Flood Consequences Assessment

Land South of Bryn Lane, Wrexham

Mauna Kea Limited

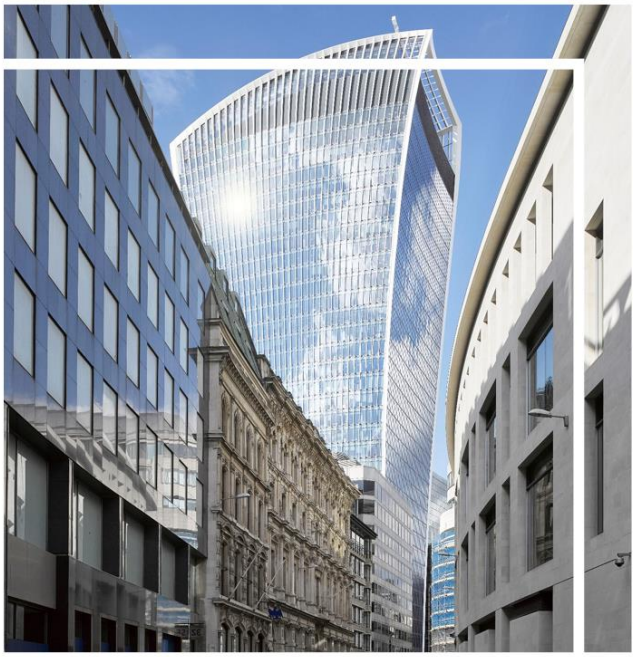
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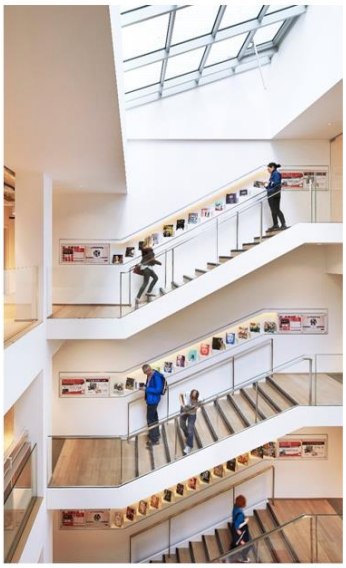
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Author:	A Lam
Checker:	E Rowlands
Approver:	P Bond
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HM Office:

Shackleton House
Hays Galleria
4 Battlebridge Lane
London
SE1 2HP

T: +44 (0)20 7940 8888
hilsonmoran.com
@HilsonMoran
hilson_moran
Hilson Moran

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Executive Summary

Hilson Moran was instructed by Net World Sports (the 'Client') to undertake a Flood Consequences Assessment (FCA), appropriate to the nature and scale of the Proposed Development at the Land South of Bryn Lane, Wrexham LL13 9UT.

The site comprises two fields (grassland) previously grazed by livestock, with trees and scrub around the northern, eastern and southern perimeters. A concrete structure is located in the north-eastern corner of the site and may have been associated with the former Royal Ordnance Factory (ROF Wrexham). The factory was demolished in the late 20th century; however, the concrete structure remains extant. The site is situated in the north-east of the Industrial Estate, with a large pharmaceutical site directly to the west and Bryn Business Centre directly to the east, with smaller units and a Kellogg's Factory beyond. The purpose of the FCA is to provide formal support for the full planning application of the construction of a new commercial/industrial unit at the site.

The proposed development will include employment floorspace (Use Classes B2 and B8) alongside ancillary office floorspace (Use Class B1a), 146 car parking spaces (including 15 disabled car parking spaces), 35 cycle parking spaces within an external cycle store, improvement of access off Bryn Lane. Additionally, new soft landscaping will be proposed for retaining the vegetation within the southern and eastern perimeter of the site.

The development will reclassify the land from greenfield to "less vulnerable development" (which includes general industrial, employment, commercial, retail, and car park uses).

This document highlights all the possible sources of flooding that may affect the area, including fluvial, pluvial, groundwater, sewer and reservoir flooding.

The above desk study highlights all of the potential sources of flooding that may affect the proposed site at Land South of Bryn Lane. The Flood Map for planning has identified the site as located within Flood Zone 1 (Zone A), indicating that the site is low risk (less than 1 in 1000 years or 0.1% annual probability of flooding in any given year), from fluvial sources from both coastal and riverine flooding.

Some areas of the site are within Flood Zone 3 for surface water and have the potential risk of greater than 1% chance of flooding from surface water in a given year. These are mainly isolated in the south where the existing pond/watercourse is located. The southern area of the site will have minimal development, with much of the vegetation along the southern and eastern boundaries being retained to provide a Strategic Ecological Network around the southern and eastern perimeter of the site. The buildings and the proposed car parks will not be affected by the surface water flood risk highlighted within the south.

