Acceptability of Flood Consequences

Section 11 of TAN15 states that developments, based on their vulnerability must be flood free for certain flood events. The flood events in which developments must be flood-free table has been extracted from Section 11 and is presented below in Table 6.

Table 6: Flood events in which development must be flood-free

VULNRABILITY CATEGORIES		FLOOD EVENT TYPE	
		RIVERS	**SEA**
HIGHLY VULNERABLE DEVELOPMENT	Emergency services (command centres and hubs)	0.1% + cc (1 in 1000)	0.1% + cc (1 in 1000)
	All other types	1% + cc (1 in 100)	0.5% + cc (1 in 200)
LESS VULNERABLE DEVELOPMENT		**1% + cc (1 in 100)**	0.5% + cc (1 in 200)
WATER COMPATIBLE DEVELOPMENT			

Figure 16 dictates that the site lies within Fluvial Flood Zone 1 – which is defined as an area that has less than 1 in 1000 (0.1%) (plus climate change) chance of flooding in a given year. The site is, therefore, deemed to be flood-free during the 1% + cc AEP storm event.

TAN15 Section 11 further states what are considered to be tolerable conditions (maximum depth and velocity of flood waters) during an extreme flood event. As the site is in Fluvial Flood Zone 1 and any Pluvial areas of Flood Zone 2 and 3 are as a result of topographical depressions, and therefore relatively low risk, this assessment is not considered necessary.

4.2. Flood Consequences Assessments: climate change allowances

The following table, see Table 7, shows the peak rainfall climate change allowances in Wales. The information is extracted from the Flood Consequences Assessment: climate change allowances documentation.

Table 7: Change to extreme rainfall intensity, compared to a 1961-90 baseline (extracted from Table 2 of Flood Consequences Assessments: Climate change allowances)

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%

Taking the central estimate, as per the guidance, would result in a design storm of 1 in 100 year + 20% climate change event. The central estimate is appropriate for the site, as it is anticipated that a design life of greater than 25years is intended for the site and based on the guidance which states that '*At a minimum, development proposals should be assessed against the central estimate'.* This is further compounded by low flood risk to the site from all sources, except in minor areas of topographical depression.

Correspondence with the SuDS Approval Body (SAB) in Wrexham, see Appendix F, indicates that climate change allowances are up to discretion of the SAB and that a 10% uplift is applied in residential areas to allow for urban creep. As the development does not include any residential areas the 10% uplift on the base 20% has not been applied.

Therefore, the site will be designed for no flooding in the 1 in 100 year + 20% climate change storm event.

4.3. Wrexham County Borough Local Development Plan 2013-2028 (Adopted 20th December 2023)

Policy SP18: Climate Change

To mitigate against the effects of climate change and to adapt to its impacts, development proposals will need to demonstrate that they have taken into account the following:

i. Reducing carbon emissions;

ii. Protecting and increasing carbon sinks;

iii. Adding to the implications of climate change at both a strategic and detailed design level;

iv. Promoting energy efficiency and increasing the supply of renewable energy; and

v. Maintaining ecological resilience;

vi. Avoiding areas susceptible to flood risk in the first instance in according with the sequential approach set out in national guidance. Highly vulnerable development, as defined in TAN15: Development and Flood Risk, should not be located within zone C2;

vii. Preventing development that increases flood risk; and

viii. Assesses the potential effects of climate change when preparing a Flood Consequence Assessment for the site.

Policy SP19: Green Infrastructure

Wrexham's distinctive natural heritage provides a network of green and blue infrastructure. Protection, conservation and enhancement of natural heritage networks needs to be reconciled with the benefits of development.

Development will be required to maintain the extent, quality and connectivity of multi-functional green infrastructure on or near a site, and, where appropriate to enhance it by:

i. Creating new interconnected areas of green infrastructure between the proposed site and the existing network;

ii. Filling gaps in the existing network to improve connectivity;

iii. Protecting the features most valuable for both nature and people; and

iv. In instances where loss of green infrastructure is unavoidable, provide mitigation and compensation for the lost assets on a site-specific basis.

