Not suitable for the type of development.
Constraints	
Type	**Infiltration systems (Source Control)**
Opportunities	Not suitable due to low infiltration rates
Constraints	
Type	**Rainwater Harvesting (Source Control)**
Opportunities	Not suitable for this development
Constraints	
Type	**Channels**
Opportunities	Storage is captured in trapezoidal drains. There will be minor infiltration through the base of the channels.
Constraints	
Type	**Wet ponds and wetlands (end of pipe treatment)**
Opportunities	There is limited space for a wetland system at the site.
Constraints	

Type	Attenuation Tanks (end of pipe treatment)
Opportunities	Should attenuation be required this could be achieved by use of a manhole, oversized drain or geo-cellular attenuation, combined with a suitable flow control device.
Constraints	None.
Type	**Downstream Defender**
Opportunities	A downstream could allow runoff from the CCU to suitably discharge after sediment is removed. The alternative is a silt buster. A downstream defender is cost efficient and safer compared with a traditional settlement pond.
Constraints	None.

6.3 Proposed Sustainable Drainage Solutions – Construction

SuDS measures promote multiple uses of SuDS benefits including temporary flooded areas. Table 6-2 presents the proposed uses for the different SuDS mechanisms onsite. The construction drainage layout is presented in Appendix C.

The site has been designed to maintain significant vegetation where possible to maintain biodiversity at the site.

Table 6-2. Multiple uses of SuDS benefits.

SuDS feature	Dry use	Wet/flooded Use	Biodiversity Value
drainage channels	Green pathways	Drainage conveyance	Habitat for aquatic and semi-aquatic life.

6.3.1 CCU

Surface water runoff from the CCU will be captured by two ditches running north-west to south-east of the CCU. These ditches will be captured by a settlement pond or downstream defender to prevent increased silt load, before discharging to the environment. The downstream defender is recommended over a settlement pond due to the space requirements and cost efficiency. In addition, there is no open water which promotes safety for site personnel.

6.3.2 Carpark

The carpark is divided into one temporary carpark and one permanent carpark. The temporary carpark will be incorporating the Bodpave system where runoff will be collected and transported to the main surface water pipes and stored in attenuation tanks. This system has been selected to provide some level of interception of surface water runoff. It is not possible to infiltrate due to low infiltration rates. A typical cross section of Bodpave in carparks is presented in drawing 215000-00190-000-CI-DST-00300.

The permanent carpark will be Asphalt with runoff from the Asphalt portion of the carpark is discharged at a controlled rate of 30 L/s to attenuation tanks.

6.3.3 Access Road

Under construction, discharge will be restricted at a controlled rate via a hydro-break (or similar). During construction, the permanent drainage systems will be constructed and used. Given the small catchment reporting to the access road, over pump from the bottom of the hill will redirect ponding towards the western ditch. Currently, all existing surface water runoff from the cement plant is directed to this ditch. Silt busters will be in place to treat runoff prior to discharge.

6.3.4 Laydown areas

During construction, the laydown areas will have topsoil, subsoil and clay removed and temporarily re-surfaced in type 1 granular stone cover. Discharge will be at a controlled rate via a hydrobreak (or similar). In addition, there will be channel ditches tying into existing stormwater infrastructure.

6.4 Foul Water Management

Domestic wastewater during construction will comprise of grey and black water from a maximum of 650 personnel and during operation, the foul system has been sized for 54 personnel (215000-00190-000-CM-COS-00001). The foul water connects from the lift station to the municipal mains, located to the west of the site. This mains system is directed to the municipal WWTP (RSK, 2024c).

6.5 Resource requirements

The following resources are required over construction and operational timeframes. A detailed construction execution plan is titled 215000-00190-000-CM-COS-00001.

During construction phase, site personnel include operational staff of the existing cement works as well as the construction and operation staff for the carbon capture plant. During operations phase, site personnel include operational staff for the existing cement works and the CCU site.

Materials management will be controlled through ERM, Worley's electronic materials management platform.

Table 6-3. Resource requirements over operational and construction timeframes

Phase	No. of Personnel	Plant Resources	Material Resources
Construction	Peaks at 650	• Earthworks HGV movements: 5 months duration	Detailed list of material resources is provided in the

Phase	No. of Personnel	Plant Resources	Material Resources
		• Retailing wall Secant pile installation – Oct/Nov 2025 • Pilling Rig – 3 months, Oct 2026 – Jan 2027. • Concrete pours – 12 months, Jan 2027 – November 2027. • Steel erection – Q4 2027 – Q1 2028. • Boiler blow-off – Sept 2028.	Chemical and Catalyst register (215000-00190-000-PR-LST-00004) and the Construction execution plan (215000-00190-000-CM-COS-00001)
Operation	154	Detailed information presented in the Construction Execution Plan	

6.6 Human and Vehicle Management

Human and vehicle access onsite is via internal access roads. Access roads have drainage mechanisms in place to control the discharge of surface water runoff to not exceed the Greenfield runoff rate.

During the construction phase, operational drainage infrastructure will be designed and constructed to support the access road. Surface water runoff will be directed to pipe networks which will have a controlled discharge point of 2 L/s/Ha. The access road will support less than 10,000 vehicles per day and therefore there is no requirement for water treatment from hydrocarbons (Highways England, 2020).

A maintenance plan is recommended to ensure the SuDS features can be maintained practically. This should include any legislative requirements, including regulatory maintenance strips to access adjacent water courses and to allow heavy machinery access. The detailed maintenance plan is presented in Appendix D.

The project does not have planned future development. As a result, there is no requirement to consider a change in future human and vehicular access to site, beyond the proposed access road and permanent car parking.

7. Operational Surface Water Management Plan

7.1 Overview of Operational Plan

During the operational phase, the Carbon Capture Unit is located in the south-west of the operational facility (Area A). This is connected to the carpark in the north via an access road which runs north-south on the western site boundary (Area B and C). These facilities make up the permanent enabling works. During operations, the laydown areas will be stripped back to topsoil and re-seeded to promote vegetation growth.

1. Area A CCU – This is comprised of gravel, paving, concrete and asphalt. Direct rainfall from the CCU is directed towards gullies and channel drains and treated via a separator before being directed to the settlement pond or downstream defender. The holding pond has been sized for the 1 in 100-year AEP event with a capacity of 3,700 m^3.

   After being stored in the settlement pond, surface water will be discharged at the pre-development greenfield runoff rate of 66.8 L/s, with a flow measurement station installed downstream of the holding pond outlet. Erosion control measures, such as rock protection and Enkamat erosion protection matting are in place at outlet headwall locations
2. Area B Carpark – The permanent carpark is retained from the construction phase and is in the northern part of the site. The carpark has perimeter drains which will intercept runoff from impermeable surfaces. The drains connect with buried piping which captures stormwater at attenuation tanks.
3. Area C Access Road- This is joining areas A and B. During operations, roadside gullies direct stormwater runoff towards a pipe system which transports to outfall locations. Outfall from this network is restricted to 2 L/s/Ha with a minimum of 5 L/s. There are two outfall locations during the operations phase, discharging at 5 L/s and 9 L/s. These are located to the north of the access road. Erosion control measures, such as rock protection and Enkamat erosion protection matting is in place at outlet headwall locations

As outlined in the Drainage Philosophy for the proposed development [215000-00190-000-PR-PHL-00004] drainage at the site is primarily classified into:

- Process Drains System
  - Collects drainage directly from equipment or piping.
  - Process drains include routine draining of equipment and pipework for maintenance operations.
  - As far as practical, drained fluid will be retained and returned to the appropriate system. Where this is undesirable, fluids will be discharged to suitable containment, treated and, if necessary, sent to off-site disposal.
- Storm Water Drain System
  - Collects rain/storm water. Drainage can originate from kerbed areas and gullies.
  - Accidental spillages from process areas or maintenance water such as Jet Wash Effluent can also be routed to storm water systems after passing the control measures put in place to ensure acceptable quality.
  - It is noted that any systems which can collect fire suppression/fire fighting water and/or surface water (rainfall) must be suitably sized for the maximum fire water demand case

- Suitable means (e.g. Penstock valves) are to be installed on the outfall of surface water systems to prevent any firewater being released off site in the event of an incident.

Both systems can contain either hazardous or non-hazardous fluids which is reviewed in further detail in the Drainage Philosophy.

Schematics of the site drainage proposed at the carpark and access road are presented in:

- 215000-00190-000-CI-DAL-02000
- 215000-00190-000-CI-DAL-02001
- 215000-00190-000-CI-DAL-02002
- 215000-00190-000-CI-DAL-02003
- 215000-00190-000-CI-DAL-02004
- 215000-00190-000-CI-DAL-02005
- 215000-00190-000-CI-DAL-02006

Surface water diversion schematics are presented in:

- 215000-00190-000-DAL-00001
- 215000-00190-000-DAL-00002

7.2 Allowable Drainage Discharge Rates

It is assumed that the allowable discharge rate from the site should not exceed the Greenfield mean annual runoff rate. It is proposed, in line with SuDS guidance, that the discharge rate can be variable, in line with the intensity of the rainfall event.

The greenfield runoff rate for the site has been calculated using the Greenfield runoff tool on the UK Sustainable Drainage System (SuDS) website (HR Wallingford, 2025) following the institute of Hydrology 124 methodology and applying the IH124 method based on the site area of 13.1 Ha. The results for the site are provided in Table 7-1 and the calculation included in Appendix C.

Table 7-1. Estimated Greenfield Runoff Rates for the site based on Greenfield runoff rate calculator (HR Wallingford, 2025a).

Event	Area (L/s)
1 year	63.1
10 year	101.8
30 year	127.6
100 year	156.2

Under the requirements of NPPF, surface water runoff from the site cannot increase following development as it could increase the flood risk downstream of the site.

7.3 Infiltration rates

Infiltration testing on site produced very low infiltration rates, in the order of 10^{-7} L/s. As a result, infiltration at the site is not possible and drainage on site will be discharged to a surface water body.

7.4 Proposed Surface Water Drainage Solutions

The proposed SuDS are a variety of surface water management techniques which reduce the velocity of surface water and partially treat it prior to discharge to a water course, water body or sewer. SuDS have been incorporated within the operational drainage layout, where possible.

Table 7-2 appraises constraints and opportunities for the use of SuDS techniques within the part of the site that will be used for operational purposes, The CCU, carpark and access road, and it adopts the hierarchical approach outlined in CIRIA C753.

Table 7-2. Operational Conditions Proposed SuDS measures

Type	**Green Roof (Source Control)**
Opportunities	Not suitable for the type of development.
Constraints	
Type	**Infiltration systems (Source Control)**
Opportunities	Not suitable due to low infiltration rates.
Constraints	
Type	**Rainwater Harvesting (Source Control)**
Opportunities	Pluvial runoff will be intercepted by the attenuation basin and utilized for process use in the cement works as required.
Constraints	
Type	**Swales (Permeable Conveyance)**
Opportunities	Drainage channels and gullies will be used throughout the CCU area to direct runoff to a settlement pond.
Constraints	Not suitable due to the minimum requirement of 1:3 side slope which requires a large spatial area.
Type	**Wet ponds and wetlands (end of pipe treatment)**
Opportunities	Create areas for biodiversity and ecosystems.
Constraints	There is limited space for a wetland system at the site.
Type	**Attenuation Tanks (end of pipe treatment)**
Opportunities	Attenuation tanks will be incorporated at the CCU area and will be achieved by use of a manhole combined with a suitable flow control device.
Constraints	None.
Type	**Settlement Pond**
Opportunities	A permanent settlement pond is proposed for the CCU area to capture runoff from the paved areas and the access roads.
Constraints	Requires regular maintenance to remove excess sediment to maintain efficiency. Significant space requirement. On this basis, a

downstream defender has been selected as it is more cost efficient and safer compared with a traditional settlement pond.

7.5 Proposed Sustainable Drainage Solutions – Operation

The proposed drainage solutions under operational conditions have been divided into the three operating ares of the site, the carpark, the access road and the CCU.

CCU: All collected surface water discharge is treated via an oil separator and then held in a settlement pond and discharged at a rate of 66.8 L/s, in line with the greenfield runoff rate. This is sized in line with SuDS surface water storage.

Carpark: Drains and gullies which will direct runoff to attenuation tanks and trapezoidal drains before discharging at the greenfield runoff rate.

Access Road: Roadside gullies will discharge water below the greenfield runoff rate.

SuDS measures promote multiple uses of SuDS benefits including temporary flooded areas under operational conditions. Table 7-3 presents the proposed uses for the different SuDS mechanisms onsite.

Table 7-3. Multiple uses of SuDS benefits.

SuDS feature	Dry use	Wet/flooded Use	Biodiversity Value
Swales/drainage channels	Green pathways	Drainage conveyance	Insect habitat and pollinator plants
Storage Ponds	Natural Habitat	Storage	Aquatic Biodiversity

7.5.1 CCU

The CCU will be a combination of gravel, paving, concrete paving and asphalt. Direct runoff from the CCU is directed towards gullies and channel drains. The outside edge of the road is gullies and the inside of the road is channel drains. Channel drains are sized for the paved areas and road surface. All runoff is collected by a pipe network to catch basin manholes, which act to remove total suspended solids. This water is treated in an interceptor and will be stored in a settlement pond.

The runoff from the CCU is restricted to 66.8 L/s and is directed to a ditch at the south of the site. The outlet flume will have a meter set to 66.8 L/s to ensure that flow does not exceed the restricted rate. Erosion control measures are in place at the outlet location.

7.5.2 Permanent carpark

The permanent carpark will be asphalt with channel drains which will connect surface water drainage that will intercept runoff from the impermeable surfaces within the development. These drains direct towards piping which captures stormwater in attenuation tanks which leads

to an existing ditch to the west, further downstream. Runoff from the carpark is treated by interceptors before being discharged to attenuation tanks.

Due to the high volume of vehicle traffic in the carpark, there will be a separator for water treatment purposes.

7.5.3 Access road

The asphalt access road has roadside gullies directing stormwater runoff towards a pipe system, directed to outfall locations. Outfall from this network is restricted to 2 a minimum of 5 L/s. There are two outfall locations, each discharging at 5 L/s. This is compliant with SuDS.

Due to the low traffic on the access road (less than 10,000 vehicle movements per day, as governed by the Highways England Water Risk Assessment Tool (HEWRAT) (Highways England, 2020)), water treatment is not required as hydrocarbons and suspended solids are expected to be low. Total suspended solids will be removed in gully pots and manholes are on a catch basis. In addition, a 300 mm sump will remove TSS and oil.

7.6 Ongoing Operational Maintenance Strategy

A detailed SuDS Maintenance plan has been prepared and is presented in Appendix D. This section summarises the maintenance strategies presented in the plan.

The potentially contaminated drainage system comprises a series of gullies and channels connected into a below ground pipework system running between inspection chambers. Maintenance of the system will include:

- Regular removal of silt from gullies via gully sucker.
- Regular inspection of flows within the inspection chamber.
- Jetting of pipelines between inspection chambers when blockages or silt build up is identified.
- Attenuation tanks are designed to have a slope of 0.5% which enables removal and maintenance of silt.