Other flooding sources (such as groundwater, sewers and reservoirs) have also been assessed and are deemed as low.

Referencing TAN15 the site is within a Fluvial Flood Risk Zone A and is low in flood risk from fluvial sources, therefore the justification test is not applicable. There is no need to consider flood risk further, and therefore the development is appropriate for development in terms of flood risk grounds.

1. Introduction

1.1. Background

Hilson Moran has been commissioned by Net World Sports (the 'Client') to undertake a Flood Consequences Assessment (FCA) and SuDS Strategy, appropriate to the nature and scale of the proposed development at the Land East of Bryn Lane, Wrexham, LL13 9UT. The proposed redevelopment of the site for a commercial/industrial end-use. The national grid reference is SJ 38483 50770, as identified in **Figure 1.1**.

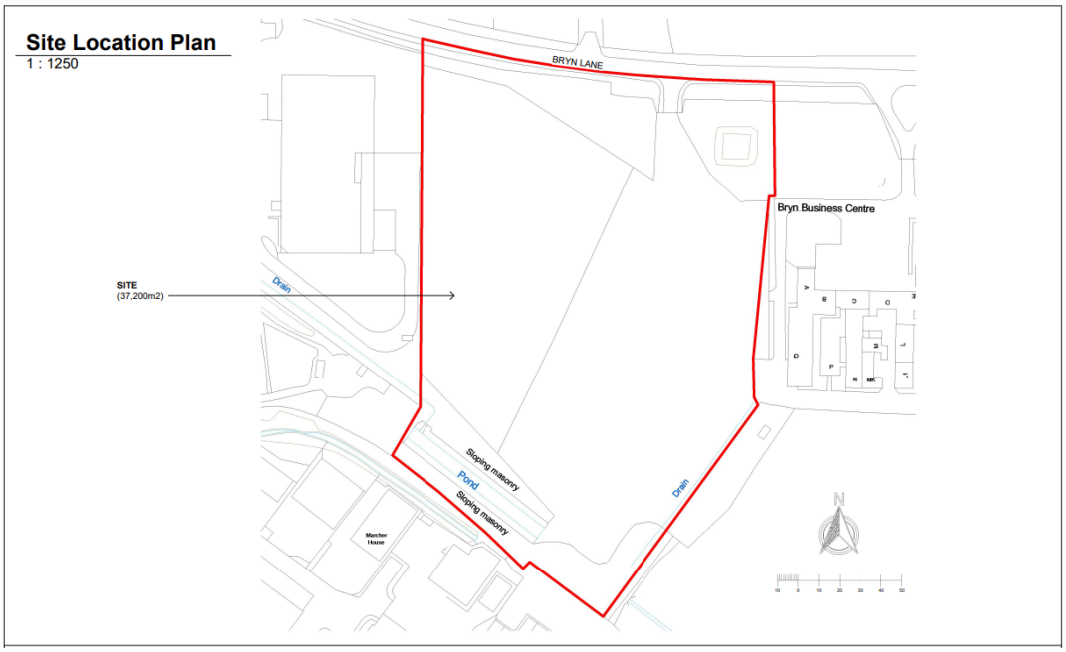


Figure 1.1 Site Red Line Boundary (Source: Pace Architecture, Drawing No. 2042.P.001, dated September 2024)

1.2. Purpose

The FCA provides formal support for the full planning application for the construction of a new commercial/industrial unit at the site.

1.3. Proposed Development

It is understood that Mauna Kea Limited (the 'Applicant'), a fully owned subsidiary of Net World Sports, intends to submit a Full Planning Application for the construction of a new commercial / industrial unit at the site.

The Proposed Development will include:

- *14,564 sq. m (GIA) of employment floorspace (Use Classes B2 and B8) alongside ancillary office floorspace (Use Class B1a);*
- *146 car parking spaces (including 15 disabled car parking spaces);*
- *30 cycle parking spaces within an external cycle store;*
- *New soft landscaping;*

- *Retention of a Strategic Ecological Network around the southern and eastern perimeter of the site, including a proposed wildlife pond at the south; and*
- *Improved access off Bryn Lane and new internal circulation roads.*

A proposed site plan has been produced and is included in **Figure 1.2**.

