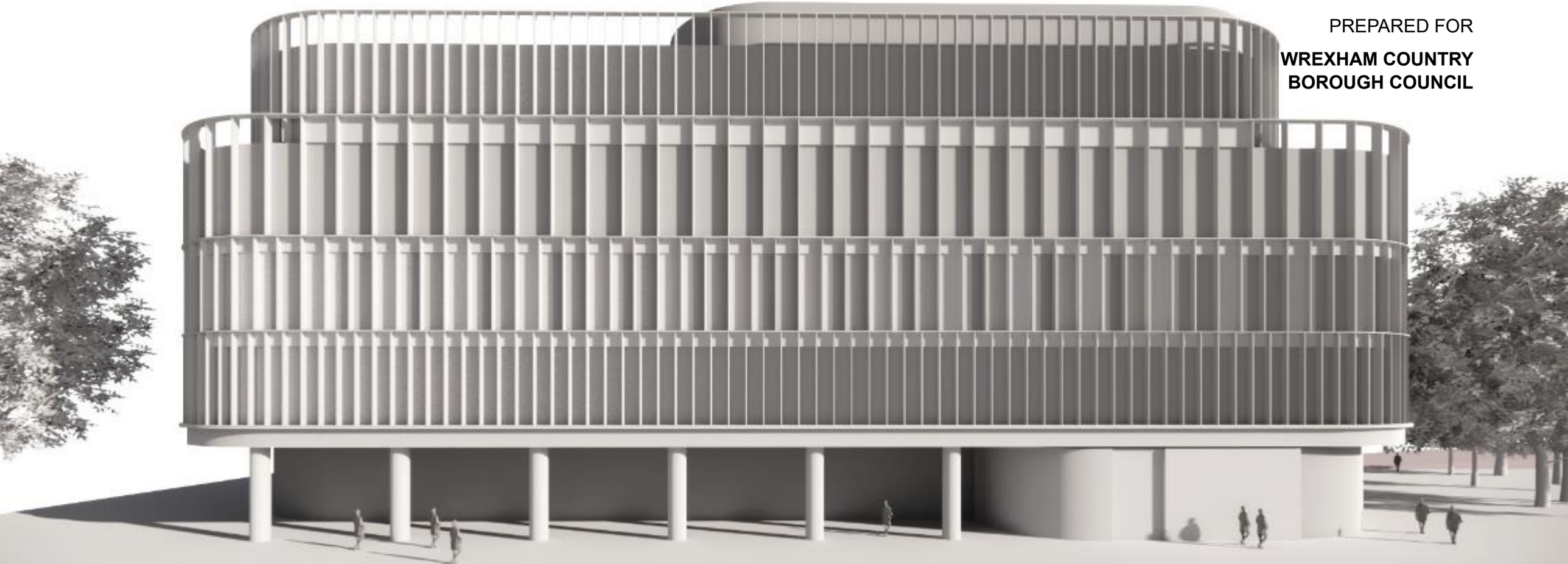
WREXHAM GATEWAY
EASTERN ZONE

FLOOD CONSEQUENCE ASSESSMENT & DRAINAGE STRATEGY

JUNE 2025

PREPARED FOR

WREXHAM COUNTRY BOROUGH COUNCIL



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FLOOD CONSEQUENCE ASSESSMENT & DRAINAGE STRATEGY

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1. Introduction

This document has been prepared on behalf of Wrexham County Borough Council (“the Applicant”) to support an Outline Planning Application for the development of Wrexham Gateway Eastern Development Zone (“the Site”).

The Wrexham Gateway Partnership is a collaboration between Wrexham County Borough Council, Transport for Wales, Wrexham University and the Welsh Government, to deliver the major regeneration of the area surrounding Wrexham General. The purpose of the proposed development is to help realise the potential of Wrexham General Station and to achieve a transformational step-change in public transport provision to support sustainable economic growth. A key aspect of this is to provide a Transport Hub at Wrexham General Station, typing in with local development proposals, and sustainable transport improvement aspirations.

The Gateway Partnership’s ambition is to create a Transport Hub which provides a high-quality, and accessible, facility suitable for a city centre location, providing an attractive ‘welcome’ to the city of Wrexham. The proposal would also tie in with the Central Masterplan’s vision to prioritise walking, cycling and public transport.

This report provides a full justification as to why the proposals for the site should be deemed acceptable in relation to flood risk and drainage.

This report has been created in support of the planning application for the proposed development. The report aims to assess it against the risk of flooding and to establish the principles of the drainage scheme in line with the Planning Policy Wales (PPW), Technical Advice Note (TAN) 15: Development, Flooding & Coastal Erosion, Statutory standards for sustainable drainage systems, Sustainable Drainage (SuDS) Statutory Guidance, as well as local/regional policy and other best practice guidance.

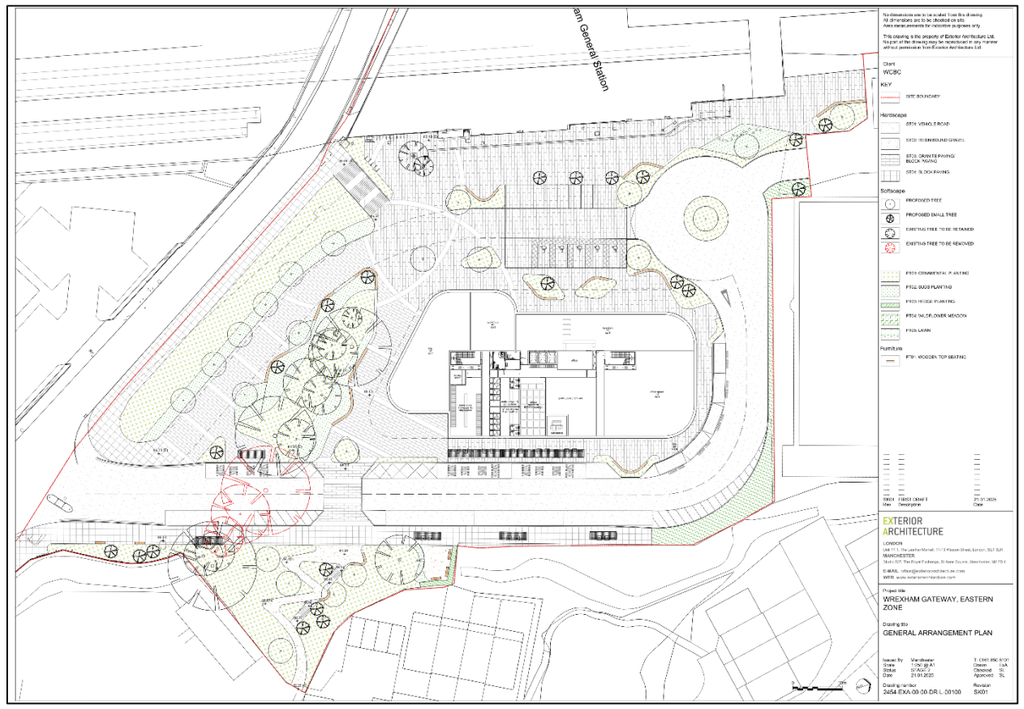


Figure 1: Landscape Architect General Arrangement

2. Development Proposals & Planning History

Development Proposals

The Wrexham Eastern Development Zone project forms part of a larger masterplan which aims to create a vibrant setting for the existing station, whilst integrating new commercial and residential units helping to improve connectivity between the site and the local university, stadium and town centre.

The planning application is seeking outline planning application for new commercial office building, creation of public realm and landscaping, conversion of existing buildings to brewery, with associated museum and taproom/restaurant, accessibility improvements including new highway infrastructure and pedestrian footbridge, including parking facilities and coach/taxi drop off, with all matters reserved except for access.”

