PINNACLE
CONSULTING ENGINEERS

Drainage Strategy

Cardiff East Park and Ride, Llanrumney

210204-PIN-XX-ZZ-RP-C-00021

October 2025

Prepared for:

Curtis Hall Limited (Ltd.)

STRUCTURAL • CIVIL • DUE DILIGENCE • ENGINEERING MASTERPLANNING
FLOOD MANAGEMENT • INFRASTRUCTURE DESIGN
PRE-DEVELOPMENT ENGINEERING • BIM • TRANSPORTATION

CONTACT DETAILS

Name	Position	Email	Telephone
Domenico Venuti	Associate Civil Engineer	domenico.v@ukpinnacle.com	01603 327170
Morgan Harris	Flood Risk Engineer	morgan.h@ukpinnacle.com	01603 327170
Jawsy Jabbar	Associate	Jawsy.j@ukpinnacle.com	01707 527636
Rubichanel Acquaye	Graduate Civil Engineer	rubichanel.a@ukpinnacle.com	01707 527630

APPROVALS

	Name	Position	Date
Prepared by	Domenico Venuti	Associate Civil Engineer	07.03.2022
Reviewed by	Morgan Harris	Flood Risk Engineer	07.03.2022
Approved by	Domenico Venuti	Associate Civil Engineer	07.03.2022

VERSIONS

Number	By	Date	Context
P1	Shaun O'Reilly	23.10.2025	Updated Site Plan

CONTENT

INTRODUCTION 3
1 EXISTING SITE CONDITIONS 4
1.1 Site description 4
1.2 Topography 5
1.3 Geological ground conditions 5
1.4 Existing surface water management 6
1.5 Existing foul water management 6
2 PROPOSED DEVELOPMENT 7
2.1 Flood Risk 7
3 LOCAL POLICY 10
4 FLOOD RISK MANAGEMENT STRATEGY 11
4.1 Surface Water Drainage 11
4.2 Foul Water Drainage 15
5 CONCLUSION 17
APPENDIX A – PROPOSED DEVELOPMENT LAYOUT 18
APPENDIX B – TOPOGRAPHIC SURVEY 19
APPENDIX C – SITE INVESTIGATION REPORT 20
APPENDIX D – EXISTING SEWER LAYOUT 21
APPENDIX E – DRAINAGE CALCULATIONS 22
APPENDIX F – DRAINAGE LAYOUT 23
APPENDIX G – DRAINAGE DETAILS 24
APPENDIX H – EXISTING DRAINAGE LAYOUT 25

LIST OF FIGURES

Figure 2.1 – Site Location Plan 4
Figure 2.2 – Foul Asset Location Plan 6
Figure 2.3 –Natural Resources Wales Development Advice Map 7
Figure 2.4 –Natural Resources Wales flood Risk Map from Rivers 8
Figure 2.5 –Natural Resources Wales flood Risk Map from the Sea 8
Figure 2.6 –Natural Resources Wales flood Risk Map from small water & small watercourses 9
Figure 5.1 – Infiltration Treatment Indices extracted from Table 26.4 of the SuDS Manual (C753) 13

LIST OF TABLES

Table 2.1 – Geological Ground Conditions 5
Table 2.2 – Groundwater Conditions 5
Table 5.1 – Greenfield Runoff Rates and Proposed Surface Water Design Rate 12

INTRODUCTION

Pinnacle Consulting Engineers Ltd have been commissioned to produce a Drainage Strategy (DS) report in support of the full planning application being submitted by Curtis Hall Limited (Ltd.) to Cardiff County Council for the redevelopment of Cardiff East Park and Ride, Llanrunmey. It is proposed to redevelop the site to provide for a data centre and associated buildings and structures, associated car parking and access roads, a bridge across the Rhymney Rover, site wide landscaping and associated works. Further description of the proposed development is outlined in section 2 of this report. The development is located south of Eastern Avenue (A48), at the Cardiff East Park & Ride, and northwest to Bryn Hafod Primary School. A plan showing the proposed development layout is enclosed in Appendix A.

The site is currently partly brownfield, with an existing park & ride and associated facilities, the remainder of the site is greenfield. The Rhymney River flows along the eastern boundary of the site from north to south. See Appendix A for site location plan.

With reference to the indicative flood maps published by the UK Government, the red line boundary for the site is in Flood Zone 1, Flood Zone 2, Flood Zone 3a and, Flood Zone 3b. It should be noted that the area of the site that will contain the industrial estate will not be located within Flood Zone 3b.

This DS report has been prepared in accordance with the requirements contained within the (i) Planning Policy Wales (PPW, Feb 2021): Chapter 6 Water and Flood Risk, (Page 146); ii) Technical Advice Note 15: Development and Flood Risk; (iii) Cardiff City Council Strategic Flood Consequences Assessment (SFCA); (iv) guidance from CIRIA C697: The SUDS Manual; and (v) Other statutory laws and local bylaws and legislations.

WSP Consulting undertook site specific flood risk modelling in support of this Drainage Strategy and the planning application for the proposed development. This modelling is detailed in WSP Consulting report 'Flood Summary for Pre-App Meeting' reference '70082841-MemC01-R2.0. The referenced WSP report is to be read alongside this DS.

The flood summary for Pre-App produced by WSP Consulting is part of the precautionary framework required to evaluate the following:

- Ensuring the nature of the proposed development is suitable for the Flood Zone it is located in.
- Ensuring the proposed location of the development satisfies the LPA's development plans; and
- Ensuring the potential consequences of a flood event for the development have been considered and found acceptable.