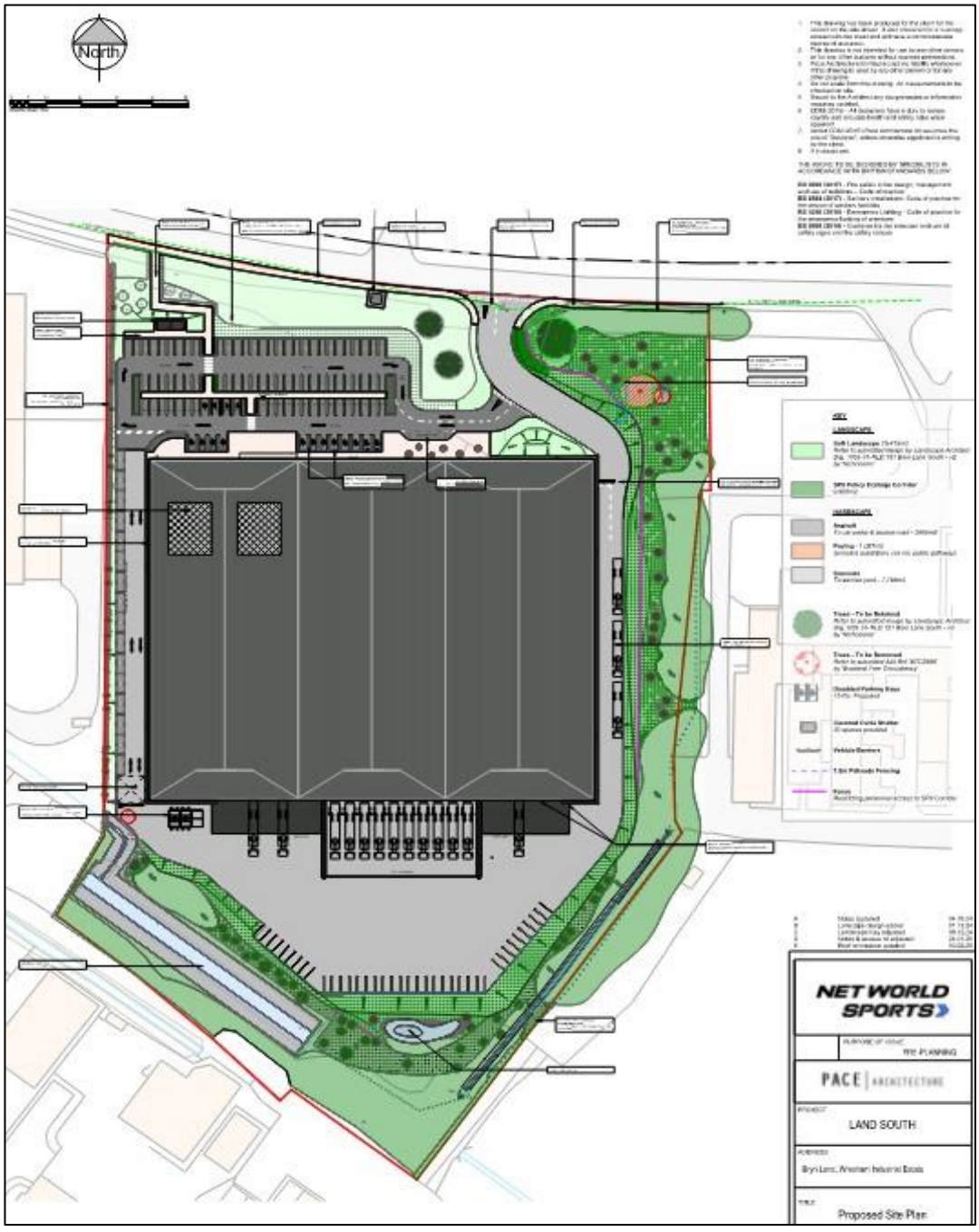


Figure 1.2 Proposed Site Plan (Source: Pace Architecture, Drawing no. 2024.P.004 (£), February 2025).

1.4. Scope of the Assessment

This document comprises a full FCA, using relevant information and up-to-date methodologies available to support the planning application for the Proposed Development.

1.5. Structure

The remainder of this document describes the legislative context of flood risk in Wales, confirms the flood risk of the proposals from all forms of flooding, presents mitigation and enhancements for the identified risk, and closes with a summary and conclusions.

Relevant appendices are included at the end of the report.

1.6. Limitations

This report has been prepared on behalf of and for the exclusive use of Net World Sports for whom the services were undertaken and are subject to and issued in connection with the provisions of the agreement set out by Hilson Moran Partnership Ltd. Hilson Moran Partnership Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party. Furthermore, this report is subject to the following limitations:

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2. Legislative Context

2.1. Planning Policy

2.1.1. National

Planning Policy Wales (PPW)[i] sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TAN)[ii], Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental, and cultural well-being of Wales, as required by the Planning (Wales) Act 2015, the Wellbeing of Future Generations (Wales) Act 2015 and other key legislation, and resultant duties such as the Socio-economic Duty.

