

BRIDGE ROAD NORTH, WREXHAM INDUSTRIAL ESTATE

DRAINAGE STRATEGY

1.0 INTRODUCTION

1.1 Background

- 1.1.1 Caulmert Limited (Caulmert) has been appointed by JCP Investments Limited (the Client) to prepare a Drainage Strategy in relation to a proposed development of a storage and distribution unit off Bridge Road North in the Wrexham Industrial Estate. The Drainage Strategy establishes the principles for surface water and foul water drainage for the proposed development, and sets out the approach that will be taken based on information gleaned from site and from desktop study.
- 1.1.2 The application site is accessed from Bridge Road North on the Wrexham Industrial Estate. The approximate post code of the site is LL13 9UG and the Ordnance Survey grid reference is SJ383499 (338339, 349941). An extract from the 1:25,000 Ordnance Survey map is at Figure 1 that highlights the site in the context of the Industrial Estate.



Figure 1: Site Location at the Wrexham Industrial Estate

1.2 Existing Site Features

- 1.2.1 The existing landuse of the application site is predominantly unkempt grassland with ruderal growth at its northern and eastern boundaries. The site extends around the east and north of an existing industrial unit (Coolpoint Refrigeration), with which the site shares the same access off Bridge Road North. The site is surrounded by established industrial units. Contemporary aerial imagery reveals a new unit currently under construction to the west of the site – Figure 2.

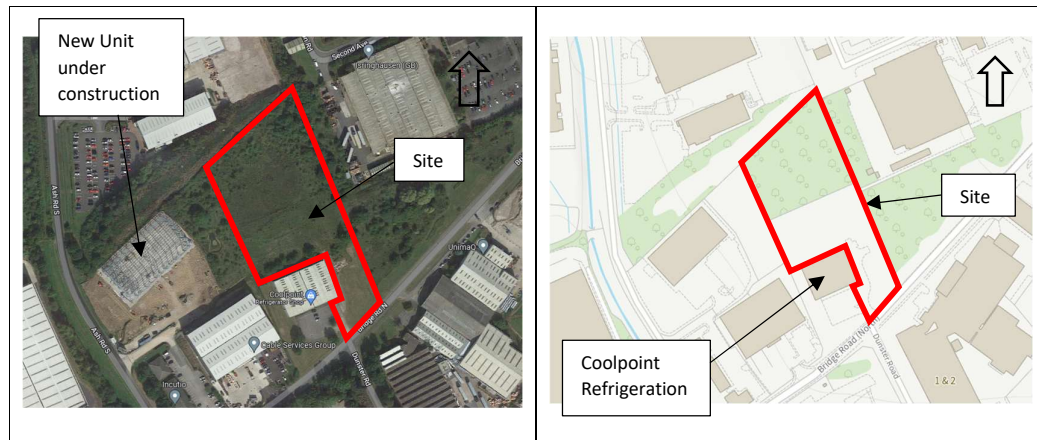


Figure 2: Site Boundary (Aerial View and Ordnance Survey Map)

- 1.2.2 The site is broadly rectangular in shape with a total plan area of approximately 1.52 hectares. It is estimated that the impermeable area of the current landuse, formed by the existing access road to the east of the Coolpoint Refrigeration unit, is 685m², which equates to less than 5% of the total site area.
- 1.2.3 A topographical survey has been undertaken and is provided in the Appendix. The site is highest along the eastern boundary, with a gentle fall to the western boundary of about 1 in 80. The highest topographic point is at the northeast corner of site at 33.1mAOD and is lowest at the western boundary of 31.1mAOD.

The existing Coolpoint Refrigeration building at the southwest boundary has a ground floor level of 31.99mAOD. The existing road surface level of Bridge Road North at the site entrance is 31.62mAOD.

- 1.2.4 An extract from a Dwr Cymru Welsh Water (DCWW) public sewer record is shown below as Figure 3. The extract shows a 150mm diameter public combined water sewer within Bridge Road North close to the site entrance. There is no public surface water sewer shown on the Public Sewer Record near the site.

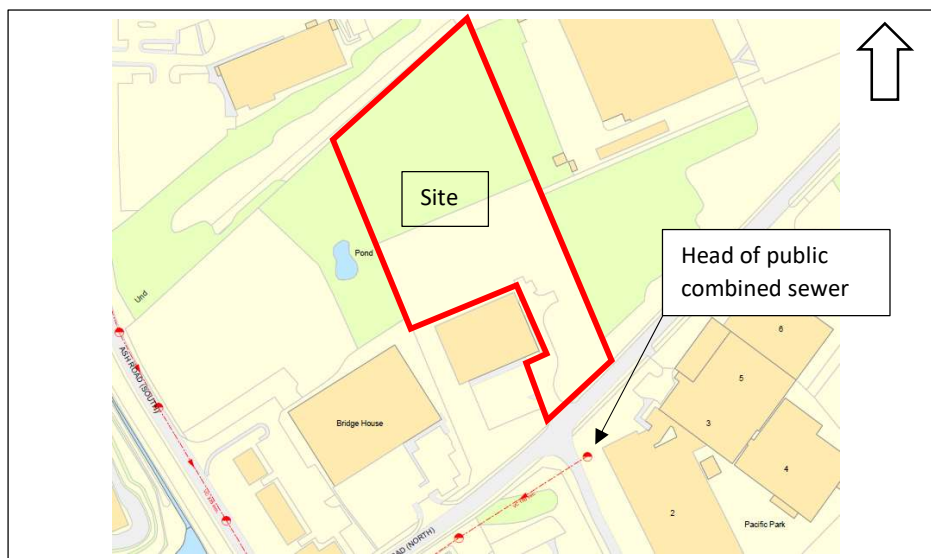


Figure 3: Extract from DCWW Public Sewer Record (October 2021)