The Field Drainage System to Roads comprises granular filled trenches with a perforated pipe, running between inspection chambers, running to an outfall. Maintenance of the system will include

- Regular inspection of flows within inspection chambers.
- Jetting of pipelines between inspection chambers when blockages / silt build up are identified.
- Where excessive buildup of silts within the granular drains is identified, the drains will be excavated and reformed. It is expected to be a very infrequent process (10 years plus).

7.7 Surface Water Storage Assessment

The surface water storage volume estimation tool (HR Wallingford, 2025) provides estimation of the required volumes of storage needed on a site under operational conditions. This storage assessment calculates the retention volumes required to control runoff in accordance with the greenfield runoff rate. SuDS guidelines and consultation with Flintshire Council have suggested

that variable discharge rates may be suitable for the site when proportional to the rainfall event.

A surface water storage estimate is provided for the site below, excluding existing areas.This assessment was based on operations phase land use and divides the site into sub catchments, as presented in Figure 7-1. Due to the industrial nature of the development the urban creep allowance has been input as 0% (no creep).

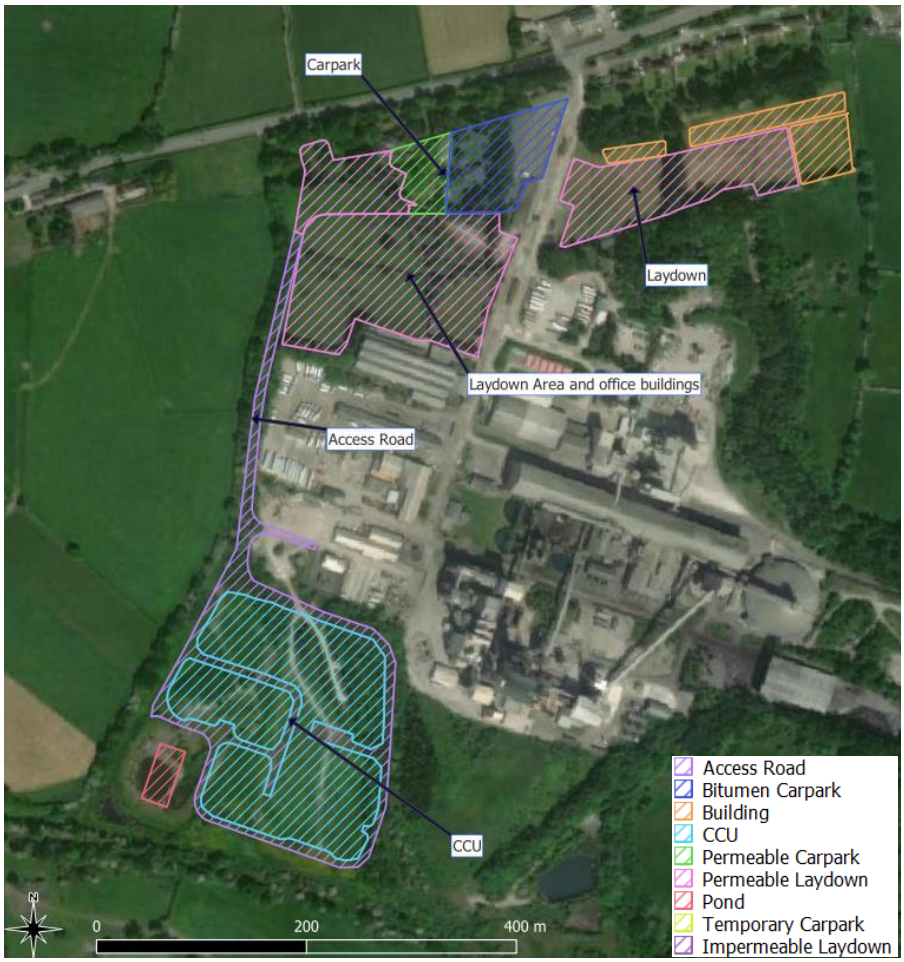


Figure 7-1. Operational phase land use use categories input into the SuDS surface water storage tool.

Table 7-4. Surface Water Storage Assessment for operation phase based on calculations from HR Wallingford (2025b).

Parameter	Whole Site	CCU	Laydown Areas	Carpark and Access Road
Total site area (Ha)	13.1	5.6	5.1	2.4
Grass (Ha)	4.8	2.1	1.9	0.8
Paved area (Ha)	8.0	3.5	2.9	1.6
Roof area (Ha)	0.3	0	0.3	0
100-year discharge flow rate (L/s)	156.2	66.8	60.5	28.2

Parameter	Whole Site	CCU	Laydown Areas	Carpark and Access Road
Total Storage (1% AEP) (m^3)	8,011.9	3,343.6	3,031.4	1449.9

8. Impact of proposed works on flood risk

The site is in an area of low flood risk from all sources of flooding. The site has been divided into three regions, the carpark in the north, the access road and the CCU to the south. This section summarises the impacts of the proposed works for operations on flood risk, as highlighted in section 7.

The carpark area in the north of the site has sufficient drainage measures in place to capture, treat and discharge water. As a result, the carpark area is not expected to increase the flood risk.

The access road discharges at two locations at a rate of 5 L/s and therefore is not expected to increase the flood risk downstream. The permanent drainage will be constructed during operations and all discharge from the road will be directed to the existing ditch to the west of the site.

All runoff from the CCU is captured, treated, stored in a downstream defender and then discharged at the greenfield runoff rate of 66.8 L/s and therefore is not expected to increase the flood risk.

9. Water Quality

As summarized in 215000-00190-000-CI-TEN-00004 and Padeswood Carbon Capture and Storage Planning Casework (RSK, 2024), an overview of potential sources of contamination that may be identified during the construction and operations phase is provided below. .

Construction:

- Cement works, including chemicals and fuels required for processes and storage of waste products.
- Made ground across the site.
- Agricultural land within the site boundary.
- Landfill sites and infilled land.
- Historical colliery.
- Infilled gravel pits and lagoons in the area south of the main cement works buildings.
- Oil.

Operations:

- Amine Solvent.
- Caustic Soda.
- Reclaimed Waste.
- DeSOx.
- SeSOx flue gas.
- Flue has condensate.e
- Diluted amine solvent.
- Amine contaminated water.
- Detritus/chemicals in firewater.
- Oil.
- RO Reject and other wastewater.

The site is already subject to Environmental Permitting, a variation of which is required for the CCS operation. The potential sources specified above are associated with the site's general operation not the CCS specifically.

Due to the presence of contaminants onsite, following measures, in line with SuDS will be implemented onsite to ensure suitable water quality is maintained during operation and construction phases.

SuDS guidelines have been followed to ensure that a pollution risk screening has been undertaken. There are no downstream sensitive water receptors onsite, but groundwater systems are required to be screened. The following points outlines the outcomes of the pollution risk screening:

- Driveways, roofs, car parks, low traffic roads, carparking with frequent change require simple index approach.
- HM-Padeswood is classified as a site with heavy pollution due to the presence of lorry parking and producing industrial chemicals. As a result, discharges may require an environmental license or permit. Obtain pre-permitting from the environmental regulator. A contamination risk assessment has been provided in 215000-00190-000-CI-TEN-00004.

Discharge quality requirements for regulatory approval are outlined in 215000-00190-000-EN-BOD-00001.

9.1 Construction phase

During construction phases, runoff from the CCU will be treated in a downstream defender prior to discharge. hydrocarbons and sediment load are removed in this process. A discharge consent is required based on volume requirements (NRW, 2025). All discharge will be treated via a separator and subsequently, no additional testing is required. Discharge consent is required and will be obtained as part of the SAB application.

The access road is not considered a high-risk zone, due to no standing vehicles releasing hydrocarbons. The temporary carpark may pose a contaminants risk, with high vehicle standing times resulting in settled hydrocarbons.

SuDS produced the Simple Index Approach to understand the risk of contaminants to sensitive downstream receptors (SuDS, 2023). This assessment is based on land use and SuDS performance evidence.

Based on runoff from the site reporting to groundwater systems, the simple index approach (Table 9-1) has been used to determine the risk of pollutants in the carpark.

Table 9-1. Simple Index Approach for the carpark during construction.

Simple Index Approach	Pollution hazard level	TSS	Metals	Hydrocarbons
1) Suitable pollution hazard indices for the proposed land use.	**High** – sites with heavy pollution, where chemicals and fuels are transported.	0.8	0.8	0.9
2) Selects SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index.		Permeable Pavement: 0.7	Permeable Pavement: 0.6	Permeable Pavement: 0.7
3) Where the discharge is to protected surface waters or groundwaters, consider the need for a more precautionary approach.		**Produce a risk screening matrix for the site :** as presented in Table 9-2. The results of the risk matrix show that the risk score is 195 and therefore there is a high risk to groundwater. Any dewatering is unlikely to exceed 20m^3/day and therefore does not require an abstraction license. Dewatering will be directed to a cut off drain to the south of site and transported to the settling facility as highlighted in the construction execution plan (215000-00190-000-CI-REP-00007). This water will be treated with a silt buster. Discharges from the Carpark and CCU will be treated by a separator. The access road has low traffic and therefore does not pose a contamination risk.		

Table 9-2. CIRIA SuDS (2023) groundwater Risk Matrix under construction conditions.

Element Number	Element description	Low risk score 1	Medium risk score 2	High risk score 3	Weighting factor.
1	Pollution hazard traffic density	All standard urban use types (excluding high hazard and trunk roads/motorways).			15
2	Standard Average Annual Rainfall Depth	< 740 mm	740 – 1060 mm	>1060 mm	15
3	Type of SuDS	Continuous unlined linear collection and conveyance components (e.g. filter strips or swales).	Shallow soakaway (eg infiltration basis, trench, permeable pavement) draining < 5000 m2 runoff		15
4	Unsaturated zone depth (i.e. depth between infiltration surface and groundwater table).	>15 m	5 – 15 m	1 – 5 m	20
5	Predominant flow types through soils between infiltration surface and groundwater	Intergranular flow (occurs in unconsolidated or non-fractured consolidated deposits and fine or medium sands).	Mixed fracture and intergranular flow (occur in fractured consolidated deposits and medium or course sands)	Fractured flow (occurs in heavily consolidated sedimentary deposits, igneous and metamorphic rock and very course sands	20

Element Number	Element description	Low risk score 1	Medium risk score 2	High risk score 3	Weighting factor.
6	Unsaturated zone: clay content	Greater than 15% clay	1 – 15% clay	< 1% clay	5
7	Unsaturated zone organic carbon content: soil organic matter (SOM) content	Greater than 15% SOM	1 – 15% SOM	< 1% SOM	5
8	Unsaturated zone material: soil pH	Greater than 8	5 – 8	<5	5

As a result of the risk matrix, the contaminants and polluting materials produced on site have been summarized in the catalyst and chemical summary (215000-00190-000-PR-LST-00004). This is presented in Figure 9-1. Further details on contaminants and water quality is captured in 215000-00190-000-CI-TEN-00004.

worley MITSUBISHI HEAVY INDUSTRIES

CATALYST AND CHEMICAL SUMMARY

Heidelberg Materials

Document No. :	Rev.
215000-00190-000-PR-LST-00004	Rev 0

CHEMICALS

Substance Name	Abbr. Chem. Name	Physical State	Density (kg/m³)	Risk Factors						Consumption Rate		Storage Vessel				Initial Fill (m³)	Supply Package	Handling Method	Required inventory	Comments
				T	Car	Cor	Com	F	O	Units	Rate	Description	Tag No.	P&ID No.	Capacity (m³)					
Caustic soda (100 wt%)										kg/h	1.5	Caustic Soda Tank	720TK003	215000-00190-720-PR-PID-14007	16.7 (HOLD 1, 8)					Note 1, 2
Sulphuric Acid (100 wt%)										kg/h	2	Sulphuric Acid Tank	720TK010	215000-00190-720-PR-PID-14009	6.9 (HOLD 1)					Note 1, 3
CCS Solvent (100 wt%)										kg/ton of CO_2	0.14	Fresh Solvent Tank	720TK007	215000-00190-720-PR-PID-14004	87 (HOLD 1)					Note 11
CCS Precoat agent		Solid								kg/cycle	60	Precoat Filtration unit	720ZZ001	215000-00190-720-PR-PID-12015	(HOLD 1)					Note 1, 4
CCS Antifoam Agent (100 wt%)										kg/day	2	Anti-Foam Injection unit	720ZZ011	215000-00190-720-PR-PID-12017	(HOLD 1)					Note 1, 9
Slake Lime										kg/h	30									Note 5, HOLD 2 (VTC)
Activated Carbon										m3	10.3									Note 6
Aqueous Ammonia (25wt%)										kg/hr	HOLD 5									
Sodium Hypochlorite (Disinfectant)											HOLD 2 (VTC)									
Sodium Carbonate											HOLD 2 (VTC)									
Calcium Hydroxide											HOLD 2 (VTC)									
Flocculent Fe2(SO4)3 - 11% Fe											HOLD 2 (VTC)									
Floc Aid Polyelectrolyte											HOLD 2 (VTC)									
CIP chemicals for RO membrane											HOLD 3 (VTC)									
Antiscalant for RO membrane											HOLD 3 (VTC)									
Sodium Chloride											HOLD 2 (VTC)									
Sodium Bicarbonate											HOLD 2 (VTC)									
CIP chemicals for EDI											HOLD 2 (VTC)									
Sodium Bisulphite (for Dechlorination)											HOLD 2 (VTC)									
Oxidising/non Oxidising Biocide for Cooling water dosing package										kg/hr	HOLD 6 (VTC)									
Corrosion inhibitor for Cooling water dosing package										kg/hr	HOLD 6 (VTC)									
Antiscale /Dispersant for Cooling water dosing package										kg/hr	HOLD 6 (VTC)									
Amine for BFW Dosing package										kg/h	HOLD 7 (VTC)									
O2 Scavenger for BFW Dosing package										kg/h	HOLD 7 (VTC)									
Phosphate for BFW Dosing package										kg/h	HOLD 7 (VTC)									

CATALYST and MEDIA

Substance Name	Abbr. Chem. Name	Physical State	Density (kg/m³)	Risk Factors						Consumption Rate		Storage Vessel				Initial Fill (m³)	Supply Package	Handling Method	Required inventory	Comments
				T	Car	Cor	Com	F	O	Units	Rate	Description	Tag No.	P&ID No.	Capacity (m³)					
O2 removal catalyst										m3	2.9									Note 7
Dehydration adsorbent										m3	20									Note 8
Instrument air dryer adsorbent										m3	HOLD 4 (VTC)									
Filtration media for Wastewater Treatment Package										m3	HOLD 2 (VTC)									Note 10

Risk Factors:
T: Toxic
Car: Carcinogenic
Cor: Corrosive
Com: Combustible
F: Flammable
O: Other

Figure 9-1. Catalyst and Chemical Summary.

9.2 Operations Phase

During operation phases, the following water quality procedures will be undertaken:

Carpark: A class 1 full retention single chamber separator will be installed upstream of the attenuation tanks. This meets the requirements for the stormwater drainage system for the runoff area of the carpark.

Access Road: The access road poses a low water quality risk due to no standing vehicles releasing hydrocarbons. Any small amounts of oil will be removed with a separator.

