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Northern Quarter Broughton Shopping Park

Drainage Strategy Report

Date: December 2025

9540-SWF-XX-XX-TR-C-0201

S2: Suitable for Information

Version: P01

Classification: PM_40_20

Report Details

Report Title	Drainage Strategy Report
Report Reference	9540-SWF-XX-XX-TR-C-0201
Client	British Land PLC
Author	Phil Sarbutts
Approval by	Dan Rogers

Revision History

Version	Date	Suitability	Revision
P01	17/12/25	S2: Suitable for Information	Issued for the planning process

Contents

1. Development Details

1.1. The client, British Land, are looking to develop a retail site adjacent to their existing retail park site in Broughton, Flintshire.

1.2. At present the site is undeveloped.

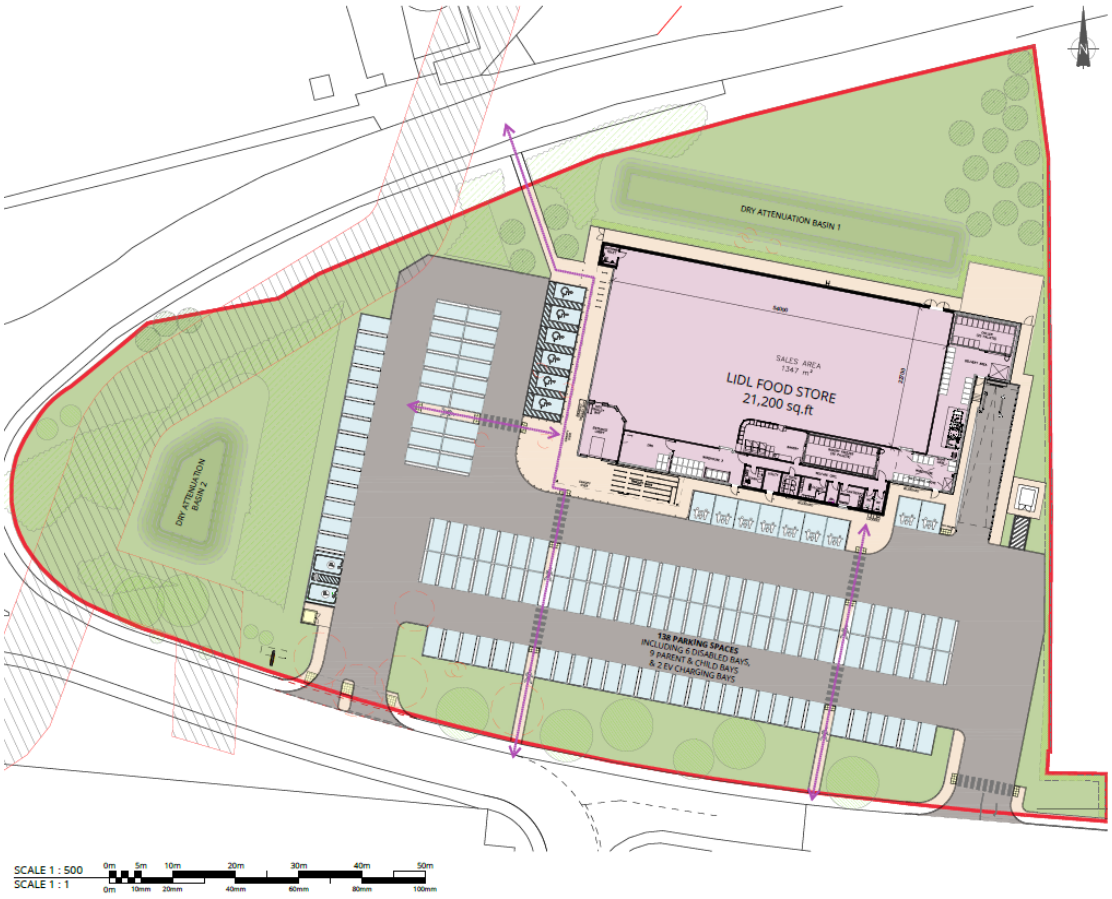
1.3. The site has a total ownership of 1.3835Ha.

1.4. Details of the existing site plan can be found in Appendix A at the rear of this report.

1.5. The proposed development will see the construction of a new food store and associated car park to the site.

1.6. The works to the site will increase the area of hardstanding to 0.8070Ha.

1.7. Appendix B details the proposed works with a smaller version of the information below.

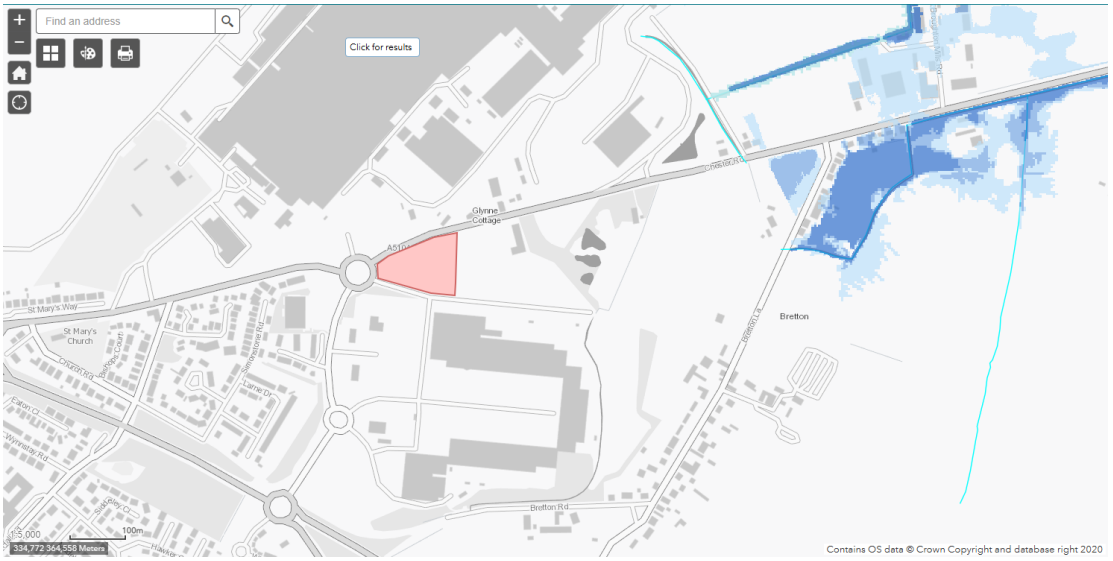


1.8. This document has been produced to support the planning application for the site although, at the time of writing, the full detailed design has not been undertaken.

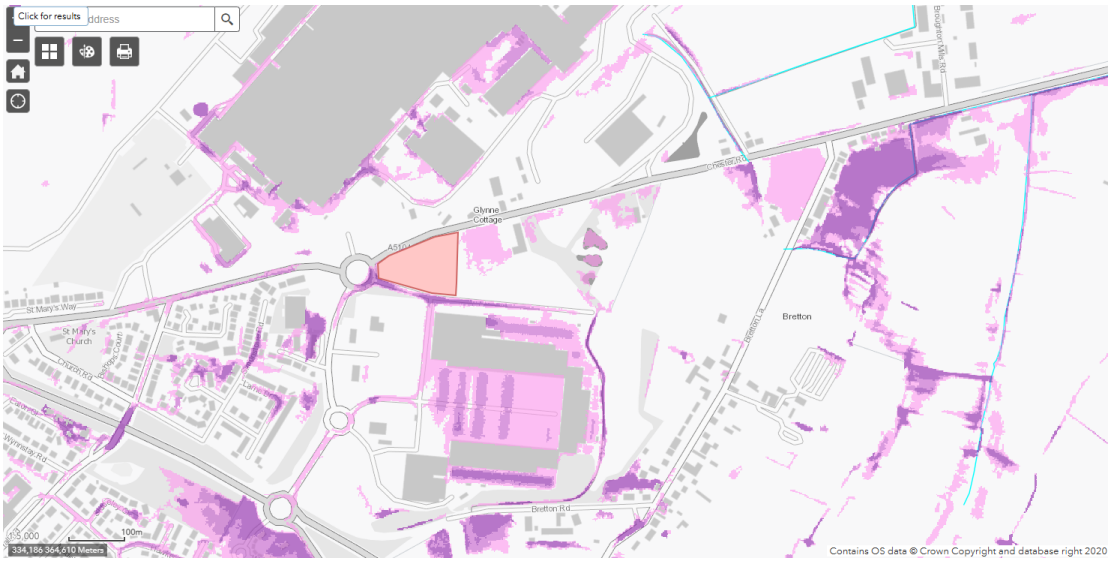
2. Flood Zone Classification

2.1. A Flood Consequences Assessment has been carried out by Weetwood Services Ltd as part of the planning application process and reference should be made to their report for detailed information on the flood risk to the development.

2.2. The Natural Resources Wales development advice map has been consulted and the site is shown to be in Flood Zone 1, an area considered with a less than 1 in 1000 (0.1%) chance of flooding in a given year, including an allowance for climate change.



2.3. The Flood Risk assessment map has also been consulted and shows the site is at medium to high risk of surface water flooding meaning it has a greater than 1% annual probability of flooding in a given year.



2.4. Larger scale versions of the mapping results can be found in Appendix C.

2.5. Discussions in the Weetwood report also cover fluvial, pluvial and surface water and small watercourse flood risk.

2.6. Additionally, pluvial risk and artificial source risk from reservoirs and canals, are discussed and noted to be low or very low risk of causing flooding.

2.7. The Weetwood report therefore concludes that the site is at negligible/ low risk of flooding from all sources and no specific mitigation measures are considered necessary.

3. Climate Change Allowance

3.1. The current guidance indicates that the change in the UK climate could result in significant changes to storm profiles and intensities and therefore an allowance should be made for this within the designs.

3.2. The Welsh Government guidance document 'Adapting to Climate Change: Guidance for Flood and Coastal Erosion Risk Management Authorities in Wales' was published in December 2017 with updated figures for flood consequence assessments issued in September 2021

3.3. This guidance states that, with an estimated design life of the development not exceeding 75 years, any necessary on-site designs for drainage, soakaways or other sustainable disposal methods for limiting surface water disposal flows will incorporate rainfall intensities that have been increased by 20-40%, depending upon the sensitivity of the location, to take account of the effects of climate change up until the year 2115.

Table 2 - Change to extreme rainfall intensity (compared to a 1961-90 baseline)

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

3.4. Given the site is not in a critical drainage area it is expected that a 20% climate change allowance will be suitable for the site.

3.5. However, for the purposes of the initial design work the upper estimates shall apply meaning 20% for the 3.33% AEP and 40% for the 1% AEP.

3.6. In addition, the requirements of the Building Regulations will be met in that no surface flooding will be accepted for the 1 in 30-year storm event and no surface water shall escape the site boundary for the 100-year event.

4. Proposed Drainage Details

4.1. Surface Water Drainage

4.1.1. The site is currently undeveloped with an existing culvert running along the western boundary of the site.

4.1.2. According to the historic drawing, contained within Appendix F, the culvert is a 2700mm x 1200mm precast concrete box culvert and this has been proven with a GPR and drainage survey also contained within the appendix.