1.3 Summary Flood Risk

- 1.3.1 Natural Resources Wales's Development Advice Map shows that the site is wholly within Flood Zone A. This is an area that is considered by NRW to be at little or no risk of fluvial or tidal flooding.
- 1.3.2 The site has a gentle east-west cross fall towards an existing watercourse alongside Ash Road South. This watercourse is the Redwither Brook, approximately 200m from the site, and is indicated by NRW to be a Main River. The Redwither Brook outfalls to the Afon Clywedog some 1.4km downstream from the development site.
- 1.3.3 The NRW's Flood Risk Assessment Wales Map indicates a small area of surface water flooding within the site boundary (coloured purple). This area appears to be alongside the existing Coolpoint Refrigeration building and is associated with the relatively low-level turning area at the head of the existing access road. Extracts from the Flood Risk Assessment Wales Map are at Figure 4.

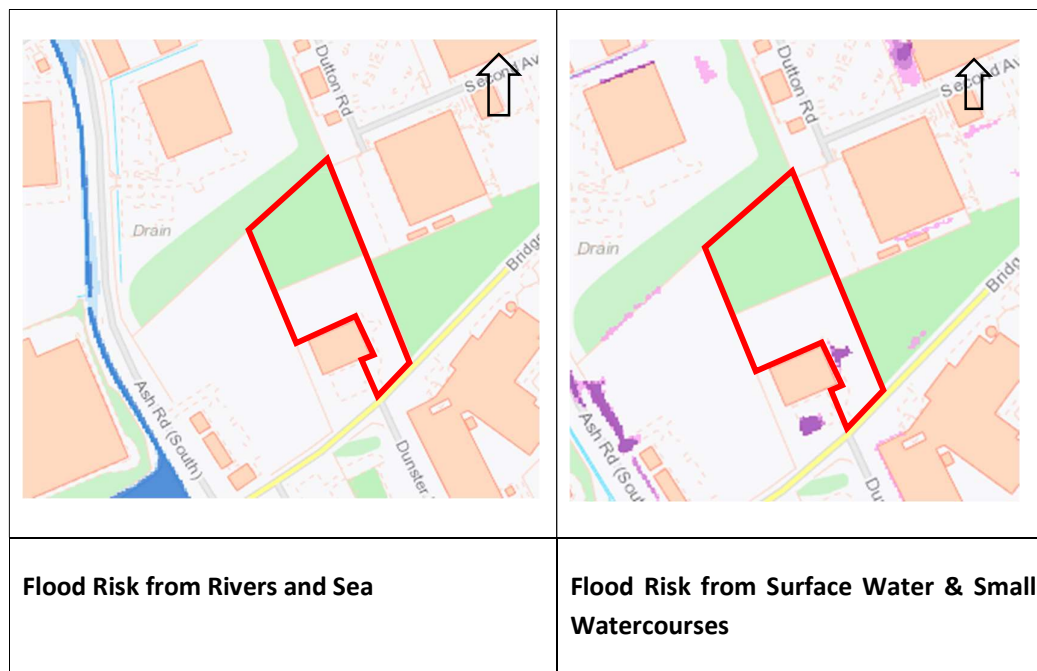


Figure 4: Extract from NRW's Flood Risk Assessment Map (July 2022)

1.4 Existing Site Drainage

- 1.4.1 The existing site area is partially drained to a surface water drain. Initial site investigation has revealed that there is a surface water drainage array within the car park of the adjacent Coolpoint Refrigeration property that discharges to a large bore drain – see Figure 5. Manhole MH01 reportedly has a 300mm diameter, 3.0m deep, surface water connection from the proposed development site, which discharges to a 5.6m deep large-bore drain at MH02.
- 1.4.2 Foul water drainage from the adjacent property appears to collect at MH03. This foul water drain is assumed to connect to the DCWW sewer within Bridge Road North.
- 1.4.3 A detailed drainage investigation will need to be undertaken to inform detailed design of the proposed development's drainage infrastructure.