CCU: A class-1 full retention two chamber separator is installed upstream of the holding pond located in the south of the CCU area. This will treat stormwater runoff from the CCU area. Water will be further treated in the holding pond (or downstream defender) to remove excess silts prior to discharge. Bunded and kerbed areas are controlled by a normally closed valve to maintain separation between contaminated and uncontaminated runoff.

As outlined by the SuDS manual, The simple index approach is presented in Table 9-3 which describes the risk factors on site.

Table 9-3. Simple index approach during operations phase.

Simple Index Approach	Pollution hazard level	TSS	Metals	Hydrocarbons
1) suitable pollution hazard indices for the proposed land use.	High – heavy pollution with lorry parks, chemicals and fuels, industrial site.	0.8	0.8	0.9
2) Selects SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index.		Permeable Pavement: 0.7 Additional proprietary treatment systems	Permeable Pavement: 0.6 Additional proprietary treatment systems	Permeable Pavement: 0.7 Additional proprietary treatment systems
3) Where the discharge is to protected surface waters or groundwaters, consider the need for a more precautionary approach.		**Produce a risk screening matrix for the site:** as presented in Table 9-4. The results of the risk matrix show that the risk score is 195 and therefore there is a high risk to groundwater. Any dewatering is unlikely to exceed 20m^3/day and therefore does not require an abstraction license. Dewatering will be directed to a cut off drain to the south of site and transported to the settling facility as highlighted in the construction execution plan (215000-00190-000-CI-REP-00007). This water will be treated with a silt buster. Discharges from the Carpark and CCU will be treated by a separator. The access road has low traffic and therefore does not pose a contamination risk.		

Table 9-4 CIRIA SuDS (2023) groundwater Risk Matrix under operation conditions.

ID	Element description	Low risk score 1	Medium risk score 2	High risk score 3	Weighting factor.
1	Pollution hazard traffic density	All standard urban use types (excluding high hazard and trunk roads/motorways).			15
2	Standard Average Annual Rainfall Depth	< 740 mm	740 – 1060 mm	>1060 mm	15

ID	Element description	Low risk score 1	Medium risk score 2	High risk score 3	Weighting factor.
3	Type of SuDS	Continuous unlined linear collection and conveyance components (e.g. filter strips or swales).	Shallow soakaway (eg infiltration basis, trench, permeable pavement) draining < 5000 m2 runoff		15
4	Unsaturated zone depth (i.e. depth between infiltration surface and groundwater table).	>15 m	5 – 15 m	1 – 5 m	20
5	Predominant flow types through soils between infiltration surface and groundwater	Intergranular flow (occurs in unconsolidated or non-fractured consolidated deposits and fine or medium sands).	Mixed fracture and intergranular flow (occur in fractured consolidated deposits and medium or course sands)	Fractured flow (occurs in heavily consolidated sedimentary deposits, igneous and metamorphic rock and very course sands	20
6	Unsaturated zone: clay content	Greater than 15% clay	1 – 15% clay	< 1% clay	5
7	Unsaturated zone organic carbon content: soil organic matter (SOM) content	Greater than 15% SOM	1 – 15% SOM	< 1% SOM	5

10. Conclusions

A surface water management plan has been produced for the proposed HM-Padeswood Carbon Capture to establish surface water management conditions on site during the construction and operations phases.

10.1.1 Sources of flood risk

Baseline flood risk was established across the site to understand the potential sources of flood risk. It was determined that there was low risk from surface water runoff from small streams and pluvial sources, as the site was within a zone 2 and 3 flood risk. There is a low risk of artificial flooding, and ongoing maintenance is required to mitigate any artificial flood risk. The site has low tidal, groundwater and breach risk.

10.1.2 Construction phase

During the construction phase the following surface water drainage strategies are proposed:

CCU:

- Surface water runoff from the CCU will be captured by two ditches running north-west to south-east of the CCU. These ditches will be captured by a downstream defender to prevent increased silt load, before discharging to the environment. The proposed settlement pond has been sized to the CCU catchment for the 1 year ARI, 5 day duration event, which was selected based on guidance from Queensland state planning policy for settlement pond design (Topo, 2025). This was validated with Natural Resources Wales guidance and Planning Policy Wales.

Temporary Carpark:

- The temporary car park during the construction phase will be divided into two sections. Half of the car park will be Bodpave with gravel where runoff will be collected and transported to the main surface water pipes and stored in attenuation tanks. This will be removed after the construction phase is completed.
- The other half of the car park will be Asphalt and will lead to gullies which will discharge below the greenfield runoff rate. Storage will be via trapezoidal drains. This section of carpark will be retained for use during the operational phase.

Access Road:

- Under construction, the access road will be discharge at a controlled rate via a hydrobreak. During construction, the permanent drainage systems will be constructed and used. Given the small catchment reporting to the access road, overpump from the bottom of the hill will redirect ponding towards the western ditch. Currently, most of the surface water runoff from the cement plant is directed to this ditch. The downstream defender will be in place to treat runoff prior to discharge.

Laydown Areas:

- Under construction, runoff at the laydown area will be directed to channel ditches and tie into existing surface water drainage.

10.1.3 Operations phase

CCU:

- The CCU will be a combination of gravel, paving, concrete paving and asphalt. Direct runoff from the CCU is directed towards gullies and channel drains. The outside edge of the road is gullies and the inside of the road is channel drains. Channel drains are sized for the paved areas and road surface. All runoff is collected by a pipe network to catch basin manholes, which act to remove total suspended solids. This water is treated in an interceptor and will be stored in a settlement pond.
- The runoff from the CCU is restricted to 66.8 L/s and is directed to a ditch at the south of the site. The outlet flume will have a meter set to 66.8 L/s to ensure that flow does not exceed the restricted rate.

Permanent Carpark

- The permanent carpark will be asphalt with gullys and channel drains which will connect surface water drainage that will intercept runoff from the impermeable surfaces within the development. These drains direct towards piping which captures stormwater in attenuation tanks which lead to an existing ditch to the west, further downstream. Runoff from the carpark is treated by interceptors before being discharged to attenuation tanks.
- Due to the high volume of vehicle traffic in the carpark, there will be a separator for water treatment purposes.

Access Road:

- The asphalt access road has roadside gullies directing stormwater runoff towards a pipe system, directed to outfall locations. Outfall from this network is restricted to 2 L/s/Ha with a minimum of 5 L/s. There are two outfall locations, each discharging at 5 L/s. This is compliant with SuDS.
- Due to the low traffic on the access road (less than 10,000 vehicle movements per day, as governed by the Highways England Water Risk Assessment Tool (HEWRAT) (Highways England, 2020)), water treatment is not required as hydrocarbons and suspended solids are expected to be low. Total suspended solids will be removed in gully pots and manholes are on a catch basis. In addition, a 300 mm sump will remove TSS and oil.

10.1.4 Water Quality

During construction phases, runoff from the CCU will be stored in a downstream defender which will treat water prior to discharge and hydrocarbons will be removed via interceptor. The access road is not considered a high-risk zone, due to no standing vehicles with the potential to release hydrocarbons. The temporary car park may pose a contamination risk, with high vehicle standing times resulting in settled hydrocarbons.

SuDS has produced the Simple Index Approach to understand the risk of contaminants to sensitive downstream receptors (SuDS, 2023).

During operation phases, all surface water runoff from site will either be captured by perimeter drains or gullies and transported to surface water channels and discharge at the greenfield runoff rate. Pollutants generated by onsite activities will be managed onsite through separators and silt busters. Bunded and/or kerbed areas are controlled by a normally closed valve to maintain separation between contaminated and uncontaminated runoff.

11. Recommendations

The following recommendations are made based on this assessment:

- Regular maintenance should be undertaken on site to ensure that drainage systems are compliant with SAB conditions.
- Any additional development will require an update to this SWMP.

Appendix A. Greenfield Runoff Rate Calculation

Greenfield runoff rate estimation tool

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

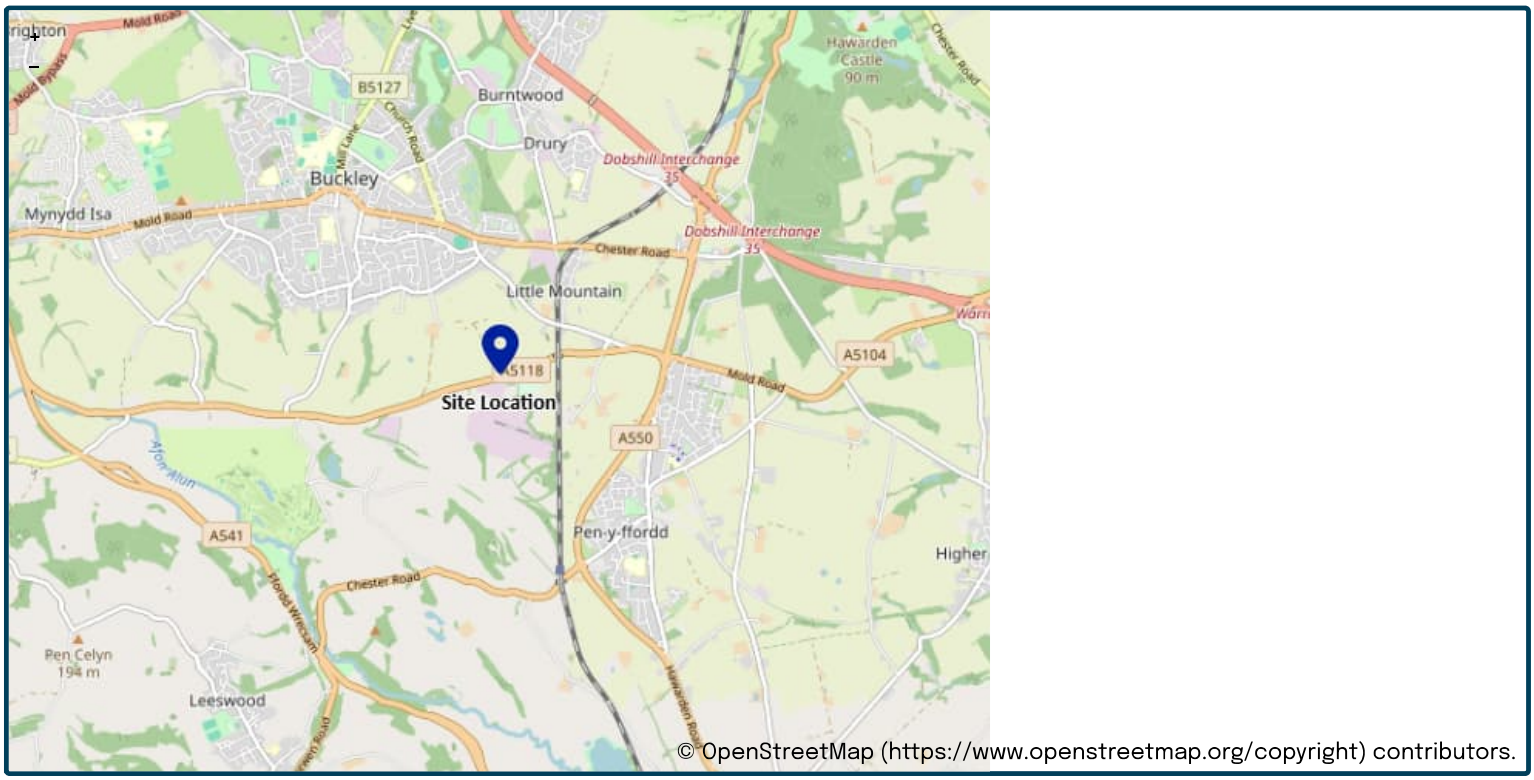
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015).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

Project details

Date	07/07/2025
Calculated by	
Reference	
Model version	2.0.1

Location

Site name	Padeswood
Site location	



Site easting	329085
Site northing	362512

Site details

Total site area (ha)	13.1 ha

Greenfield runoff

Method

Method	IH124

IH124

	My value		Map value
SAAR (mm)	779 mm		779
How should SPR be derived?	WRAP soil type		
WRAP soil type	4		4
SPR	0.47		
QBar (IH124) (l/s)	71.7 l/s		

Growth curve factors

	My value		Map value
Hydrological region	9		9
1 year growth factor	0.88		
2 year growth factor	0.93		
10 year growth factor	1.42		
30 year growth factor	1.78		
100 year growth factor	2.18		
200 year growth factor	2.46		

Results

Method	IH124
Flow rate 1 year (l/s)	63.1 l/s
Flow rate 2 year (l/s)	66.7 l/s
Flow rate 10 years (l/s)	101.8 l/s
Flow rate 30 years (l/s)	127.6 l/s
Flow rate 100 years (l/s)	156.2 l/s
Flow rate 200 years (l/s)	176.3 l/s

Appendix B. Surface Water Storage Volume Calculation

Surface Water Storage Volume Calculation – Whole Site

Surface water storage volume design tool

www.uksuds.com | Surface water storage volume design tool (https://www.uksuds.com/)

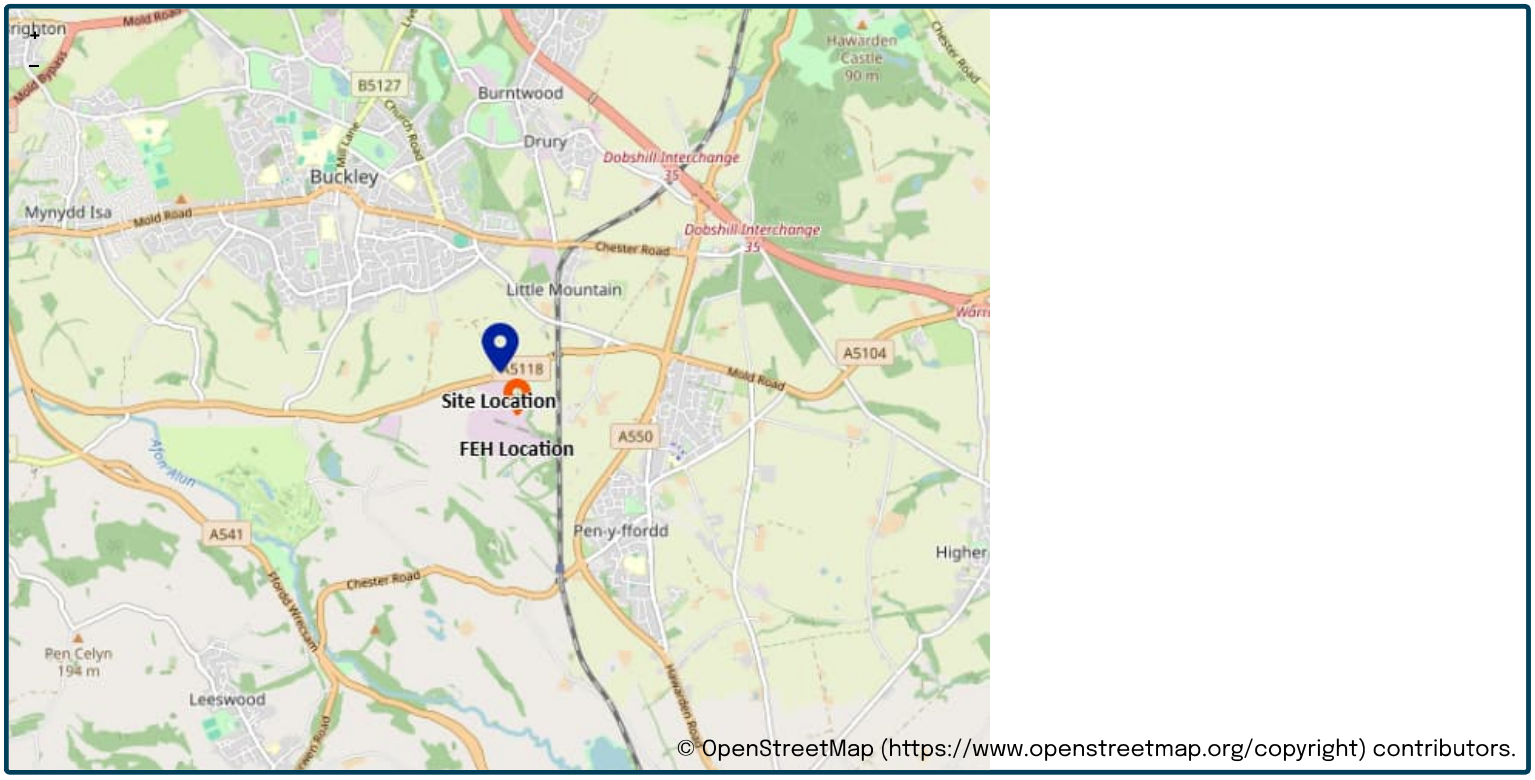
This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is recommended that the total storage volume for the site is distributed across the site using multiple SuDS and that hydraulic modelling software is used to undertake and finalise the detailed design of the drainage system.