TAN 15 provides technical guidance that supplements the policies set out in PPW in relation to flooding and coastal erosion and sets out the framework for assessing flood risks within Wales. Further information on this is provided in Section 2.2.5. It also provides advice on the consequences of the risks and adapting to and living with flood risk.

Chapter 6 of the TAN 15 - "Nature of development or land use", sets out the guidelines on the types of infrastructure with their respective flood risk vulnerability classification.

The TAN 15 also states that in mixed-used areas that have a single building, its vulnerability will be defined by the most vulnerable use. This includes buildings where ground floors have commercial uses, and upper floors are for residential uses.

Refer to Table 2.1 for further details:

Table 2.1 - TAN 15 Flood Vulnerability Classification

Development Category	Types
Highly vulnerable development	All residential premises (including hotels, Gypsy and Traveller sites, caravan parks and camping sites). Schools and childcare establishments, colleges and universities. Hospitals and GP surgeries.

Development Category	Types
	Especially vulnerable industrial development (e.g. power generating and power stations, chemical plants and waste disposal sites). Emergency services. (*e.g.* fire stations, police stations). Emergency flood shelters.
Less vulnerable development	Car parks. General industrial (*e.g.* commercial and retail development). Public buildings (excluding those identified as emergency shelters). Places of worship. Cemeteries. Equipped play areas. Renewable energy generation facilities.
Water compatible development	Marinas and essential works are required at mooring basins. Development associated with canals. Flood defences and management infrastructure. Open spaces (excluding equipped play areas). Hydro renewable energy generation.

2.1.2. Local

The Wrexham Local Development Plan[iii] is a document that outlines the national legislation and planning guidance, and it is the duty of the Local Planning Authority (LPA), Country Borough of Wrexham (CBW), to produce. The FCA will also use guidance from the Dee Preliminary Flood Risk Assessment[iv].

The following policies from the Wrexham Local Development Plan are relevant to flood risk:

Policy SP19: Climate Change

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

vi. Avoiding areas susceptible to flood risk in the first instance in accordance with the sequential approach set out in national guidance; and

vii. Preventing development that increases flood risk".

Policy DM1: Development Management Considerations

"All development must:

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

The Wrexham Unitary Development Plan[v] provides a framework for local decision making and is split into two parts: Part 1 is the strategy which outlines the Council's broad intention for development in the area and provides a framework for the more specific policies and proposals, and Part 2 contains specific policies which expand on the strategic vision for the County Borough and provide detailed guidance for the development and other use of land. Policies within the Unitary Development Plan which are relevant to flood risk include:

Policy EC12: Development and Flood Risk

"Development (including the raising of land) within defined flood plains will only be permitted if it:-

a) would not be subject to an unacceptable risk of flooding on-site; and/or

b) does not result in an unacceptable risk of flooding on or off-site; and/or

c) does not adversely affect flood management or maintenance schemes".

Policy EC13: Surface Water Runoff:

"Development which would result in an unacceptable adverse impact on the water environment due to additional surface water run-off will not be permitted".

EC14: Protection of Controlled Waters:

"Development which would have an unacceptable adverse impact upon the capacity, flow, quality or availability of controlled waters and associated land will not be permitted".

2.2. Legislation

2.2.1. Building Regulations Part H: Drainage and Waste Disposal (2010)

Building Regulations Approved Document Part H3 provides guidance on the hierarchy of options for surface water removal from a development site. The document states that, where feasible, the first choice for surface water removal should be to discharge such waters to an adequate soakaway or infiltration system. If this is not reasonably practicable, then discharge should be to a watercourse, with discharge to an existing sewer being the least favoured option. Infiltration techniques should therefore be applied wherever they are feasible.

Building Regulation H3 stipulates that "...[Infiltration devices should not be built] where the presence of any contamination in the run-off could result in the pollution of a groundwater source or resource". This is reaffirmed in the SuDS Manual[vi], which states

that “in areas containing contaminated soils or contaminated groundwater, soakaways are not acceptable”.

2.2.2. Water Industry Act (1991)

Legislation covering connection to a public sewer is contained in Section 106 to Section 109 of the Water Industry Act 1991 (the Act). Section 106 of the Act provides that the owner or occupier of any premises may have their drains or private sewer connected to the public sewers of the sewerage undertaker.

By the Act, the following types of connection may (subject to approval) be made to the public sewerage system. The type of connection you make will depend on the sewerage system in the area of the required connection.

1) Foul water into a foul sewer (e.g., from toilets, sinks, showers, and baths);
2) Surface water into a surface water sewer (e.g., roof and paved area drainage);
3) Foul and surface water into a combined water sewer (both a. and b. above); and,
4) Other types of connections may be permitted in exceptional circumstances, but they would be considered at the time of application.