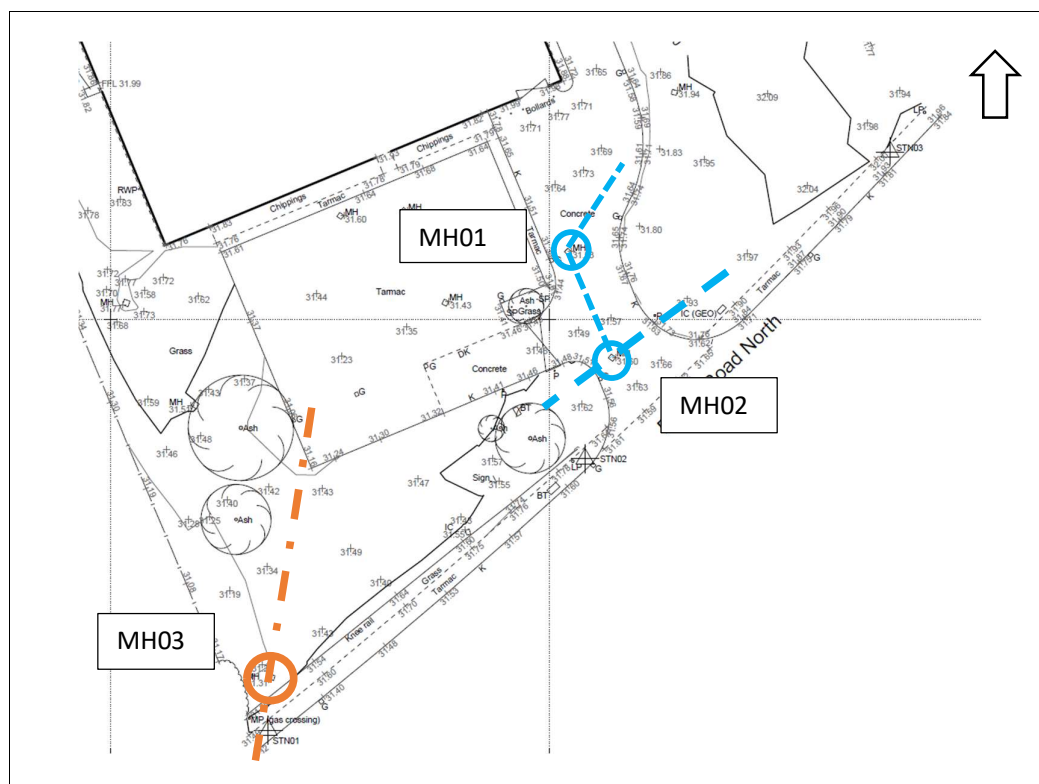


Figure 5: Initial Investigation of Existing Site Drainage

1.5 Proposed Development

1.5.1 The proposed development will comprise a storage and distribution unit with associated parking, service yard, and hardstanding areas. Access to the unit will be via a new access from Bridge Road North adjacent to the existing access used by Coolpoint Refrigeration. An excerpt from the proposed development layout drawing is at Figure 6, with the full size drawing in the Appendix. Within the proposed unit are staff amenity facilities that will generate domestic-equivalent foul effluent.

1.5.2 The table below compares the existing surface areas with the proposed land use.

Landuse	Existing (m ²)	Proposed (m ²)
Building Roof	0	5,085
Hardstanding (car park/service yard/access)	685	4,540
Landscaping	14,528	5,588
Total	15,213	15,213

Table 1: Landuse Comparison – Existing and Proposed Impermeable Areas

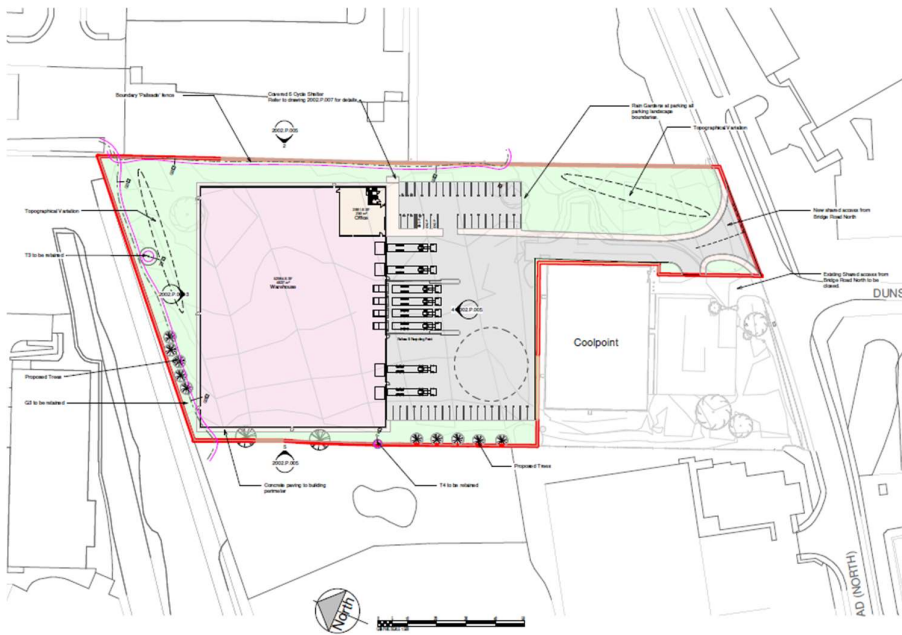


Figure 6: The Proposed Development of a Storage and Distribution Unit (excerpt from Pace Architecture Drg No 2002.P.003(A))

2.0 FOUL DRAINAGE

2.1 Connection to Public Sewer Network

- 2.1.1 It is anticipated that foul water drainage from the proposed units will discharge to existing public combined sewer within Bridge Road North. The route of new foul water drainage is expected to be via the existing foul water drain in the car park of the adjacent Coolpoint Refrigeration car park, which will be subject to a Section 106 application with DCWW.
- 2.1.2 The development is not expected to generate trade effluent flows that require connection to public sewer.
- 2.1.3 The application site is within the catchment of the River Dee and Bala Lake Special Area of Conservation (SAC). Any new development within this catchment might increase the amount of phosphate (or phosphorus) within a river SAC area that could lead to damaging effects to the SAC. However, employees at the proposed development are expected to be drawn from the local area and, as such, this should not result in a net increase in overall foul water/phosphate discharge to the SAC.