This report has been prepared to address the requirements of TAN15 and has derived the following data/information from various sources including:

- Information published or explicitly provided by National Resources Wales;
- Information published by the Local Planning Authorities.
- A site specific topographical survey;
- Adopted sewer asset plan;
- Specific design works carried out for this report.

1 EXISTING SITE CONDITIONS

1.1 Site description

The proposed development is located at National Grid Reference ST 21309 80974.

The site is located in the north-eastern part of the City of Cardiff in an existing park & ride facility. The site is bounded to the north by Eastern Avenue (A48) and residential land use in the surrounding area. The site is bounded to the east by the Rhymney River, beyond the river there is thicket of trees and residential land. 'Figure 2.1' below shows the site location plan of the proposed development.

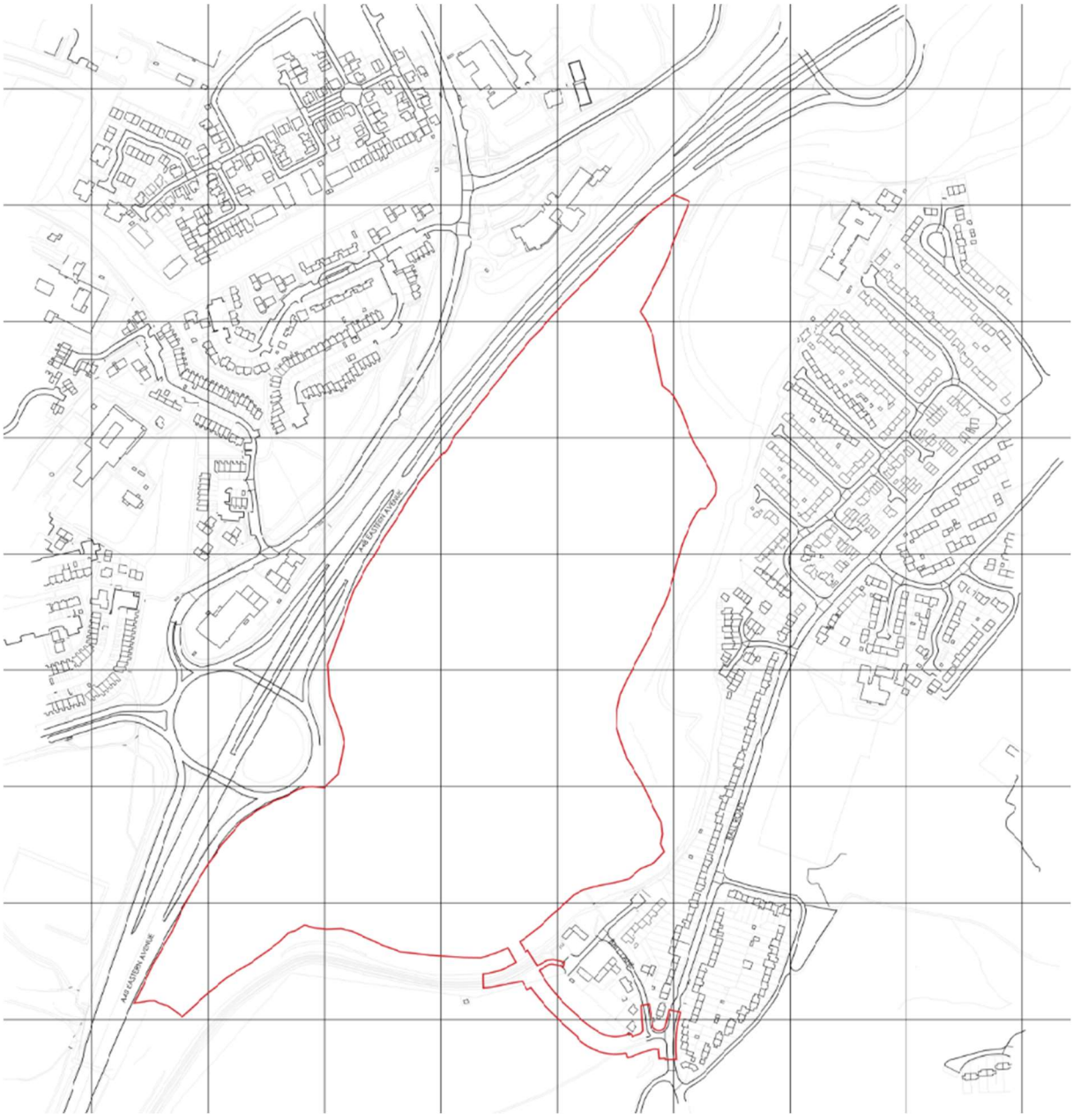

Figure 2.1 – Site Location Plan

1.2 Topography

The red-line boundary for the development encompasses an area of approximately 23.4ha, with ground levels onsite being within the region of ~14.5m AOD, in the north of the site, and ~10.0m AOD, in the south-east of the site. For additional details on the site topography, refer to Appendix B of this report which includes a full topographic survey of the site.

1.3 Geological ground conditions

A site Geo-environmental Investigation was carried out on the site during the months of March and April 2021. Geological conditions at the site are detailed below in 'Table 2.1'.