4.1.3. Ground investigations undertaken on the site indicate cohesive measures, in the form or firm to stiff clay, under the topsoil and unlikely highly to support infiltration techniques.

4.1.4. Selected extracts from the ground investigation can be found in Appendix G.

4.1.5. The site ownership covers 1.3835 Ha with no hard landscaping in the present form.

4.1.6. The proposed development will see the area of hard landscaping increase to 0.8070Ha.

4.1.7. Any design work will be subject to a SAB Application to Flintshire County Council under Welsh Government requirements. This application will aim to adhere to the principles of sustainable drainage systems as outlined in the statutory guidance document.

4.1.8. Each particular section of the standard is discussed in the following sections and give the basis of the surface water design to be adopted on the site.

4.2. Standard S1: Surface Water Run off Destination

4.2.1. The priority for any scheme should be for collecting and re-using surface water by way of grey water harvesting, typically for use in toilets where non-potable water can be used. However, given the limited demand for grey water within the site it is not anticipated that rainwater harvesting will be financially viable for the scheme and therefore rainwater harvesting will not be considered for this project.

4.2.2. Level 2 of this section of the standard requires the discharge of the surface water to be taken to the ground unless one of the five exception criteria can be demonstrated. These are:

i. *Permeability:* the use of infiltration drainage is not practicable due to the lack of permeability of the soil for disposing of runoff

ii. *Ground Instability:* the use of infiltration drainage would result in a risk of instability through ground movement or subsidence

iii. *Pollution of groundwater or receiving surface waters:* the use of infiltration drainage would pose an unacceptable risk of pollution of groundwater or surface water bodies:

- as a result of existing contaminants on the site being mobilised or
- as a result of activities in the area draining to the infiltration device (for example an area where there is the storage or handling of chemicals or fuels) or
- as a result of the sensitivity of the groundwater or surface waterbody

iv. *Groundwater flooding:* the use of infiltration drainage would result in an unacceptable risk of flooding from groundwater

v. *Infiltration into a combined sewer:* the use of infiltration may cause ingress of flow into a combined sewer which might result in an increased risk of flooding or pollution on the site or downstream.

4.2.3. No infiltration testing has been undertaken on site at present although ground investigation works have been undertaken.

4.2.4. Extracts from the report have been reproduced in Appendix G.

4.2.5. These boreholes suggest that the site will be founded on cohesive measures and therefore unlikely to support infiltration techniques.

4.2.6. Given infiltration is unlikely to be acceptable then Level 3 of the standard requires the consideration of discharging to a surface water body.

4.2.7. The point of discharge will be via the existing culverted watercourse to the western boundary of the site.

4.2.8. Information on the existing services across the site have been determined using a GPR survey with the results being found in Appendix F alongside historic records of the culverted watercourse.

4.3. Standard S2: Surface Water Hydraulic Control

4.3.1. The calculations for greenfield run-off, based on the existing site, have been undertaken using the UKSuDS website, using the FEH statistical method, contained in Appendix H.

	QBAR	YR 2	YR 30	YR 100
Greenfield Rate (l/s)	4.5	4.2	8.1	9.9

4.3.2. It is anticipated that infiltration techniques will not be viable on the site and a restricted flow from the site will be required.

4.3.3. Discharge from site will therefore be restricted to 4.5l/s for all storm events.

4.3.4. Given the need to reduce the flow from site, attenuation measures will be required.

4.3.5. Allowing no infiltration, and a restricted discharge rate of 4.5l/s, the attenuation requirements are as follows, with the sizing found within Appendix I:

	YR 2	YR 30+CC	YR100+CC
Attenuation size V (m^3)	117 to 185	364 to 523	610 to 832

4.3.6. It is expected that the development will use a number of different control measures to limit the rate of discharge with the following measures being considered:

- Impermeable macadam – to be used to the main access road where permeable macadam is not sufficiently robust for specification in this area. Conventional drainage will be required in this area.
- Permeable Macadam – to be used in parking areas not accessed by HGV's. Likely to require perforated pipe to allow the area to drain to the network.
- Swale – acting as a conveyance run for the roof drainage.
- Dry basin – acting as final attenuation before discharge to the culverted watercourse.

4.3.7. Flow from the site will need to be controlled using orifice plates at various locations across the site.

4.3.8. Blockages to the swale and dry basin will be avoided using protected pipes with stone surround.

4.3.9. The attenuation measures will be sized to ensure that all storm events, up to and including the 1% AEP event are contained within the site boundary.

4.4. Standard S3: Water Quality

4.4.1. The proposal for much of the site is to introduce permeable paving which will treat any surface borne pollutants in the stone sub-base providing sufficient pollution mitigation under the Simple Index Approach.

4.4.2. The provision of an oil separator is therefore not necessary on the site with the permeable pavement providing sufficient treatment of the surface water run-off.

4.4.3. The roof of the retail unit is expected to discharge to a swale at the rear with pollutants being trapped within the grass construction of the swale.

4.4.4. This method will again provide sufficient protection to the downstream watercourse under the Simple Index Approach.

4.4.5. Discharge from both the swale and permeable pavement is to pass through a dry basin prior to discharge to the watercourse to provide another level of treatment to any discharge from the site.

4.5. Standard S4: Amenity

4.5.1. There is no public open space associated with the development with the site being a private retail development.

4.5.2. Given the location of the Airbus facility to the north west of the site, and the associated airport, permanent ponds are not acceptable due to the risk of bird strikes.

4.5.3. Careful consideration will need to be given to the landscaping to ensure the site increases the current amenity of grassland.

4.5.4. It should be noted that the site will have a dry basin and swale which will add to the amenity value of the site.

4.6. Standard S5: Biodiversity

4.6.1. Landscaping provision will need to be carefully considered on the site to increase the biodiversity of the site.

4.6.2. At present the site is grassland with some shrubs but there is potential to increase the vegetation provision with the dry basin and swale.

4.6.3. A Landscape Architect should be able to assist in providing a suitable design for the development that maximised the biodiversity provision on the site.

4.7. Standard S6: Design of drainage for construction, operation, maintenance and structural integrity.

4.7.1. Section 5 of the report discusses the maintenance of the proposed system in more detail however it should be noted that the responsibility for the installed drainage systems on this site will remain with the landowner, British Land. There is no intention for the drainage to be offered for adoption and it will therefore remain private.

4.7.2. The drainage will all be designed in accordance with the latest British Standards for drainage together with the advice contained within the Ciria SUDS Manual 2015 to ensure that the installed drainage is sufficient for use.

4.8. Surface Water Scheme

4.8.1. It has already been discussed in the preceding sections of this report that the site will be drained on the basis of permeable paving, a swale and dry basin before discharging to the culverted watercourse.

4.8.2. There is therefore no need for an oil separator on the site but any stone sub-base to the car park must be suitably sized for all storm events up-to and including the 1%AEP including an allowance for climate change.

4.8.3. Flow controls will be provided to outlets from the swale, permeable pavements and pond to ensure the discharge limit from site is maintained at 4.5l/s.

4.8.4. Flow controls are generally expected to be in the form of orifice plates within manholes with provision for overflows as necessary

4.8.5. A schematic drawing showing the proposed drainage for the development can be found in Appendix J at the rear of the report.

4.8.6. It is expected that the permeable sub-base will be taken under the circulation routes even if these areas are constructed in impermeable macadam. Give this, the area of permeable sub-base is expected to be 4375m^2.

4.8.7. Based on the design of sub-base being 350mm of 4-20mm stone, with a 30% void ratio, the generated storage volume to the permeable parking is at least 460m^3.

4.8.8. Given the swale is designed to be 0.75m deep with the base 4.50m, having 1 in 3 side slopes and approximately 55m long, generates 278m^3 of storage.

4.8.9. The dry basin is expected to be 1.3m deep with a base area of 96m^2 and side slopes of 1 in 3 giving an area at the surface of 287m^2. This generates storage of 238m^3.

4.8.10. Therefore, the total storage provision on the scheme is at lease 976m3, well above the required volume of 832m^3 described in paragraph 4.3.5.

4.9. Foul Water Drainage

4.9.1. The Dwr Cymru sewer records have been consulted for the area and are presented in Appendix D.

4.9.2. A pre-planning inquiry was submitted to Dwr Cymru back in November 2023 for a previous iteration of the development site and the response must therefore be treated with caution.

4.9.3. This enquiry to Dwr Cymru Welsh Water, reference PPA0008360, has indicated that the discharge from the development can be taken to the combined sewer between manholes SJ34649289 and SJ35640288 located in Chester Road to the north.

4.9.4. The nature of the effluent is domestic content with the retail store expected to have WCs and associated wash hand basins together and a small staff kitchen.

4.9.5. Findings from the pre-planning application can also be found within Appendix E.

5. Future Maintenance

5.1. Given the drainage installation is a gravity fed system the requirements for maintenance are similar to any typical installation.

5.2. It is recommended that any road gullys or linear drainage channels are cleared of silt build up on an annual basis to prevent the build-up of silts within the below ground drainage network. In addition, the roads should be swept of debris, particularly around the autumn months to reduce the ingress of leaf litter.

5.3. Land drainage and silt trap manholes associated with the car park are able to be cleaned via jetting units with the silt trap manholes to be cleared on a regular basis. It is expected that this can be on a bi-annual basis although this will need to be reviewed once the store is operational.

5.4. As with any drainage system is it recommended that jet clearing of the system is undertaken on a 5-yearly basis. This should check for defects in the pipework and allow for the removal of any debris.

5.5. Grass in the swale and dry basin should be maintained at a length of between 75mm and 150mm to maintain the pollutant removing properties.

5.6. Porous pavement areas may need to be topped up with grit if a concrete block paving solution is adopted across the site.

5.7. Further guidance on the maintenance requirements can be found in at the rear of this report.

6. Responsible Person

6.1. Following the completion of the project the client will retain responsibility for the private drainage network on site.