Policy DM1: Development Management Considerations

Development proposals, where relevant, must:

viii. Not increase the risk of flooding but make adequate provision for sustainably dealing with foul and surface water drainage and not result in an unacceptable impact upon the water environment.

Policy NE6: Waste Water Treatment and River Water Quality

All new development will only be permitted where there is no adverse effect on the integrity of the River Dee and Bala Lake SAC in particular through the treatment of waste water.

To ensure no adverse effect on the integrity of the River DEE and Bala Lake SAC development creating waste water discharges will be required to demonstrate there is no increase in phosphorus levels in the SAC.

This can be achieved through implementation of mitigation measures an associated supplementary planning guidance. Mitigation will involve, either:

i. Delivery of measures specified in the Dee Catchment Phosphorus Reduction Strategy (DCPRS), which will require:

   a. Developer contributions/community infrastructure levy funds to deliver measures identified within the DCPRS to reduce phosphorus levels within the catchment;

   b. Phasing of development to meet the delivery milestones within the DCPRS, and delaying development if milestones have not been met;

OR

ii. Using alternative mitigation approaches to those mentioned in 1. above. Where further evidence demonstrates that adverse effects on the integrity of the River Dee and Bala Lake SAC can be avoided using alternative mitigation, these must be agreed with Council, consultation with Natural Resources Wales.

5. Hydrological Assessment

5.1. Flooding History

There are no recorded flood events in the NRW's detailed Flood Map for Planning.

5.2. Fluvial Flood Risk

The site lies within Flood Zone 1, as shown in Figure 16 in Section 4.1. This means that the site has a less than 1 in 1000 (0.1%) (plus climate change) chance of flooding from fluvial sources in a given year. Therefore, the site is considered to be at low risk of fluvial flooding.

5.3. Pluvial Flood Risk

The site contains pockets of Flood Zone 2 and Flood Zone 3, as shown in Figure 17 in Section 4.1. For Flood Zone 2 this means areas that have a less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding from surface water sources in a given year, including climate change. For Flood Zone 3 this means areas that have a greater than 1 in 100 (1%) chance of flooding from surface water sources in a given year, including climate change.

NRW Flood Hazard Data shows the site to have a maximum low risk surface water flooding depth of 0.58m with a corresponding maximum low risk surface water velocity of 0.59m/s It additionally shows the site has a maximum medium risk surface water flooding depth of 0.45m with a corresponding medium risk surface water velocity of 0.51l/s. There is no high risk area identified on the site. The depth mapping can be seen in Figure 18.



Figure 18: NRW Flood Hazard Data - Surface Water Depths (Low & Medium Risk)



Figure 19: NRW Flood Hazard Data - Surface Water Velocity (Low & Medium Risk)

The velocity and depth mapping are congruent with the topographical information presented in Section 3.1 and, as such, the pockets of Flood Zone 2 and 3 risk are considered to be as a result of existing topographical depressions.

Therefore, the site is considered to be at a low-to-medium of pluvial flooding.

5.4. Tidal Flood Risk

The site is located approximately 40km from the Irish Sea and sits approximately 85m above sea level. The site is, therefore, considered to be at an insignificant risk from tidal flooding.

5.5. Groundwater Flood Risk

Groundwater flooding occurs as a result of water rising up from an underlying aquifer or from water flowing from abnormal springs. The risk of this is highest at areas where the water table is at a shallower depth, as the flooding occurs after long periods of sustained high rainfall. It is noted that there is some risk present due to the underlying aquifer, as detailed in Section 3.5.

The Dee Preliminary Flood Risk Assessment identifies no records of past groundwater flooding withing Wrexham County Borough.

As such, the groundwater flood risk is considered to be low.

5.6. Reservoir Flood Risk

The NRW Flood Risk from Reservoirs Map shows the site lies outside the predicted maximum extent of flooding from reservoir failure and is, therefore, considered to be at no significant risk of flooding from reservoirs.