The key elements of the proposed development are as follows:

- New commercial office building,
- New public plaza outside the station entrance, with landscaping and seated areas,
- Improved access to the station and the new buildings from Mold Road for pedestrians & cyclists
- New parking facilities including disabled bays, electric vehicle charging, taxi spaces, and dedicated pick up/drop off bays
- New bus stop and waiting facilities
- New cycle storage facilities
- New pedestrian footbridge over railway track from north-end of site.

The building consists of a mixture of commercial and back of house spaces at ground level, with 4 storeys of office space to the upper floors. An accessible terrace will be situated at level 4 and an accommodation for plant and PV at roof level. The total GIA is circa 8500m2. The site is an existing brownfield site in Wrexham.

Civic Engineers (CE) have been appointed as civil and structural engineering consultants for the development of the site.

The landscape general arrangement, illustrating the development proposals, can be seen in Figure 1 and are included for reference in Appendix A.

Planning History

A review of Wrexham County Borough Council’s web based public access has shown there is no significant planning history considered relevant to the future development of the Site. The planning history for the wider site relates predominantly to applications for works to the Railway Station, priori notification for the demolition of the Countrywide building, and applications relate to residential development on Gerald Street (outside the site boundary).

3. Existing Site

Existing Site Description

Wrexham Gateway – Eastern Development Zone is located directly easy of Wrexham General Station, in the western/central extent of the City. The 'Eastern Zone' of the site relates to Station Approach (the road), the former Jewson warehouse buildings, undeveloped land and embankments around the train station and a currently vacant brownfield plot of land, which was formerly a Countrywide Store, which has since been demolished.

Neighbouring uses and features around the Site consist of The Racecourse Football stadium, a Premier Inn Hotel, a Royal Mail depot, and residential properties to the north-easy on Grosvenor Gardens, Spring Gardens and Gerald Street. The A541 abuts the southern boundary of the Site. The Site lies within the Wrexham County Borough Area.

The Site is located within the development limits and Centre Masterplan for Wrexham. The Site is not within a Conservation area. However, the Grosvenor Road Conservation Area is located 80m south-east of the Site boundary. The Wrexham Town Centre Conservation Area is also situated 400m south-east of the Site boundary. Wrexham General Station entrance building is a Grade II listed building. There are no other listed buildings within the Site boundary or immediately neighbouring the Site.

The existing site is located adjacent to the Wrexham General railway station. The site is located on Station Approach, just off the A541, Wrexham. The site is bounded by Wrexham General to the west, the A541 to the south, a large commercial warehouse to the north and a number of residential properties, leisure buildings and a royal mail facility to the east.

The current site is brownfield and consists of the station approach, with its associated bus stop and car parking.

Red Line Boundary

Figure 2 shows the whole site ownership and application boundaries. The area highlighted in red (shown in Figure 3) is the red line boundary taken forward through this application for the development of the drainage strategy. The area highlighted in lilac is designated for parking, pedestrian access into the site and other uses. This area is either remaining undeveloped or as existing and, as such, has not been taken forward through this report for the development of the drainage strategy.

From herein out, the site and the developed strategy refers to the red line boundary shown in Figure 3.

The approximate centre of the site has easting and northing coordinates of 333002, 350780.

The total site area is approximately 1.15ha and the site location is shown below in Figure 3.

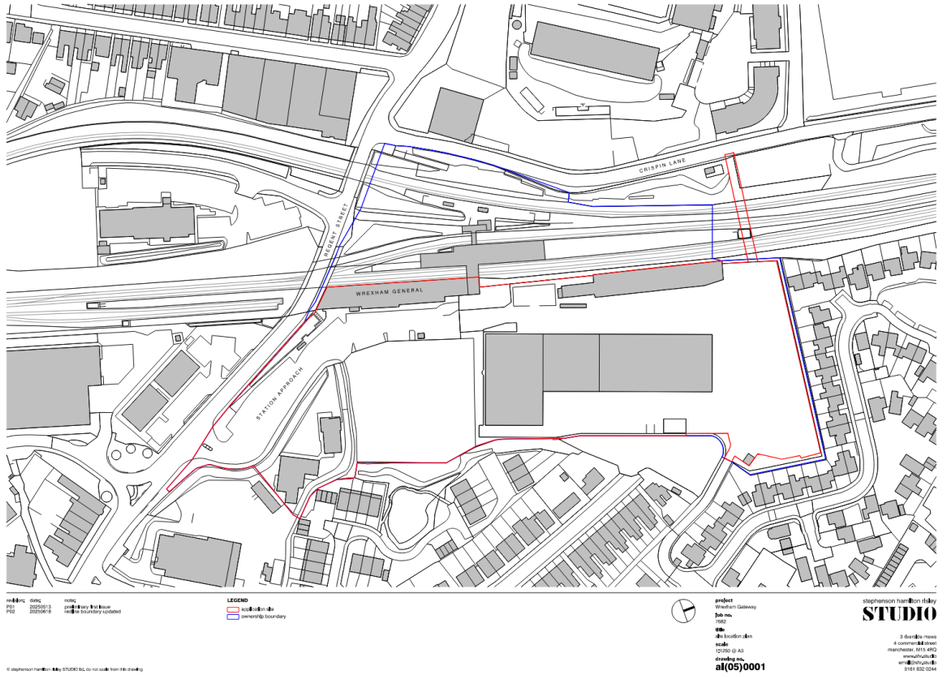


Figure 2: Whole Site Ownership & Application Boundaries

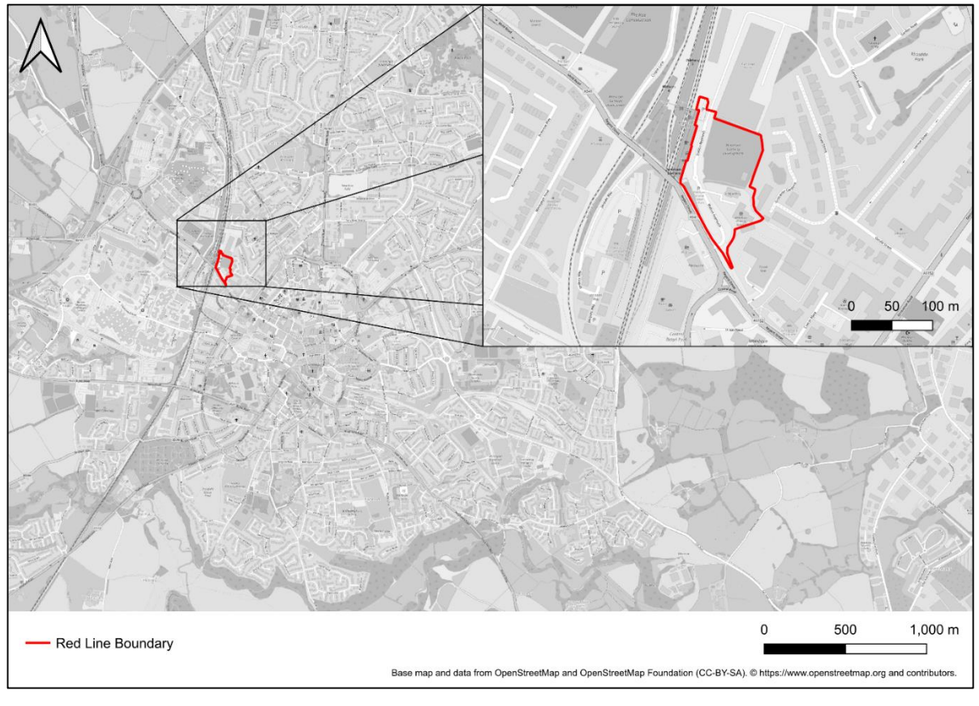


Figure 3: Existing Site Location Red Line Boundary

3.1. Topography

The existing site sits at the base of two slopes. The building plot is located on the northern most slope which falls from north to south from a top level of approximately 86.5mAOD to a base of 84.4mAOD. The existing access road into the site additionally slopes toward the railway station in a north-westerly direction from a level of 87mAOD to a level of 85.4mAOD. It should be noted that there is around a 3.6m level difference between the adjacent A541 at 88mAOD and the base of the site at around 84.4mAOD. A contour plan of the site produced from LIDAR data can be seen in Figure 4

A topographic survey produced by WSP on the 17th of November 2023 has been included in Appendix B.