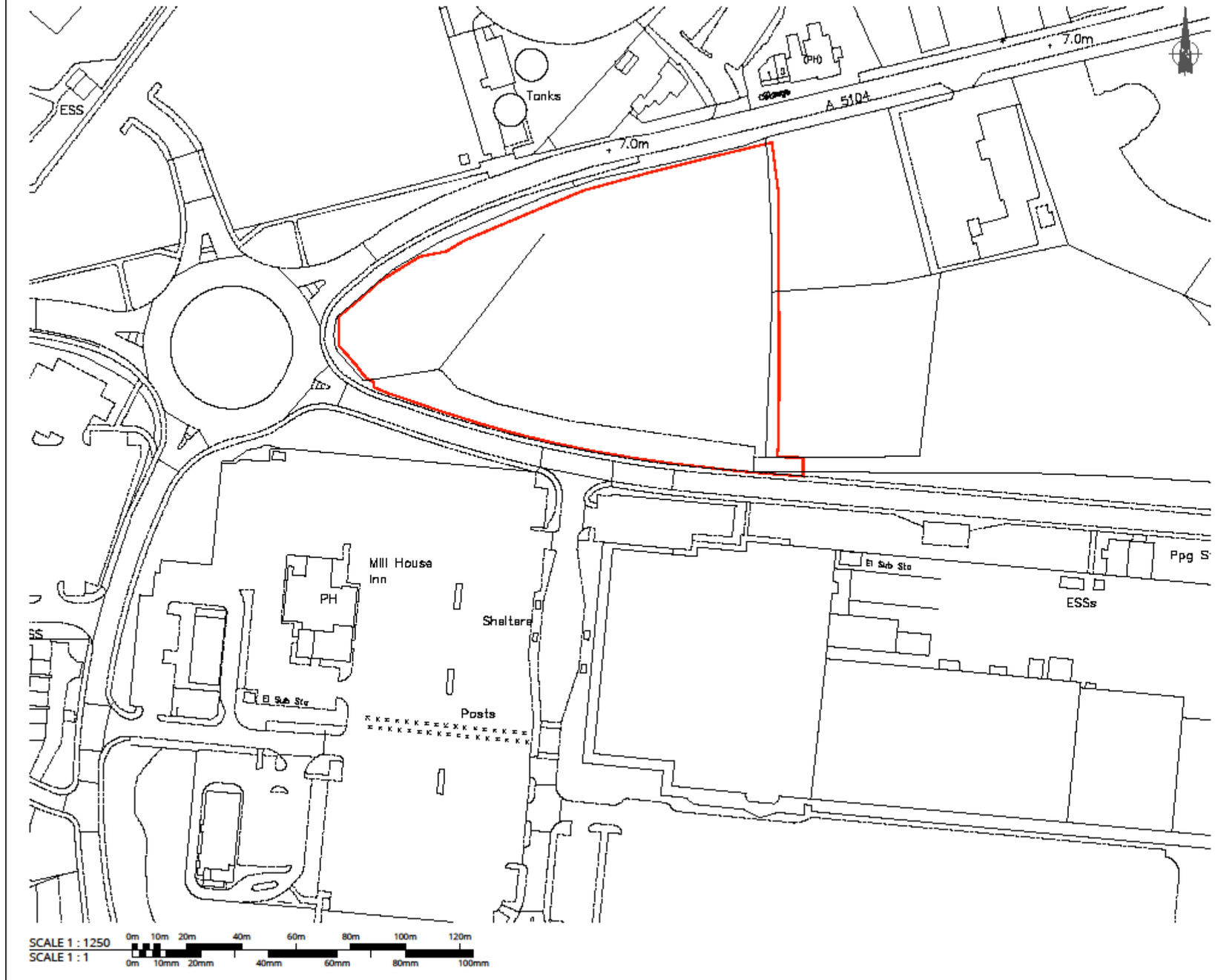
6.2. The drainage maintenance is likely have works sub-contracted as necessary to ensure the drainage is free flowing.

6.3. It is expected that the on-site management team will be the immediate point of contact for the drainage on site.

6.4. At the time of writing the report they can be contacted at

Site Security Office
Broughton Shopping Park
Chester Road
Bretton
Flintshire
CH4 0DP
Tel: 01244 534354

Appendix A Existing Site Plans



Urban Edge Architecture Limited
One Scotgate Mews, Scotgate,
Stamford, Lincolnshire, PE9 2FX.

Tel. ++44 (0)1780 755 665
Fax. ++44 (0)1780 755 360

DO NOT SCALE FROM THIS DRAWING - ALL DIMENSIONS TO BE CHECKED ON SITE, ANY DISCREPANCIES RAISED WITH URBAN EDGE

DRAWING TO BE READ IN COLOUR

URBAN EDGE
architecture / landscape / masterplanning

Client
BRITISH LAND COMPANY PLC

Project
NORTHERN QUARTER
BROUGHTON SHOPPING CENTRE
CHESTER

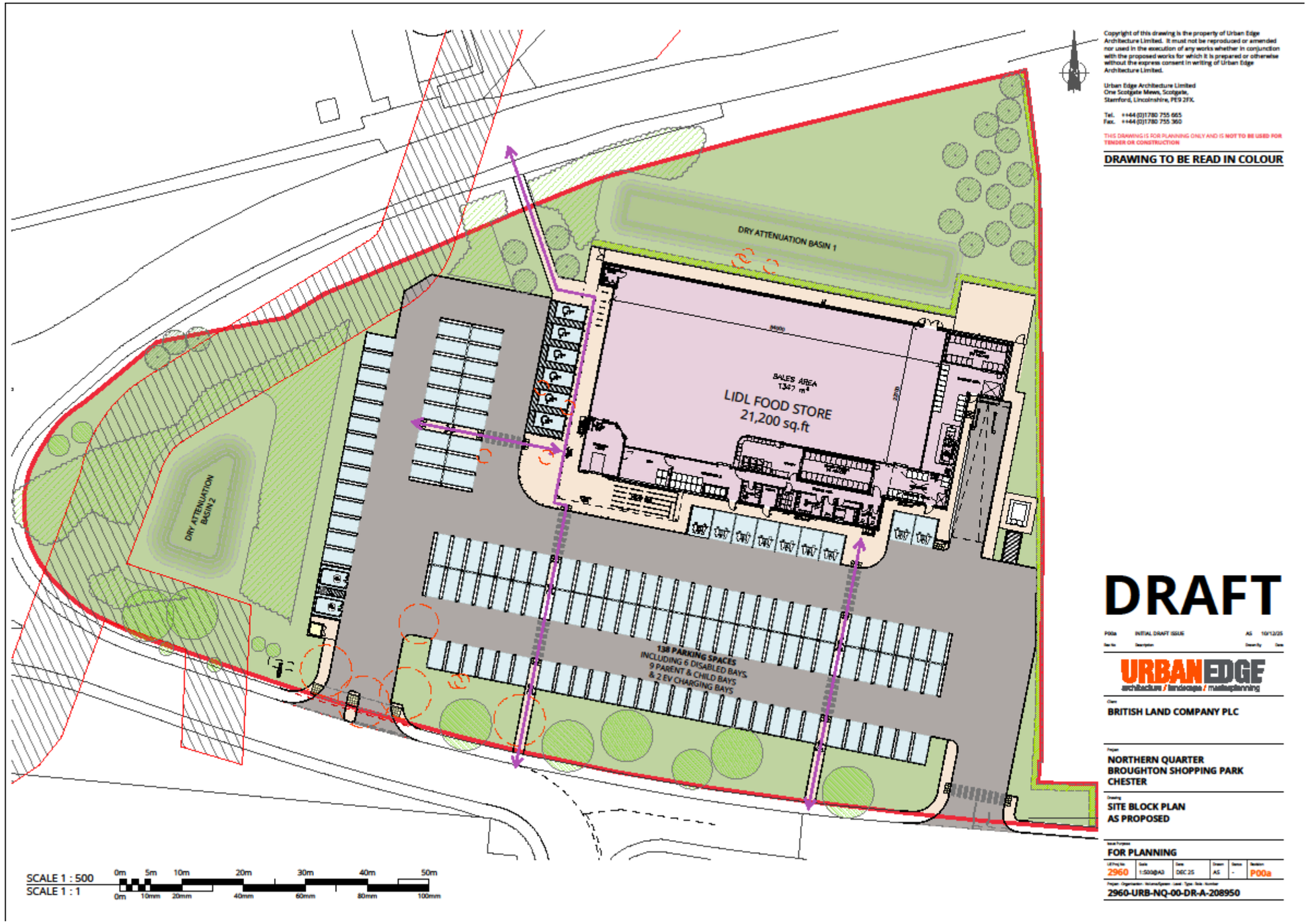
Drawing
SITE LOCATION PLAN

Issue Purpose
PLANNING

Job/Proj No	Scale	Date	Drawn	Status	Revision
2921	1:1,250@A3	AUG 25	DF	-	P00a

Project - Organisation - Volume/System - Level - Type - Role - Number
2921-URB-NQ-00-DR-A-103150

Appendix B Proposed Site Plan



Urban Edge Architecture Limited
One Scotgate Mews, Scotgate,
Stamford, Lincolnshire, PE9 2FX.

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Fax. ++44 (0)1780 755 360

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Rev No	Description	Drawn By	Date
P00a	INITIAL DRAFT ISSUE	AS	10/12/25