5.7. Sewer, Highway Drainage, and Infrastructure Failure Flood Risk

The sewers and drains on the site are primarily public sewers maintained by Welsh Water. The risk from public sewers and highway drainage is, therefore, considered low.

5.8. Summary of Flood Risk

A summary of the flood risk to the site is shown in Table 8. Overall, flood risk to the site is considered to be low.

Table 8: Summary of Flood Risk

SOURCE OF FLOODING	RISK TO THE SITE
FLUVIAL (RIVER)	Low
PLUVIAL (SURFACE WATER)	Low-to-medium
TIDAL	Insignificant
RESERVOIR	Insignificant
GROUNDWATER	Low
INFRASTRUCTURE	Low

6. Proposed Surface Water Drainage Strategy

The Flood and Water Management Act 2010 (Schedule 3) came into effect in Wales on 7th January 2019 and requires all new developments to include Sustainable Drainage Systems (SuDS) features that comply with national standards. The six standards are detailed in this section, alongside how the drainage proposals for the site adhere to them.

6.1. Standard 1 – Surface Water Runoff Destination

Standard 1 of the Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems specifies the following hierarchy of drainage options for the discharge of surface water:

Priority Level 1: Surface water runoff is collected for use;

Priority Level 2: Surface water runoff is infiltrated to ground;

Priority Level 3: Surface water runoff is discharged to a surface water

Priority Level 4: Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system;

Priority Level 5: Surface water runoff is discharged to a combined sewer.

An appraisal of the drainage hierarchy follows, with a summary in Table 9.

Collected for use

Re-use of surface water runoff will be considered through the next design stages. Possibilities to explore include the use of RWH through tanked storage, located on-site either underground or on the roof of the commercial building.

Infiltration based system

Infiltration is considered as an appropriate means of surface water discharge. This is based on the following (as previously detailed in Section 3.4 and 3.5):

- The current understanding of the superficial geology of the site is that there is a significant presence of sand and gravel, which have typically high infiltration rates.
- Whilst groundwater levels are unknown pending Phase 2 ground investigation works, there is no evidence to suggest that a high water table is present on the site.
- The PRA indicates that there are aquifers present beneath the site, which have good recharge potential as a result of good infiltration rates.
- The site is not located within a groundwater Source Protection Zone (SPZ).

Surface Waterbody

The closes open waterbody to the site is a pond, located approximately 15m east of the site boundary. It's use as an appropriate discharge point is currently unknown and, as such, it is not currently considered to be an appropriate outfall location.

The River Gwenfro runs approximately 200m south of the site. A connection to the river, where it is not opened up, is not considered a viable option as it would have to pass through third-party land.

Surface Water Sewer

There are no surface water sewers within the vicinity of the site, as detailed in Section 0, and so no connection is considered viable.

Combined Sewer

The closest combined sewer runs southeast in Regent Street approximately 120m from the site boundary.

Table 9: Summary of Point of Discharge Suitability

POINT OF DISCHARGE	SUITABILITY
COLLECTED FOR USE	√
GROUND	√
SURFACE WATER BODY	×
SURFACE WATER SEWER	×
COMBINED SEWER	√
√ suitable	**× unsuitable**

As per Standard 1, it would be proposed to discharge runoff via infiltration. Where infiltration is not found to be viable to drain the site in its own right, a partial infiltration system will be sough with a proposed outfall to the combined sewer.