Figure 4: Existing Site Contours

3.2. Waterbodies

The River Gwenfro runs approximately 200m south of the site. It runs parallel to the sites southern boundary before being culverted through the centre of Wrexham.

The closest waterbody to the site is a small pond of approximately 350m2 which sits circa 15m to the east of the site boundary.

The local waterbodies can be seen in Figure 5.

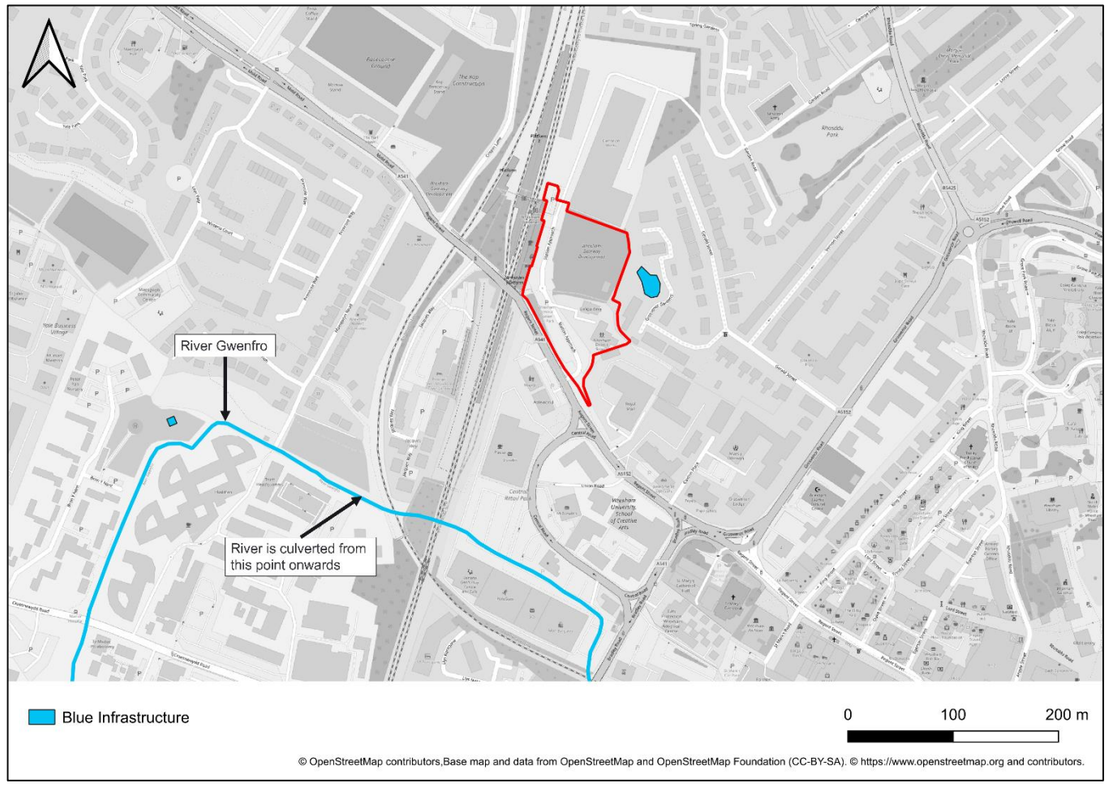


Figure 5: Local Waterbodies

3.3. Existing Public Sewers

Existing Welsh Water asset mapping, obtained February 2025, can be seen in Figure 6 and is available in full in Appendix E.

The asset mapping indicates that the there are two major foul sewer runs adjacent to the site;

- One heading south to north on the west side of the railway tracks, from Jacques to Crispin Lane. The sewer run originates from a pumping station (Jaques Yard) from the south of the Hotel on Jaques and ranges from 80mm to 225mm in diameter.
- One heading east from Union onto Regents Street. This run is 225mm in diameter.

Additionally, to this, there is a pumping station to the south east of the site (Grosvenor Gardens) with a foul run emanating from it running eastward with a 100mm diameter.

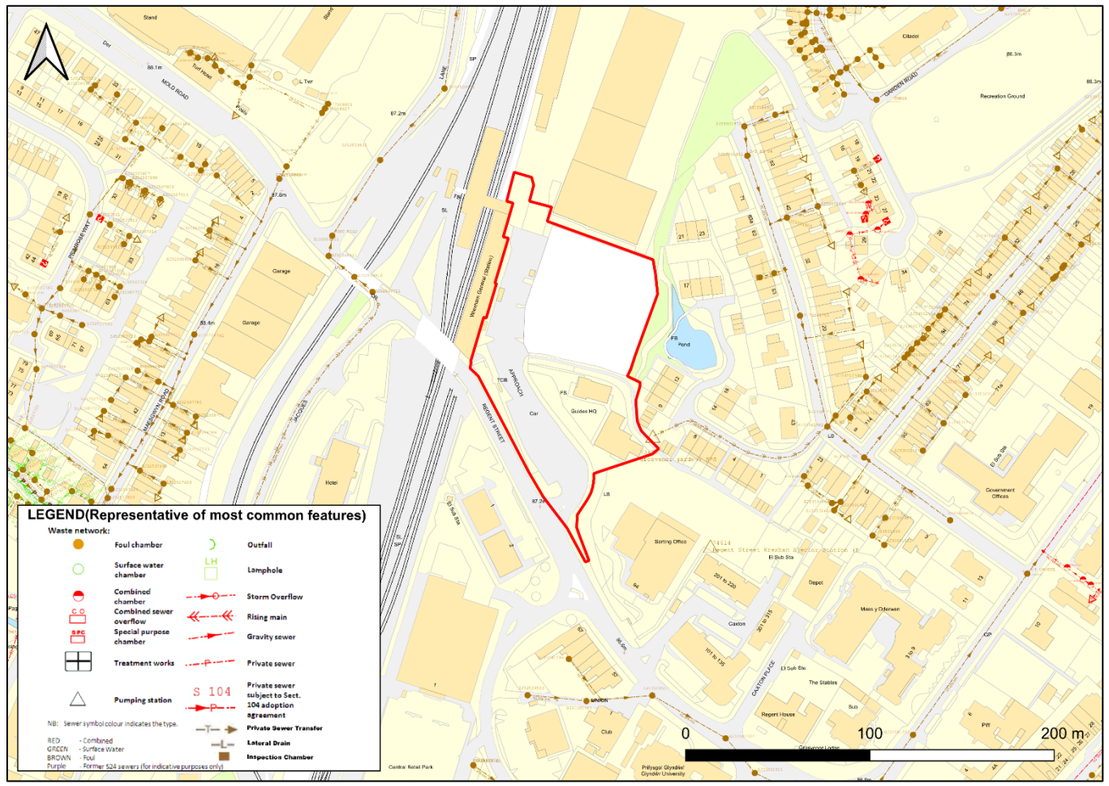


Figure 6: Existing Welsh Water Sewer Assets

3.4. Geology

Published British Geological Survey (BGS) Geology

The BGS data available online identifies the following geological strata beneath the site:

Bedrock Geology (see Figure 7): Etruria – Formation – Mudstone

Superficial Deposits (see Figure 8): Glaciofluvial Sheet Deposits, Devensian – Sand and Gravel

The BGS viewer indicates that the bedrock geology and superficial geology and consistent across the site.