URBANEDGE
architecture / landscape / masterplanning

Client
BRITISH LAND COMPANY PLC

Project
NORTHERN QUARTER
BROUGHTON SHOPPING PARK
CHESTER

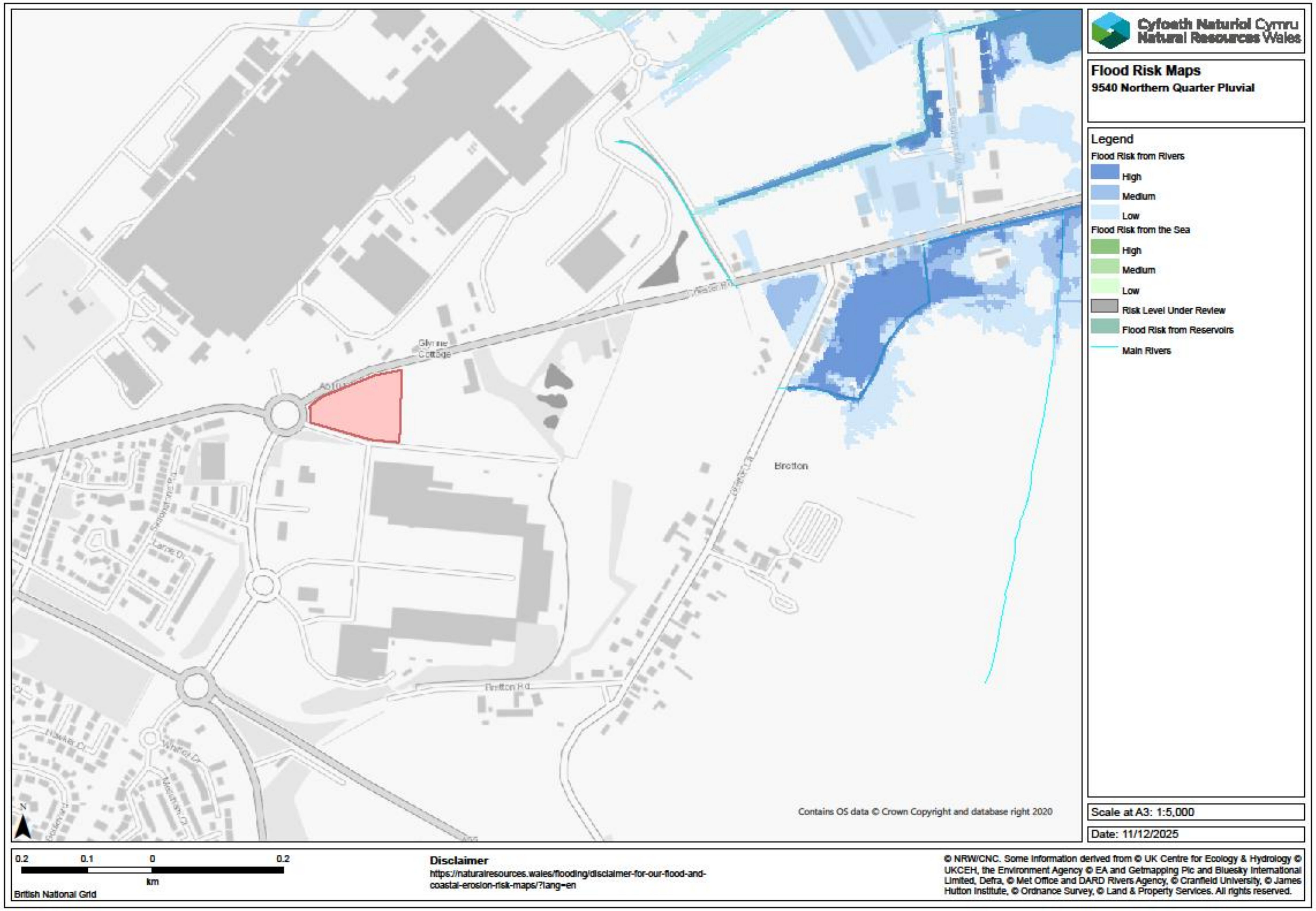
Drawing
SITE BLOCK PLAN
AS PROPOSED

Issue Purpose
FOR PLANNING

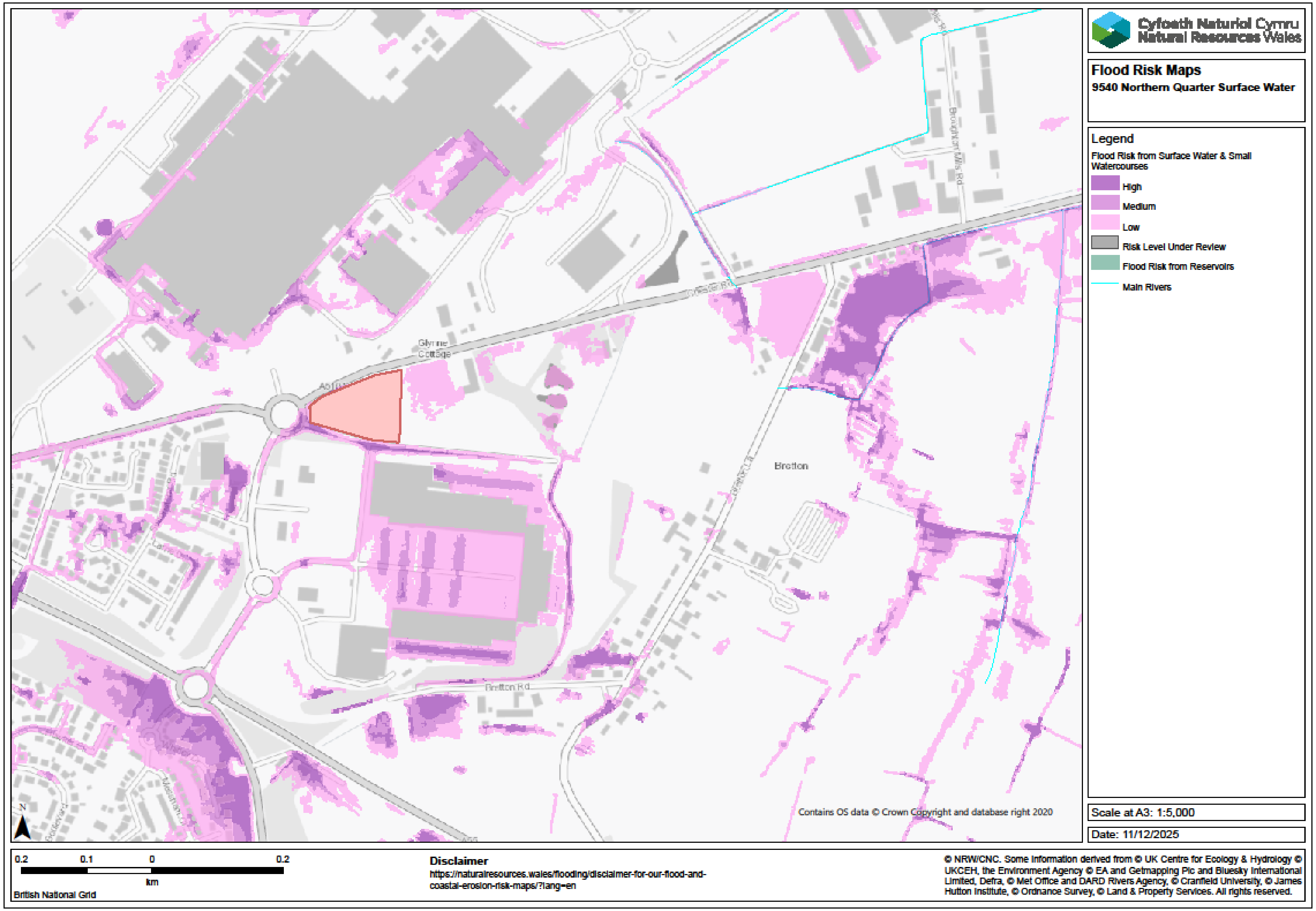
UE Proj No	Scale	Date	Drawn	Check	Revision
2960	1:500@A3	DEC 25	AS	-	P00a

Project - Organisation - Volume/System - Level - Type - Role - Number
2960-URB-NQ-00-DR-A-208950

Appendix C Natural Resource Wales Maps



Cyfoeth Naturiol Cymru
Natural Resources Wales
Flood Risk Maps
9540 Northern Quarter Pluvial
Legend
Flood Risk from Rivers
High
Medium
Low
Flood Risk from the Sea
High
Medium
Low
Risk Level Under Review
Flood Risk from Reservoirs
Main Rivers
Glynne Cottage
Bretton
Bretton Rd
Contains OS data © Crown Copyright and database right 2020
Scale at A3: 1:5,000
Date: 11/12/2025
0.2 0.1 0 0.2
km
British National Grid
Disclaimer
https://naturalresources.wales/flooding/disclaimer-for-our-flood-and-coastal-erosion-risk-maps/?lang=en
© NRW/CNC. Some information derived from © UK Centre for Ecology & Hydrology © UKCEH, the Environment Agency © EA and Getmapping Plc and Bluesky International Limited, Defra, © Met Office and DARD Rivers Agency, © Cranfield University, © James Hutton Institute, © Ordnance Survey, © Land & Property Services. All rights reserved.


Cyfoeth Naturiol Cymru
Natural Resources Wales
Flood Risk Maps
9540 Northern Quarter Surface Water
Legend
Flood Risk from Surface Water & Small Watercourses
High
Medium
Low
Risk Level Under Review
Flood Risk from Reservoirs
Main Rivers
Glynne Cottage
Bretton
Bretton Rd
Broughton Mills Rd
Contains OS data © Crown Copyright and database right 2020
Scale at A3: 1:5,000
Date: 11/12/2025
0.2 0.1 0 0.2
km
British National Grid
Disclaimer
https://naturalresources.wales/flooding/disclaimer-for-our-flood-and-coastal-erosion-risk-maps/?lang=en
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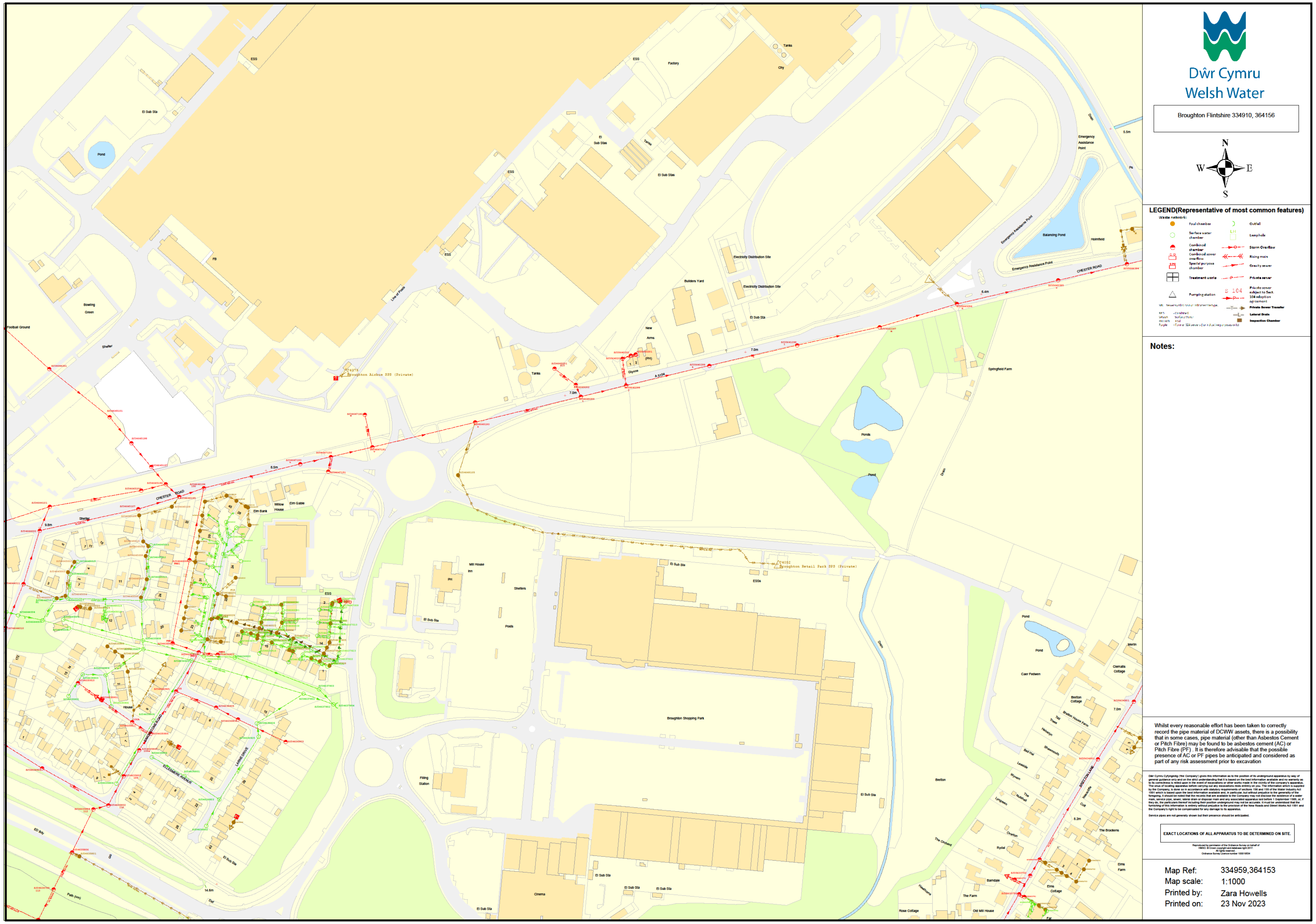
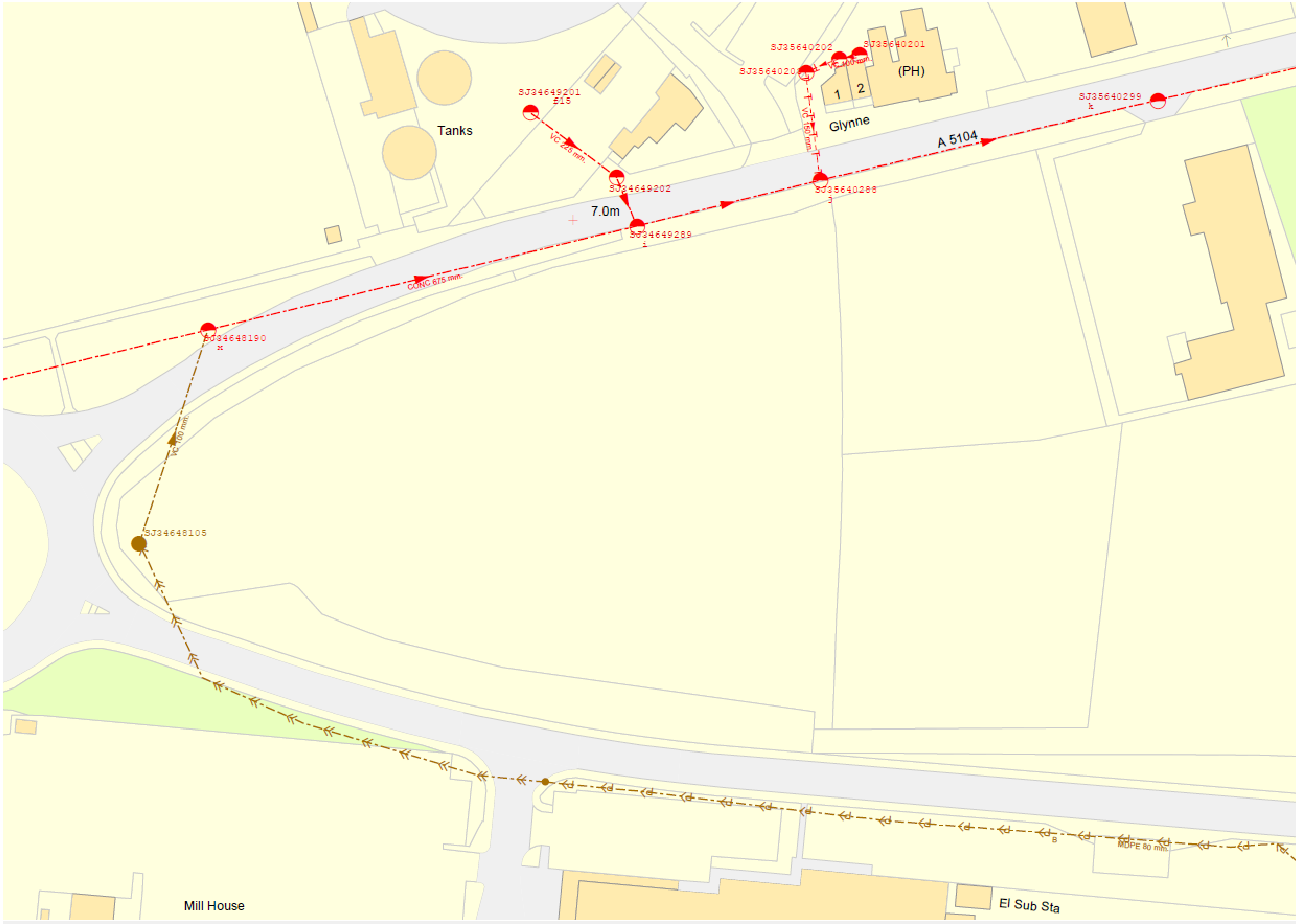
Appendix D Sewer Records