6.2. Standard 2 – Surface Water Hydraulic Control

Standard 2 of the statutory standards states the following:

1) *Surface water should be managed to prevent, so far as possible, any discharge from the site for the majority of rainfall events of less than 5mm*
2) *The surface water runoff rate for the 1 in 1 year return period event (or agreed equivalent) should be controlled to help mitigate the negative impacts of the development runoff on the morphology and associated ecology of the receiving surface water bodies*
3) *The surface water runoff (rate and volume) for the 1% (1 in 100 year) return period event (or agreed equivalent) should be controlled to help mitigate negative impacts on flood risk in the receiving water body.*
4) *The surface water runoff for events up to the 1% (1 in 100 year) return period (or agreed equivalent) should be managed to protect people and property on and adjacent to the site from flooding from the drainage system.*
5) *The risks (both on site and off site) associated with the surface water runoff for events greater than the 1% (1 in 100 year) return period should be considered. Where the consequences are excessive in terms of social disruption, damage or risk to life, mitigating proposals should be developed to reduce these impacts.*
6) *Drainage design proposals should be examined for the likelihood and consequences of any potential failure scenarios (e.g. structural failure or blockage), and the associated flood risks managed where possible.*

6.2.1. Detailed Site Areas

The overall site area is approximately 1.15ha.

The existing and proposed site impermeable/permeable split is shown in Table 10.

Table 10: Existing and proposed detailed site areas

SCENARIO	PERMEABLE AREA (ha)	IMPERMEABLE AREA (ha)	TOTAL (ha)
EXISTING	0.19	0.96	1.15
PROPOSED	0.27	0.88	1.15

6.2.2. Infiltration Rate

Infiltration rates are unknown for the site, subject to the completion of infiltration testing as part of the Phase 2 GI works. The following have been taken into consideration in assuming an infiltration rate for initial design:

- The Wrexham Kop Development Drainage Strategy by Ramboll (Report Ref: RUK2021N00485-RAM-XX-XX-RP-C-00001) reported soakaway test results of between 1.44m/hr and 5.04m/hr.
- The current understanding of the site geology is that the site is underlain by sand and gravel. Gravel has a typical infiltration coefficient of between 1.08m/hr and 108m/hr according to Table 25.1 of Ciria C753.

Therefore, a conservative infiltration rate of 1.08m/hr is assumed for the initial design.

6.2.3. Water Quantity & Preliminary Modelling

Based on the infiltration rate of 1.08m/hr, the attenuation requirements have been estimated using InfoDrainage. The modelling results can be seen in Appendix G.

The model assumes a surface area, equivalent to the number of proposed bioretention features (see Section 6.2.4) – 1650m2 and a depth of 1.05m based on a typical build-up of 750mm of Topsoil and 300mm of sub-base. The whole impermeable catchment has been modelled with a conservative runoff coefficient of 1 applied.

A factor of safety of 5 has been applied to the infiltration calculation, based on table 25.2 of CIRIA C753 (Suggested factors of safety, F, for use in hydraulic design of infiltration systems (designed using Bettess (1996). This is based on the consequences of failure of the infiltration system and the size of the drained area.

The following table, see Table 11, shows the drain-down times of the infiltration components for the critical storm events. In both critical storm events the SuDS components half-empty within 24hours, demonstrating capacity for a subsequent storm event.

Table 11: Infiltration Design Drain Down Times

STORM	CRITICAL EVENT	HALF DRAIN DOWN TIME (MINS)
1 IN 30	720min Summer	91
1 IN 100 + 20% CC	180min Summer	128

6.2.4. Proposed Surface Water Attenuation & Sustainable Drainage Systems (SuDS)

The SuDS features proposed for the site consist of the following:

- Bioretention Areas

The layout of the outline SuDS strategy can be seen in the drainage strategy sketch available in Appendix H.

The attenuation for the site is provided within planting soil, free-from-fines coarse graded aggregate (with 30% voids) and in above ground depressions during larger storm events.

The proposed drainage system is of System Type A – full infiltration, pending confirmation of infiltration rates from on-site geological testing.

The typical buildups used in determining the level of provided storage for the site can be seen in Table 12.

Table 12: Typical SuDS Features Storage Parameters

SUDS FEATURE	LAYER	TYPICAL POROSITY (%)	TYPICAL DEPTH (mm)
BIORETENTION AREA	Depression Storage	100	150
	Planting Soil	15	750
	Sub-base	30	300

6.3. Standard 3 – Water Quality

Standard 3 of the statutory standards states the following:

Treatment for surface water runoff should be provided to prevent negative impacts on the receiving water quality and/or protect downstream drainage systems, including sewers.