Project details

Date	07/07/2025
Calculated by	
Reference	
Model version	2.0.1

Location

Site name	Whole Site
Site location	



Site easting	329085
Site northing	362512

Site areas

Total site area (ha)	13.1	ha

Roof area

Total roof area (ha)	0.35	ha
Contributing roof area (ha)	0.35	ha
Non-contributing roof area (ha)	0	ha

Paved area

Total paved area (ha)	7.99	ha
Contributing paved area (ha)	7.99	ha
Non-contributing paved area (ha)	0	ha

Grass / vegetated area

Total grass / vegetated area (ha)	4.76	ha
Contributing grass / vegetated area (ha)	4.76	ha
Non-contributing grass / vegetated area (ha)	0	ha

Total area

Total contributing area (ha)	13.1	ha

Contributing areas with urban creep allowance

Urban creep allowance factor	+0% (no creep)

Storage design parameters

Storage base shape	Rectangular / square	
Storage base length to width ratio	1:1 (square)	
Storage design depth (mm)	1000	mm
Storage side slope (1 in x)	1 in 1	
Storage voids ratio (%)	100% (all voids)	
Storage volume design return period (years)	1:100 years	

Discharge flow rate from the site

Method

Type of site	Greenfield
Specify the method	IH124

IH124

	My value		Map/default value
SAAR (mm)	779 mm		779
How should SPR be derived?	WRAP soil type		
WRAP soil type	4		4
SPR	0.47		
Total area for greenfield runoff calculation (ha)	13.1 ha		13.1
QBar (l/s)	71.7 l/s		
Hydrological region	9		9
Return period (years)	1:100 years		
Growth curve factor	2.18		
Flow rate (IH124) (l/s)	156.2 l/s		

Final discharge rate

Runoff calculation method	IH124
Design flow rate (l/s)	156.2 l/s

Blockage risk

Specify the method	Flow rate
Minimum discharge flow rate to prevent blockage	1l/s

	My value		Calculated value
Design orifice diameter (mm)	283 mm		283
Flow rate of orifice (l/s)	155.2 l/s		

Rainfall and runoff

Rainfall input type	FEH22 CSV file
	FEH_Point_Rainfall_FEH22_POT_329214_362076_POT.csv
Distance from FEH location to site (km)	0.5 km
Climate change allowance factor	130%
Specify the runoff method from grass / vegetated areas	Fixed percentage - based on rainfall event depth and SPR

	My value		Map value
How should SPR be derived?	WRAP soil type		
WRAP soil type	4		4

SPR 0.47

Model results

- **Maximum discharge flow rate:** 155.2 (l/s)
- **Outflow orifice diameter:** 283 (mm)
- **Storage base length:** 88.53 (m)
- **Storage base width:** 88.53 (m)
- **Storage base area:** 7838.11 (m^2)
- **Storage total volume:** 8011.9 (m^3)
- **Storage total water volume:** 8011.9 (m^3)
- **Storm return periods run:** 1, 2, 10, 30, 100, 200 (years)
- **Storm durations run:** 15, 30, 60, 120, 180, 240, 360, 540, 720, 900, 1080, 1440, 1800, 2160, 2880 (minutes)

Return Period (years)	Critical Duration (minutes)	Peak Flow Rate (l/s)	Max Depth (m)	Max water volume (m^3)	Max storage volume (m^3)
1	1080	67.6	0.3	2399.2	2399.2
2	900	82.4	0.38	3028.9	3028.9
10	900	113	0.6	4735.3	4735.3
30	1080	133.5	0.78	6187.5	6187.5
100	1080	155.2	1	8011.9	8011.9
200	900	167.1	1.14	9137.4	9137.4

Surface Water Storage Volume Calculation – CCU

Surface water storage volume design tool

www.uksuds.com | Surface water storage volume design tool (https://www.uksuds.com/)

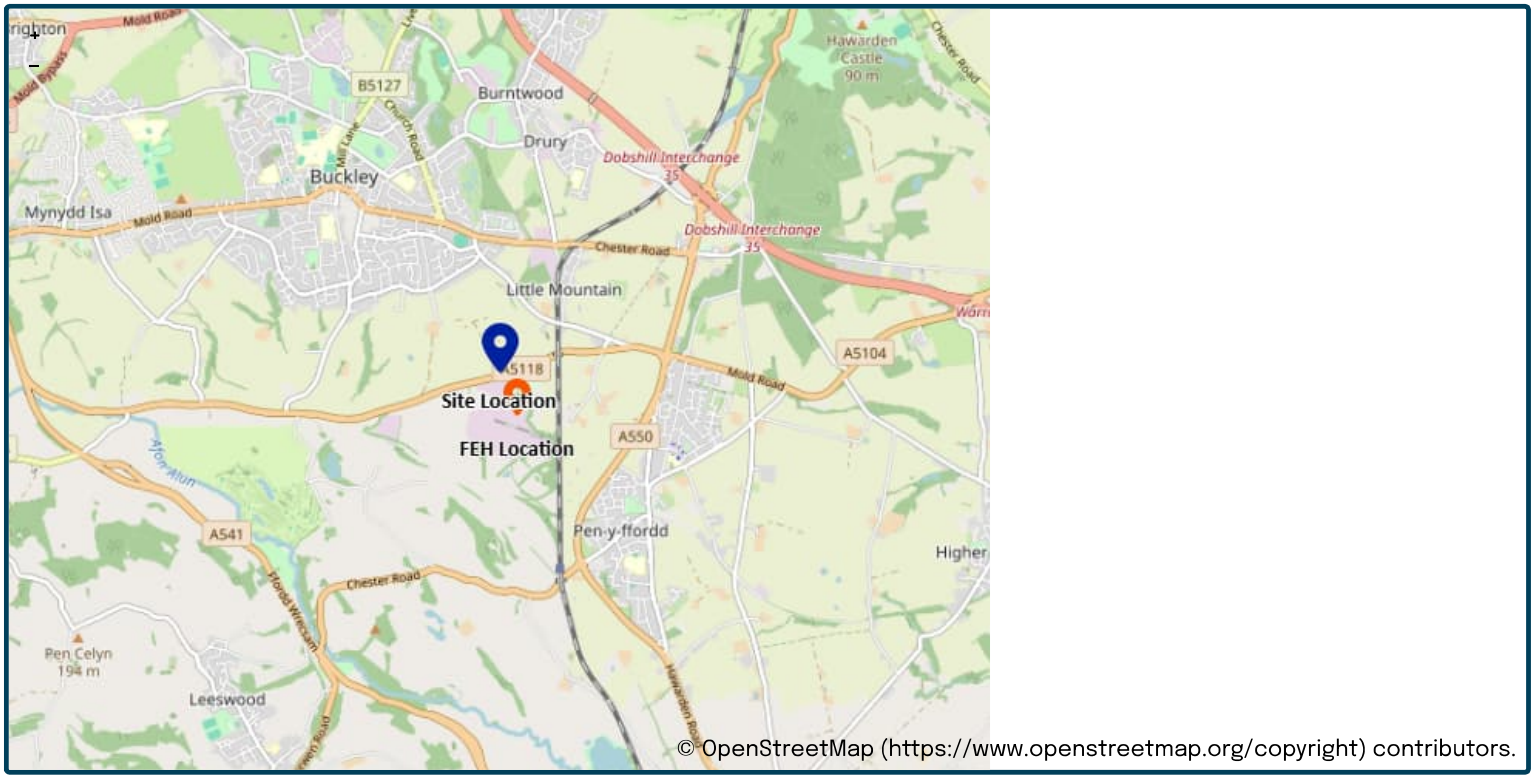
This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is recommended that the total storage volume for the site is distributed across the site using multiple SuDS and that hydraulic modelling software is used to undertake and finalise the detailed design of the drainage system.

Project details

Date	07/07/2025
Calculated by	
Reference	
Model version	2.0.1

Location

Site name	CCU
Site location	



Site easting	329085
Site northing	362512

Site areas

Total site area (ha)	5.6	ha

Roof area

Total roof area (ha)	0	ha
Contributing roof area (ha)	0	ha
Non-contributing roof area (ha)	0	ha

Paved area

Total paved area (ha)	3.55	ha
Contributing paved area (ha)	3.55	ha
Non-contributing paved area (ha)	0	ha

Grass / vegetated area

Total grass / vegetated area (ha)	2.05	ha
Contributing grass / vegetated area (ha)	2.05	ha
Non-contributing grass / vegetated area (ha)	0	ha

Total area

Total contributing area (ha)	5.6	ha

Contributing areas with urban creep allowance

Urban creep allowance factor	+0% (no creep)

Storage design parameters

Storage base shape	Rectangular / square	
Storage base length to width ratio	1:1 (square)	
Storage design depth (mm)	1000	mm
Storage side slope (1 in x)	1 in 1	
Storage voids ratio (%)	100% (all voids)	
Storage volume design return period (years)	1:100 years	

Discharge flow rate from the site

Method

Type of site	Greenfield
Specify the method	IH124

IH124

	My value		Map/default value
SAAR (mm)	779 mm		779
How should SPR be derived?	WRAP soil type		
WRAP soil type	4		4
SPR	0.47		
Total area for greenfield runoff calculation (ha)	5.6 ha		5.6
QBar (l/s)	30.6 l/s		
Hydrological region	9		9
Return period (years)	1:100 years		
Growth curve factor	2.18		
Flow rate (IH124) (l/s)	66.8 l/s		

Final discharge rate

Runoff calculation method	IH124
Design flow rate (l/s)	66.8 l/s

Blockage risk

Specify the method	Flow rate
Minimum discharge flow rate to prevent blockage	1l/s

	My value		Calculated value
Design orifice diameter (mm)	183 mm		183
Flow rate of orifice (l/s)	66.7 l/s		

Rainfall and runoff

Rainfall input type	FEH22 CSV file
	FEH_Point_Rainfall_FEH22_POT_329214_362076_POT.csv
Distance from FEH location to site (km)	0.5 km
Climate change allowance factor	130%
Specify the runoff method from grass / vegetated areas	Fixed percentage - based on rainfall event depth and SPR

	My value		Map value
How should SPR be derived?	WRAP soil type		
WRAP soil type	4		4

SPR	0.47

Model results

- **Maximum discharge flow rate:** 66.8 (l/s)
- **Outflow orifice diameter:** 183 (mm)
- **Storage base length:** 56.84 (m)
- **Storage base width:** 56.84 (m)
- **Storage base area:** 3230.92 (m^2)
- **Storage total volume:** 3343.6 (m^3)
- **Storage total water volume:** 3343.6 (m^3)
- **Storm return periods run:** 1, 2, 10, 30, 100, 200 (years)
- **Storm durations run:** 15, 30, 60, 120, 180, 240, 360, 540, 720, 900, 1080, 1440, 1800, 2160, 2880 (minutes)

Return Period (years)	Critical Duration (minutes)	Peak Flow Rate (l/s)	Max Depth (m)	Max water volume (m^3)	Max storage volume (m^3)
1	900	31.3	0.29	947.7	947.7
2	720	37.2	0.37	1223.5	1223.5
10	900	49.5	0.59	1945.7	1945.7
30	900	57.8	0.77	2560.7	2560.7
100	900	66.8	1	3343.6	3343.6
200	900	71.7	1.14	3827.6	3827.6

Surface Water Storage Volume Calculation – Laydown Areas

Surface water storage volume design tool

www.uksuds.com | Surface water storage volume design tool (https://www.uksuds.com/)

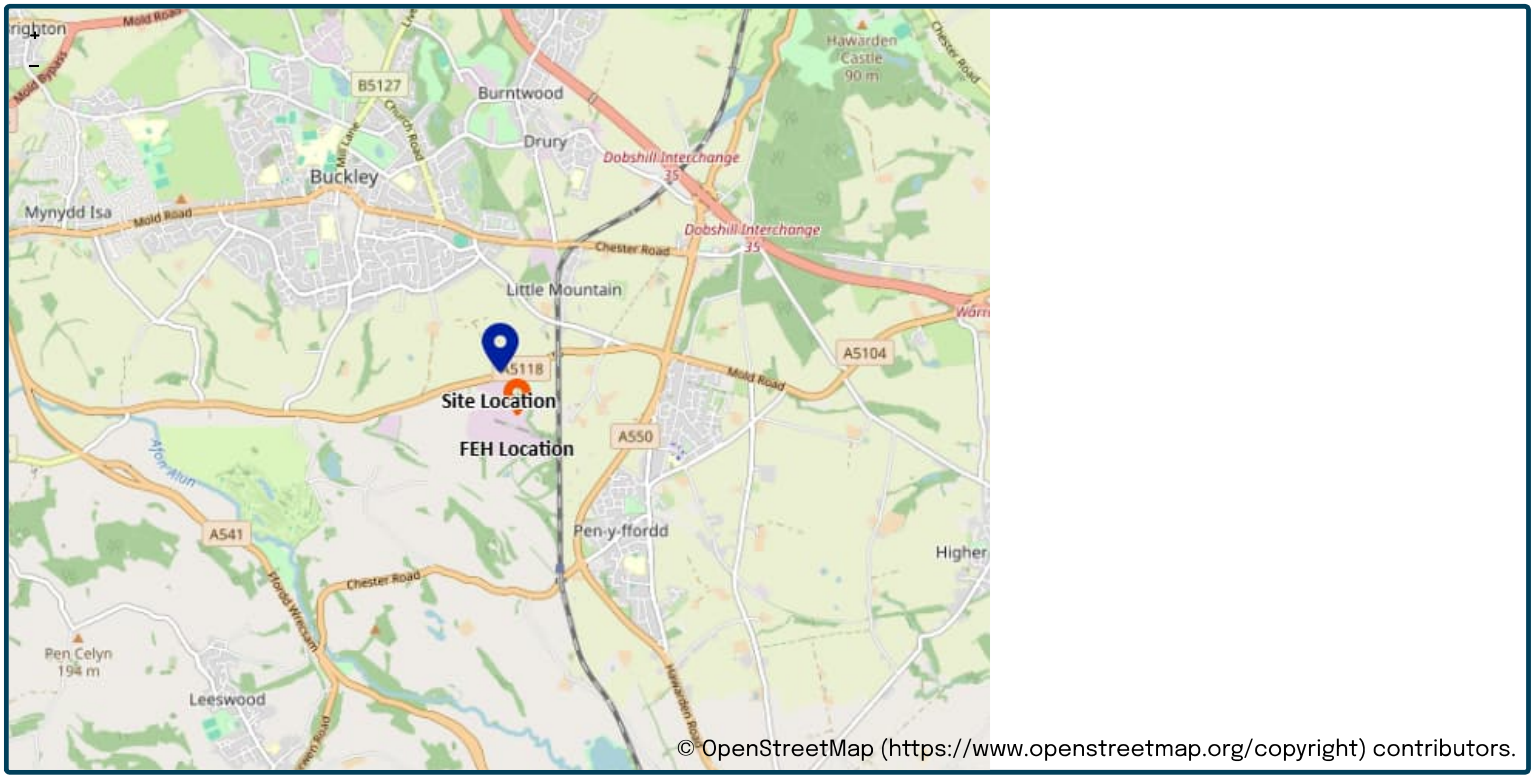
This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is recommended that the total storage volume for the site is distributed across the site using multiple SuDS and that hydraulic modelling software is used to undertake and finalise the detailed design of the drainage system.