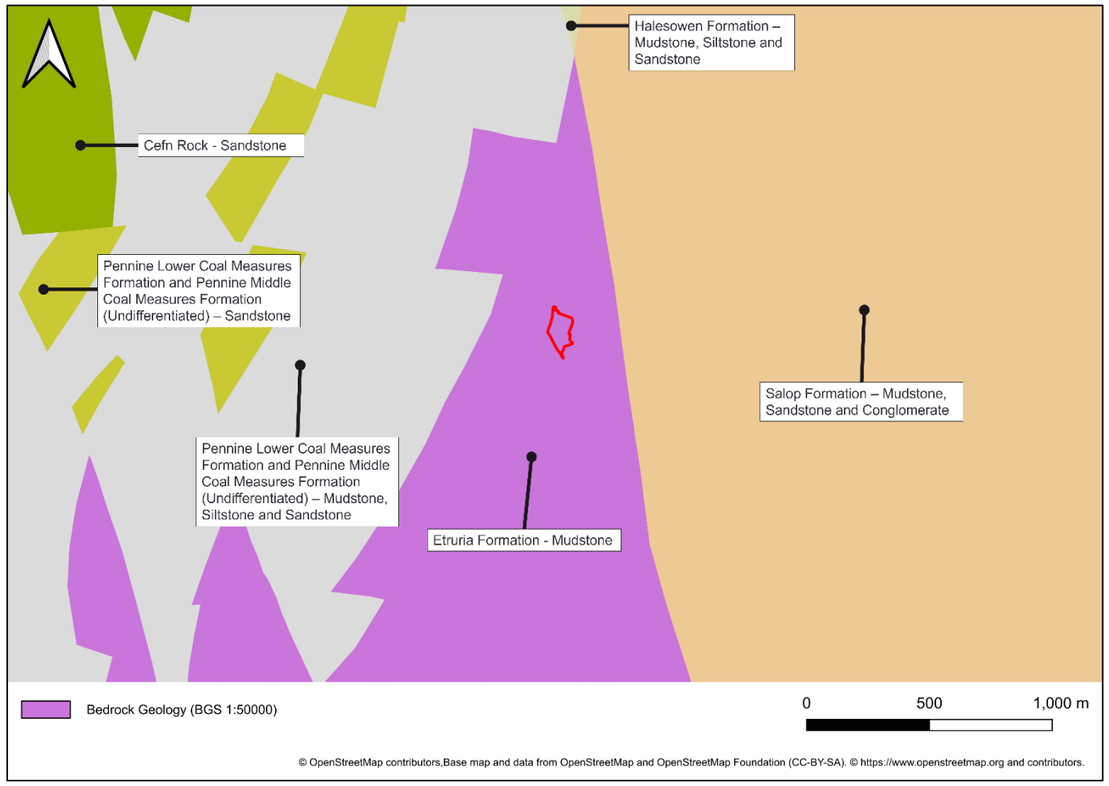


Figure 7: Bedrock Geology (BGS GeoIndex 1:50000 Scale)

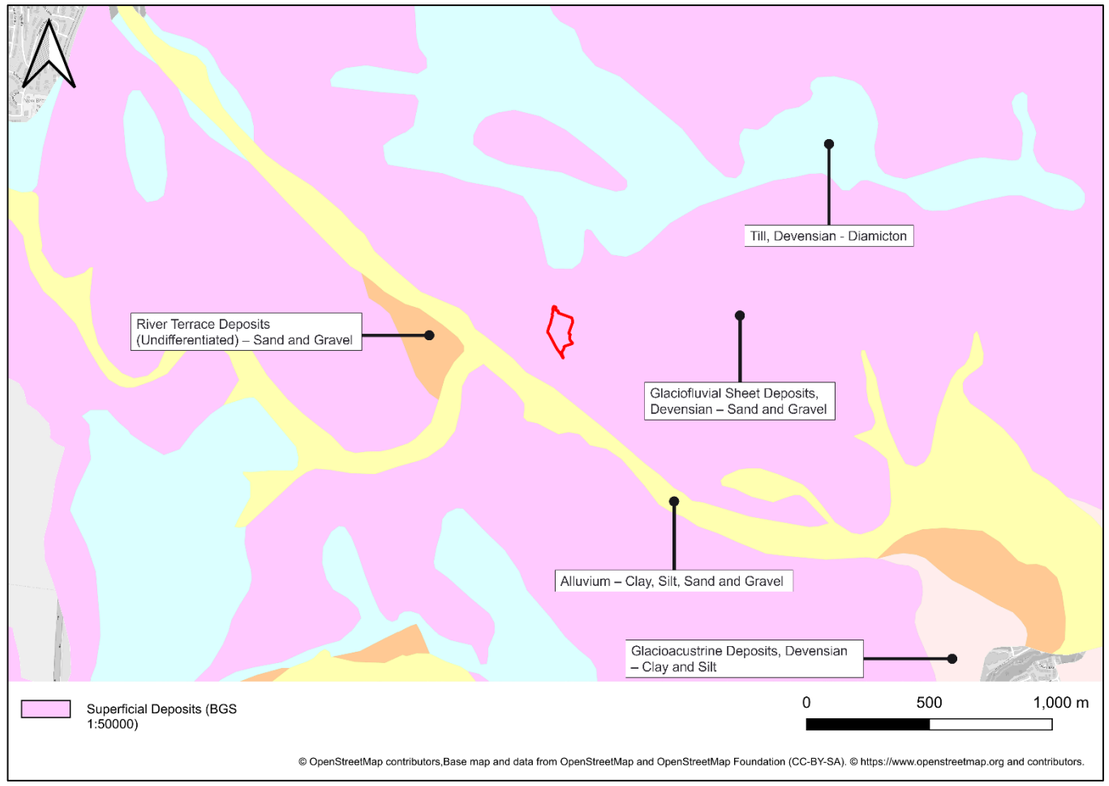


Figure 8: Superficial Deposits (BGS GeoIndex 1:50000 Scale)

Phase 1 Preliminary Ground Investigation

A site-specific Phase 1 Preliminary Risk Assessment (PRA) was carried out by Civil Earth Ltd, in February 2024. This has been included in The report dictates, with reference to the BGS Lexicon, that the following strata are anticipated at the site:

- *'Made Ground: Made Ground in an area where the pre-existing (natural or artificial) land surface is raised by artificial deposits. The purpose of the made ground is unspecified.*
- *Glaciofluvial Sheet Deposits: Glacial sand and gravel.*
- *Glacial Till Deposits: Diamicton*
- *Etruria Formation: Red, purple, brown, ochreous, green, grey and commonly mottled mudstone, with lenticular sandstones and conglomerates referred to as 'espleys'. Common pedogenic horizons, but coal seams are rare. Subordinate, lenticular sandstones and conglomerates commonly consist mostly of volcanic and lithic clasts.*
- *Pennine Lower Coal Measures Formation and Pennine Middle Coal Measures Formation (undifferentiated): Productive coal measures (mudstone, siltstone and sandstone), inferred outcrop of coal seams 375m west of the site.*

With reference to the Groundsure Enviro + Geo Insight report obtained for the site, whilst deposits of artificial Made Ground (undivided) are indicated to be present along the southern edge of the site, Made Ground is anticipated to be more widespread across the development area given the historical development of the site. Whilst Glacial Till deposits do not outcrop within the boundary of the site, it is possible that these may underlie the Glaciofluvial Sheet deposits at depth, particularly to the north end of the site where the Till comes within 100m of the site boundary. Although the Pennine Lower Coal Measures Formation and Pennine Middle Coal Measures Formation (undifferentiated) do not outcrop within the boundary of the site, they are anticipated to underlie the Etruria Formation at depth. Depth to base of the Etruria Formation within the footprint of the site is currently unknown.'