Designing for water quality involves the specification of SuDS components which adequately cleanse and filter pollutants arising from runoff draining into the system. Runoff from developments is shown to potentially have high levels of suspended solids, copper, zinc, nickel and hydrocarbons which have toxic effects to aquatic life and the general environmental standard of waterbodies.

The approach to providing treatment is closely related to source control. SuDS networks should aim to use interception to prevent runoff from entering the SuDS system for the first 5mm of rainfall and should direct runoff through SuDS components providing major treatment/filtering up to the 1 in 1 year storm event.

The primary inlets of the proposed SuDS system – bioretention area, are components which provide interception storage.

A preliminary check of water quality performance has been undertaken at this design stage based on the Simple Index Approach detailed in Section 26.7.1 of CIRIA C753. The highest pollution hazard level of runoff from the site is Medium, with the corresponding hazard indices shown in Table 13.

Table 13: Pollution hazard indices for different land use classifications

LAND USE	POLLUTION HAZARD LEVEL	TOTAL SUSPENDED SOLIDS (TSS)	METALS	HYDROCARBONS
OTHER ROOFS (TYPICALLY COMMERCIAL/INDUSTRIAL ROOFS)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
COMMERCIAL YARD AND DELIVERY AREAS, NON-RESIDETNIAL CAR PARKING WITH FREQUENT CHANGE (E.G. HOSPITALS, RETAIL), ALL ROADS EXCEPT LOW TRAFFIC RAODS AND TRUNK ROADS/MOTORWAYS	Medium	0.7	0.6	0.7

The proposed SuDS treatment train coveys the runoff through the primary inlets described above before attenuation said runoff whilst it infiltrates into the ground. As the discharge is to groundwater/there is a risk of groundwater pollution the SuDS mitigation indices for discharges to groundwater apply in this instance. The mitigation indices for the SuDS features are shown in Table 14.

For the proposed SuDS system all proposed inlet features have mitigation indices greater than the highest level of anticipated pollutants. As such, the proposed system is considered to adequately mitigate the risks of water quality pollution.

Table 14: Indicative SuDS mitigation indices for discharges to groundwater

CHARACTERISTICS OF THE MATERIAL OVERLYING THE PROPOSED INFILTRATION SURFACE, THOUGH WHICH RUNOFF PERCOLATES	TOTAL SUSPENDED SOLIDS (TSS)	METALS	HYDROCARBONS
BIORETENTION UNDERLAIN BY A SOIL WITH GOOD CONTAMINANT ATTENUATION POTENTIAL OF AT LEAST 300mm IN DEPTH	0.8	0.8	0.8

6.4. Standard 4 – Amenity & Standard 5 - Biodiversity

Standard 4 and Statutory 5 of the statutory standards states the following:

The design of the surface water management system should maximise amenity benefits.

The design of the surface water management system should maximise biodiversity benefits.

The landscaping strategy for the development has been co-ordinated with the proposed SuDS to provide amenity and biodiversity improvements across the site. Planting selection is to be appropriate for use within the proposed SuDS infrastructure. Further details of the amenity and biodiversity benefits provided by the proposed scheme may be found in the Landscape Architects report.

Common benefits provided by the SuDS features forming the drainage strategy can be seen in Table 15.