3.0 PROJECT APPROACH TO SUSTAINABLE DRAINAGE

3.1 Sustainable Drainage Standards - SuDS

3.1.1 This section summarises an outline design for the disposal of surface water from the site. The approach outlined in the Sustainable Drainage Systems Standards for Wales (SuDS Standards) and in the CIRIA SuDS manual seek to manage the quality and quantity of rainwater runoff close to where it falls and to allow its use in a manner that provides amenity benefit to site users and encourages biodiversity.

3.1.2 The statutory standards are contained within Welsh Government guidance notes are summarised in the six points listed below:

- S1 - Runoff Destination
- S2 - Hydraulic Control
- S3 - Water Quality
- S4 - Amenity
- S5 - Biodiversity
- S6 - Construction, Operation and Maintenance

3.1.3 Subsequent paragraphs of this section of the Drainage Strategy report outline how these standards can be achieved within the outline drainage design for the proposed development.

3.2 S1 - Runoff Destination

3.2.1 The statutory standards have five priority levels for surface water runoff. In order of high to low priority, these are:

- Priority 1: Surface water runoff collected for use
- Priority 2: Surface water runoff is infiltrated to ground
- Priority 3: Surface water runoff is discharged to a surface water body
- Priority 4: Surface water runoff is discharged to a surface water sewer, highway drain, or other drainage system
- Priority 5: Surface water runoff is discharged to a combined sewer

Information has been gathered specific to the proposed development and is considered against these priorities below.

Priority 1: Runoff Collected for Use

3.2.2 There is no rainwater harvesting proposed for the development as the demand for non-potable water on site is limited to toilet flushing only. There is no stress on the public water supply system identified at the site, and the provision of rainwater harvesting would not be cost-effective for the demand generated.

- 3.2.3 Water butts were considered for installation at rainwater outlet points. Nevertheless, there is no subsequent use for collected water within the proposed development.

Priority 2: Infiltration to Ground

- 3.2.4 Ground investigation trial pits have been carried out in May 2022 to advise an assessment of ground contamination within the application site. A total of 11 trial pits were made.

Ten of these trial holes recovered solid material described as 'clay' with a moisture content typically between 15% and 20%. It is evident that the ground comprises topsoil plus made ground overlying a clay that is described as a firm orange or grey/blue sandy clay. It is not likely that the ground is suitable for using infiltration as a means of managing significant flow rates of surface water. The images in Figure 7 illustrate the clays encountered within two of the trial holes made.



Figure 7: Typical Trial Pits made during Contaminated Ground Assessment (May 2022)

- 3.2.5 The British Geological Survey (BGS) 'Geology of Britain 3D' provides an overview of the geology within the application site. This shows that there are superficial deposits of Devensian Till over a Salop Formation mudstone bedrock, both of which suggest a poor rate of infiltration. The Cranfield Soil and Agrifood Institute 'Soilscapes' indicates an expected impeded drainage, substantiating the BGS detail.
- 3.2.6 Notwithstanding the predicted slow nature of ground infiltration characteristics anticipated within the application site, it is proposed that low intensity, frequent, and shallow depths of rainfall up to 5mm can be retained on site by using a drainage system that is, where appropriate, "leaky". This will give opportunity for such rainfall to slowly soak into the ground.

Priority 3: Discharge to a Surface Water Body

- 3.2.7 Contemporary Ordnance Survey mapping show that there is a body of water just to the west of the application site and on third party land. It is believed that this body of water has no outlet and is therefore not considered suitable to receive runoff from the application site. This

body of water and its close environs are to form a 'habitat area' for the adjacent development associated with planning application reference P/2015/0843 west of the site.

- 3.2.8 The Redwither Brook, adjacent to the west side of Ash Road South, is some 200m from the application site and via third party land. It is not considered reasonable to discharge surface water from the application site along this route.

Priority 4: Discharge to a Surface Water Sewer

- 3.2.9 From an initial investigation of the site there does appear to be an existing surface water drainage system. There are two existing surface water manholes located within the car park of the adjacent Coolpoint Refrigeration property. This drainage should be available to receive drainage from the proposed development subject to necessary approvals and permissions.
- 3.2.10 There is no public surface water sewer shown on DCWW public sewer records at or near the application site.

Priority 5: Discharge to a Combined Sewer

- 3.2.11 There is a public combined water sewer within Bridge Street North and close to the entrance to the site. In the absence of any alternative and higher priority disposal route, a discharge via connection to public combined sewer may be considered possible.