Borehole Records

The following plan, see Figure 9, shows the location of adjacent BGS boreholes. Additionally noted are the trial pits undertaken by Your Environment as part of the Kop Development Drainage Strategy Report (Planning Ref: P/2022/0725) on 13/07/2022. These have been extracted from said report to provide the most complete picture of the existing geology ahead of the Level 2 Ground Investigation Works.

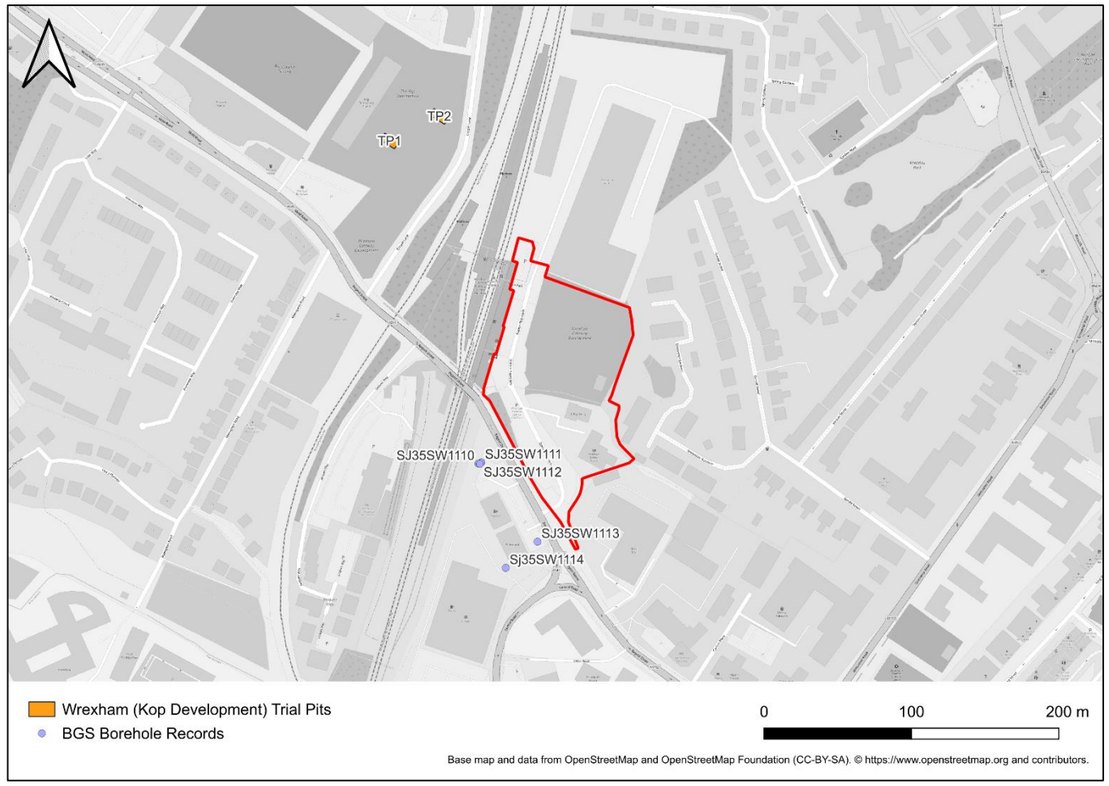
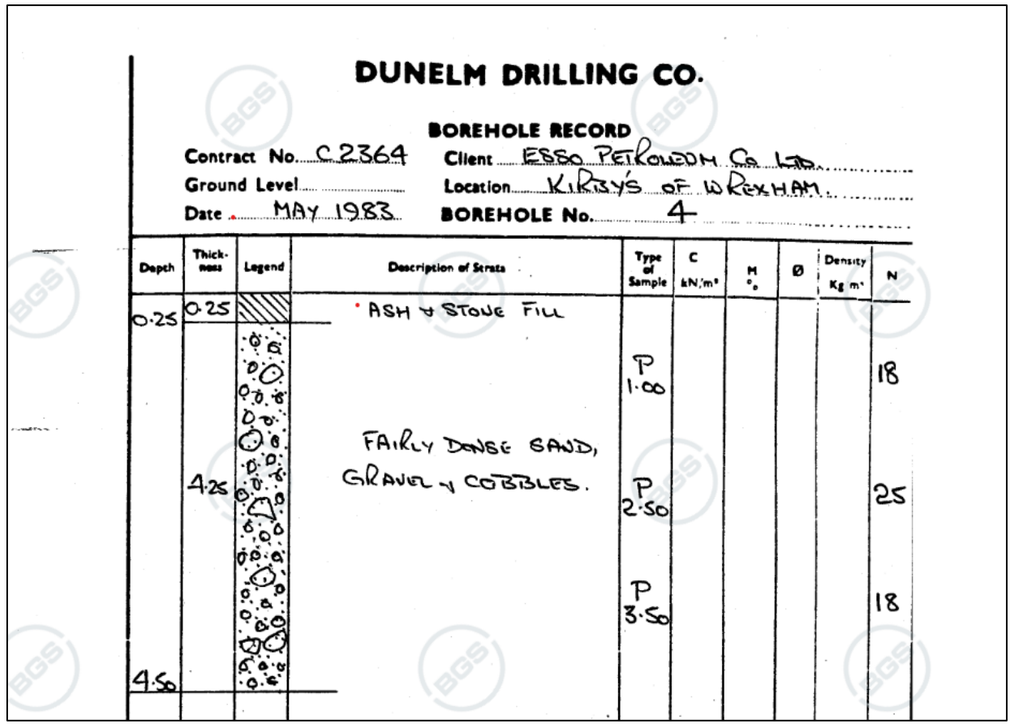


Figure 9: Borehole Location Pan

The BGS GeoIndex Onshore resource chronicles five available borehole records within the immediate vicinity of the site. All four records are located at 'Kirby's of Wrexham' and were undertaken for Esso Petroleum Co Ltd in May 1983. The records show made ground or other fill to a level of around 0.5-2m overlaying fairly dense sand, gravel and cobbles. Borehole record 17565375 (SJ35SW1114) has been included below in Figure 10 with the other records available in Appendix D.



DUNELM DRILLING CO.

BOREHOLE RECORD

Contract No. C2364 Client ESSO PETROLEUM Co Ltd.
Ground Level ..... Location KIRBY'S OF WREXHAM.
Date MAY 1983 BOREHOLE No. 4

Depth	Thick-ness	Legend	Description of Strata	Type of Sample	C kN/m²	M °	Ø	Density Kg m⁻³	N
0.25	0.25		ASH & STONE FILL						
				P 1.00					18
			FAIRLY DENSE SAND, GRAVEL & COBBLES.						
	4.25			P 2.50					25
				P 3.50					18
4.50									

Figure 10: BGS Borehole SJ35SW1114 Record (ID: 17565375)

TP02 from the Kop Development Planning Application can be seen in Figure 11. The borehole corroborates with the information available from the BGS.

Water Strike	Samples & In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.15			MADE GROUND. Grey fine to coarse angular COBBLES and GRAVEL of concrete
							MADE GROUND. Blackish brown gravelly SAND containing occasional concrete, brick, metal debris and plastic bottles
				0.60			Dark brown very gravelly cobbly fine to medium SAND. Gravel is fine to coarse rounded to subangular of sandstone, mudstone and siltstone. Cobbles of sandstone.
				2.50			End of Pit at 2.50m

Figure 11: TP02 from the Kop Development Planning Application (Reproduced from the Kop Development Drainage Strategy Report 'RUK2021N00485-RAM-XX-XX-RP-C-00001')

3.5. Hydrology & Hydrogeology

Groundwater Levels

Groundwater levels are not currently known on-site as intrusive testing has yet to be undertaken. It is noted that no groundwater strikes have been recorded in the borehole records detailed in Section 3.4 and Appendix D, which cover ground depths of between 1.8m and 5m.