Table 15: Adaption of Table 5.1 of CIRIA C753, detailing pertinent amenity and biodiversity benefits delivered by SuDS

CATEGORY	EXAMPLE
AIR QUALITY IMPROVEMENTS	SuDS using blue and green areas, including grass and trees, provide significant air quality improvements by, for example, trees 'scrubbing; fine particulates from urban streets.
AIR AND BUILDING TEMEPRATURE REGULATION	Green and blue infrastructure buffers and moderates extreme temperatures, which will become increasingly important in future, as the climate changes and cities get hotter.
BIODIVERSITY AND ECOLOGY	Green and blue SuDS help to support flora and fauna for the benefit of communities, and it is here that SuDS amenity and biodiversity value come together.
CARBON EMISSION REDUCTION AND SEQUESTRATION	Plants and soils take in and store CO2 and other greenhouses gases, so where SuDS use plants, this potential can be exploited. SuDS tend to require less energy use in all stages of the supply chain and life cycle than conventional drainage and, by harvesting water at source, this also saves energy.
COMMUNITY COHESTION AND CRIME REDUCTION	SuDS can help bring communities together. By increasing opportunities for human interaction and creating more enjoyable environments, people are more likely to feel they belong to the community and take a greater pride in their neighbourhood. This is especially the case if the community has been involved in the SuDS design process and residents have ownership of the ongoing maintenance.
ECONOMIC GROWTH AND INWARD INVESTMENT	Attractive places (particularly where water is a feature of the design) tend to encourage and support inward investment. Productivity tends to be enhanced in attractive environments, such as business parks with green spaces. Green and blue SuDS have been shown to add value to land and property nearby. The SuDS in themselves may provide interest for tourists especially where they are a novelty. SuDS also contribute to the creation of attractive places that appeal to tourists.
EDUCATION	By using green and blue spaces as part of the management of the water cycle this provides many opportunities to support education both formally in schools and in communities as a whole through environmental groups.
HEALTH AND WELL-BEING	Green and blue infrastructure can play an important role in maintaining mental and physical health by providing places for recreation and relaxation.
NOISE REDUCTION	SuDS and associated trees and grassed areas can provide noise-absorbent barriers and surfaces. Green roofs provide sound insulation for buildings.
SECURITY OF WATER SUPPLY	Direct collection of rainwater to use for domestic and other purposes saves water and potentially provides essential irrigation resources and long-term viability for amenity trees, vegetation and crops.
RECREATION	SuDS can deliver a wide range of green and blue spaces that can be used for walking, cycling, informal play, organised sports and games etc.

6.5. Standard 6 – Design of drainage for Construction, Operation and Maintenance and Structural Integrity

Standard 6 of the statutory standards states the following:

1) *All elements of the surface water drainage system should be designed so that they can be constructed easily, safely, cost-effectively, in a timely manner, and with the aim of minimising the use of scarce resources and embedded carbon (energy)*

2) *All elements of the surface water drainage strategy should be designed to ensure maintenance and operation can be undertaken (by the relevant responsible body) easily, safely, cost-effectively, in a timely manner, and with the aim of minimising the use of scarce resources and embedded carbon (energy).*

3) *The surface water drainage system should be designed to ensure structural integrity of all elements under anticipated loading conditions over the design life of the development site, taking into account the requirement for reasonable levels of maintenance.*

6.5.1. SuDS – Normal Function

SuDS generally mimic the natural drainage patterns of the undeveloped site allowing infiltration into the ground/attenuation, improving water quality and controlling outflow rates from the development. This reduces the impact and risk of flooding on downstream development alongside providing additional benefits such as pollution control, increasing biodiversity and providing water-based amenity.

The SuDS features proposed for the site are listed below:

- Bioretention Systems (including tree pits and raingardens)

In short, these drainage features will provide:

- A platform to capture surface water,
- A medium to attenuate, filter and treat surface water, and
- A means of conveying surface water.

6.5.2. Operation & Maintenance requirements

The maintenance regime of the SuDS on site can be divided into three categories – regular maintenance, occasional tasks and remedial works. The frequency of regular maintenance will usually be monthly, the occasional tasks and remedial works should be conducted as required. Specific maintenance needs of the SuDS should be monitored, and maintenance schedules adjusted to suit requirements.

A schedule providing guidance on the type of operation and maintenance requirements that may be appropriate for the proposed SuDS features, based on CIRIA C753 The SuDS Manual is contained within Appendix I.