Stratum	Thickness range (m)	Depth range to top of lithology (m bgl)	Depth range to base of lithology (m bgl)
Asphalt or gravel	0.17-0.2 (Average 0.19)	From Surface	0.17-0.2
Made Ground	0.7 – 1.33 (Average 0.94)	0.17 - 0.2	0.9 – 1.5
Alluvium	0.4 – 4.5 Average 1.56	Surface to 4.5	0.9 – 4.5
Glaciofluvial deposits	0.4 – 6.0 Average 3.94	1.2 – 4.5	4.5 – 8.0
Raglan Mudstone Formation	Greater than 13.5 (BH07)	4.5 – 8.0	>20.0 (BH07)

Table 2.1 – Geological Ground Conditions

The HDR Bradbrook Consulting have undertaken site investigation for the proposed development. Appendix C of this report contains the preliminary site investigation report for site.

Groundwater was encounter during the site investigations. The table below outlines the Site Investigation Report tabulated water strikes.

Hole ID	Monitoring well response zone depth (mbgl)	Response zone lithologies	Water depth (mbgl)	Water depth (mAOD)
BH01	1.0 – 5.7	Alluvium, Glaciofluvial, Raglan Mudstone	4.72	9.78
BH02	1.0 – 4.9	Alluvium, Glaciofluvial	1.37	9.53
BH03	1.0 to 5.8	Alluvium, Glaciofluvial, Raglan Mudstone	1.87	8.83
BH04	1.0 to 6.0	Alluvium, Glaciofluvial	1.89	9.71
BH05	1.0 to 6.9	Alluvium, Glaciofluvial, Raglan Mudstone	2.80	8.20
BH06	2.0 to 8.0	Alluvium, Glaciofluvial	3.09	7.91
BH07	1.0 to 20.0	Alluvium, Glaciofluvial, Raglan Mudstone	2.71	7.29

Table 2.2 – Groundwater Conditions

The proposed drainage strategy accommodates for the existing ground condition and pollution onsite with the drainage elements designed accordingly.

1.4 Existing surface water management

The current park & ride site has an associated surface water drainage network, this network has been surveyed up to the site boundary. The outfall was unable to be identified as part of this survey.

A drawing showing a survey of the existing sewer network is included in Appendix H.

1.5 Existing foul water management

An existing foul water network services the existing facilities building on the park & ride site offices. This network discharges to a cesspit tank at the southern edge of the car park site.

A drawing showing a survey of the existing sewer network is included in Appendix H.

There are 2 foul assets running through the site, running from the northeast to the southwest of the site. The foul sewers are 300mm ∅ and 450mm ∅ vitrified clay and concrete pipes respectively.

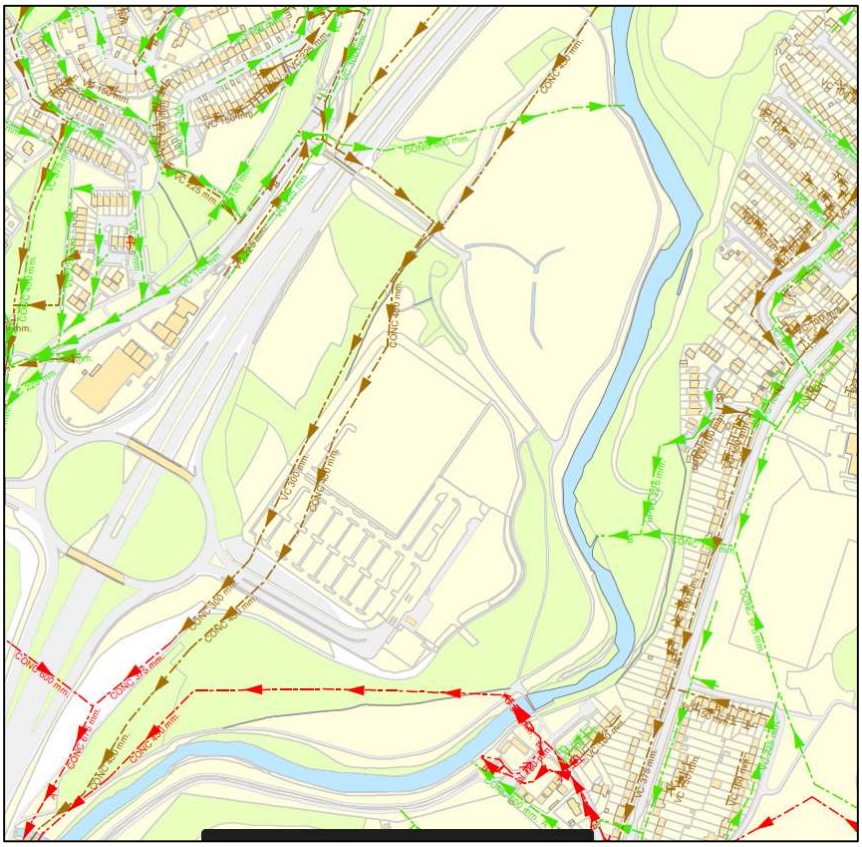

Figure 2.2 – Foul Asset Location Plan

2 PROPOSED DEVELOPMENT

The proposed development involves the construction of a data centre and associated buildings and structures, associated car parking and access roads, a bridge across the Rhymney River, site wide landscaping and associated works. The proposed development provides the opportunity to provide for critical national digital and economic infrastructure and related employment. The proposed development would also facilitate a new bridge connecting the site with Llanrumney. Development plans are enclosed in Appendix A.

The masterplan submitted with the application sets out the development proposals and its purpose are to demonstrate to the planning authority that is it possible to accommodate the scale of development proposed having regard to the key constraints affecting the site – one of which is flood risk.

The total site area is equivalent to circa 23.4ha.