Aquifers

The PRA indicates that the site is underlain by a Secondary A Bedrock Aquifer (see Figure 12) and a Secondary A Superficial Aquifer (see Figure 13). Secondary A Aquifers comprise of permeable layers that can support local water supplies and may form an important source of base flow to rivers.

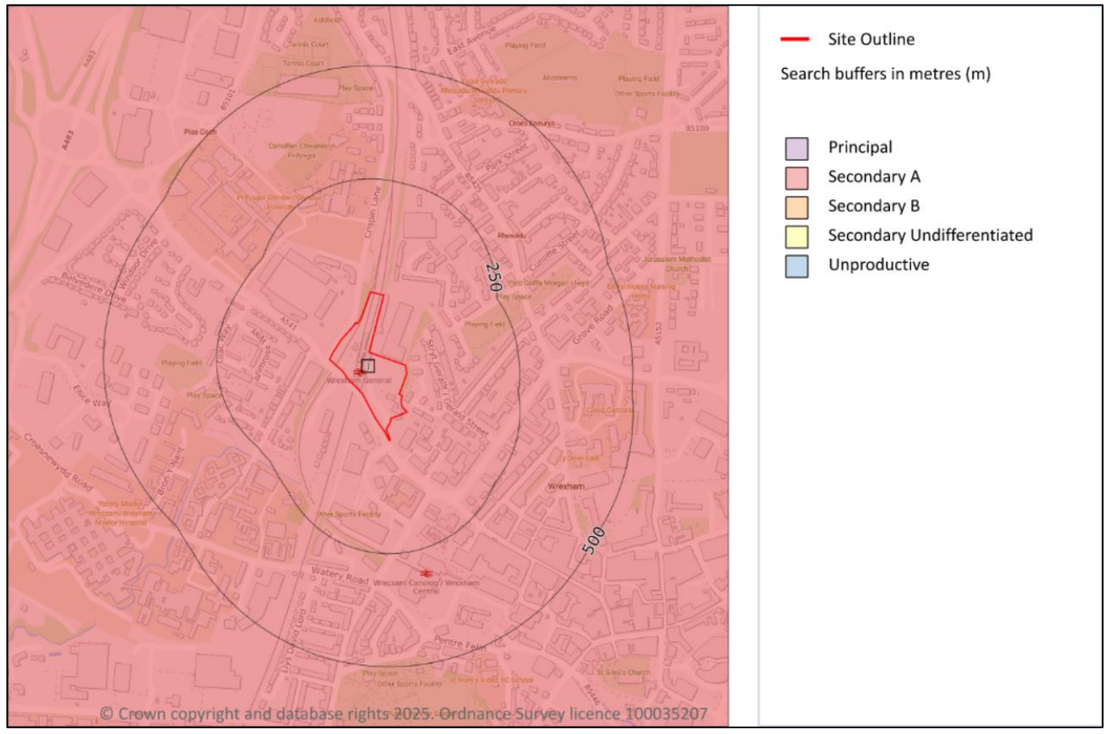


Figure 12: Bedrock aquifer designation (Reproduced from Groundsure Enviro+Geo Report, Ref: GS-6BR-ABD-2HV-EW3)

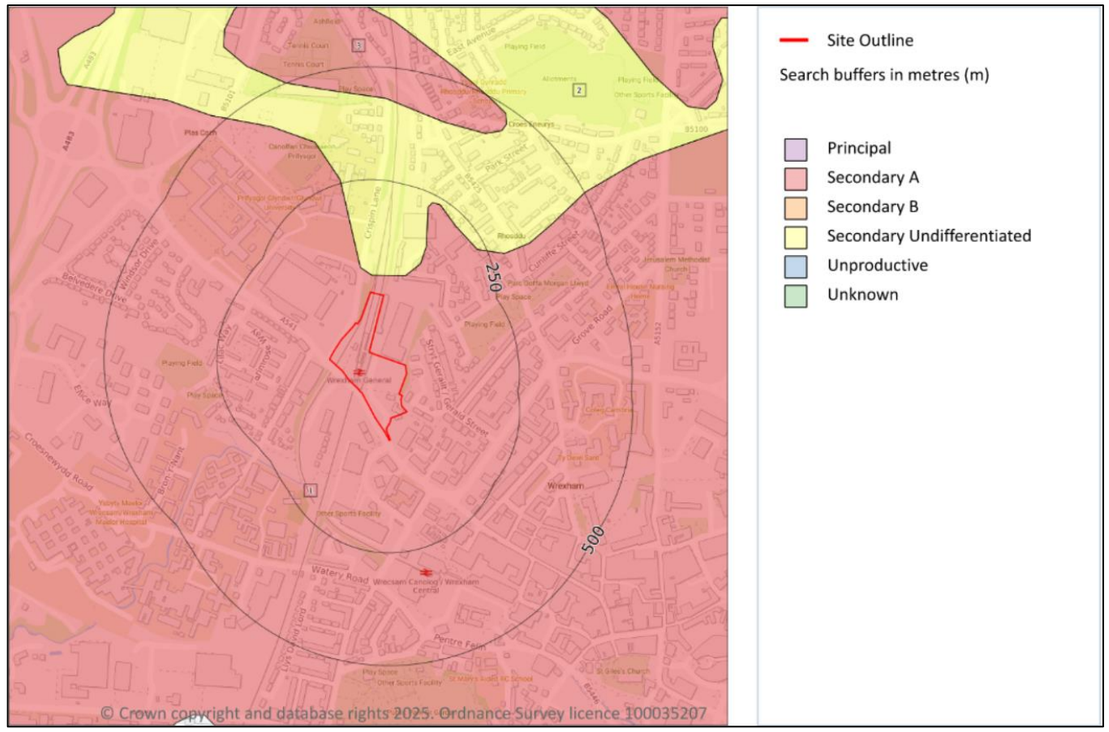


Figure 13: Superficial aquifer designation (Reproduced from Groundsure Enviro+Geo Report, Ref: GS-6BR-ABD-2HV-EW3)

Source Protection Areas

The site is not located within a groundwater Source Protection Zone (SPZ), as defined by the Natural Resources Wales SPZ database and by the Phase 1 PRA (see Figure 14).

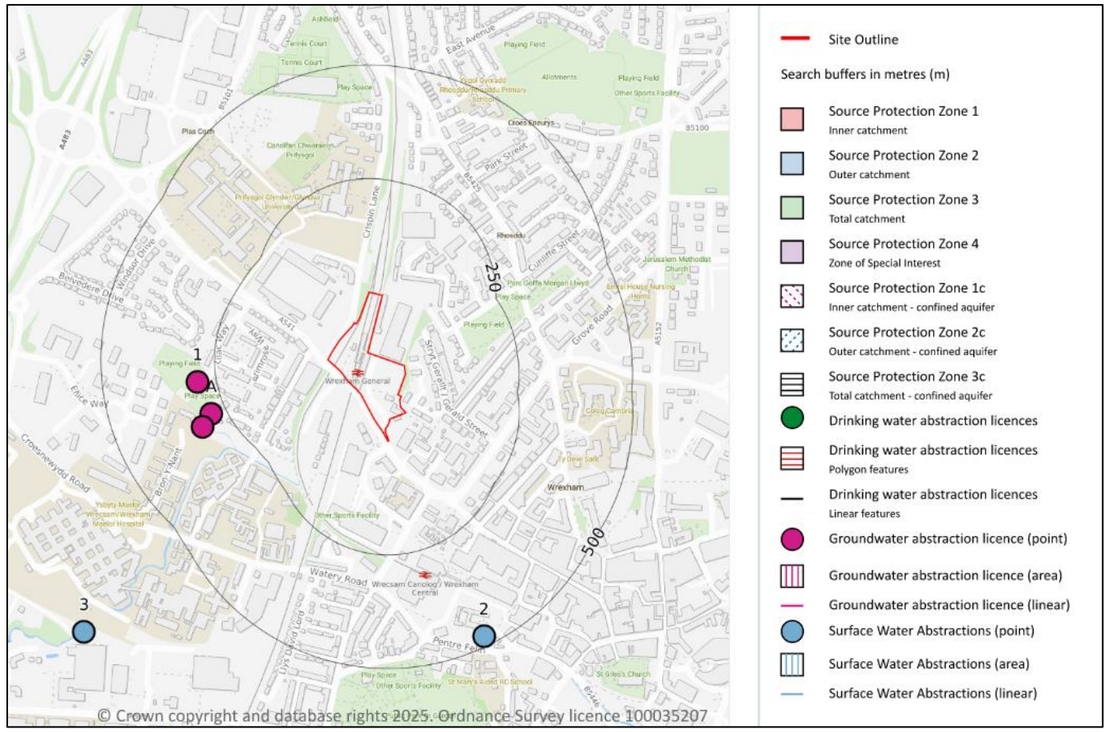


Figure 14: Abstractions and Source Protection Zones (Reproduced from Groundsure Enviro+Geo Report, Ref: GS-6BR-ABD-2HV-EW3)