Dŵr Cymru
Welsh Water
Broughton Flintshire 334910, 364156
N
E
S
W
LEGEND(Representative of most common features)
Notes:
Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases, pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation
EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.
Map Ref: 334959,364153
Map scale: 1:1000
Printed by: Zara Howells
Printed on: 23 Nov 2023
CHESTER ROAD
Broughton Shopping Park
Cinema
Balancing Pond
Springfield Farm
Pond
Ponds
Football Ground
Bowling Green


Tanks
SJ34649201
SJ34649202
7.0m
SJ34649289
SJ35640202
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Glynne
A 5104
SJ35640288
SJ35640299
CONC 675 mm.
SJ34648190
SJ34648105
MDPE 80 mm.
Mill House
El Sub Sta

Appendix E Dwr Cymru Welsh Water Pre-planning Advice

Dŵr Cymru
Welsh Water

Developer Services
PO Box 3146
Cardiff
CF30 0EH

Tel: +44 (0)800 917 2652
Fax: +44 (0)2920 740472
E.mail: developer.services@dwrcymru.com

Gwasanaethau Datblygu
Blwch Post 3146
Caerdydd
CF30 0EH

Ffôn: +44 (0)800 917 2652
Ffacs: +44 (0)2920 740472
E.bost: developer.services@dwrcymru.com

Mr Phil Sarbutts
SWF Consulting
Unit 4 Millbank House
Riverside Business Park
Wilmslow
Cheshire
SK9 1BJ

Date: 10/11/2023
Our Ref:P A0008360

Dear Mr Sarbutts

Grid Ref: 334942 364153

Site Address: Broughton Phase 3, Broughton Retail Park, Broughton

Development: 3 Retail Units

I refer to your pre-planning enquiry received relating to the above site, seeking our views on the capacity of our network of assets and infrastructure to accommodate your proposed development. Having reviewed the details submitted I can provide the following comments which should be taken into account within any future planning application for the development.

APPRAISAL

Firstly, we note that the proposal relates to 2 drive throughs and an EV charging station at Broughton Retail Park and acknowledge that the site comprises of a potential windfall development with no allocated status in the Local Development Plan (LDP). Accordingly, whilst it does not appear an assessment has been previously undertaken of the public sewerage and watermains systems, we offer the following comments as part of our appraisal of this development.

Public Sewerage Network

The proposed development site is located in the immediate vicinity of a predominantly combined public sewerage system which drains to Chester Wastewater Treatment Works (WwTW).

Asset Protection

This site is crossed by a public sewer with the approximate position being marked on the attached Statutory Public Sewer Record. In accordance with the Water Industry Act 1991, Dwr Cymru Welsh Water requires access to its apparatus at all times in order to carry out maintenance and repairs. However, having regard to sustainable drainage plan (8998-SWF-XX-XX-DR-S-9001), it appears the proposed development would be situated outside the protection zone of the public sewer measured

3 metres either side of the centreline and therefore acceptable in principle. Nonetheless, it is recommended that the developer ascertain the distance and relationship of the sewer to the proposed development and should be referred to, for the purposes of any forthcoming planning application. Further information regarding Asset Protection is provided in the attached Advice & Guidance note.

In the first instance, it is recommended that the developer carry out a survey to ascertain the location of this sewer and establish its relationship to the proposed development. Further information regarding Asset Protection is provided in the attached Advice & Guidance note.

You are also advised that some public sewers and lateral drains may not be recorded on our maps of public sewers because they were originally privately owned and were transferred into public ownership by nature of the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011. The presence of such assets may affect the proposal. In order to assist you may contact Dwr Cymru Welsh Water on 0800 085 3968 to establish the location and status of the apparatus in and around your site. Please be mindful that under the Water Industry Act 1991 Dwr Cymru Welsh Water has rights of access to its apparatus at all times.

Surface Water Drainage

As of 7th January 2019, this proposed development is subject to Schedule 3 of the Flood and Water Management Act 2010. The development therefore requires approval of Sustainable Drainage Systems (SuDS) features, in accordance with the 'Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems'. As highlighted in these standards, the developer is required to explore and fully exhaust all surface water drainage options in accordance with a hierarchy which states that discharge to a combined sewer shall only be made as a last resort. Disposal should be made through the hierarchical approach, preferring infiltration and, where infiltration is not possible, disposal to a surface water drainage body in liaison with the Land Drainage Authority and/or Natural Resources Wales.

It is therefore recommended that the developer consult with Flintshire County Council, as the determining SuDS Approval Body (SAB), in relation to their proposals for SuDS features. Please note, DCWW is a statutory consultee to the SAB application process and will provide comments to any SuDS proposals by response to SAB consultation. Please refer to further detailed advice relating to surface water management included in our attached Advice & Guidance note.

In addition, please note that no highway or land drainage run-off will be permitted to discharge directly or indirectly into the public sewerage system.

Foul Water Drainage – Sewerage Network

We have considered the impact of foul flows generated by the proposed development and concluded that flows can be accommodated within the public sewerage system. We advise that the flows should be connected to the combined sewer between manholes SJ34649289 and SJ35640288 located in Chester road to the north. Should a planning application be submitted for this development we will seek to control these points of communication via appropriate planning conditions and therefore recommend that any drainage layout or strategy submitted as part of your application takes this into account. However, should you wish for an alternative connection point to be considered please provide further information to us in the form of a drainage strategy, preferably in advance of a planning application being submitted.

You may need to apply to Dwr Cymru Welsh Water for any connection to the public sewer under Section 106 of the Water industry Act 1991. However, if the connection to the public sewer network is either via a lateral drain (i.e. a drain which extends beyond the connecting property boundary) or via a new sewer (i.e. serves more than one property), it is now a mandatory requirement to first enter into a Section 104 Adoption Agreement (Water Industry Act 1991). The design of the sewers

and lateral drains must also conform to the Welsh Ministers Standards for Foul Sewers and Lateral Drains, and conform with the publication "Sewers for Adoption"- 7th Edition. Further information can be obtained via the Developer Services pages of www.dwrcymru.com.

SEWAGE TREATMENT

No problems are envisaged with the Waste Water Treatment Works for the treatment of domestic discharges from this site.

I trust the above information is helpful and will assist you in forming water and drainage strategies that should accompany any future planning application. I also attach copies of our water and sewer extract plans for the area, and a copy of our Planning Guidance Note which provides further information on our approach to the planning process, making connections to our systems and ensuring any existing public assets or infrastructure located within new development sites are protected.

Please note that our response is based on the information provided in your enquiry and should the information change we reserve the right to make a new representation. Should you have any queries or wish to discuss any aspect of our response please do not hesitate to contact our dedicated team of planning officers, either on 0800 917 2652 or via email at **developer.services@dwrcymru.com**

Please quote our reference number in all communications and correspondence.