2.1 Flood Risk

2.1.1 Flood Zones

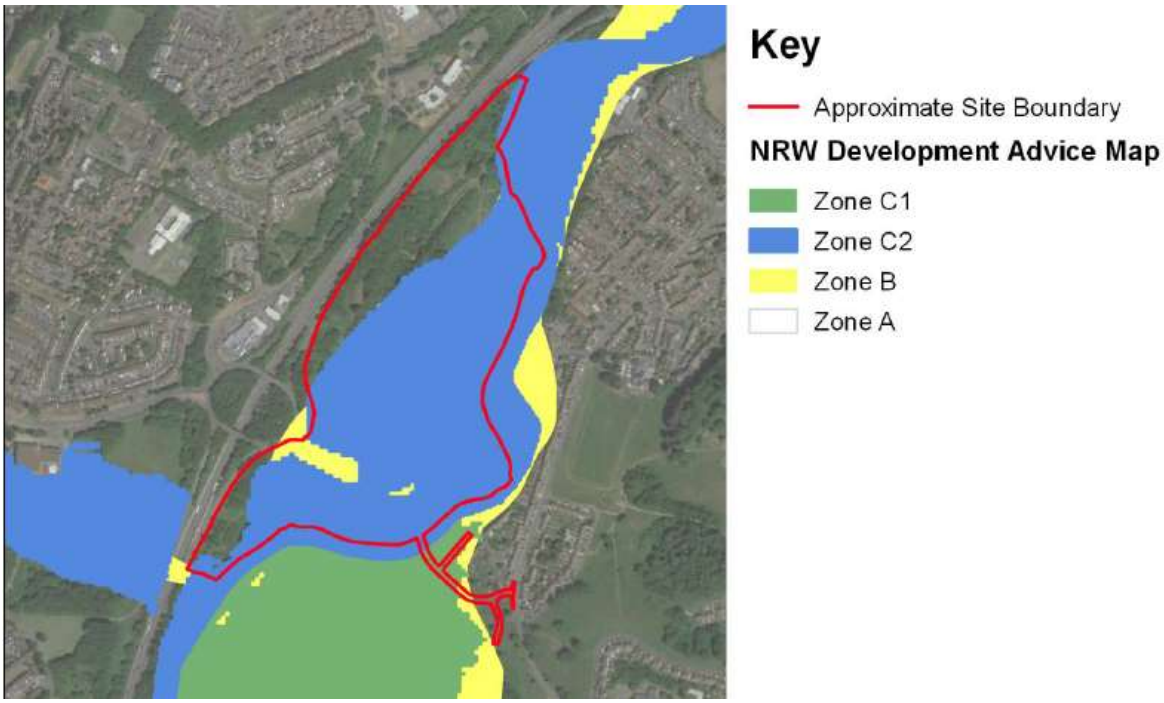

Figure 2.3 –Natural Resources Wales Development Advice Map

According to WSP's Flood Summary for the Pre-App Meeting, the proposed site has a significant portion of its land situated within DAM Zone C2. The National Resources Wales website identifies zone C2 as an area considered at risk of flooding and without the benefits of flood defence infrastructure. According to TAN15, our proposed site is considered as a less Vulnerable Development which can only be acceptable after a consequence and a justification test.

WSP Consulting have undertaken a site-specific flood risk modelling in support of this Drainage Strategy and the planning application for the proposed development. This modelling is detailed in WSP Consulting report 'Flood Summary for Pre-App Meeting' reference '70082841-MemC01-R2.0

A plan showing the proposed development is available within Appendix A of this report.