3.3 S2 - Hydraulic Control

- 3.3.1 The current runoff from the site is made up of surface water flow from the grassed/vegetated area and from runoff from the paved area next to the Coolpoint Refrigeration building. The paved area appears to drain via highway gullies to a point of disposal within Bridge Road North via drainage within the adjacent property's car park.
- 3.3.2 It is possible to estimate the runoff from paved areas using the Modified Rational Method formula $Q=2.78Aip$. The area of paving is approximately $685m^2$, which produces a runoff rate of 9.5 l/s with an assumed rainfall intensity of 50mm/hr. This is considered to be the maximum discharge rate from the application site's paved area.
- 3.3.3 Using the UKSuDS HR Wallingford Greenfield Runoff Estimation Tool, the greenfield Q_{bar} runoff rate from the remainder of the site (1.452ha) is estimated to be 7.0l/s, based on FEH methodology with a HOST class of 23 adjusted to reflect the impermeable nature of the soils on the site. A copy of the report is in the Appendix.
- 3.3.4 A 30% reduction in the flow rate to surface water sewer is 9.5 less 2.9 = 6.6l/s. The provision of a reduced runoff rate from the brownfield impermeable area of the site would equate to a lower flow rate presented to sewer. Typically, a limited flow rate can be achieved by installing a vortex flow control unit within the final chamber before the outfall to sewer.

- 3.3.5 A reduction in flow rate leaving the site will require the storage of surface water within the site's footprint. Such attenuation storage can be provided by a combination of a) granular material beneath porous paving, b) vegetated swale, and c) subterranean cellular storage.
- 3.3.6 Surface water storage at the application site will be designed for rainfall events with a return period of up to 1 in 100 plus a 30% climate change allowance. A 100% run-off value will be assumed for roof and external hard standing, and a 20% run-off value for the soft landscaping areas where they slope towards SuDS features. The total equivalent drained area of the proposed development is estimated to be 1.28ha.
- 3.3.7 The storage requirement has been estimated using drainage calculation. The approximate volume required for the 1 in 30 year return period is 400m³, and 1 in 100 year return period rainfall with an allowance for climate change is 745m³.
- 3.3.8 Storage for up to 1 in 30 years return period would be stored below ground in porous subbase and in cellular storage units. For storm events greater than 1 in 30 years, surface water will be designed to pond on surfaces remote from buildings, generally in low parts of the car park and adjacent landscaped area.
- 3.3.9 Storage could be provided in a number of areas within the developed site as follows:
- 350mm of Type 3 stone (30% voids) beneath service yard areas totalling 1,000m² would provide 105m³ of storage;
 - A total parking area of 700m² x 0.5m deep cellular storage would provide 330m³;
 - A 100mm average depth of standing water over sections of the car parking and service yard areas would provide a storage volume of approximately 100m³;
 - A shallow depression within the landscaped area in the southern part of the site could contain around 200m³ of surface storage.
- 3.3.10 The total of these storage volumes is 735m³, which approximates to the estimated 1 in 100 year plus climate change storage requirement.
- 3.3.11 It should also be possible to provide minor topographical variations in areas of the application site as part of ecological mitigation measures. These ecological mitigation features, which will have no drainage outlet, will act as shallow swales for the long-term retention of surface water.

S3 - Water Quality

- 3.3.12 The quality of the surface water to be discharged from the site shall be assessed using the simple index approach described in Section 26.7 of CIRIA C753 'The SUDS Manual'. The sources of rainwater discharges and their potential for contamination will be assessed and relevant pollution mitigation measures will be researched and specified.
- 3.3.13 Heavy goods vehicle delivery and manoeuvring areas will drain initially to a bioremediation channels, such as the D-Rainclean bioremediation channel (Stormwater Management Limited)

shown in Figure 8. It is also likely that an oil separator will be necessary for secondary mitigation from areas of 'high' pollution risk.

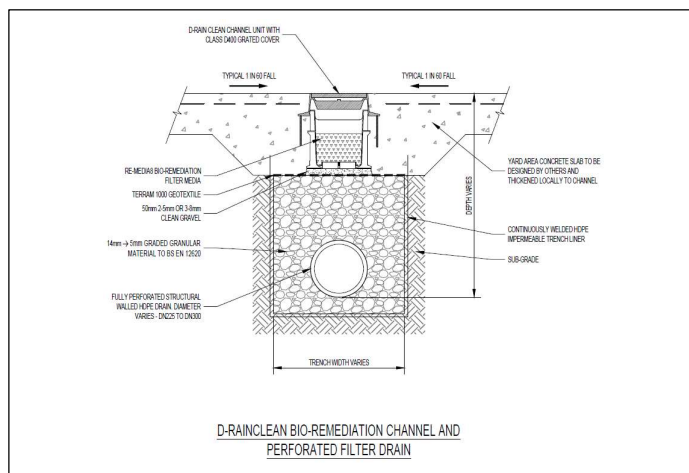


Figure 8: Bioremediation Channel – typical detail

3.3.14 Car parking areas will drain via porous paving and supplemented where possible into a swale via over-the-edge flow routes.

3.3.15 It should be possible to create rain gardens or planters on the western edge of the service yard and to the eastern and southern edges of the car parking area where elements of water retention and filtration should occur.

3.4 S4 - Amenity and S5 - Biodiversity

3.4.1 The Amenity and Biodiversity standards can be achieved in a number of ways. Planters will provide opportunity for plants to encourage insects, and landscaped areas will perpetuate this character with a wider variety of vegetation. The topographical variations proposed in the southern part of the site can provide a wetland-type environment. The combined effect will be to provide an amenity for occupants of the development and for those passing by, and species-rich plants should encourage a biodiversity greater than the site currently supports.

3.5 S6 - Construction, Operation and Maintenance

3.5.1 The SuDS proposed for the development will remain as a private facility of the landowner. The SuDS features will not be offered for adoption by the SuDS Approval Body (SAB).