Project details

Date	07/07/2025
Calculated by	
Reference	
Model version	2.0.1

Location

Site name	Laydown Area
Site location	



Site easting	329085
Site northing	362512

Site areas

Total site area (ha)	5.1	ha

Roof area

Total roof area (ha)	0.35	ha
Contributing roof area (ha)	0.35	ha
Non-contributing roof area (ha)	0	ha

Paved area

Total paved area (ha)	2.85	ha
Contributing paved area (ha)	2.85	ha
Non-contributing paved area (ha)	0	ha

Grass / vegetated area

Total grass / vegetated area (ha)	1.9	ha
Contributing grass / vegetated area (ha)	1.9	ha
Non-contributing grass / vegetated area (ha)	0	ha

Total area

Total contributing area (ha)	5.1	ha

Contributing areas with urban creep allowance

Urban creep allowance factor	+0% (no creep)

Storage design parameters

Storage base shape	Rectangular / square	
Storage base length to width ratio	1:1 (square)	
Storage design depth (mm)	1000	mm
Storage side slope (1 in x)	1 in 1	
Storage voids ratio (%)	100% (all voids)	
Storage volume design return period (years)	1:100 years	

Discharge flow rate from the site

Method

Type of site	Greenfield
Specify the method	IH124

IH124

	My value		Map/default value
SAAR (mm)	779 mm		779
How should SPR be derived?	WRAP soil type		
WRAP soil type	4		4
SPR	0.47		
Total area for greenfield runoff calculation (ha)	5.1 ha		5.1
QBar (l/s)	27.9 l/s		
Hydrological region	9		9
Return period (years)	1:100 years		
Growth curve factor	2.18		
Flow rate (IH124) (l/s)	60.8 l/s		

Final discharge rate

Runoff calculation method	IH124
Design flow rate (l/s)	60.8 l/s

Blockage risk

Specify the method	Flow rate
Minimum discharge flow rate to prevent blockage	1l/s

	My value		Calculated value
Design orifice diameter (mm)	174 mm		174
Flow rate of orifice (l/s)	60.5 l/s		

Rainfall and runoff

Rainfall input type	FEH22 CSV file
	FEH_Point_Rainfall_FEH22_POT_329214_362076_POT.csv
Distance from FEH location to site (km)	0.5 km
Climate change allowance factor	130%
Specify the runoff method from grass / vegetated areas	Fixed percentage - based on rainfall event depth and SPR

	My value		Map value
How should SPR be derived?	WRAP soil type		
WRAP soil type	4		4

SPR	0.47

Model results

- **Maximum discharge flow rate:** 60.5 (l/s)
- **Outflow orifice diameter:** 174 (mm)
- **Storage base length:** 54.06 (m)
- **Storage base width:** 54.06 (m)
- **Storage base area:** 2922.91 (m^2)
- **Storage total volume:** 3031.4 (m^3)
- **Storage total water volume:** 3031.4 (m^3)
- **Storm return periods run:** 1, 2, 10, 30, 100, 200 (years)
- **Storm durations run:** 15, 30, 60, 120, 180, 240, 360, 540, 720, 900, 1080, 1440, 1800, 2160, 2880 (minutes)

Return Period (years)	Critical Duration (minutes)	Peak Flow Rate (l/s)	Max Depth (m)	Max water volume (m^3)	Max storage volume (m^3)
1	900	28.5	0.29	854.6	854.6
2	720	33.9	0.37	1105.9	1105.9
10	900	44.9	0.59	1760.7	1760.7
30	900	52.4	0.77	2319.6	2319.6
100	900	60.5	1	3031.4	3031.4
200	900	65	1.14	3471.5	3471.5

Surface Water Storage Volume Calculation – Carpark and Access Road

Surface water storage volume design tool

www.uksuds.com | Surface water storage volume design tool (https://www.uksuds.com/)

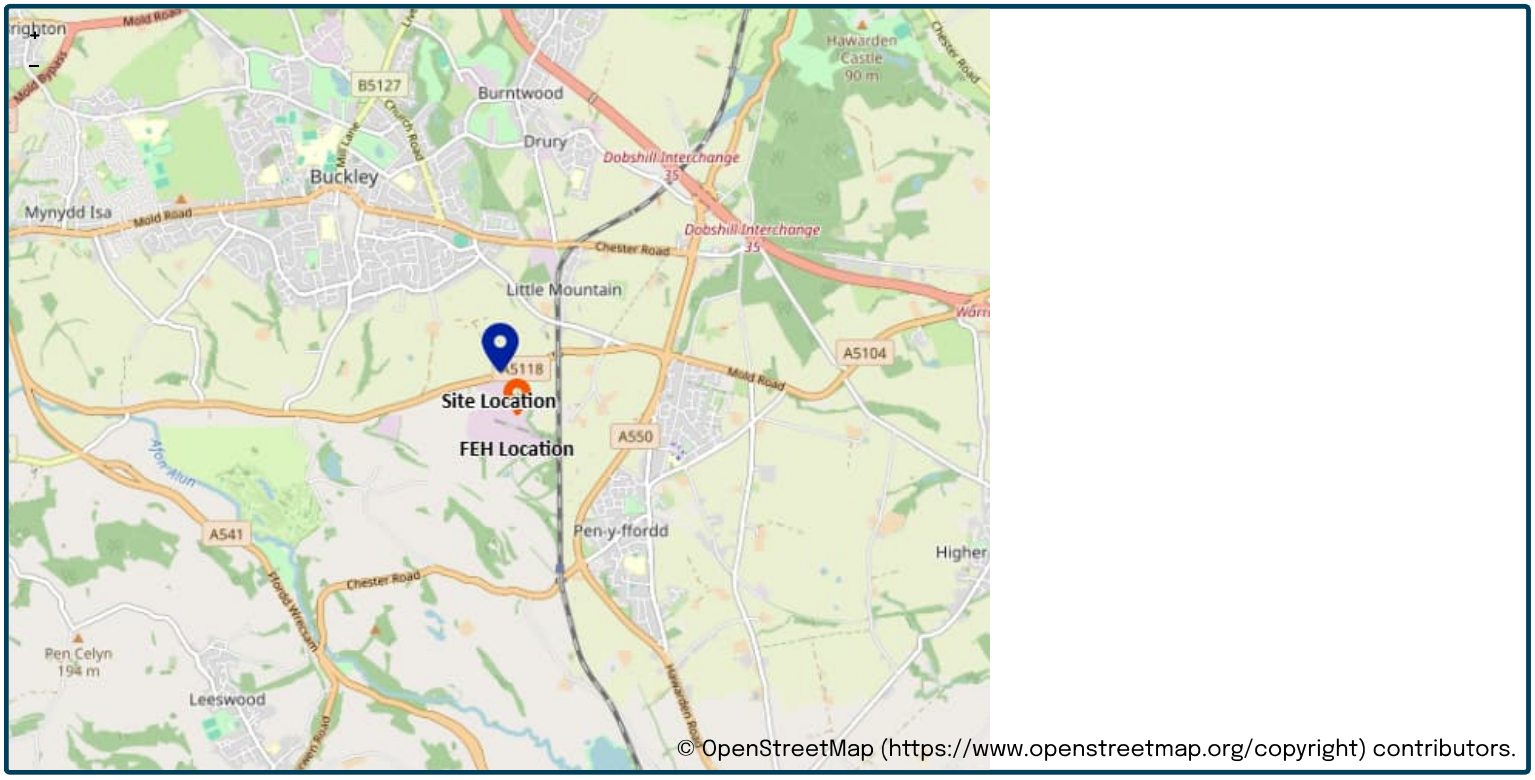
This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance “Rainfall runoff management for developments”, SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is recommended that the total storage volume for the site is distributed across the site using multiple SuDS and that hydraulic modelling software is used to undertake and finalise the detailed design of the drainage system.

Project details

Date	07/07/2025
Calculated by	
Reference	
Model version	2.0.1

Location

Site name	Padeswood Carpark and Access Road
Site location	



Site easting	329085
Site northing	362512

Site areas

Total site area (ha)	2.4	ha

Roof area

Total roof area (ha)	0	ha
Contributing roof area (ha)	0	ha
Non-contributing roof area (ha)	0	ha

Paved area

Total paved area (ha)	1.589	ha
Contributing paved area (ha)	1.589	ha
Non-contributing paved area (ha)	0	ha

Grass / vegetated area

Total grass / vegetated area (ha)	0.811	ha
Contributing grass / vegetated area (ha)	0.811	ha
Non-contributing grass / vegetated area (ha)	0	ha

Total area

Total contributing area (ha)	2.4	ha

Contributing areas with urban creep allowance

Urban creep allowance factor	+0% (no creep)

Storage design parameters

Storage base shape	Rectangular / square	
Storage base length to width ratio	1:1 (square)	
Storage design depth (mm)	1000	mm
Storage side slope (1 in x)	1 in 1	
Storage voids ratio (%)	100% (all voids)	
Storage volume design return period (years)	1:100 years	

Discharge flow rate from the site

Method

Type of site	Greenfield
Specify the method	IH124

IH124

	My value		Map/default value
SAAR (mm)	779 mm		779
How should SPR be derived?	WRAP soil type		
WRAP soil type	4		4
SPR	0.47		
Total area for greenfield runoff calculation (ha)	2.4 ha		2.4
QBar (l/s)	13.1 l/s		
Hydrological region	9		9
Return period (years)	1:100 years		
Growth curve factor	2.18		
Flow rate (IH124) (l/s)	28.6 l/s		

Final discharge rate

Runoff calculation method	IH124
Design flow rate (l/s)	28.6 l/s

Blockage risk

Specify the method	Flow rate
Minimum discharge flow rate to prevent blockage	1l/s

	My value		Calculated value
Design orifice diameter (mm)	118 mm		118
Flow rate of orifice (l/s)	28.2 l/s		

Rainfall and runoff

Rainfall input type	FEH22 CSV file
	FEH_Point_Rainfall_FEH22_POT_329214_362076_POT.csv
Distance from FEH location to site (km)	0.5 km
Climate change allowance factor	130%
Specify the runoff method from grass / vegetated areas	Fixed percentage - based on rainfall event depth and SPR

	My value		Map value
How should SPR be derived?	WRAP soil type		
WRAP soil type	4		4

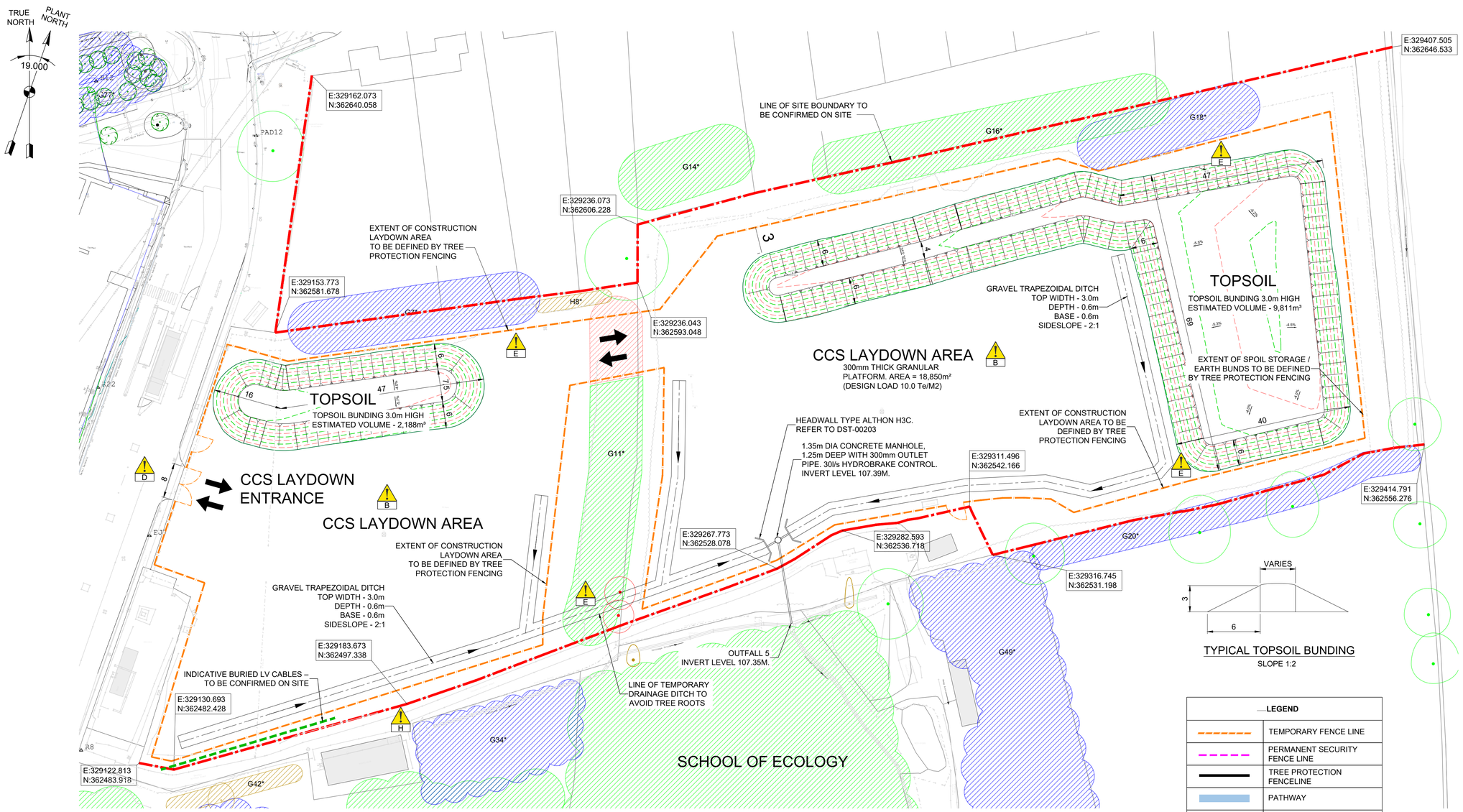
SPR 0.47

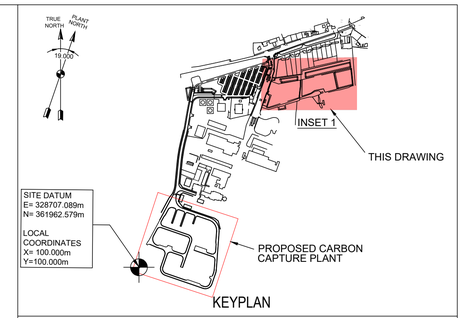
Model results

- **Maximum discharge flow rate:** 28.2 (l/s)
- **Outflow orifice diameter:** 118 (mm)
- **Storage base length:** 37.1 (m)
- **Storage base width:** 37.1 (m)
- **Storage base area:** 1376.26 (m^2)
- **Storage total volume:** 1449.9 (m^3)
- **Storage total water volume:** 1449.9 (m^3)
- **Storm return periods run:** 1, 2, 10, 30, 100, 200 (years)
- **Storm durations run:** 15, 30, 60, 120, 180, 240, 360, 540, 720, 900, 1080, 1440, 1800, 2160, 2880 (minutes)