2.1.2 Flood Risk from Rivers

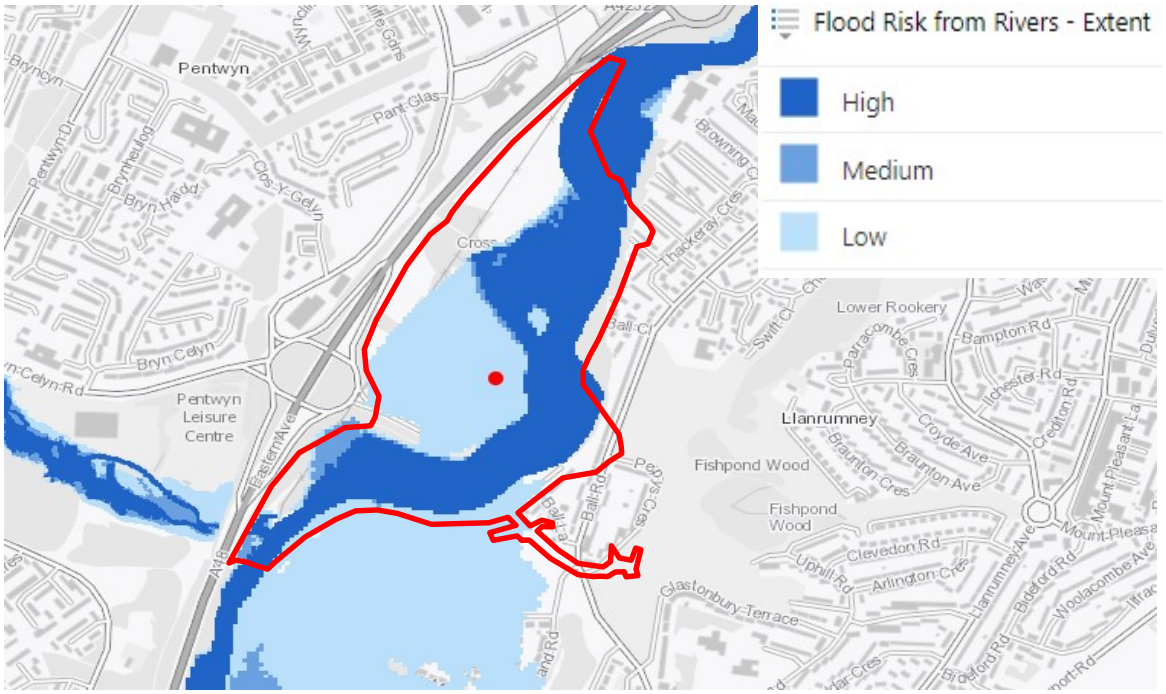

Figure 2.4 –Natural Resources Wales flood Risk Map from Rivers

The above risk map identifies the site to be in an area where flood risk levels from rivers are either high or low. The areas with a high risk of flooding from rivers have a greater than 1 in 30 chances of flooding, while the areas with a low risk of flooding from rivers have a 0.1% to 1% chance of flooding.

2.1.3 Flood Risk from the Sea

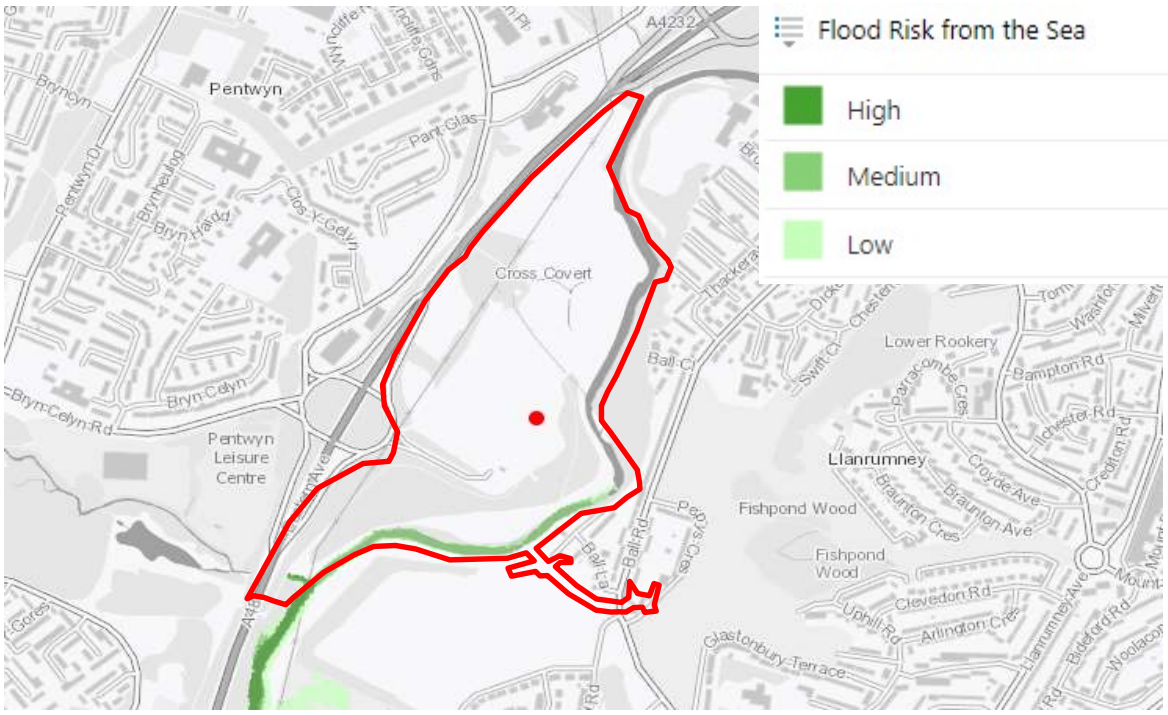

Figure 2.5 –Natural Resources Wales flood Risk Map from the Sea

The above risk map identifies the site to have small areas on the southwestern border of the site in an area where flood risk levels from the sea are either medium or low. The areas with a medium risk of flooding from the sea have a chance of flooding of between 0.5% and 3.3%, while the areas with a low risk of flooding from the sea have a chance of flooding of between 0.1% and 1%.