3.5.2 Inspection and maintenance guidance will be prepared for the SuDS system and issued to the developer and as part of the full SAB application.

4.0 EXCEEDANCE FLOW PATHS

4.1 Flood Risk Assessment

- 4.1.1 Section 1.3 refers to existing flood risk. The overall flood risk of the site is likely to remain unaltered consequential to the proposed development.
- 4.1.2 It should be possible to reduce or eliminate the small area of local flood risk (Flood Risk from Surface Water & Small Watercourses) noted at Figure 4 by creating ground levels that prevent standing water.

4.2 Exceedance Routing

- 4.2.1 The existing landuse slopes from the east to the west towards third party land. This flow path should not continue in the developed site as it would introduce an unacceptable risk to adjacent land.
- 4.2.2 The proposed development should allow for ground levels that slope south towards Bridge Road North. It is anticipated that the finished floor level of the proposed unit will be above existing ground levels to achieve satisfactory exceedance flow routes. In the event of rainfall exceeding the system design capacity or in the event of a collapse or blockage of drainage infrastructure then rainwater would be expected to flow onto Bridge Road North.

5.0 SUMMARY

5.1 Foul Water Drainage

- 5.1.1 The proposed development will generate domestic-equivalent foul water flows that will be connected to the public combined water sewer in Bridge Road North via an existing manhole within the car park of the adjacent property.

5.2 Surface Water Drainage

- 5.2.1 The table below summarises how the drainage strategy for the proposed development will address the standards and priorities contained in the Sustainable Drainage System Standards for Wales.

Standard	Comments
S1 – Destination	
Priority 1 – Re-use	- Limited demand for non-potable water - No stress on water supply mains - Rainwater harvesting not cost effective - No requirements for irrigation
Priority 2 – Infiltration	Unsuitable ground for significant infiltration

	Locally, permeable parking area and adjacent swale provide opportunity for infiltration of shallow depth rainfall
Priority 3 – Discharge to surface water body	There is no watercourse reasonably close to the site
Priority 4 – Discharge to surface water sewer	There is a surface water sewer close to the site that may be suitable for discharge subject to consent and permission
Priority 5 – Discharge to combined sewer	There is a combined water sewer within Bridge Road North that may be suitable for discharge
S2 – Runoff Hydraulic Control	
	- The site comprises mainly grassed area, with some impermeable surfaces draining to a piped system. - It is proposed to reduce the runoff from the developed site to a lower rate currently achieved from the undeveloped site. - The developed site runoff would be limited to 6.6l/s - Attenuation would be achieved by porous paving and cellular storage
S3 – Water Quality	
	- Use of rain gardens/planters and porous pavements provides sufficient mitigation for level of potential pollution anticipated for low risk areas - The vehicle turning area would be protected by a bio-remediation channel such as D-Rainclean plus an oil interceptor
S4 - Amenity & S5 - Biodiversity	
	- Rain gardens/planters will provide some benefit - Landscaped areas/swales will be planted with species-rich seeds - Opportunities for staff to visit landscaped areas for breaks and wellbeing.
S6 - Construction, Operation & Maintenance	
	- Detailed design is subject to SAB approval - Development owner and operator to be provided with maintenance guidance document

Table 2: Summary of Drainage Strategy

5.3 Flood Risk

- 5.3.1 Minor surface water flood risk is identified at the existing site associated with the access road turning head. Flood exceedance routes from the existing site currently flow west towards third party land.
- 5.3.2 Surface water flooding from the existing access road will be effectively managed by the proposed development, specifically by the adjacent landscape area. The flood exceedance route for the developed site is to be redirected south towards the Bridge Road North highway.

5.4 Outline Proposals

5.4.1 The accompanying sketch within the Appendix illustrates the outline drainage layout for the proposed site. The outline proposal addresses shortcomings of the existing landuse and seeks to improve the drainage, flood risk, and environmental value of the site.

Appendix

- Topographical Survey
- The Development Proposal
- Greenfield Runoff Estimate
- Outline SuDS Layout

Prepared by	Steve Barber-Bailey	15 th July 2022
Approved by	Jonathan Sykes	18 th July 2022
Document Reference	5125-CAU-XX-XX-RP-D-0300.S4-P2	
Status	Planning Issue	

REVISION HISTORY

Rev No	Date	Paragraph	Change History
P1	29/09/22	-	Planning Issue
P2	09/05/23	-	Revised proposed development