Return Period (years)	Critical Duration (minutes)	Peak Flow Rate (l/s)	Max Depth (m)	Max water volume (m^3)	Max storage volume (m^3)
1	900	13.9	0.28	397.9	397.9
2	720	16.3	0.37	520.8	520.8
10	720	21.2	0.59	835.8	835.8
30	900	24.6	0.77	1105.8	1105.8
100	900	28.2	1	1449.9	1449.9
200	900	30.2	1.14	1662.4	1662.4

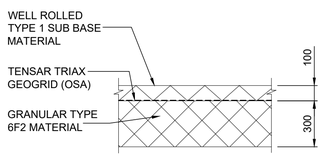
Appendix C. Construction Layouts



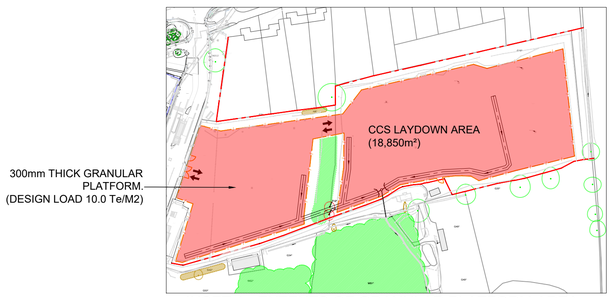


CCS CONSTRUCTION LAYDOWN AREA

1:500



TYP SECTION THRO' UNSEALED GRANULAR PAVEMENT
(BASED ON 5% CBR)
(SCALE 1:20)



INSET 1 - EXTENTS OF GRANULAR PLATFORM AREA

LEGEND

	TEMPORARY FENCE LINE
	PERMANENT SECURITY FENCE LINE
	TREE PROTECTION FENCELINE
	PATHWAY
	RETAINING WALL
	HM SITE BOUNDARY
	DEMOLITION
	EXISTING ARMCO BARRIER
	EXISTING PALISADE FENCING
	TEMPORARY CONSTRUCTION BUILDING
	EXISTING BUILDING
	CATEGORY A TREES (REFER NOTE 3)
	CATEGORY B TREES (REFER NOTE 3)
	CATEGORY C TREES (REFER NOTE 3)
	TREES TO BE REMOVED (REFER NOTE 3)
CREST OF SLOPE / TOE OF SLOPE	EMBANKMENT SLOPE

GENERAL NOTES:

1. COORDINATES ARE TO OSGB 1936 BRITISH NATIONAL GRID COORDINATE SYSTEM. ELEVATIONS ARE RELATIVE TO THE OSGB 1936 DATUM
2. ALL DIMENSIONS IN m (METRES) UNLESS OTHERWISE STATED
3. REFER TO APPENDIX 4 OF THE ARBORICULTURAL IMPACT ASSESSMENT PLAN (SI) - DRAWING No. ADAS_1052143_CCL_PADESWOOD_AIAP FOR TREE CATEGORIES
4. ALL TREE POSITIONS ARE INDICATIVE AND BASED UPON THE ARBORICULTURAL IMPACT ASSESSMENT PLAN
5. EXACT LAYOUT OF TEMPORARY CONSTRUCTION FENCING AND TREE PROTECTION FENCING TO BE DETERMINED ON SITE AND AGREED WITH ABORICULTURALIST
6. LENGTH OF CONSTRUCTION FENCING = 880Lm PLUS GATES. CONSTRUCTION FENCING TO BE HERAS TYPE OR SIMILAR APPROVED
7. ALL TOPSOIL AND SOFT SPOTS ARE TO BE REMOVED PRIOR TO PLACEMENT OF GRANULAR FILL IN ACCORDANCE WITH DRAWING 215000-00190-000-CI-DST-00100
8. 300MM OF TOPSOIL ASSUMED TO BE STRIPPED OVER AN AREA OF 21,160m². TOPSOIL BUNDING VOLUMES CALCULATED WITH A 10% BULKING FACTOR ADDED
9. THE SUBGRADE SHALL BE INSPECTED BY SUITABLY QUALIFIED GEOTECHNICAL ENGINEER AND TESTED VIA CBR METHOD PRIOR TO PLACEMENT OF FILL. CBR TEST (PLT) SHALL BE UNDERTAKEN PER 20m X 20m AREA. CBR 5% MINIMUM REQUIRED AT SUBGRADE OTHERWISE ADDITIONAL EXCAVATION IS REQUIRED.
10. TERRAM T1000 OR EQUAL APPROVED SEPARATION LAYER SHALL BE USED
11. GEOSYNTHETIC REINFORCEMENT SHALL BE STORED AND HANDLED AS PER MANUFACTURERS INSTRUCTIONS.
12. GRANULAR PLATFORM SHALL BE CONSTRUCTED IN ACCORDANCE WITH MCHW SPECIFICATION FOR SPECIFIC FILL. DENSITY TESTING SHALL BE UNDERTAKEN WITHIN EVERY LAYER TO ENSURE COMPLIANCE. 1 NO. DENSITY TEST SHALL BE UNDERTAKEN PER 20m X 20m AREA
13. CBR TESTING (PLT) SHALL BE UNDERTAKEN AT SURFACE OF THE PLATFORM. A MINIMUM 20% IS REQUIRED TO BE ACHIEVED.
14. SPMT'S ARE PROHIBITED FROM ACCESSING AREAS WHERE PLATFORM THICKNESS IS DESIGNATED AS 300MM
15. THE PLATFORM SHALL BE REGULARLY INSPECTED AND RE TESTED AT APPROPRIATE INTERVALS

HEALTH, SAFETY AND ENVIRONMENTAL INFORMATION

THE FOLLOWING NOTES HIGHLIGHT SIGNIFICANT RESIDUAL HAZARDS IDENTIFIED BY CONTRACTOR. TYPICAL HAZARDS THAT SHOULD BE IDENTIFIED BY A COMPETENT WORKS CONTRACTOR ARE NOT INCLUDED. THE WORKS CONTRACTOR SHALL CARRY OUT THE WORKS USING AN APPROVED SAFE SYSTEM OF WORK.
FURTHER INFORMATION ON HAZARDS CAN BE FOUND IN THE PROJECT CDM HAZARD AND RISK REGISTER.

REF.	HAZARD
B /GENERAL	UNCHARTED BURIED SERVICES
D	WORKING ADJACENT TO LIVE CARRIAGEWAYAND EXISTING PLANT MAIN ENTRANCE
E /GENERAL	WORKING IN CLOSE PROXIMITY TO PROTECTED TREES
H	WORKING IN CLOSE PROXIMITY TO PUBLIC FOOTPATH

0.4 0 0.4 0.8 0.12 0.16 0.2
SCALE 1:20 METRES

10 0 10 20 30 40 50
SCALE 1:500 METRES

HOLDS LIST

HOLD	CODE	DESCRIPTION
1	W	FINAL LOCATION OF CONSTRUCTION FACILITY, BUILDINGS, FENCES, FOOTPATH ETC.
2	C	HM SITE BOUNDARY LINE
3	W	RESULTS OF TOPOGRAPHICAL SURVEY FOR THIS AREA
4	W	TOPSOIL BUNDING SEEDING SPECIFICATION
5	W	TOPSOIL BUNDING DRAINAGE DETAILS
6	W	LAYDOWN AREA DRAINAGE DETAILS

CODES: C = CLIENT INFORMATION REQUIRED.
S = SUPPLIER / VENDOR INFORMATION REQUIRED.
W = WORLEY INTERNAL INFORMATION REQUIRED.

REV	DATE	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	REF DRAWING No	REFERENCE DRAWING TITLE
0	22/08/25	ISSUED FOR IFD	PG	MC	-	CD	SS	215000-00190-000-CI-DAL-04000	FENCING AND GATES LAYOUT - ENABLING WORKS
B	04/07/25	ISSUED FOR REVIEW	PB	MC	-	CD	SS	215000-00190-000-CI-DAL-01022	SITE LAYOUT - CONSTRUCTION TEMPORARY FACILITIES AREA
A	15/05/25	ISSUED FOR INTER-DISCIPLINARY CHECK	PB	-	-	SS	AG	215000-00190-000-CI-DAL-01021	SITE LAYOUT - CONSTRUCTION FABRICATION AREA

A1 SHEET SCALE 1:20 / 1:500

WORLEY PROJECT No. 215000-00190

ENGINEERING AND PERMIT STAMPS (As Required)

worley DELIVERING SUSTAINABLE CHANGE

MITSUBISHI HEAVY INDUSTRIES

CUSTOMER

Heidelberg Materials

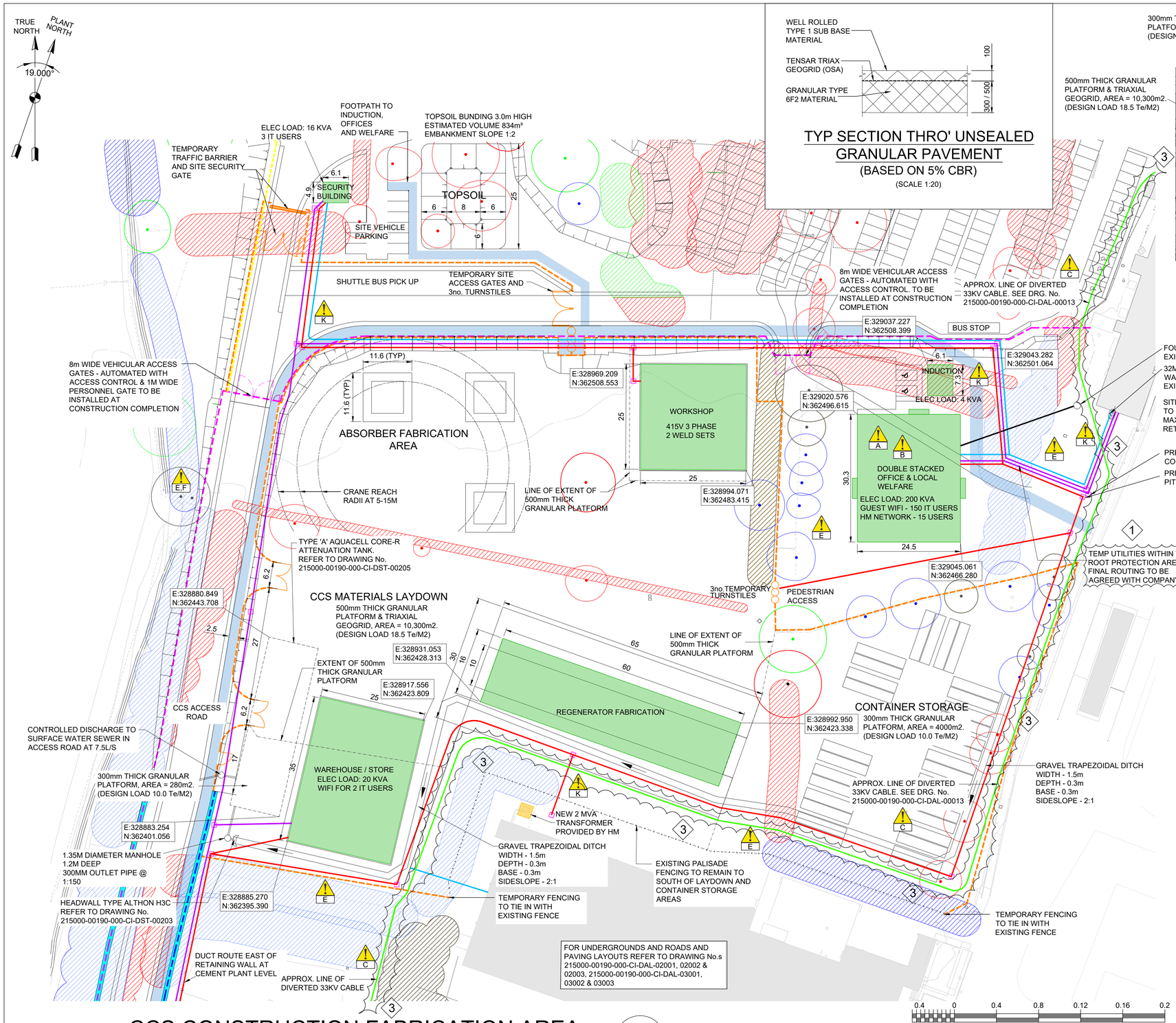
DRG TITLE

SITE LAYOUT
CONSTRUCTION LAYDOWN AREA

DRG No 215000-00190-000-CI-DAL-01020 REV 0

PID File Path:
USER NAME:
DATE & TIME:

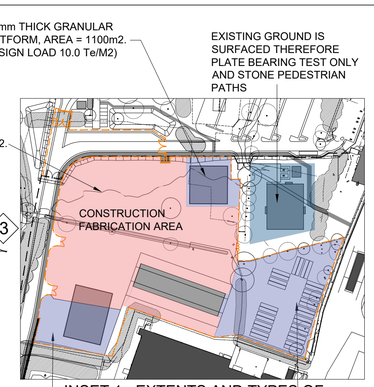
Worley_A1



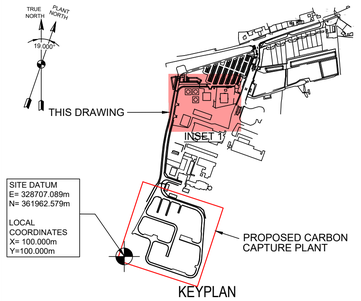
TYP SECTION THRO' UNSEALED GRANULAR PAVEMENT

(BASED ON 5% CBR)