2.1.4 Flood Risk from Small water & Small Watercourses

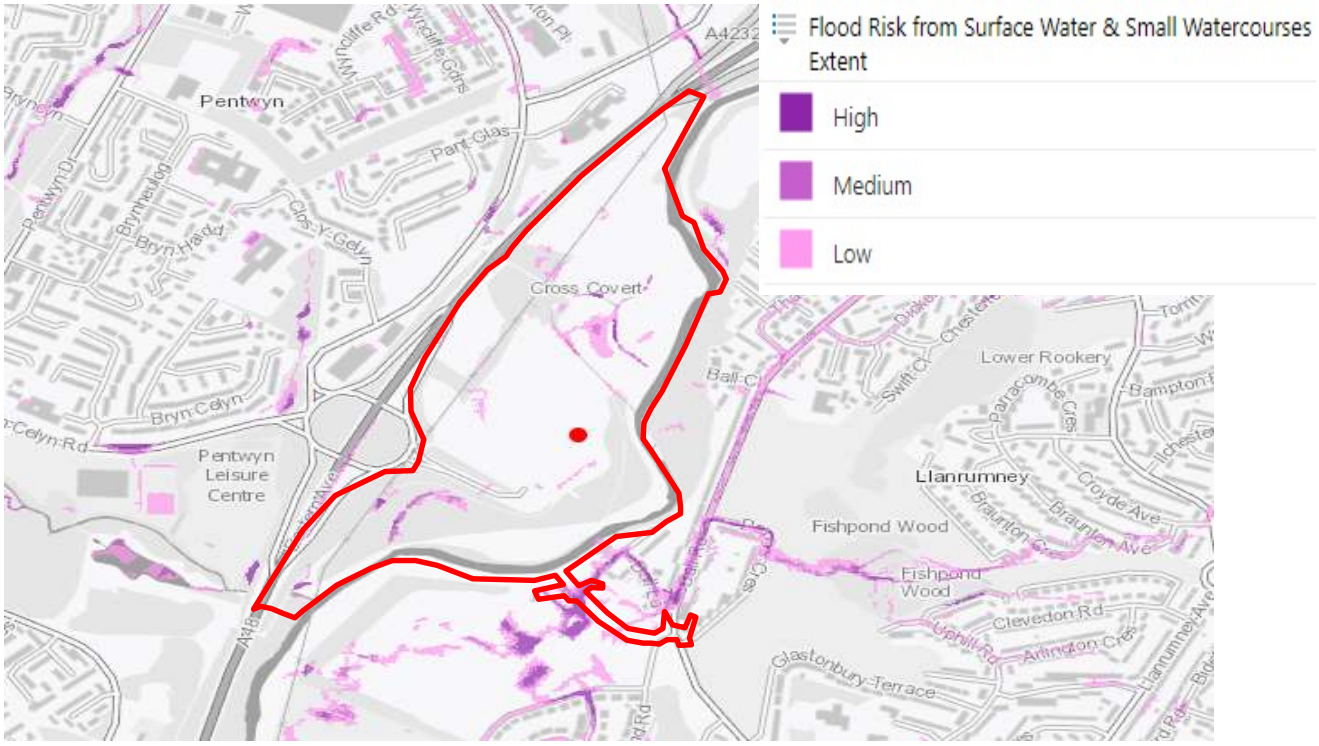

Figure 2.6 –Natural Resources Wales flood Risk Map from small water & small watercourses

The above risk map identifies the site to have small areas across the site situated in areas of high, medium and low risk of flooding from surface water & small watercourses. The areas with high risk have a chance of flooding of greater than 1 in 30, the areas with a low risk have a chance of flooding of between 0.1% and 1% and the areas with a medium risk have a chance of flooding of between 0.5% and 3.3%.

3 LOCAL POLICY

Planning policy and guidance produced by Cardiff Council.

- Schedule 3 of the Flood and Water Management Act (FWMA) 2010 requires surface water drainage for new developments to comply with mandatory National Standards for sustainable drainage (SuDS).
- SuDS Scheme Application for SuDS Approving Body (SAB) Approval – Wales.

4 FLOOD RISK MANAGEMENT STRATEGY

4.1 Surface Water Drainage

4.1.1 Drainage Hierarchy

The majority of the site currently discharges into the Rhymney River, with a small proportion of the site discharging through an existing sewer network. It should be noted that no plans are currently available for the existing sewer showing any discharge location to a watercourse. The drainage hierarchy as outlined in the Cardiff City Council has been considered below in the context of the proposed development and is as follows:

- Discharge into the ground;
- Discharge to a surface water body;
- Discharge to a surface water sewer; and
- Discharge to a combined sewer

4.1.1.1 Discharge into the Ground

It is considered that managing surface water via infiltration is appropriate for the southwestern portion of the proposed development (Plot 8 south of the Eastern Access ramp) subject to long term groundwater monitoring. The rest of the site is unsuitable for infiltration into the ground. The ground investigation report has identified the groundwater to be approximately 1.5m below ground level. The design levels for the development propose to raise the site by approximately 1.2m, for flood mitigation, allowing for at least a 1m deep filtration layer under the infiltration crates for Plot 8. The rest of the plots will discharge to a watercourse.

BRE365 Infiltration testing was undertaken throughout the site where soakaway crates were proposed. The test results have shown predominately poor infiltration rates across the site. A copy of the Infiltration testing can be found in Appendix C.

An additional regime of water table monitoring has been undertaken to outline a yearly groundwater record. A copy of the water table monitoring reports can be found in Appendix C.

The CIRIA SuDS Manual (C753) states that a minimum of 1.0m must be available between ground water levels and the bottom of infiltrating structures. On some parts of the site (based on resting ground water levels), once the depth of the infiltration feature (e.g., infiltration basin) is accounted for, a minimum of 1m between the groundwater levels and the bottom of the infiltrating structure will be achievable. Appendix C contains a site investigation report for the proposed development, including borehole logs, which indicates there is resting groundwater levels. Therefore, it is suggested to use the following SuDS elements for Plot 8:

- Soakaway crates for roof water;
- Bio & Infiltration swales and basins for hardstanding areas;
- Filter drains to manage surface water in car parking areas;
- Full retention petrol interceptors for loading yards to be used in emergency spillage events.

4.1.2 Discharge to a Surface Water Body

As onsite infiltration is deemed to be suitable only for a small portion of the site located in the south of the Eastern Access Road Ramp, discharging surface water for Plots 1 to 6 to a ‘water body’ is considered as the alternative option based on the hierarchy. For discharging into the watercourse is

therefore required, and the Greenfield release rate (QBAR) of 3.9 l/s/ha will be adopted for a controlled watercourse discharge solution. Calculations for greenfield runoff rates are included in Appendix E.

4.1.3 Discharge to a Surface Water Sewer

The park and ride facility has a sewer network, but the discharge point is unknown at this stage of the project. It is assumed that there is a drainage point for the watercourse as there are no records for public sewers. It is proposed that the water from the parking and ride will discharge into the watercourse as it currently does.