PROPOSED SITE PLAN

1 1 : 500

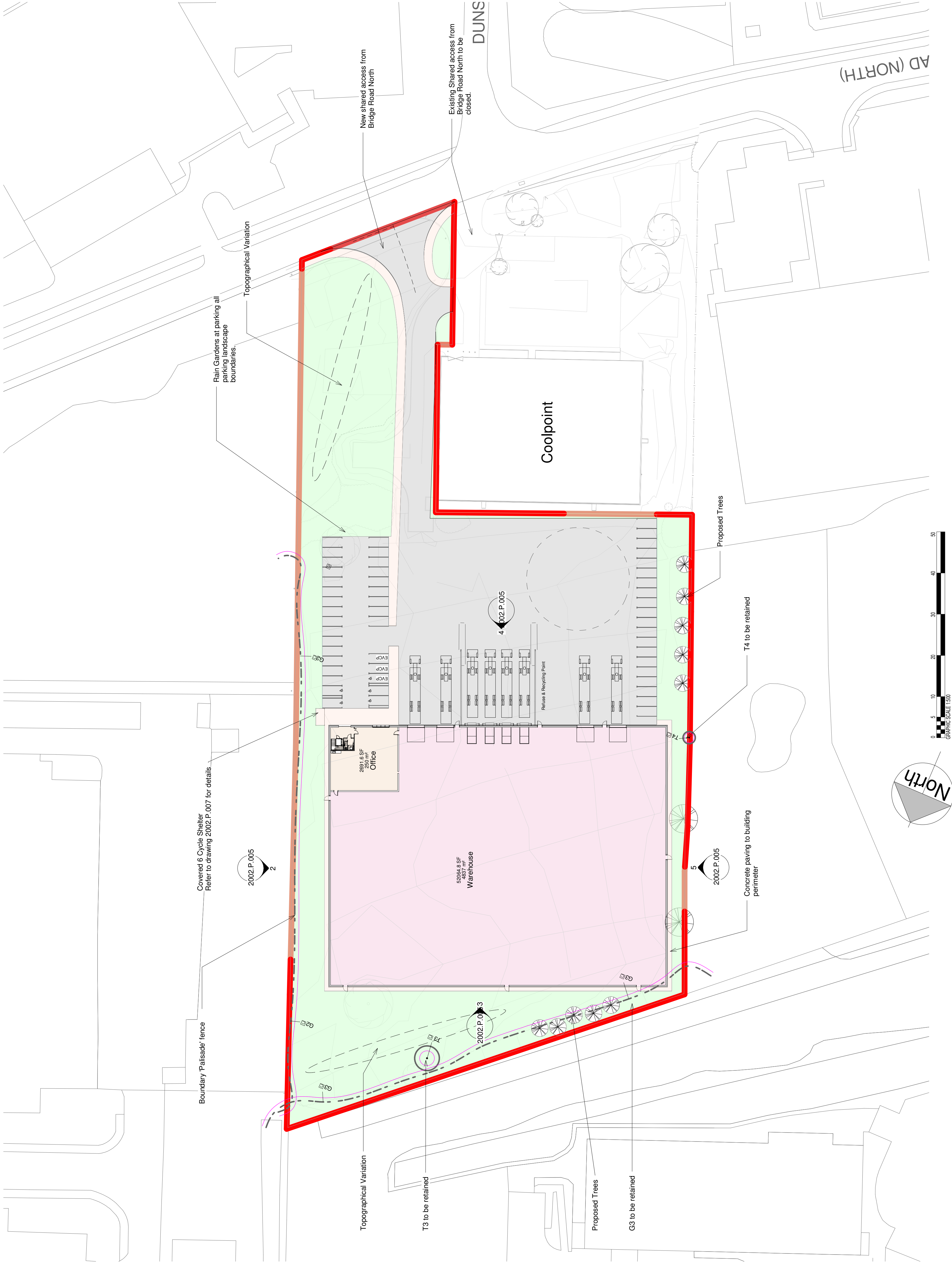
ECOLOGICAL MITIGATION

Gross Site Area	15,105m2
Area of Mitigation (shown green)	4,696m2 (31% of application area)
Developed Area	10,410m2 (69% of application area)
Building Footprint	5,210m2
Hardstanding	5,200m2

PARKING PROVISION

UNIT 1		
Gross Internal Area	5,087m2	
Parking Provisions		51 Total spaces (average 1/100m2)
Car Parking Bays	5 spaces (10% of Provision)	
Disabled Bays	6 sheltered spaces	
Cycles		

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 - Pace Architecture Limited accept no liability whatsoever if this drawing is used by any other person or for any other purpose.
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 - If in doubt ask.
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- BS 9999 (2017)** - Fire safety in the design, management and construction of buildings. Code of practice for the design, management and construction of buildings.
- BS 6864 (2017)** - Sanitary installations. Code of practice for the design of sanitary facilities.
- BS 5266 (2016)** - Emergency Lighting - Code of practice for the emergency lighting of premises.
- BS 5499 (2014)** - Guidance for the selection and use of safety signs and fire safety notices



PURPOSE OF ISSUE		Project Status	
PACE ARCHITECTURE		www.pace-architecture.co.uk	
PROJECT		NEW INDUSTRIAL UNIT	
ADDRESS		Bridge Road North, Wrexham, LL13 9PS	
TITLE		PROPOSED SITE PLAN	
CLIENT		JCP Investments Ltd	
DRAWN BY HC	CHECKED BY HJ	DATE 27.04.23	
SCALE (@ A1) 1 : 500		PROJECT NUMBER 2002	
DRAWING NUMBER 2002.P.003(A)		REV	

Print

Close Report



Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:

Steve Barber-Bailey

Site name:

Coolpoint Refrigeration

Site location:

Wrexham IE

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.

Site Details

Latitude:

53.04273° N

Longitude:

2.92143° W

Reference:

971334192

Date:

Jul 11 2022 14:34

Runoff estimation approach

FEH Statistical

Site characteristics

Total site area (ha):1.4515

Methodology

Q_{MED} estimation method:Calculate from BFI and SAAR

BFI and SPR method:Calculate from dominant HOST

HOST class:23

BFI / BFIHOST:0.302

Q_{MED} (l/s):6.53

Q_{BAR} / Q_{MED} factor:1.08

Notes

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

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

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

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

(3) Is $SPR/SPR_{HOST} \leq 0.3$?