(SCALE 1:20)



INSET 1 - EXTENTS AND TYPES OF GRANULAR PLATFORMS



KEYPLAN

GENERAL NOTES:

1. COORDINATES ARE TO OSGB 1936 BRITISH NATIONAL GRID COORDINATE SYSTEM. ELEVATIONS ARE RELATIVE TO THE OSGB 1936 DATUM
2. ALL DIMENSIONS IN m (METRES) UNLESS OTHERWISE STATED
3. REFER TO APPENDIX 4 OF THE ARBORICULTURAL IMPACT ASSESSMENT PLAN (SI) - DRAWING No. ADAS_1052143_CCL_PADESWOOD_AIAP FOR TREE CATEGORIES
4. ALL TREE POSITIONS ARE INDICATIVE AND BASED UPON THE ARBORICULTURAL IMPACT ASSESSMENT PLAN
5. EXACT LAYOUT OF TEMPORARY CONSTRUCTION FENCING AND TREE PROTECTION FENCING TO BE DETERMINED ON SITE AND AGREED WITH ABORICULTURALIST
6. TEMPORARY WAREHOUSE 35m X 25m MINIMUM - BASED UPON A MECALUX REF No. 017 WAREHOUSE WITH RACKING FOR PICKING MODEL M7. TEMPORARY WORKSHOP SIMILAR ALTHOUGH 25m X 25m
7. TEMPORARY SECURITY & INDUCTION BUILDINGS BASED UPON A PICKERING PRIMA 8 UNIT TYPE - 1 X 2 BAY & 1 X 3 BAY CONFIGURATIONS
8. TEMPORARY OFFICE AND WELFARE BUILDING BASED UPON A DOUBLE STACKED PICKERING PRIMA 8 UNIT TYPE IN A 50 + 30 CONFIGURATION
9. LENGTH OF TEMPORARY CONSTRUCTION FENCING = 812Lm. CONSTRUCTION FENCING TO BE HERAS TYPE OR SIMILAR APPROVED
10. ALL TOPSOIL AND SOFT SPOTS ARE TO BE REMOVED PRIOR TO PLACEMENT OF GRANULAR FILL IN ACCORDANCE WITH DRAWING 215000-00190-000-CI-DST-00100
11. ASSUMED 300MM OF TOPSOIL TO BE STRIPPED OVER AN AREA OF APPROX. 17,900m². TOPSOIL STORAGE / BUNDING VOLUMES CALCULATED WITH A 10% BULKING FACTOR ADDED
12. THE SUBGRADE SHALL BE INSPECTED BY SUITABLY QUALIFIED GEOTECHNICAL ENGINEER AND TESTED VIA CBR METHOD PRIOR TO PLACEMENT OF FILL. CBR TEST (PLT) SHALL BE UNDERTAKEN PER 20m X 20m AREA. CBR 5% MINIMUM REQUIRED AT SUBGRADE OTHERWISE ADDITIONAL EXCAVATION IS REQUIRED.
13. TERRAM T1000 OR EQUAL APPROVED SEPARATION LAYER SHALL BE USED
14. GEOSYNTHETIC REINFORCEMENT SHALL BE STORED AND HANDLED AS PER MANUFACTURERS INSTRUCTIONS.
15. GRANULAR PLATFORM SHALL BE CONSTRUCTED IN ACCORDANCE WITH MCHW SPECIFICATION FOR SPECIFIC FILL. DENSITY TESTING SHALL BE UNDERTAKEN WITHIN EVERY LAYER TO ENSURE COMPLIANCE. 1 NO. DENSITY TEST SHALL BE UNDERTAKEN PER 20m X 20m AREA
16. CBR TESTING (PLT) SHALL BE UNDERTAKEN AT SURFACE OF THE PLATFORM. A MINIMUM 20% IS REQUIRED TO BE ACHIEVED.
17. SPMT'S ARE PROHIBITED FROM ACCESSING AREAS WHERE PLATFORM THICKNESS IS DESIGNATED AS 300MM
18. THE SPMT SHALL BE 8 AXLE MINIMUM
19. THE PLATFORM SHALL BE REGULARLY INSPECTED AND RE TESTED AT APPROPRIATE INTERVALS
20. THE DESIGN IS BASED ON CURRENT LOADING CRITERIA. AT CONSTRUCTION STAGE, A FULL LIFT PLAN IS REQUIRED WITH PLATFORM THICKNESS DICTATED BY THE APPOINTED TEMPORARY WORKS DESIGNER.
21. TEMPORARY UTILITIES TO BE RUN ABOVE GROUND WHERE POSSIBLE. ROUTING TO BE ESTABLISHED ON SITE AND AGREED WITH COMPANY.

HEALTH, SAFETY AND ENVIRONMENTAL INFORMATION

THE FOLLOWING NOTES HIGHLIGHT SIGNIFICANT RESIDUAL HAZARDS IDENTIFIED BY CONTRACTOR. TYPICAL HAZARDS THAT SHOULD BE IDENTIFIED BY A COMPETENT WORKS CONTRACTOR ARE NOT INCLUDED. THE WORKS CONTRACTOR SHALL CARRY OUT THE WORKS USING AN APPROVED SAFE SYSTEM OF WORK.
FURTHER INFORMATION ON HAZARDS CAN BE FOUND IN THE PROJECT CDM HAZARD AND RISK REGISTER.

REF.	HAZARD
A GENERAL	POTENTIAL CONTAMINATED GROUND
B GENERAL	UNCHARTED BURIED SERVICES
C	BURIED 33kV LIVE CABLE
E GENERAL	WORKING IN CLOSE PROXIMITY TO PROTECTED TREES
F	WORKING IN CLOSE PROXIMITY TO WATERCOURSE
K	UNDERGROUND SERVICES CROSSING AT VARYING DEPTHS

HOLDS LIST

HOLD	CODE	DESCRIPTION
1	W	FINAL LOCATION OF CONSTRUCTION FACILITY, BUILDINGS, FENCES, FOOTPATH ETC.
2	C/W	FINAL LOCATION AND EXTENT OF TREE PROTECTION FENCING
3	C	33kV SPEN CABLE DIVERSION ROUTE (TO BE SUPERSEDED BY SPEN'S AS-LAID DRAWINGS)

CODES: C = CLIENT INFORMATION REQUIRED. S = SUPPLIER / VENDOR INFORMATION REQUIRED. W = WORLEY INTERNAL INFORMATION REQUIRED.

LEGEND	
	INDICATIVE 33kV DIVERTED CABLE ROUTE
	TEMPORARY FENCE LINE
	PERMANENT SECURITY FENCE LINE
	NEW 1100MM HIGH GUARDRAIL (280Lm)
	NEW IMPACT PROTECTION BARRIER (95Lm)
	PATHWAY
	RETAINING WALL
	HM SITE BOUNDARY
	DEMOLITION
	EXISTING ARMCO BARRIER
	EXISTING PALISADE FENCING
	TEMPORARY CONSTRUCTION BUILDING
	EXISTING BUILDING
	CATEGORY A TREES (REFER NOTE 3)
	CATEGORY B TREES (REFER NOTE 3)
	CATEGORY C TREES (REFER NOTE 3)
	TREES TO BE REMOVED (REFER NOTE 3)
CREST OF SLOPE / TOE OF SLOPE	EMBANKMENT SLOPE

TEMPORARY UTILITIES LEGEND	
	TWIN FIBRE OPTIC DUCTS
	LOW VOLTAGE ELECTRICAL DUCTS
	FOUL DRAIN
	32mm / 25mm ALKATHENE WATER SUPPLY
	PULL PIT

SCALE 1:20 — 0.4 0 0.4 0.8 0.12 0.16 0.2 METRES

SCALE 1:500 — 10 0 10 20 30 40 50 METRES

CCS CONSTRUCTION FABRICATION AREA

1:500

REV	DATE	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	REF DRAWING No	REFERENCE DRAWING TITLE
								215000-00190-000-CI-DST-00300	ROAD AND PAVING DETAILS ROAD AND CAR PARK DETAILS
0	22/08/25	ISSUED FOR IFD	MC	PG	-	CD	SS	215000-00190-000-CI-DAL-04000	FENCING AND GATES LAYOUT - ENABLING WORKS
B	04/07/25	ISSUED FOR REVIEW	PB	MC	-	CD	SS	215000-00190-000-CI-DAL-01022	SITE LAYOUT - CONSTRUCTION TEMPORARY FACILITIES AREA
A	15/05/25	ISSUED FOR INTER-DISCIPLINARY CHECK	PB	-	-	SS	AG	215000-00190-000-CI-DAL-01020	SITE LAYOUT - CONSTRUCTION LAYDOWN AREA

A1 SHEET | SCALE 1:20 / 1:500

WORLEY PROJECT No. 215000-00190

ENGINEERING AND PERMIT STAMPS (As Required)

worley DELIVERING SUSTAINABLE CHANGE

MITSUBISHI HEAVY INDUSTRIES

CUSTOMER

Heidelberg Materials

"This drawing is prepared solely for the useof the contractual customer of Worley andWorley assumes no liability to any otherparty for any representations contained inthis drawing."

DRG TITLE

SITE LAYOUT
CONSTRUCTION FABRICATION AREA

DRG No 215000-00190-000-CI-DAL-01021

REV 0

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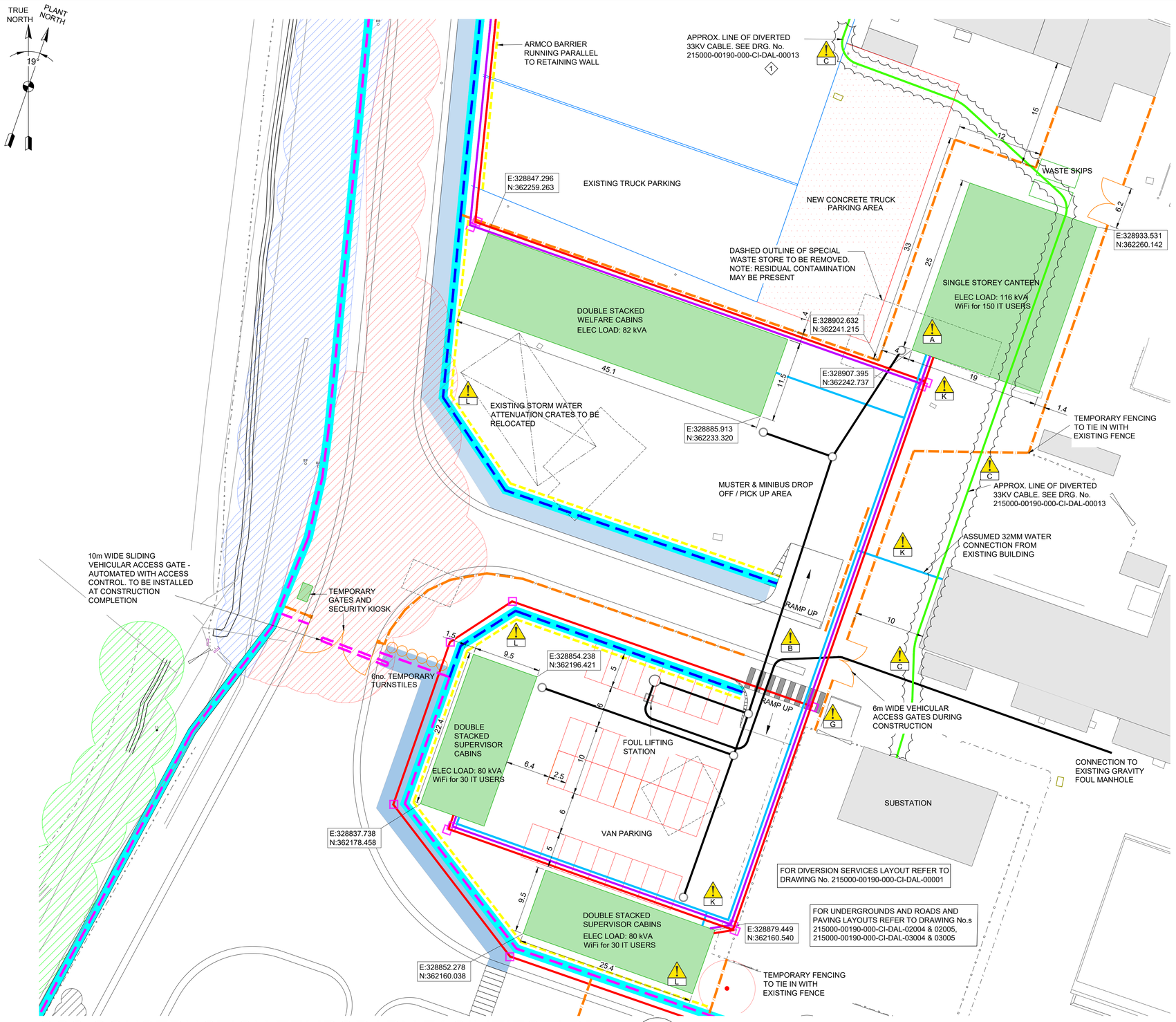
Worley_A1



CCS CONSTRUCTION TEMPORARY FACILITIES AREA

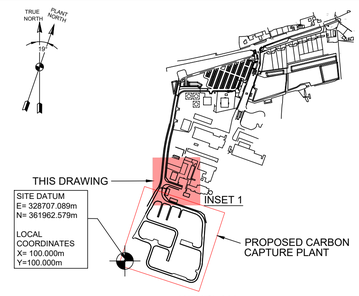
1:300

INSET 1 - EXTENT OF WELFARE FACILITIES AREAS

300mm THICK GRANULAR PLATFORM, AREA = 1,910m2. (DESIGN LOAD 10.0 Te/M2)

	LEGEND
	TEMPORARY FENCE LINE
	PERMANENT SECURITY FENCE LINE
	NEW 1100MM HIGH GUARDRAIL (280Lm)
	NEW IMPACT PROTECTION BARRIER (95Lm)
	PATHWAY
	RETAINING WALL
	HM SITE BOUNDARY
	DEMOLITION
	EXISTING ARMCO BARRIER
	EXISTING PALISADE FENCING
	TEMPORARY CONSTRUCTION BUILDING
	EXISTING BUILDING (REFER NOTE 3)
	CATEGORY A TREES (REFER NOTE 3)
	CATEGORY B TREES (REFER NOTE 3)
	CATEGORY C TREES (REFER NOTE 3)
	TREES TO BE REMOVED
	INDICATIVE 33kV DIVERTED BURIED CABLE ROUTE

TEMPORARY UTILITIES LEGEND	
	TWIN FIBRE OPTIC DUCTS
	LOW VOLTAGE ELECTRICAL DUCTS
	FOUL DRAIN
	32mm / 25mm ALKATHENE WATER SUPPLY
	PULL PIT



KEYPLAN

GENERAL NOTES:

1. COORDINATES ARE TO OSGB 1936 BRITISH NATIONAL GRID COORDINATE SYSTEM. ELEVATIONS ARE RELATIVE TO THE OSGB 1936 DATUM
2. ALL DIMENSIONS IN m (METRES) UNLESS OTHERWISE STATED
3. REFER TO APPENDIX 4 OF THE ARBORICULTURAL IMPACT ASSESSMENT PLAN (SI) - DRAWING No. ADAS_1052143_CCL_PADESWOOD_AIAP FOR TREE CATEGORIES
4. ALL TREE POSITIONS ARE INDICATIVE AND BASED UPON THE ARBORICULTURAL IMPACT ASSESSMENT PLAN
5. EXACT LAYOUT OF TEMPORARY CONSTRUCTION FENCING AND TREE PROTECTION FENCING TO BE DETERMINED ON SITE AND AGREED WITH ABORICULTURALIST
6. LENGTH OF TEMPORARY CONSTRUCTION FENCING = 357Lm PLUS GATES. CONSTRUCTION FENCING TO BE HERAS TYPE OR SIMILAR APPROVED
7. SECURITY KIOSK BASED UPON A GLASDON GENESIS KIOSK MODEL K1523A OR SIMILAR APPROVED

HEALTH, SAFETY AND ENVIRONMENTAL INFORMATION

THE FOLLOWING NOTES HIGHLIGHT SIGNIFICANT RESIDUAL HAZARDS IDENTIFIED BY CONTRACTOR. TYPICAL HAZARDS THAT SHOULD BE IDENTIFIED BY A COMPETENT WORKS CONTRACTOR ARE NOT INCLUDED. THE WORKS CONTRACTOR SHALL CARRY OUT THE WORKS USING AN APPROVED SAFE SYSTEM OF WORK.
FURTHER INFORMATION ON HAZARDS CAN BE FOUND IN THE PROJECT CDM HAZARD AND RISK REGISTER.