Yours faithfully,

Owain George

Planning Liaison Manager

Developer Services

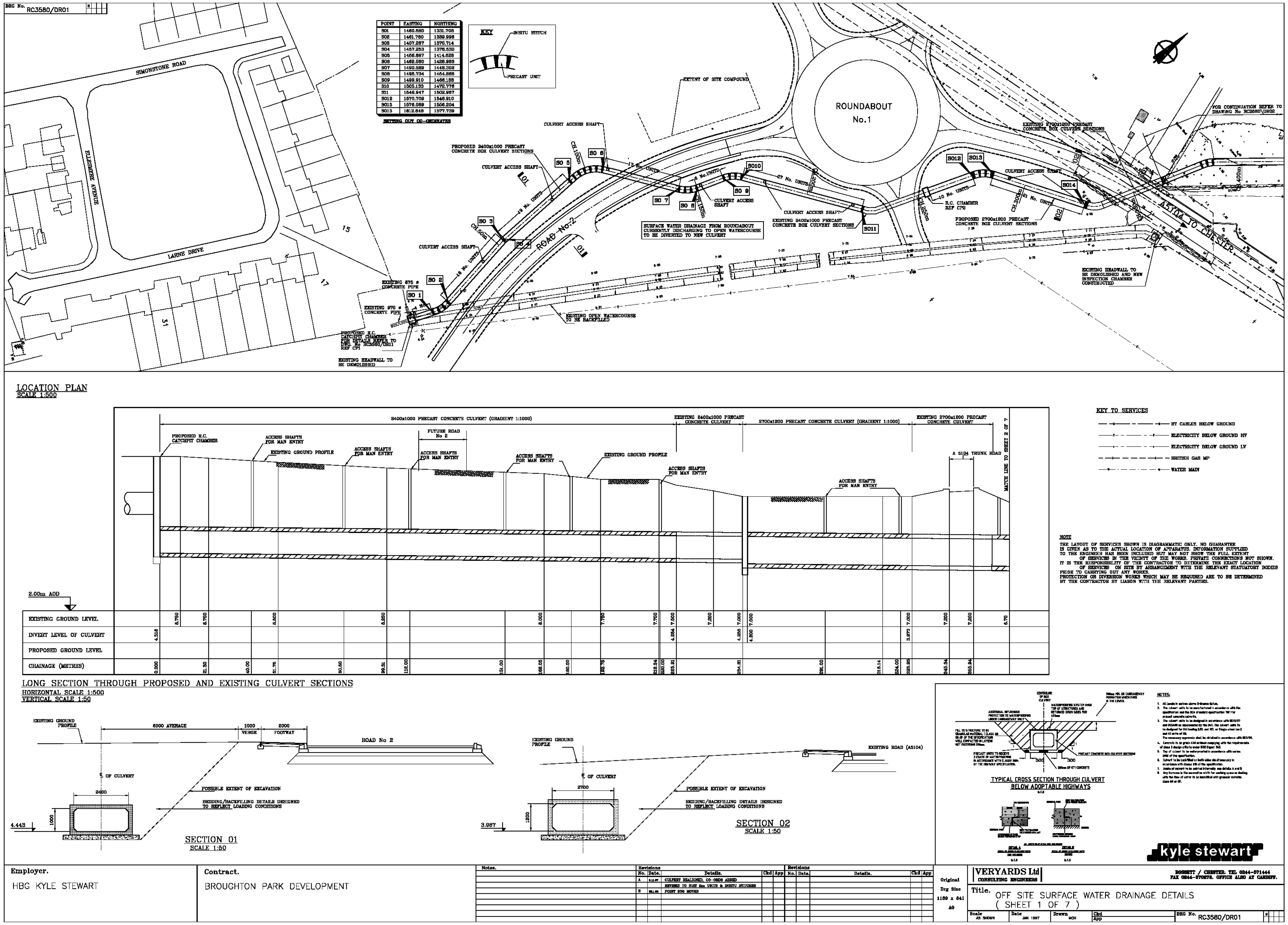
Enc. Water plan

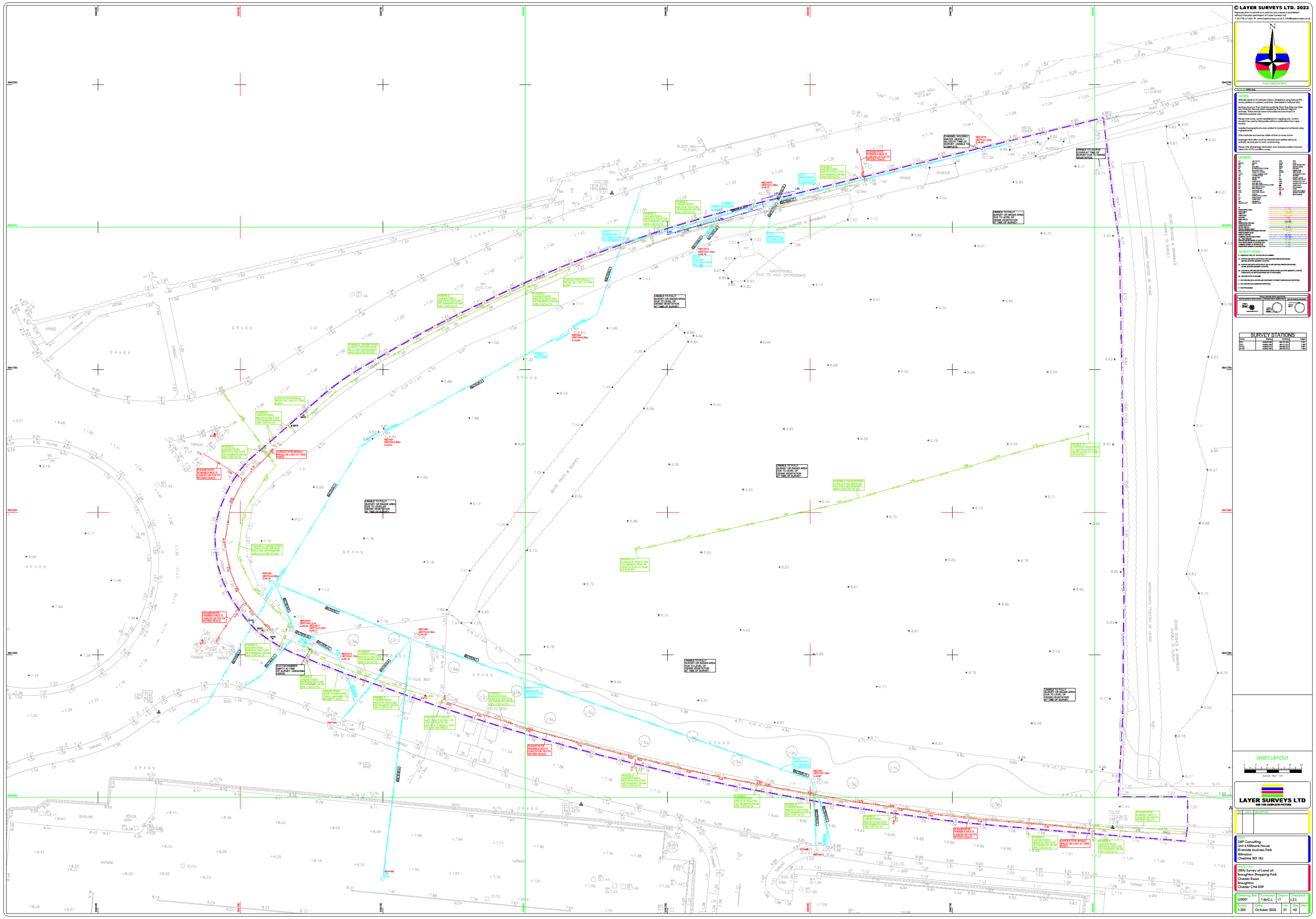
Sewer plan

Pre planning notes

***Please Note** that demands upon the water and sewerage systems change continually; consequently the information given above should be regarded as reliable for a maximum period of 12 months from the date of this letter.*

Appendix F Existing Drainage Plan


ROUNDABOUT
No.1
ROAD No.2
LOCATION PLAN
SCALE 1:500
LONG SECTION THROUGH PROPOSED AND EXISTING CULVERT SECTIONS
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:50
EXISTING GROUND LEVEL
INVERT LEVEL OF CULVERT
PROPOSED GROUND LEVEL
CHAINAGE (METRES)
SECTION 01
SCALE 1:50
SECTION 02
SCALE 1:50
KEY TO SERVICES
TYPICAL CROSS SECTION THROUGH CULVERT BELOW ADOPTABLE HIGHWAYS
kyle stewart
Employer.
HBG KYLE STEWART
Contract.
BROUGHTON PARK DEVELOPMENT
VERYARDS Ltd
CONSULTING ENGINEERS
Title.
OFF SITE SURFACE WATER DRAINAGE DETAILS
(SHEET 1 OF 7)
RC3580/DR01


© LAYER SURVEYS LTD. 2023
SURVEY STATIONS
SHEET LAYOUT
Scale Bar (m)
LAYER SURVEYS LTD
SEE THE COMPLETE PICTURE
REV DATE DESCRIPTION
CLIENT
SWF Consulting
Unit 4 Millbank House
Riverside business Park
Wilmslow
Cheshire SK9 1BJ
PROJECT TITLE
Utility Survey of Land at:
Broughton Shopping Park
Chester Road
Broughton
Chester CH4 0DP
Drawing Ref. LS5051
Surveyed T.W/C.L
Drawn I.T
Checked L.S.L
Scale 1:200
Date October 2023
No. 01
Size A0
Rev

Appendix G Borehole Records

Earth Environmental & Geotechnical Ltd
Houldsworth Mill Business Centre
Houldsworth Street
Stockport
SK5 6DA

Borehole Log

Borehole No. **WS1** Sheet 1 of 1

Project Name:	Broughton Shopping Park	Project No. A5552	Co-ords: 334995.00 - 364113.00	Hole Type WS
Location:	Broughton		Level: 7.00	Scale 1:25
Client:	SWF Consulting Ltd		Dates: 30/10/2023 - 30/10/2023	Logged By BG

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.15	ES		0.20	6.80		Grass over, dark greyish brown, slightly sandy, slightly gravelly CLAY. Sand is fine to coarse. Gravel is sub-rounded, fine to medium of mudstone. Frequent rootlets. (TOPSOIL)
		1.00		N=16 (2,3/4,4,4,4)				Firm to stiff, brown slightly sandy, slightly gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular, fine to coarse of sandstone and quartz.
								HP at 1.60m of 96kN/m2
		2.00		N=18 (3,3/4,4,5,5)				
		2.50	D					*HP at 2.60m of 120kN/m2*
		3.00		N=25 (4,4/5,5,7,8)				
								HP at 3.60m of 168kN/m2
		4.00		N=50 (3,7/50 for 295mm)	4.00	3.00		*Refusal in very dense sand.* End of borehole at 4.00 m

Remarks
1) Location scanned with CAT.

Earth Environmental & Geotechnical Ltd
Houldsworth Mill Business Centre
Houldsworth Street
Stockport
SK5 6DA

Borehole Log

Borehole No. **WS2** Sheet 1 of 1

Project Name:	Broughton Shopping Park	Project No. A5552	Co-ords: 334991.00 - 364129.00	Hole Type WS
Location:	Broughton		Level: 7.00	Scale 1:25
Client:	SWF Consulting Ltd		Dates: 30/10/2023 - 30/10/2023	Logged By BG

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES		0.30	6.70		Grass over, dark greyish brown, slightly sandy, slightly gravelly CLAY. Sand is fine to coarse. Gravel is sub-rounded, fine to medium of mudstone. Frequent rootlets. (TOPSOIL)
		0.50	ES					Firm to stiff, brown slightly sandy, slightly gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular, fine to coarse of sandstone and quartz.
		1.00		N=11 (2,3/2,3,3,3)				HP at 1.60m of 64kN/m2
		2.00		N=20 (4,4/4,4,5,7)				HP at 2.60m of 120kN/m2
		3.00		N=26 (5,6/6,7,6,7)				HP at 3.60m of 132kN/m2
		3.50	D					
		4.00		N=50 (5,8/50 for 290mm)	4.00	3.00		Refusal in very stiff clay.
								End of borehole at 4.00 m

Remarks
1) Location scanned with CAT.