The activities listed are generic to the relevant SuDS types and represent the minimum maintenance and inspection requirements, however additional tasks or varied maintenance frequency may be instructed by the maintenance company as required.

All those responsible for maintenance should follow the relevant Health and Safety legislation for all the activities listed including lone working, if relevant, and risk assessments should always be undertaken.

Inspection checks shall be carried out by a qualified and competent person, at the minimum intervals listed within the schedules and the appropriate work carried out.

The maintenance strategy for the specific SuDS proposed at the site will be dependent on the products used within the installation of the systems and is, therefore, subject to manufacturers guidance.

7. Proposed Foul Drainage Strategy

Foul water collected from the development will be discharged into the existing foul water sewer network around the site. The exact details of this connection point into the foul sewer network will be confirmed through detailed design.

Pre-development consultation with Welsh Water, see Appendix J, indicates that it is '*unlikely that sufficient capacity exists to accommodate [the] development within the immediate public sewerage system without causing detriment to the existing services.*'

The development proposals include the removal of surface water flows from the existing network. It is noted that there are a number of gullies on the site, which drain the highway around the station building. Pending further information, it is assumed that these gullies and the other manholes located on site connect into the public sewer running along Regents Street (A541).

As such and considering the removal of surface water flows entering the sewer network, it is considered that in this instance there is capacity within the public sewer network to accommodate the foul flows emanating from the site.

The proposed connection point would be to Regents Street, either through the construction of new drainage apparatus or by the reuse of existing drainage runs, where appropriate.

8. Conclusions

The site is located within Fluvial Flood Zone 1, as shown in Sections 4.1 and 5.2. The proposed development type (less vulnerable development) is appropriate for this flood zone.

The site has pockets of Pluvial Flood Zone 2 and Zone 3; these are considered to be as a result of topographical depressions within the site and are to be addressed during detailed design. As a result, the risk of flooding from these sources is considered to be low.

It is proposed to discharge the site fully through infiltration, pending confirmation of on-site infiltration testing. A conservative estimate for the infiltration rate of 1.08m/hr has been assumed through the design, as detailed in Section 4.1 and Section 6.2.2.

The Flood Consequence Assessment portion of this report has demonstrated that the proposed development is at low-to-medium, low or insignificant risk of flooding from all sources. The proposed surface water drainage strategy reduces the flood risk from surface water to the site and downstream areas by significantly reducing runoff from the site and into the public sewer.

In line with national and local guidance/policy and with the statutory SuDS standards, surface water will be managed using bioretention systems (inclusive of tree pits and raingardens), providing a significant improvement to the quality and quantity of runoff from the detailed site.

The report has considered and explained how the design and its principles adhere to the SuDS statutory standards. This is laid out through Section 6. Water Quality (Standard 3) has been assessed in line with the CIRIA simple index approach, as detailed in Section 6.3 and the site is considered to adequately deal with the worst case anticipated pollutant levels.

The SuDS features provide a total 582m3 of effective storm attenuation. The required attenuation volume has been calculated using the InfoDrainage software, to ensure that there is no flooding to habitable spaces or escape routes for up to the 1 in 100 year storm event + 20% climate change storm event. The drain down time of this, for the conservatively assumed infiltration rate of 1.08m/hr, is 128mins in the worst instance.

The development is not expected to have a detrimental impact on wider flood risk in the area and is anticipated to reduce flood risk within the immediate vicinity owing to the betterment on existing drainage rates targeted by the proposals. As such and taking into account all the information presented in the body of this report, it is considered that the development should be considered acceptable from a planning perspective in relation to flood risk and concerning its drainage strategy.