REF.	HAZARD
A /GENERAL	POTENTIAL CONTAMINATED GROUND
B /GENERAL	UNCHARTED BURIED SERVICES
C	BURIED 33kV LIVE CABLE
G	WORKING IN CLOSE PROXIMITY TO EXISTING LIVE SUBSTATION
K	UNDERGROUND SERVICES CROSSING AT VARYING DEPTHS
L	RISK OF FALLS FROM HEIGHT

6 0 6 12 18 24 30

SCALE 1:300 METRES

HOLDS LIST

HOLD	CODE	DESCRIPTION
1	W	FINAL LOCATION OF CONSTRUCTION FACILITY, BUILDINGS, FENCES, FOOTPATH ETC.
2	W	BASIS FOR TEMPORARY BUILDINGS
3	C	33kV SPEN CABLE DIVERSION ROUTE (TO BE SUPERCEDED BY SPEN'S AS-LAID DRAWINGS)

CODES: C = CLIENT INFORMATION REQUIRED.
S = SUPPLIER / VENDOR INFORMATION REQUIRED.
W = WORLEY INTERNAL INFORMATION REQUIRED.

REV	DATE	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	REF DRAWING No	REFERENCE DRAWING TITLE
0	22/08/25	ISSUED FOR IFD	AA	MC	-	CD	SS	215000-00190-000-CI-DAL-04000	FENCING AND GATES LAYOUT - ENABLING WORKS
B	04/07/25	ISSUED FOR REVIEW	PB	MC	-	CD	SS	215000-00190-000-CI-DAL-01021	SITE LAYOUT - CONSTRUCTION FABRICATION AREA
A	15/05/25	ISSUED FOR INTER-DISCIPLINARY CHECK	PB	-	-	SS	AG	215000-00190-000-CI-DAL-01020	SITE LAYOUT - CONSTRUCTION LAYDOWN AREA

A1 SHEET SCALE 1:300

WORLEY PROJECT No. 215000-00190

ENGINEERING AND PERMIT STAMPS (As Required)

worley DELIVERING SUSTAINABLE CHANGE

MITSUBISHI HEAVY INDUSTRIES

CUSTOMER

Heidelberg Materials

"This drawing is prepared solely for the useof the contractual customer of Worley andWorley assumes no liability to any otherparty for any representations contained inthis drawing."

DRG TITLE

SITE LAYOUT
CONSTRUCTION TEMPORARY FACILITIES AREA

DRG No 215000-00190-000-CI-DAL-01022

REV 0

Worley_A1

PID File Path:

USER NAME:

DATE & TIME:

Appendix D. SuDS Maintenance Plan

Memorandum

Subject	Padeswood Carbon Capture Plant - SuDS Maintenance Plan		
Date	13 August 2025		
To	Heidelberg Materials	From	Josephine Weston
CC	Stan Siong	Nicola King	James Assem
Project No	215000-00190	Doc No	215000-00190-TQ-0069-RevA
File Loc			
Project	Heidelberg Materials: Padeswood Carbon Capture Plan – SuDS Maintenance Plan		

Introduction

This memorandum has been prepared to set out the initial proposal with respect to SuDS management and maintenance.

The management plan aims to:

- Summarise the drainage features used within the site.
- Establish who is responsible for the maintenance.
- Ensure that all those involved in the maintenance and operation of the SuDS understand their functionality and maintenance requirements in terms of supporting long term performance.

Site Setting

The Padeswood Carbon capture storage (CCS) site is approximately 2.1 km south of Buckley, near Mold, Flintshire, North Wales. The site is owned and operated by Heidelberg Materials. The existing cement works has been in operation since 1949. The proposed CCS plant site is located adjacent to the existing Padeswood Cement Works. The existing operation consists of Kilns, grinding mills, silos and supporting infrastructure (office buildings, workshops and car parking).

The CCS plant site area is currently predominantly undeveloped. As part of the project, the site will be developed and used to house a CCS plant. In addition to the CCS, the development will also include flow gas duct work tie-in and additional processing infrastructure within the existing cement plant. This work is outside the scope of this assessment.

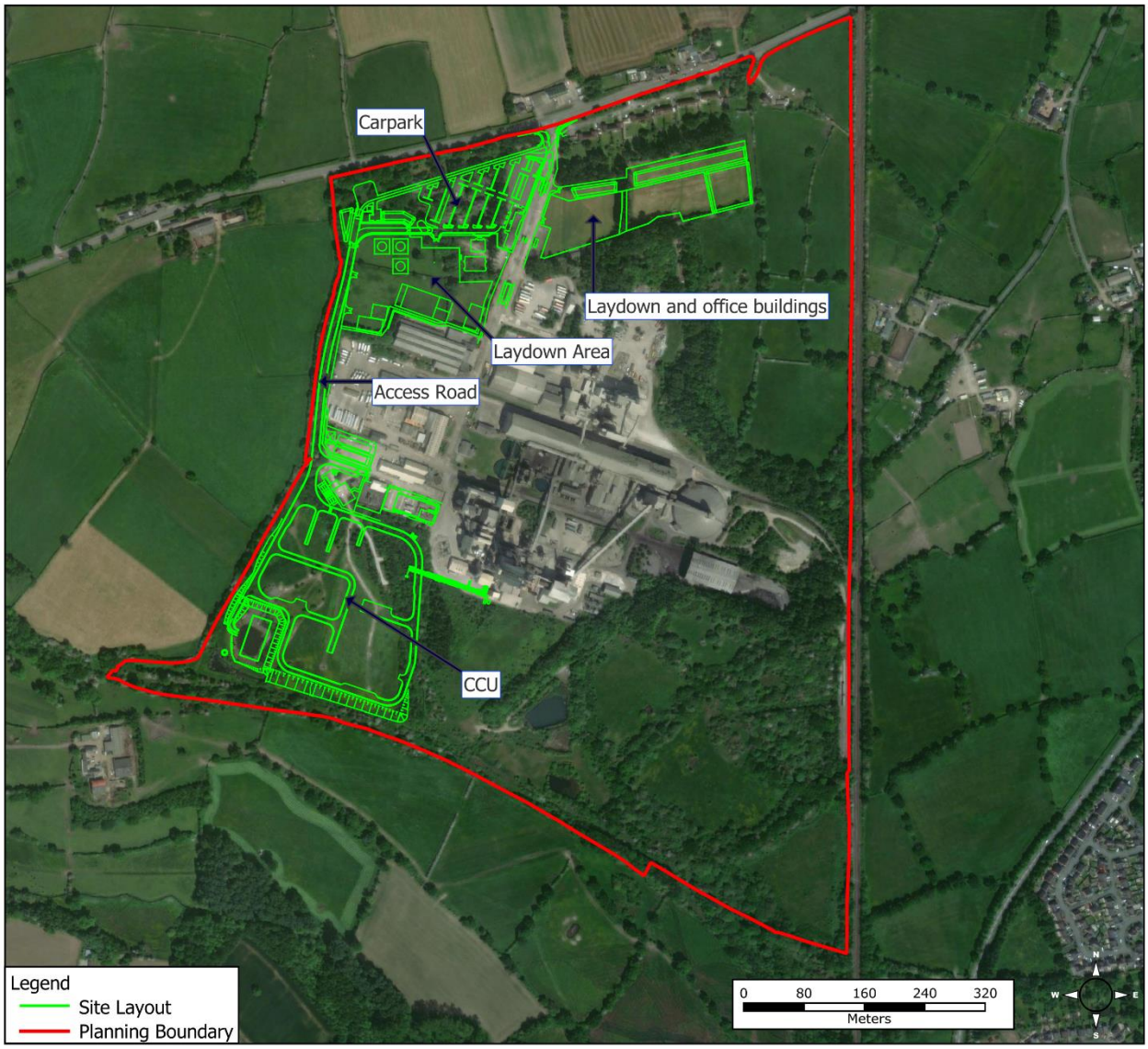


Figure 11-1. Site Plan

Surface Water Drainage Strategy

The majority of surface water runoff across the site will be conveyed to attenuation tanks and outlet systems which discharge surface water runoff at the Greenfield runoff rate.

Responsibility of Maintenance

Responsibility for the maintenance of the drainage network will be shared between the site operator and the adopting water company. The proposal for each component is summarized below:

- Attenuation tanks: Site Owner/Operator.
- Controlled discharge at greenfield runoff rate: Site Owner/Operator.

Only trained personnel shall be permitted to undertake maintenance works. This work must be carried out in accordance with the Confined Space Regulations where appropriate.

This maintenance should be implemented upon completion of any portion of the drainage system. All maintenance shall be the responsibility of the developer until the drainage system has been handed over to relevant body with long term responsibility, for example, the adopting water company. A handover inspection is required prior to handover from the developer to the site operator.

The purpose of regular SuDS inspections after handover will then:

- Help determine optimum future maintenance activities.
- Establish ongoing hydraulic and water quality performance of each SuDS system.
- Allow for identification of any system failures. This may include but is not limited to: blockage or poor water quality.

A copy of this document should be provided to those responsible for maintenance of the drainage networks. A record of all maintenance activities shall then be kept for the lifetime of the development in line with the operator's maintenance inspection regime and safety management systems.

SuDS Management and Maintenance Regime

This section outlines the maintenance strategies required to protect the proposed SuDS management systems at the Padeswood site and outlines who is responsible for the upkeep.

Attenuation Tanks

The attenuation tanks will be the responsibility of the site operator. The following maintenance strategy measures are recommended:

- Litter and debris removal should be undertaken as part of general landscape maintenance for the site and before any other SuDS management task. All litter should be removed from the site.
- Grass clippings should be disposed of off-site or outside the detention basin area to remove nutrients and pollutants.
- The recommended maintenance requirements for the attenuation tanks are outlined in Table 1.

Table 1. Maintenance Schedule for Attenuation Tanks

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – for access routes	Monthly (during growing season), or as required.
	Manage other vegetation and remove nuisance plants.	Monthly, at the start and then as required
	Inspect inlets and facility surfaces or silt accumulation, establish appropriate silt removal frequency.	Monthly (for first year) and then annually as required.

Maintenance Schedule	Required Action	Recommended Frequency
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets and outlets	Annually
Occasional Maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every two years, or as required.
	Sedimentation management	Every five years, or as required. It is likely to be minimal where effective upstream control is required.
Remedial Actions	Repair erosion or other damage	As required

Outlet Networks

The culvert and outlet networks discharge surface water runoff to external surface water features. These are the responsibility of the site operator and are required to maintain discharge at the permitted discharge rate. All activities need to be compliant with permits and regulatory requirements.

Before being handed over to the site operator, the outlets should be inspected for clogging, litter and weeds at the outlet which may prevent appropriate flows. The drainage system has been designed to operate with as little maintenance as possible, however, regular inspections are required. After the outlet networks are handed over to the private management company, outlets should be inspected, particularly after heavy rainfall.

Litter picking at the site should be frequent to prevent rubbish limiting the effective operation of components. The recommended maintenance requirements for the outlet networks are outlined in Table 2.

Table 2. Maintenance Schedule for Outlet Networks

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Remove litter and debris	Monthly, or as required
	Manage vegetation and remove nuisance plants	Monthly, or as required.
	Inspect inlets and outlets for blockages and clear if required.	Monthly
	Inspect structures and pipework for evidence of physical damage	Monthly
	Insect inlets for silt accumulation	Monthly for the first year and then annual as required.
	Check mechanical devices (discharge controller)	Annually
Occasional Maintenance	Prune and trim any trees and remove cuttings	Every two years, or as required.

	Remove sediment from inlets	Every five years, or as required. This is expected to be minimal where effective downstream control is provided.
Remedial Actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of riprap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels.	As required.

Pipe Network, Manholes and Gullies

Whilst the drainage system has been designed to operate with as little maintenance as possible, there are key operations that must regularly be undertaken to ensure that the system remains in optimal condition. The majority of these actions are routine and should be carried out upon all drainage systems.

The recommended maintenance requirements for the drainage system are outlined below in Table 3.

Table 3. Maintenance Schedule for Pipe Network, Manholes and Gullies

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Check the system for blockages, siltation and damage. Clean or repair as required.	Monthly for the first 3 months then every 3 months for the first year.
	Clean out gully sumps and gratings	Annually or after large storm events.
	Clean out catch pits in manholes.	Annually or after large storm events.
	Inspect entire system for poor operation and damage to manholes	Annually or after large storm events.

Oil-Water Separators

The oil-water separators filter surface water to remove hydrocarbons prior to discharge at the greenfield runoff rate These are the responsibility of the site operator and are required to maintain water quality requirements across the site. All activities need to be compliant with permits and regulatory requirements. It is strongly recommended to follow the manufacturer's suggested maintenance and to pay particular attention to any automatic closure device and coalescer if present.

Prior to handover to the site operator, all oil-water separators on site require a full inspection to ensure that they are efficient at removing Hydrocarbons from the water runoff. These

systems require regular maintenance to comply with water quality regulations. Inspection is recommended every one to six months and suitable documentation is required.

Table 4. Maintenance Schedule for Oil-Water Separators.

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Check for leaks, visible issues and the condition of components	Biannually, or as required.
	Check and clean filters	Monthly, or as required.
	Inspect all parts for wear and tear.	Monthly
	Monitor Oil Viscosity	Biannually, or as required.
Occasional Maintenance	Removal of Sludge and Oil	Every year, or as required.

Record of Maintenance

A record of ongoing inspections (including photographic evidence) shall be provided, in line with the operator's maintenance inspection regime and safety management systems. This ongoing documentation should be collated with this document.