Groundwater Vulnerability

The site lies within a high vulnerability, secondary superficial aquifer groundwater vulnerability zone as indicated by Figure 15. Both the bedrock and superficial aquifers and considered to be productive.

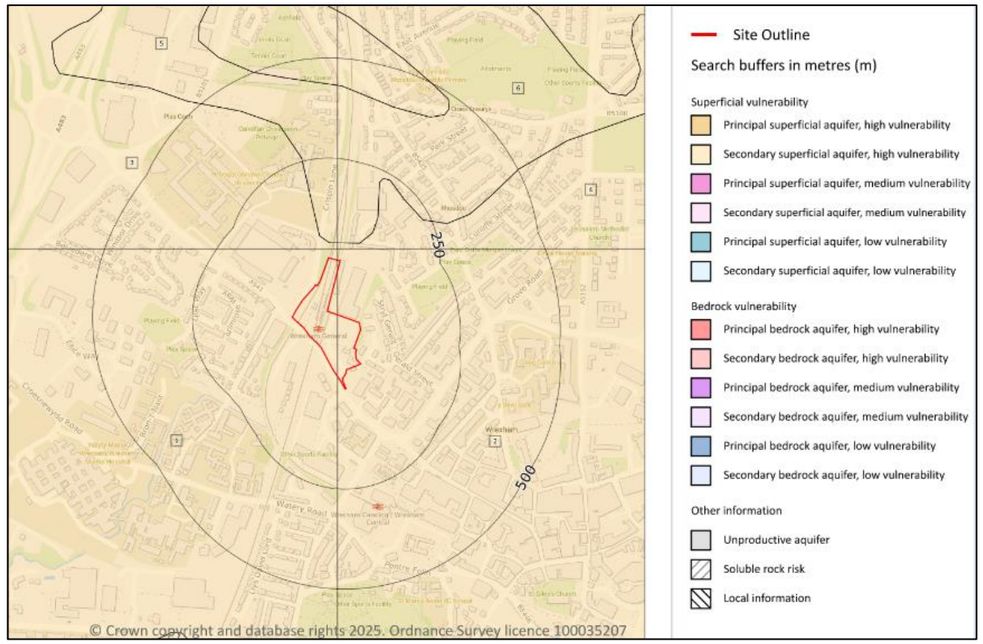


Figure 15: Groundwater Vulnerability (Reproduced from Groundsure Enviro+Geo Report, Ref: GS-6BR-ABD-2HV-EW3)

The groundwater vulnerability parameters for the superficial and bedrock geology can be seen in Table 1. These indicate that there is a high likelihood of superficial aquifers present across the site, with good recharge potential resulting from good infiltration rates. As such, groundwater pollution would need to be carefully considered through any design proposals.

Table 1: Superficial and Bedrock Geology Groundwater Vulnerability Parameters

PARAMETER	SUPERFICIAL GEOLOGY	BEDROCK GEOLOGY
VULNERABILITY	High	Low
AQUIFER TYPE	Secondary	Secondary
THICKNESS	>10m	-
PATCHINESS VALUE	>90%	-
RECHARGE POTENTIAL	High	-
FLOW MECHANISM	-	Well Connected Fractures

The groundwater vulnerability parameters for the soil/surface, see Table 2, further corroborate the indicated good inflation potential.

Table 2: Soil/Surface Groundwater Vulnerability Parameters

PARAMETER	SOIL/SURFACE
LEACHING CLASS	High
INFILTRATION VALUE	>70%
DILUTION VALUE	300-550mm/year

4. Relevant Policy and Guidance

4.1. Planning Policy Wales

Flood Risk Categorisation

Technical Advice Note 15 – Development, flooding and coastal erosion from Planning Policy Wales (PPW) refers to the Flood Zones shown on the NRW Flood Maps for Planning and establishes the range of uses which are appropriate for each Flood Zone, or compatible for each Flood Zone. Table 3 ,extracted from the Flood 2 – Definition of Flood Map for Planning flood zones, summarises the flood zones and their definitions.

Table 3: Flood Zone Categorisation and Definition

FLOOD ZONE	FLOODING FROM RIVERS	FLOODING FROM THE SEA	FLOODING FROM SURFACE WATER AND SMALL WATERCOURSES
1	Less than1 in 1000 (0.1%) (plus climate change) chance of flooding in a given year.		
2	Less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.	Less than 1 in 200 (0.5%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.	Less than 1 in 100 (1%) but greater than 1 in 1000 (0.1%) chance of flooding in a given year, including climate change.
3	A greater than 1 in 100 (1%) chance of flooding in a given year, including climate change.	A greater than 1 in 200 (0.5%) chance of flooding in given year, including climate change.	A greater than 1 in 100 (1%) chance of flooding in a given year, including climate change.
TAN15 DEFENDED ZONES	Areas where flood risk management infrastructure provides a minimum standard of protection against flooding from rivers of 1:100 (plus climate change and freeboard).	Areas where flood risk management infrastructure provides a minimum standard of protection against flooding from the sea of 1:200 (plus climate change and freeboard).	Not applicable.

The Natural Resources Wales (NRW) Flood Map for Planning shows that the site lies within Flood Zone 1 for Flooding from Rivers (see Figure 16).