2.2.3. Environment Act (Wales) 2016

This Act will see the establishment of the Flood and Coastal Erosion Committee which will provide advice to the Welsh Ministers on flooding from all sources and coastal erosion across Wales.

The Act aims to provide benefits for local communities equally, by encouraging decision makers to consider the economic, social, and environmental impacts of decisions on current and future generations. It intends to create a resilient natural environment, so that natural resources can provide clean water, good air quality, climate regulation, and crop pollination.

2.2.4. The Flood and Water Management Act (2010) – Wales

The Act states that construction work that has drainage implications may not be commenced unless a drainage system for the work has been approved by an approving body (unitary authority/ County Council), known as the SuDS Approving Body.

In determining an application for approval, the approving body must “grant it, if satisfied that the drainage system if constructed as proposed will comply with national standards for sustainable drainage; or refuse it if not satisfied.

The Act therefore removes the automatic right to connect to the public sewer if the proposed drainage strategy does not fully consider the feasibility of sustainable drainage systems (SuDS).

As part of the provisions of the Act, Llywodraeth Cymru (The Welsh Government) has set a statutory standard for designing, constructing, operating, and maintaining SuDS.

Reducing the impact of surface water runoff from the development on flood risk is based on limiting the peak runoff rate and runoff volume for extreme events. The 1:100 year return period rainfall event is the criterion normally used.

For controlling runoff rates at the development, the Act states:

- *"Aiming to replicate greenfield runoff rates for extreme events helps ensure that the flood risk associated with the receiving watercourse/sewer is not increased by the development."*
- *"For previously developed sites, site runoff rates should be reduced to the greenfield rates wherever possible. Because the critical duration for the attenuation storage system for the proposed development will be much longer than the storm duration used for sizing pipework for the previously developed site, there is a risk that by allowing previously developed runoff rates to occur (for a much longer duration) receiving watercourse damage and flood risk could be made considerably worse. Thus, betterment of at least 30% should be considered as a minimum requirement (this will need to be established and agreed with the drainage approving body) and strong consideration should still be given to controlling volumes of runoff to greenfield equivalents."*

For runoff volume control at the development, the Act states:

- *Where possible, the volume of runoff from the site (or development) area should not exceed the volume of runoff from the equivalent area in its natural undeveloped or "greenfield" state (for the same rainfall event).*

Where controlling runoff volumes to greenfield volumes is considered unachievable, then the runoff volume should be reduced as much as possible and any additional volume should be stored and released at a low rate that will not increase downstream flood risk (normally 2 l/s/ha is considered an appropriate rate) using either of the following approaches:

1) The additional runoff volume (i.e. the difference between the predicted development runoff volume and the estimated greenfield runoff volume, often called long-term storage) should be discharged from the site at a rate of 2 l/s/ha or less, while still allowing greenfield runoff peak flow rates to be applied for the greenfield runoff volume.
2) All the runoff from the site for the 1:100 year event should be discharged at either a rate of 2 l/s/ha or the average annual peak flow rate (i.e. the mean annual flood, QBAR), whichever is the greatest.
3) For previously developed sites, the surface water management system should be designed so the volume of surface water runoff discharged from the site for the 1:100 year, 6 hour event is kept as close to greenfield conditions as possible.

Details of the surface water management plans for the development will be discussed in **Section 7** of the report.

2.2.4.1. Schedule 3 of the Flood and Water Management Act 2010

Schedule 3 of the Flood and Water Management Act 2010 (the 2010 Act) relates to provisions for sustainable drainage (SuDS). These include the establishment of a SuDS Approving Body (SAB) to be set up within the local authority alongside their lead local flood authority (LLFA) duty. SAB approval will be required before construction of drainage systems can commence on new and redeveloped sites. Provided appropriate statutory National SuDS Standards (SuDS standards) are met, the SAB will be required to adopt and maintain the approved SuDS that serve more than one property.

2.2.5. Technical Advice Note 15 (TAN 15)

The TAN 15 is the technical guidance that supplements the PPW in relation to flooding and coastal erosion, it is a framework that the flood risk arising from rivers, the sea and surfaces can be assessed, as week as provide advice on the consequences of the risk and adapting to and living with flood risk.

The aim of the TAN is to advise caution with respect to new developments in areas at high risk of flooding by setting out a precautionary framework to guide planning decisions. This includes (where possible) directing new developments away from areas of high flood risk, and justification and flood consequences are taken into account (detailed in sections 6 and 7 of the TAN 15) to ensure that development is as safe as possible.