4.1.4 Discharge to a Combined Sewer

There are no known surface water flows associated with the site that enter a combined sewer. No surface water flows are proposed to discharge to a combined sewer post-development.

4.1.5 Drainage Hierarchy Summary

The surface water drainage hierarchy outlined by Cardiff City Council in their SFRA has been reviewed and applied in the context of the proposed development. It is proposed that all surface water associated with the development will discharge via infiltration. The proposed development represents an improvement on the pre-development arrangement from the perspective of the surface water hierarchy as areas that currently discharge to the public sewer network will discharge via infiltration.

4.1.6 Surface Water Modelling Considerations

An existing park and ride portion of the site is currently brownfield. Despite the brownfield conditions, the greenfield runoff rate has been calculated for the proposed development. The greenfield runoff rate will be calculated as 3.9l/s per hectare of existing greenfield site to be development, 'Table 5.1' contains a summary of the greenfield runoff rate for the site . The greenfield runoff rate calculation can be found in Appendix E.

Return Period	Runoff Rate
QBAR	3.9 l/s/ha
Q1	3.4 l/s/ha
Q30	6.9 l/s/ha
Q100	8.5 l/s/ha

Table 5.1 – Greenfield Runoff Rates and Proposed Surface Water Design Rate

The discharge rate from the site will be kept as close to the QBAR rate as possible, where it is not proposed to infiltrate.

The critical design storm used to design the proposed drainage network is the 1:100-year plus 40% climate change event.

4.1.7 Proposed Drainage Regime

A copy of the proposed drainage layout can be seen in Appendix F and calculations supporting the proposed drainage layout can be seen in Appendix E. It must be noted that this drainage layout (Appendix F) is indicative and serves to visually demonstrate the design intent of the proposed surface water management strategy. The drainage calculations included in Appendix E demonstrate that the proposed surface water management system can adequately serve the proposed development and

manage surface water flooding to the appropriate requirements. It must be noted that the proposed calculations in Appendix E are relatively coarse (appropriate for this stage of the development process) and have been set up and calculated to ensure that an accurate assessment has been undertaken. The model has taken conservative measures to ensure it is suitably robust to prevent any challenges developing a more refined model further along the development pipeline.

Surface water will be collected onsite using a network of rain gardens and channel drainage. The proposed external surface has been designed to support surface water catchment by sloping external areas towards the surface water catchment features.

The proposed drainage network has incorporated as many SuDS elements as reasonably possible into the design. Strong use of rain gardens, detention crates, bioretention system techniques, filter drains and, proprietary treatment systems have been used. The SuDS take on three key roles within the drainage layout i) surface water treatment (detailed discussion available in 'Section 5.1.8') ii) surface water conveyance iii) surface water attenuation. Drainage details are included in Appendix G of this report that indicate the design of the proposed SuDS and traditional piped drainage.

Where infiltration is not deemed feasible, it is proposed that the attenuation crates sit on top of 1m clean sand with perforated pipes collecting the treated water and then discharging into the watercourse. This allows all roof water to have a treatment level prior to discharging into the watercourse.

Given the development constraints, the proposed site development takes into account the surroundings and has limited the development footprint to the vulnerable areas of the site thus keeping the natural ancient woodlands and trails unaffected by the development. Therefore, a compact surface water strategy has been formulated to reduce land take.

Should a storm occur that is greater than the 1:100-year plus 40% (an exceedance event), the surface water drainage network onsite may flood. In an exceedance event, the site will be submerged by flooding allowing for a maximum 150mm depth of water on the surface of the parking and open areas. FFL will be set 300mm above predicted flood levels.

4.1.8 Surface Water Pollution Management

Pollution treatment has been provided within the proposed drainage network and the Simple Index Approach, as outlined in 'Section 26' the SuDS manual (C753) has been considered to ensure all stormwater will be appropriately treated. The site has been identified to have four different pollution source types, as outlined in Table 26.2 of the SuDS manual:

- Industry roofs: low pollution hazard level;
- Car parking: low pollution hazard level;
- Estate road: medium pollution hazard level; and
- Commercial yard area: – medium pollution hazard level

As shown in Table 26.4 of the SuDS manual, *"Bioretention underlain by a soil with good contaminant attenuation potential of at least 300 mm in depth"* will provide a suitable level of pollution treatment to all pollution sources on the site (as shown in Figure 5.1 below)

Bioretention underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.8[4]	0.8	0.8

Figure 5.1 – Infiltration Treatment Indices extracted from Table 26.4 of the SuDS Manual (C753)

The proposed development will be suitably treated for the development site.

4.1.9 Surface Water Drainage Maintenance

Responsibility for the maintenance of the proposed drainage onsite will fall to the site owner, or a maintenance company operating on their behalf.

A SuDS maintenance manual will be presented with the full planning application.

4.1.10 Water course strategy

Existing spring watercourses currently crosses the site, these water courses will be diverted to accommodate the proposed development for short sections. The diverted watercourses will have similar cross section as existing and will connect back into the existing watercourse downstream. The existing culverted outfall from this watercourse will be maintained, refer to the drainage layout in appendix F.