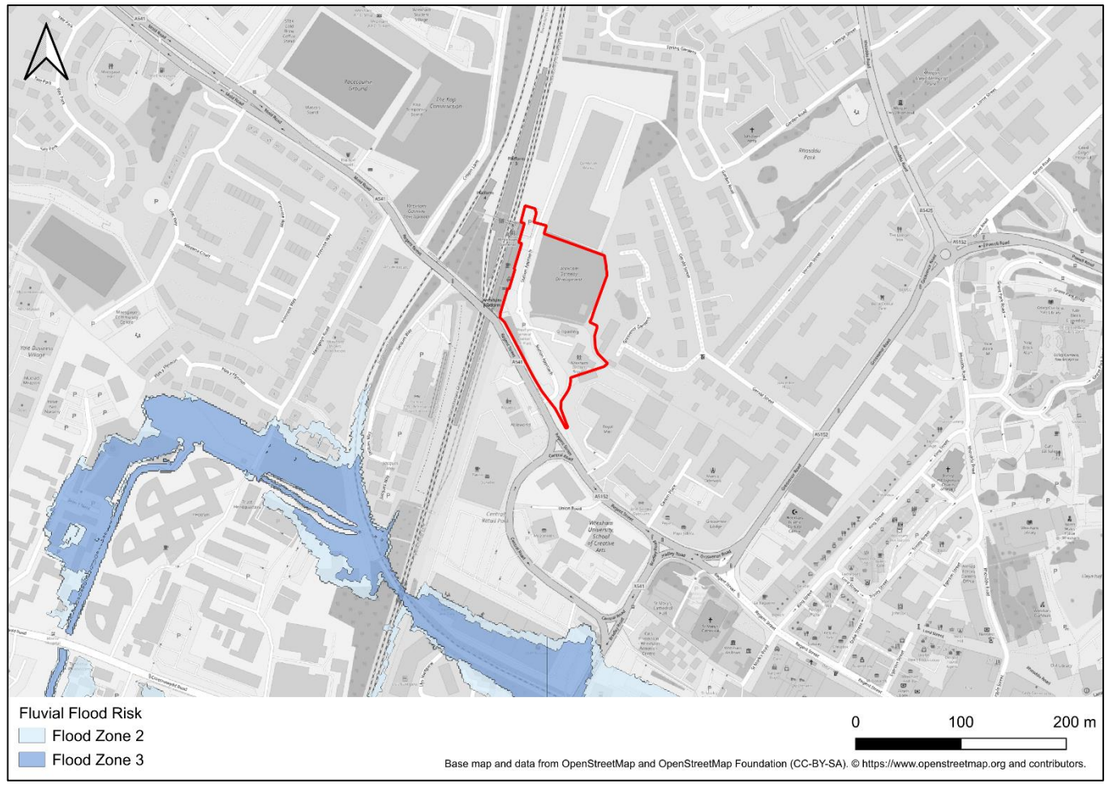


Figure 16: NRW Flood Map for Planning - Flooding from Rivers

The NRW Flood Map for Planning additionally shows that pockets of Flood Zone 2 and Flood Zone 3 for Flooding from Surface Water and Small Watercourses (see Figure 17) lie within the site boundary. These correlate with the low spots, as can be seen by the displayed contours.

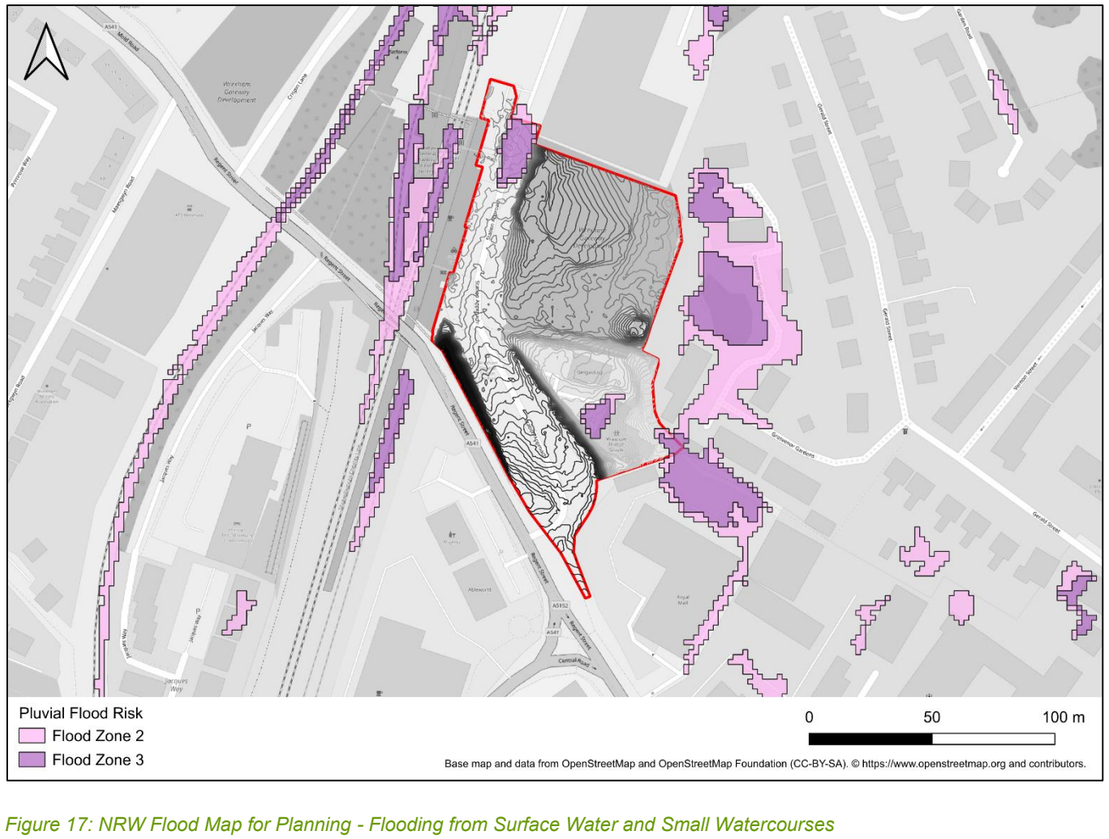


Figure 17: NRW Flood Map for Planning - Flooding from Surface Water and Small Watercourses

Flood Risk Vulnerability and Flood Zone Compatibility

Section 6 of Tan15 defines the type and nature of different development classifications in the context of their flood risk vulnerability. The information from Section 6 was extracted and is presented in Table 4.

Table 4: Flood risk vulnerability classification

DEVELOPMENT CATEGORY	TYPES
HIGHLY VULNERABLE DEVELOPMENT	• All residential premises (including hotels, Gypsy and Traveller sites and caravan parks and camping sites). • Schools and childcare establishments, colleges and universities. • Hospitals and GP surgeries. • Especially vulnerable industrial development (e.g. power venerating and distribution elements of power stations, transformers, chemical plans, incinerators), and waste disposal sites. • Emergency services, including ambulance stations, fire stations, police stations, command centres, emergency depots. • Buildings used to provide emergency shelter in time of flood.
LESS VULNERABLE DEVELOPMENT	• **General industrial, employment, commercial and retail development.** • **Transport and utilities infrastructure.** • Car parks. • Mineral extraction sites and associated processing facilities (excluding waste disposal sites). • Public buildings including libraries, community centres and leisure centres (excluding those identified as emergency shelters). • Places of worship. • Cemetries. • Equipped play areas. • Renewable energy generation facilities (excluding hydro generation).
WATER COMPATIBLE DEVELOPMENT	• Boatyards, marinas and essential works required at mooring basins. • Development associated with canals. • Flood defences and management infrastructure. • Open spaces (excluding equipped play areas). • Hydro renewable energy generation.

The flood risk vulnerability and flood zone compatibility extracted from Section 10 of TAN15 and is presented below in Table 5.

Table 5: Flood Zone Compatibility Location Justification

FLUVIAL FLOOD ZONE	HIGHLY VULNERABLE DEVELOPMENT	LESS VULNERABLE DEVELOPMENT	WATER-COMPATIBLE DEVELOPMENT
1	**All types of development are acceptable in principle.**		
2	Justified if it will assist, or be part of, a strategy supported by the Development Plan to regenerate an existing settlement or achieve key economic or environmental objectives AND its location meets the definition of previously developed land AND the potential consequences of a flooding event for the particular type of development have been considered and found to be acceptable in accordance with the criteria contained within TAN15 Section 11.		
3	Not permitted	Only justified if there are exceptional circumstances that require its location in Zone 3, such as the interests of national security, energy security, public health or ton mitigate the impacts of climate change AND its location meets the definition of previously developed land AND the potential consequences of a flooding event for the particular type of development have been considered, and found to be acceptable in accordance with the criteria contained within Tan15 Section 11.	Acceptable
TAN15 DEFENDED	Justified if its location meets the definition of previously developed land AND the potential consequences of a flooding event for the particular type of development have been considered, and found to be acceptable in accordance with the criteria contained in TAN15 Section 11		

The proposals for the development of the site fall within the category of Less Vulnerable Development under the definition of ‘General industrial, employment, commercial and retail development’ and ‘Transport and utilities infrastructure’.

Less Vulnerable development is appropriate and acceptable in principle in Fluvial Flood Zone 1.