Earth Environmental & Geotechnical Ltd
Houldsworth Mill Business Centre
Houldsworth Street
Stockport
SK5 6DA

Borehole Log

Borehole No. **WS4** Sheet 1 of 1

Project Name:	Broughton Shopping Park	Project No. A5552	Co-ords:	334923.00 - 364130.00	Hole Type WS
Location:	Broughton		Level:	6.00	Scale 1:25
Client:	SWF Consulting Ltd		Dates:	30/10/2023 - 30/10/2023	Logged By BG

Well	Water Strikes	Samples and In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m)	Legend	Stratum Description
		0.25	ES		0.40	5.60		Grass over, dark greyish brown, slightly sandy, slightly gravelly CLAY. Sand is fine to coarse. Gravel is sub-rounded, fine to medium of mudstone. Frequent rootlets. (TOPSOIL)
		1.00		N=14 (2,3/2,4,4,4)				Firm to stiff, brown slightly sandy, slightly gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular, fine to coarse of sandstone and quartz.
								HP at 1.50m of 120kN/m2
		2.00		N=18 (3,4/3,5,5,5)				
		2.25	D					*HP at 2.25m of 144kN/m2*
								HP at 2.75m of 168kN/m2
		3.00		N=50 (8,10/50 for 290mm)	3.00	3.00		*Refusal in very stiff clay.* End of borehole at 3.00 m

Remarks
1) Location scanned with CAT.

Earth Environmental & Geotechnical Ltd
Houldsworth Mill Business Centre
Houldsworth Street
Stockport
SK5 6DA

Borehole Log

Borehole No. **WS7** Sheet 1 of 1

Project Name:	Broughton Shopping Park	Project No. A5552	Co-ords: 334953.00 - 364171.00	Hole Type WS
Location:	Broughton		Level: 6.00	Scale 1:25
Client:	SWF Consulting Ltd		Dates: 30/10/2023 - 30/10/2023	Logged By DS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20	5.80		Grass over, dark greyish brown, slightly sandy, slightly gravelly CLAY. Sand is fine to medium. Gravel is sub-rounded to sub-angular, fine to medium of sandstone and mudstone. Frequent rootlets. (TOPSOIL)
		0.40	ES					Stiff to very stiff, brown with light grey mottling, slightly sandy, slightly gravelly CLAY. Sand is fine to medium. Gravel is sub-angular, fine to medium of mudstone and coal.
		1.00		N=15 (2,2/3,3,4,5)				
		2.00		N=19 (3,3/4,4,5,6)				
								HP at 2.60m of >215kN/m2
		2.70	D					HP at 2.70m of 120kN/m2
								HP at 2.90m of 144kN/m2
		3.00		N=53 (5,6/10,13,14,16)	3.00	3.00		Refusal in very stiff clay. End of borehole at 3.00 m

Remarks
1) Location scanned with CAT.

Earth Environmental & Geotechnical Ltd
Houldsworth Mill Business Centre
Houldsworth Street
Stockport
SK5 6DA

Borehole Log

Borehole No. **WS9** Sheet 1 of 1

Project Name:	Broughton Shopping Park	Project No. A5552	Co-ords: 334987.00 - 364167.00	Hole Type WS
Location:	Broughton		Level: 7.00	Scale 1:25
Client:	SWF Consulting Ltd		Dates: 30/10/2023 - 30/10/2023	Logged By DS

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES		0.30	6.70		Grass over, dark greyish brown, slightly sandy, slightly gravelly CLAY. Sand is fine to medium. Gravel is sub-rounded to sub-angular, fine to medium of sandstone and mudstone. Frequent rootlets. (TOPSOIL)
					1.00	6.00		Firm, brown with grey mottling, slightly sandy, slightly gravelly CLAY. Sand is fine to medium. Gravel is sub-rounded to sub-angular, fine to medium of sandstone, mudstone and coal.
		1.20		N=11 (1,2/3,2,3,3)				Very stiff, brown with grey mottling, slightly sandy, slightly gravelly CLAY. Sand is fine to medium. Gravel is sub-rounded to sub-angular, fine to medium of sandstone, mudstone and coal.
		1.40	D					HP at 1.50m of >215kN/m2
								HP at 1.70m of >215kN/m2
		2.00		N=21 (2,3/4,4,6,7)				HP at 1.90m of >215kN/m2
								HP at 2.50m of >215kN/m2
								HP at 2.70m of >215kN/m2
								HP at 2.90m of >215kN/m2
		3.00		N=51 (5,6/11,14,12,14)	3.00	4.00		Refusal in very stiff clay. End of borehole at 3.00 m

Remarks
1) Location scanned with CAT. 2) Hand dug pit to 1.00m

Appendix H QBAR Calculation

Greenfield runoff rate estimation tool

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

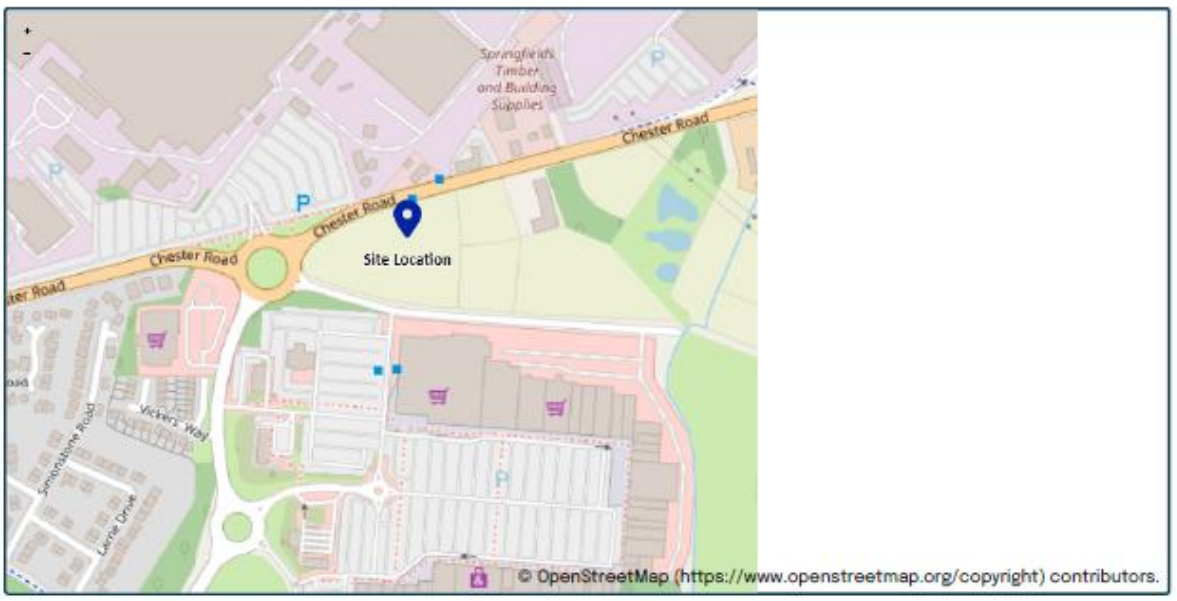
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). 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	15/12/2025
Calculated by	Phil Sarbutts
Reference	9540
Model version	2.2.2

Location

Site name	Northern Quarter
Site location	Broughton Shopping Park



Site easting (British National Grid)	334955
Site northing (British National Grid)	364154

Site details

Total site area (ha)	1.3835 ha

Greenfield runoff

Method

Method	FEH statistical (2025)

FEH statistical (2025)

	My value		Map value	
SAAR9120 (mm)	716	mm		
BFIHOST19scaled	0.482			
QMed-QBar conversion	1.075		1.075	
QMed (l/s)	4.2	l/s		
QBar (FEH statistical 2025) (l/s)	4.5	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	FEH statistical (2025)	
Flow rate 1 year (l/s)	4.0	l/s
Flow rate 2 year (l/s)	4.2	l/s
Flow rate 10 years (l/s)	6.5	l/s
Flow rate 30 years (l/s)	8.1	l/s
Flow rate 100 years (l/s)	9.9	l/s
Flow rate 200 years (l/s)	11.2	l/s

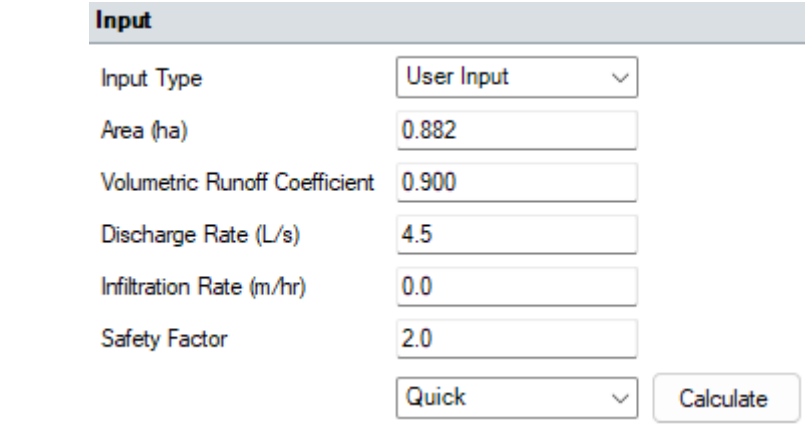
Please note runoff estimation is subject to significant uncertainty. Results are therefore normally reported to only 1 decimal place. Where 2 decimal places are provided, this does not indicate accuracy to this level, it has been adopted to prevent 'zero' figures from being reported. Outputs less than 0.01 l/s are reported as 0.01 l/s.

Disclaimer

This report was produced using the Greenfield runoff rate estimation tool (2.2.2) developed by HR Wallingford and available at uksuds.com (https://www.uksuds.com/). The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at uksuds.com/terms-conditions (https://www.uksuds.com/terms-conditions). The outputs from this tool have been used to estimate Greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, Centre for Ecology and Hydrology, Wallingford Hydrosolutions or any other organisation for the use of these data in the design or operational characteristics of any drainage scheme.