Figure 4.1 –Existing Spring water course map (highlighted yellow)

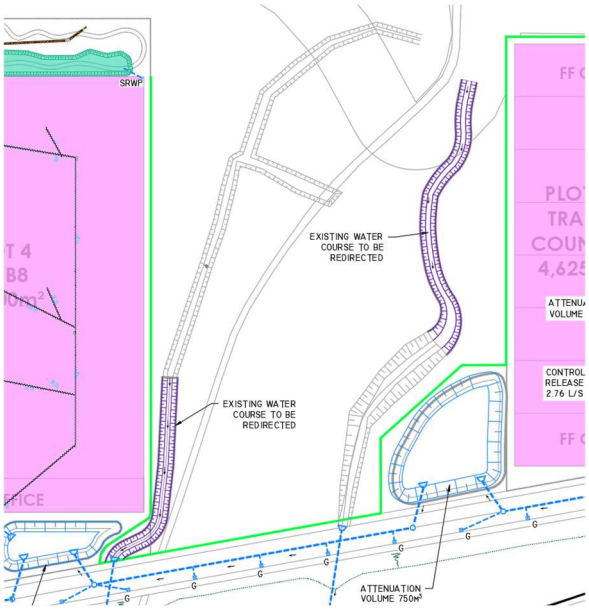

Figure 4.2 –Diverted water course map

4.2 Foul Water Drainage

The proposed development will manage foul water flows via a piped connection directly into the existing public sewer located to the north. It is to be noted that the foul sewer shown on the asset plan is currently indicative and the exact positions will be confirmed once an utilities survey is undertaken.

At the time of producing this report, the precise foul water flows associated with the proposed development are unconfirmed as the post-development requirements will be dictated by the tenants. However, the developer has provided an initial estimate that the foul flows will be approximately 6.5 l/s with a peak of 15 l/s.

A pre-development enquiry response states they have no record of the connection between the site and the sewer running through the proposed development.

Whilst no formal agreement over foul water discharge from the site has been made, active discussions are taking place with the developer, and it is considered likely that an agreement will be made in due course.

4.3 Maintenance Requirements

The end user will in all likelihood maintain the completed drainage network for the entire scheme incorporating the following activities and frequency for each SuDS component.

4.3.1 Gullies/Channels/Pipes/Manholes

All components are to be periodically cleaned of foreign particles and silt accumulation, on a quarterly basis. Components located in unadopted areas will be maintained by the landowner. Those located in adopted areas will be maintained by the adopting authority.

4.3.2 Soakaway

The soakaway will require routine maintenance by the owner to ensure continuing operation to design performance standards. A typical maintenance schedule is detailed below in table 13.1 from the CIRIA SuDS manual.

TABLE 13.1 Operation and maintenance requirements for soakaways

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

4.3.3 Proprietary Systems

Proprietary systems will require routine maintenance by the owner to ensure continuing operation to design performance standards. A typical maintenance schedule is detailed below in table 14.2 from the CIRIA SuDS manual.

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

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

5 CONCLUSION

The existing site is partly brownfield and partly greenfield. The site discharges at an unknown rate into the adjacent watercourse.

The proposed drainage network makes strong and effective use of SuDS for conveyance, attenuation, treatment, and infiltration. All surface water discharging from the site will have been appropriately treated.

The proposed drainage design complies with the following Cardiff Council SAB Standards:

1. Surface water run-off destination
    a. Surface water will be via infiltration as close as possible to the source for Plot 8, the remainder of the site will discharge to the watercourse.
2. Surface water run-off hydraulic control
    a. Discharge to the watercourse will be limited to a greenfield run-off rate of 3.9 l/s/ha with the exception of Plot 8.
3. Water quality
    a. Water quality will be achieved by directing hardstanding surface water to grassed infiltration bio-swales with roof water directed to attenuation crates / basin with 1m deep sand filter medium allowing for water to then enter the sewer via perforated pipes.
4. Amenity
    a. The swales and attenuation basins will be planted and allows for surface water ponding for short duration. The planting will be co-ordinated with the landscape architect. This in turn will help reduce overland erosion.
5. Biodiversity
    a. Biodiversity requirements will be achieved by planting the attenuation basins and swales allowing for bio-habitats to be introduced into the development.
6. Design of drainage for Construction and Maintenance and Structural Integrity
    a. A construction management plan will be formulated and submitted. A full drainage and SuDS maintenance plan will prepare as a guidance for the owner of the assets.

Foul water drainage for the proposed development will be managed by a gravity connection or a pumped solution following further investigation of the onsite sewers.

Any surface water flooding will occur in non-critical areas, FFLs are raised at least 300mm above the 0.1% AEP flood levels.

Appendix A – Proposed Development Layout

Appendix B – Topographic Survey

Appendix C – Site Investigation Report

Appendix D – Existing Sewer Layout

Appendix E – Drainage Calculations

Appendix F – Drainage Layout

Appendix G – Drainage Details

Appendix H – Existing Drainage Layout

PINNACLE
CONSULTING ENGINEERS

NORWICH
Pinnacle House
3 Meridian Way
Norwich
NR7 0TA

01603 327 170

norwich@ukpinnacle.com

WELWYN GARDEN CITY
Alchemy
Bessemer Road
Welwyn Garden City
AL7 1HE

01707 527 630

welwyn@ukpinnacle.com

LONDON
Sixth Floor
Prospect House
100 New Oxford Street
London
WC1A 1HB

0207 043 3410

london@ukpinnacle.com

DUBLIN
Grosvenor Court
67 Patrick Street
Dun Laoghaire
County Dublin

+353 1231 1041

dublin@iepinnacle.com

THE HAGUE
Business Suite 5.01 D-1
Business Center, WTC
Prinses Margrietplantsoen 33
2595 AM, The Hague
Netherlands

+31 70 240 0412

netherlands@nlpinnacle.com

www.pinnacleconsultingengineers.com