The PPW establishes the developer of sustainable places and impacts on the development management decisions within Wales. The PPW identifies 5 key areas:

- Maximising environmental protection and limiting environmental impact.
- Facilitating accessible and healthy environments.
- Making the best use of resources.
- Growing our economy in a sustainable manner.
- Creating and sustaining communities.

The TAN provides advice to enable planning authorities and developers to fulfil the requirements set out in PPW.

Flood Zones within the TAN 15 are categorised into Flood Zones ranging from A to C2 and are equivalent to Flood Zones 1 to 3 (used in England).

Table 2.2 details each of the Flood Zone classifications used in the TAN15.

Table 2.2 Composition and use of these zones to control and manage development - TAN15

Description of Zone		Use within the precautionary framework
Considered to be at little or no risk of fluvial or tidal/coastal flooding.	**A**	Used to indicate that the justification test is not applicable and no need to consider flood risk further.
Areas known to have been flooded in the past evidenced by sedimentary deposits.	**B**	Used as part of a precautionary approach to indicate where site levels should be checked against the extreme (0.1%) flood level. If site levels are greater than the flood levels used to define adjacent extreme flood outlines there is no need to consider flood risk further.
Based on Environment Agency's extreme flood outline, equal to or greater than 0.1% annual probability of flooding (river, tidal, or coastal)	**C**	Used to indicate that flooding issues should be considered an integral part of decision making by the application of the justification test including the assessment of consequences.
Areas of the floodplain that are developed and served by significant infrastructure, including flood defences.	**C1**	Used to indicate that development can take place subject to application of justification test, including acceptability of consequences.
Areas of the floodplain without significant flood defence infrastructure.	**C2**	Used to indicate that only "Less vulnerable" development should be considered subject to application of justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered.

Specific chapters of the TAN 15 will be highlighted throughout the FCA to ensure that the report is compliant.

3. Proposed Development

3.1. Location

The proposed site is located in the highly developed Wrexham Industrial Estate. The redline boundary (RLB) is approximately 3.72ha. North of the development boundary is the local highway (Bryn Lane). The site is between existing commercial/industrial buildings to the east and west boundaries, a small woodland to the south east, whilst to southwest there is an ordinary watercourse running through the southern boundary within the RLB (**Figure 3.1**).

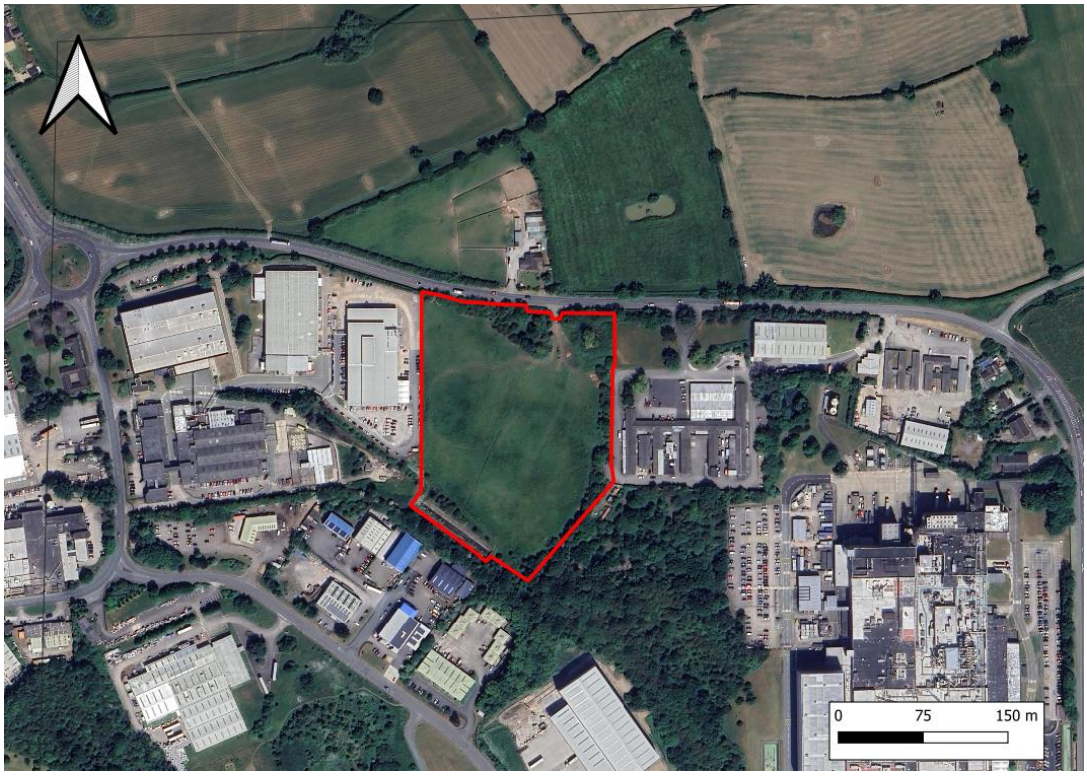


Figure 3.1 Arial photography of the area surround the RLB.