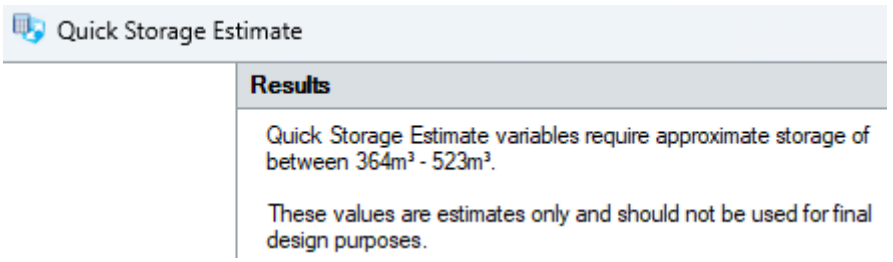
Appendix I Quick Storage Estimation

50% AEP (2-year) event:



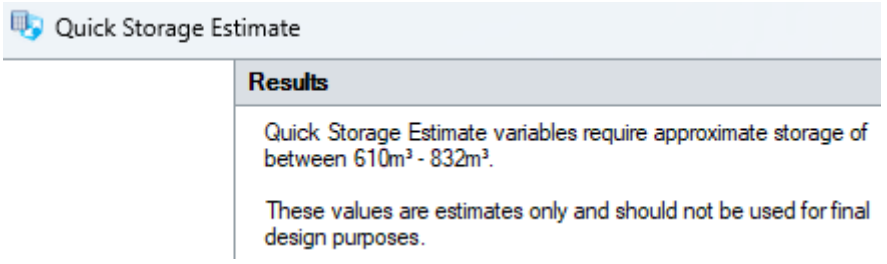
3.33% AEP (30-year) event plus climate change:

Input variables as the 50% AEP event but with 20% climate change

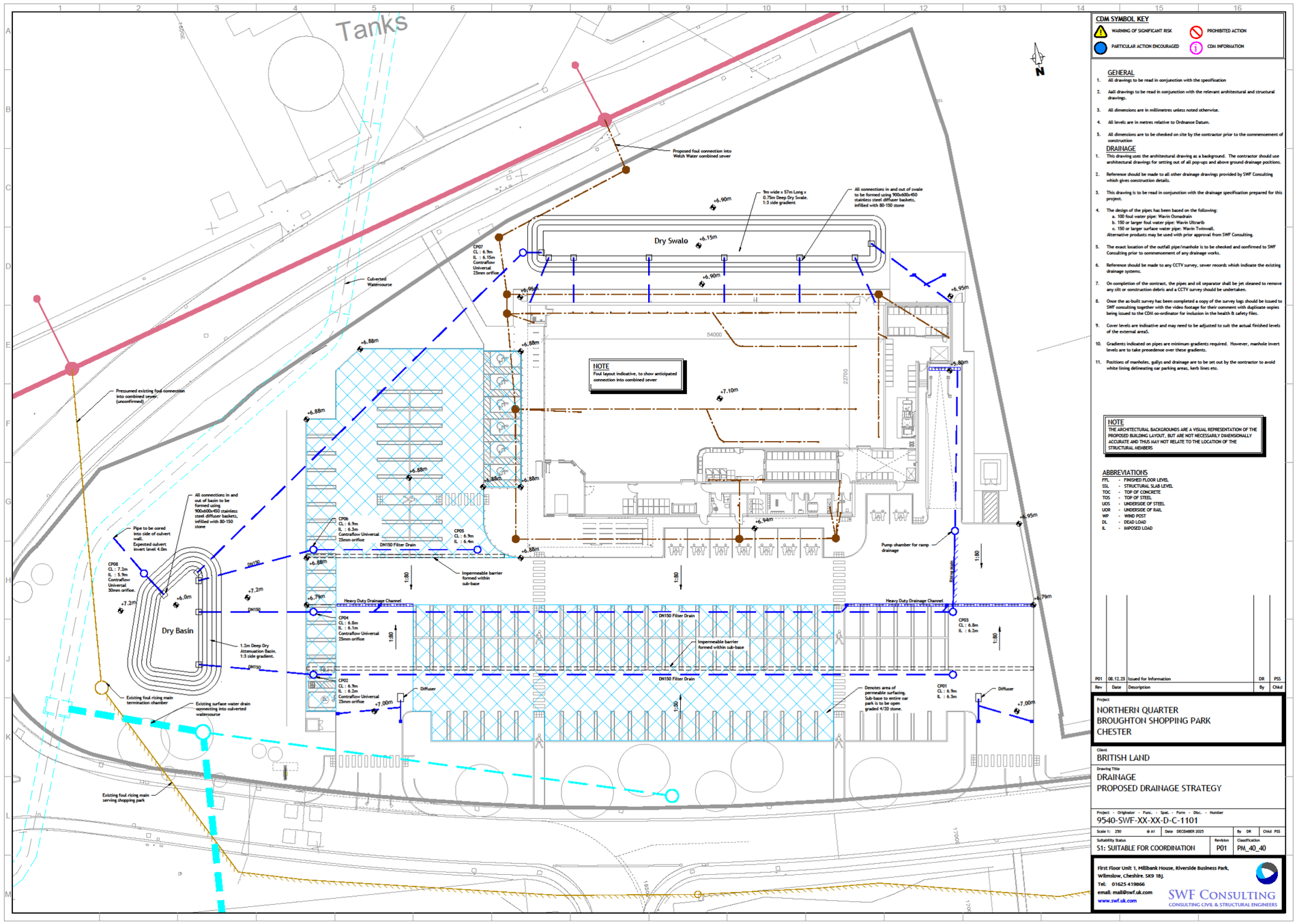


1% AEP (100-year) event plus climate change:

Input variables as the 50% AEP event but with 40% climate change



Appendix J Proposed Drainage Schematic


Tanks
Proposed foul connection into Welsh Water combined sewer
Culverted Watercourse
Presumed existing foul connection into combined sewer. (unconfirmed)
9m wide x 57m Long x 0.75m Deep Dry Swale. 1:3 side gradient
All connections in and out of swale to be formed using 900x600x450 stainless steel diffuser baskets, infilled with 80-150 stone
Dry Swale
CP07 CL : 6.9m IL : 6.15m Contraflow Universal 25mm orifice
NOTE Foul layout indicative, to show anticipated connection into combined sewer
All connections in and out of basin to be formed using 900x600x450 stainless steel diffuser baskets, infilled with 80-150 stone
Pipe to be cored into side of culvert wall. Expected culvert invert level 4.0m
CP08 CL : 7.2m IL : 5.9m Contraflow Universal 30mm orifice.
Dry Basin
1.2m Deep Dry Attenuation Basin. 1:3 side gradient.
Existing foul rising main termination chamber
Existing surface water drain connecting into culverted watercourse
Existing foul rising main serving shopping park
CP06 CL : 6.9m IL : 6.3m Contraflow Universal 25mm orifice
CP05 CL : 6.9m IL : 6.4m
DN150 Filter Drain
Impermeable barrier formed within sub-base
Heavy Duty Drainage Channel
CP04 CL : 6.8m IL : 6.1m Contraflow Universal 25mm orifice
CP02 CL : 6.9m IL : 6.2m Contraflow Universal 25mm orifice
Diffuser
CP03 CL : 6.8m IL : 6.2m
CP01 CL : 6.9m IL : 6.3m
Denotes area of permeable surfacing. Sub-base to entire car park is to be open graded 4/20 stone.
Pump chamber for ramp drainage
Rising Main
54000
22700
CDM SYMBOL KEY
WARNING OF SIGNIFICANT RISK
PROHIBITED ACTION
PARTICULAR ACTION ENCOURAGED
CDM INFORMATION
GENERAL
1. All drawings to be read in conjunction with the specification
2. Aall drawings to be read in conjunction with the relevant architectural and structural drawings.
3. All dimensions are in millimetres unless noted otherwise.
4. All levels are in metres relative to Ordnance Datum.
5. All dimensions are to be checked on site by the contractor prior to the commencement of construction
DRAINAGE
1. This drawing uses the architectural drawing as a background. The contractor should use architectural drawings for setting out of all pop-ups and above ground drainage positions.
2. Reference should be made to all other drainage drawings provided by SWF Consulting which gives construction details.
3. This drawing is to be read in conjunction with the drainage specification prepared for this project.
4. The design of the pipes has been based on the following:
a. 100 foul water pipe: Wavin Osmadrain
b. 150 or larger foul water pipe: Wavin Ultrarib
c. 150 or larger surface water pipe: Wavin Twinwall.
Alternative products may be used with prior approval from SWF Consulting.
5. The exact location of the outfall pipe/manhole is to be checked and confirmed to SWF Consulting prior to commencement of any drainage works.
6. Reference should be made to any CCTV survey, sewer records which indicate the existing drainage systems.
7. On completion of the contract, the pipes and oil separator shall be jet cleaned to remove any silt or construction debris and a CCTV survey should be undertaken.
8. Once the as-built survey has been completed a copy of the survey logs should be issued to SWF consulting together with the video footage for their comment with duplicate copies being issued to the CDM co-ordinator for inclusion in the health & safety files.
9. Cover levels are indicative and may need to be adjusted to suit the actual finished levels of the external areaS.
10. Gradients indicated on pipes are minimum gradients required. However, manhole invert levels are to take preeedence over these gradients.
11. Positions of manholes, gullys and drainage are to be set out by the contractor to avoid white lining delineating car parking areas, kerb lines etc.
NOTE
THE ARCHITECTURAL BACKGROUNDS ARE A VISUAL REPRESENTATION OF THE PROPOSED BUILDING LAYOUT, BUT ARE NOT NECESSARILY DIMENSIONALLY ACCURATE AND THUS MAY NOT RELATE TO THE LOCATION OF THE STRUCTURAL MEMBERS
ABBREVIATIONS
FFL - FINISHED FLOOR LEVEL
SSL - STRUCTURAL SLAB LEVEL
TOC - TOP OF CONCRETE
TOS - TOP OF STEEL
UOS - UNDERSIDE OF STEEL
UOR - UNDERSIDE OF RAIL
WP - WIND POST
DL - DEAD LOAD
IL - IMPOSED LOAD
P01 08.12.25 Issued for Information DR PSS
Rev Date Description By Chkd
Project
NORTHERN QUARTER
BROUGHTON SHOPPING PARK
CHESTER
Client
BRITISH LAND
Drawing Title
DRAINAGE
PROPOSED DRAINAGE STRATEGY
Project · Originator · Func. · Spat. · Form · Disc. · Number
9540-SWF-XX-XX-D-C-1101
Scale 1: 250 @ A1 Date DECEMBER 2025 By DR Chkd PSS
Suitability Status S1: SUITABLE FOR COORDINATION
Revision P01 Classification PM_40_40
First Floor Unit 1, Millbank House, Riverside Business Park, Wilmslow, Cheshire. SK9 1BJ.
Tel: 01625 419866
email: mail@swf.uk.com
www.swf.uk.com
SWF CONSULTING
CONSULTING CIVIL & STRUCTURAL ENGINEERS

Appendix K Maintenance Requirements

Swales

Extract from CIRIA SuDS Manual

TABLE 17.1 Operation and maintenance requirements for swales

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

Permeable Paving

Extract from CIRIA SuDS Manual 2015

TABLE 20.15 Operation and maintenance requirements for pervious pavements

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

Detention Basin

Extract from CIRIA SuDS Manual 2015

TABLE 22.1 Operation and maintenance requirements for detention basins

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in Chapter 23)
Occasional maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required