Appendix A: Landscape Architect General Arrangement Plan (DWG: 2454-EXA-00-00-DR-L-00100)

WREXHAM GENERAL

reception
####
#######

office unit

office

refuse
(based on
BS5906
weekly)

LV switch
room

comms /
server

hold water
& DHN
intake

post / lm
space

cycle hub
####
######

cycle store
1 bike per 10
employees

retail
####
######

SAFER
BUS
STOP

SAFER
BUS
STOP

TACTILE PAVING

TACTILE PAVING

KEY

SITE BOUNDARY

Hardscape

ST01: VEHICLE ROAD

ST02: RESIN BOUND GRAVEL

ST03: GRANITE PAVING/
BLOCK PAVING

ST04: BLOCK PAVING

Softscape

PROPOSED TREE

PROPOSED SMALL TREE

EXISTING TREE TO BE RETAINED

EXISTING TREE TO BE REMOVED

PT01: ORNAMENTAL PLANTING

PT02: SUDS PLANTING

PT03: HEDGE PLANTING

PT04: WILDFLOWER MEADOW

PT05: LAWN

Furniture

FT01: WOODEN TOP SEATING

0 10m

North

Z:\LONDON PROJECTS\2024\2454 WREXHAM GATEWAY, EASTERN ZONE\01 BIM\02 CAD\03 SHEET LAYOUT\01 RIBA 1-3 PLANNING\2454-EXA-00-00-DR-L-00102.DWG

EXTERIOR
ARCHITECTURE

LONDON
Unit 17.2, The Leather Market, 11-13 Weston Street, London, SE1 3ER
MANCHESTER
Studio 537, The Royal Exchange, St Anns Square, Manchester, M2 7DH

E-MAIL office@exteriorarchitecture.com
WEB www.exteriorarchitecture.com

Client
WCBC

No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site.
Area measurements for indicative purposes only.

This drawing is the property of Exterior Architecture Ltd.
No part of the drawing may be reproduced in any manner
without permission from Exterior Architecture Ltd.

Rev	Description	Date
----	----	----
----	----	----
----	----	----
----	----	----
----	----	----
----	----	----
----	----	----
----	----	----
----	----	----
P01	STAGE 2 ISSUE	03.03.2025

Project title
WREXHAM GATEWAY, EASTERN ZONE

Drawing title
GENERAL ARRANGEMENT PLAN (SOUTH)

Issued By	Manchester	T: 0161 850 8101	
Scale	1:250 @ A1	Drawn	ExA
Status	STAGE 2	Checked	SL
Date	03.03.2025	Approved	LP

Drawing number
2454-EXA-00-00-DR-L-00102

Revision
P01

Appendix B: Topographical Survey

Upon Request

Appendix C: Geotechnical Desk Study

Appendix E: Welsh Water Existing Asset Mapping

Dŵr Cymru
Welsh Water

WREXHAM EASTERN GATEWAY ZONE, Station Approach, Wrexham LL11 2AA

N
W E
S

LEGEND(Representative of most common features)

Waste network:

	Foul chamber		Outfall
	Surface water chamber	LH	Lamphole
	Combined chamber		Storm Overflow
	Combined sewer overflow		Rising main
	Special purpose chamber		Gravity sewer
	Treatment works		Private sewer
	Pumping station	S 104	Private sewer subject to Sect. 104 adoption agreement
			Private Sewer Transfer
			Lateral Drain
			Inspection Chamber

NB: Sewer symbol colour indicates the type.
RED - Combined
GREEN - Surface Water
BROWN - Foul
Purple - Former 524 sewers (for indicative purposes only)

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

Dŵr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus. The onus of locating apparatus before carrying out any excavations rests entirely on you. The information which is supplied by the Company, is done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 which is based upon the best information available and, in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a water main, service pipe, disposal main, lateral drain or disposal pipe and any associated apparatus laid before 1 September 1989, or, if they do, they may particulars thereof and position in relation to underground mains may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provisions of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

Service pipes are not generally shown but their presence should be anticipated.

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

Reproduced by permission of the Ordnance Survey on behalf of HMSO. © Crown copyright and database right 2017. All rights reserved. Ordnance Survey Licence number 100019634

Map Ref:	332982,350935
Map scale:	1:1000
Printed by:	Emily Marsden
Printed on:	26 Feb 2025

Appendix F: SAB Correspondence