3.2. Proposal

The proposed application is to redevelop the existing plot of land into commercial/ industrial development as mentioned in Section 1.2. As such, the land will be reclassified according to the TAN15. The redevelopment of the greenfield land into commercial office spaces, will recategorise the existing land into the “Less vulnerable development” category (Table 5.1).

Table 3.1 TAN15 Flood Vulnerability development

Development Category	Types
Emergency services	Hospitals, ambulance stations, fire stations, police stations, coastguard stations, command centres, emergency depots, and buildings are used to provide emergency shelter in times of flood.
Highly vulnerable development	All residential premises (including hotels and caravan parks), public buildings (e.g. schools, libraries, leisure centers), especially vulnerable industrial development (e.g. power stations, chemical plants, incinerators), and waste disposal sites.
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.

Developments that have been categorised as “Less vulnerable” are able to develop in areas with higher flood risk, compared to developments that are in the “highly vulnerable” category. Subject to the development within passing the justification test, including the acceptability of consequences, “Less vulnerable” development can be considered to be developed in areas with higher flood vulnerability Zones B-C2. The following chapter assesses the baseline conditions and current flood risk levels within the proposed development.

4. Baseline Conditions

4.1. Existing Conditions

The application site is approx. 3.72ha. Currently, the site is greenfield and mainly consists of arable grassland with a small woodland on the northern boundary and thick shrubbery located on the border along the east and the north, with the southwest having a lined channel/pond that flows in a south-easterly direction. Access to the site is located on the northern boundary via Bryn Lane and fenced. Parts of the site have thick shrubbery, mainly along the eastern boundary. The access road leads to an unpaved track that leads to the centre of the fields (Figure 4.1).



Figure 4.1 Current access to the site from Bryn Lane (Google Maps)

4.2. Topography

The general topography of the site slopes from the north to the south, with no distinctive topographical features. Contours generated from the local digital terrain model (DTM), indicate a slight southeastern slope, with a noticeable drop in elevation to the south of the wooded area (Figure 4.2).

The topographic survey was conducted on the development by Pace Architecture on 03/09/2024. The survey indicates that the highest point on the site is located on the northern boundary and measures around 33.23m AOD. Whilst the lowest point is in the south and measures to about 28.96m AOD. It is noted that at the time of the survey that

the northwestern section of the site was unable to be surveyed due to the presence of vegetation.

Refer to **Appendix A** for the full details of the topographic survey.



Figure 4.2 General topography and NS cross-sectional profile

4.3. Geology and Soils

The British Geological Survey's (BGS) Geology of Britain viewer provides an understanding of the geological formations throughout Great Britain[vii]. A review of the information at the 1:50,000 scale mapping identifies that the bedrock consists of Early Triassic Mudstones (Salop Formation). The superficial geology consists of a Quaternary (Devensian) Till deposit. Refer to **Appendix B** for the geology base maps.

With reference to the National Soil Resources Institute (NSRI) Soilscape[viii] the soil within the site is entirely made up of slowly permeable, clayey/ loamy soils (Figure 4.3).