Hydrological characteristics

DefaultEdited

SAAR (mm):684684

Hydrological region:99

Growth curve factor 1 year:0.880.88

Growth curve factor 30 years:1.781.78

Growth curve factor 100 years:2.182.18

Growth curve factor 200 years:2.462.46

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

Greenfield runoff rates

DefaultEdited

Q_{BAR} (l/s):7.027.02

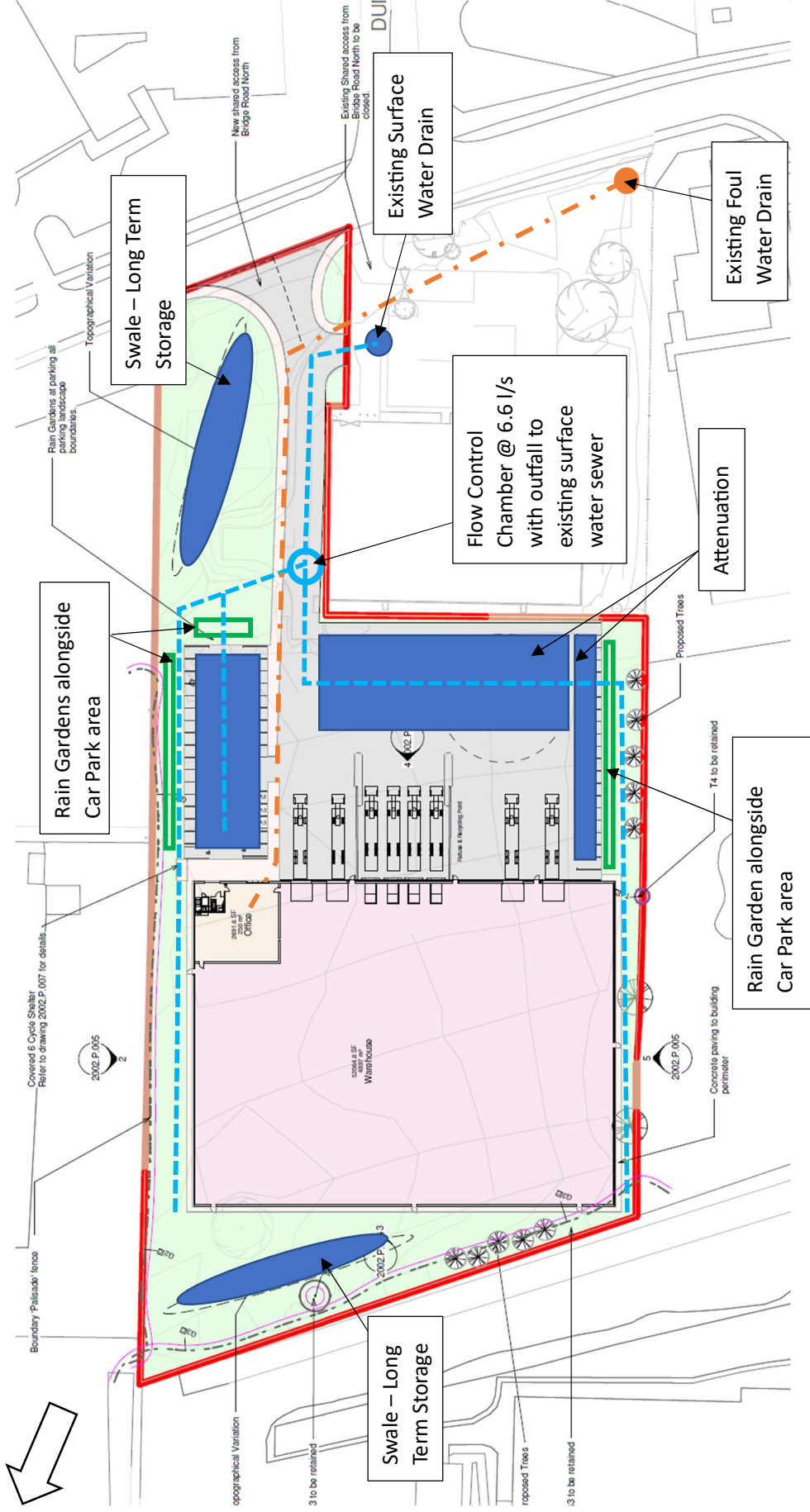
1 in 1 year (l/s):6.176.17

1 in 30 years (l/s):12.4912.49

1 in 100 year (l/s):15.2915.29

1 in 200 years (l/s):17.2617.26

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



PROPOSED COMMERCIAL DEVELOPMENT
BRIDGE ROAD NORTH – WREXHAM INDUSTRIAL ESTATE

DRAINAGE STRATEGY – OUTLINE DRAINAGE LAYOUT

SKETCH REF: 5125-CAU-XX-SK-C-0001.P02 (not to scale)



Registered Office: InTec, Parc Menai, Bangor, Gwynedd, LL57 4FG

Tel: 01248 672666

Fax: 01248 672601

Email: contact@caulmert.com

Web: www.caulmert.com