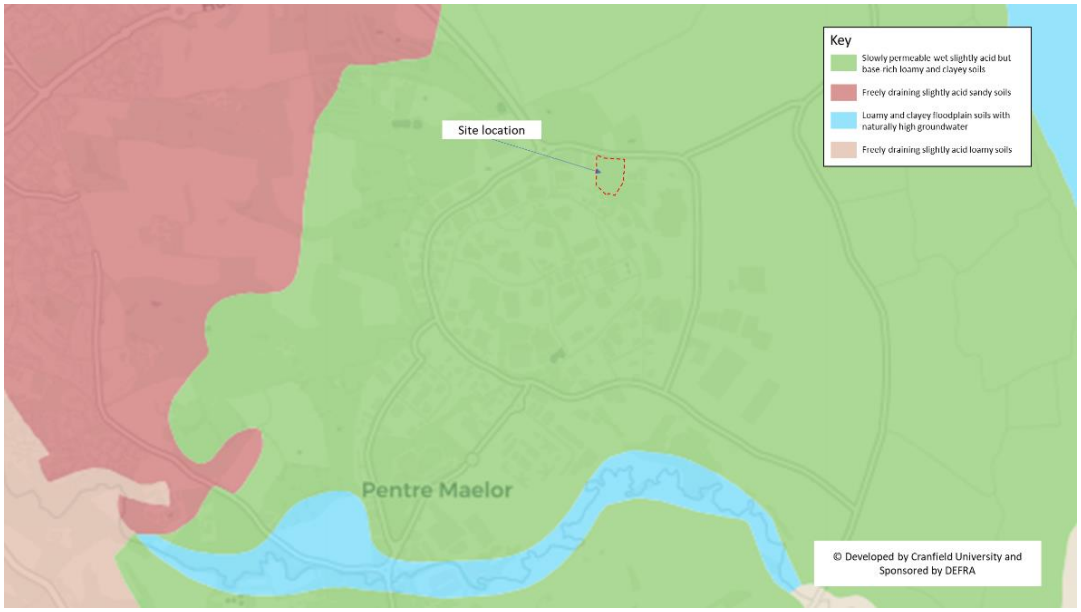


Figure 4.3 NSRI Soilscape – Soil types within the surrounding area

4.3.1. Source Protection Zones

Source Protection Zones (SPZs) are defined as areas that contain groundwater that is used to supply drinking water and are protected by Natural Resources Wales (NRW). This includes wells, boreholes, and springs.

Datamaps Wales indicates that the far northwest corner of the site may encroach onto a SPZ3 - Total Catchment (Figure 4.4). An area that is classified as an SPZ3 is defined as the total area needed to support the abstraction or discharge from the protected groundwater source.

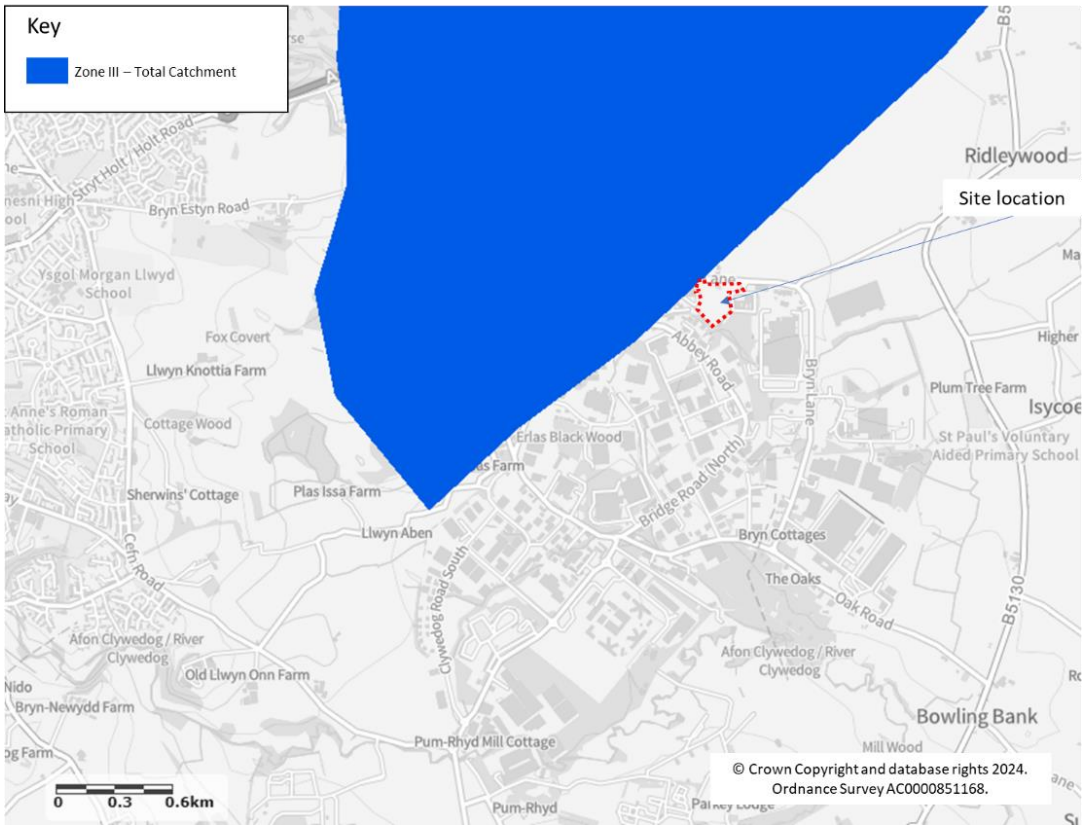


Figure 4.4 Nearest SPZ in relation to the Application Site

4.4. Hydrology

4.4.1. Information Source

In determining the hydrological conditions across the site and environs, reference has been made to several sources. In particular, information has been brought together from:

- The NRW's Flood Map internet resource;
- Wrexham County Borough Council Flood Risk Management Strategy (FRMP)[ix] ;

  and,
- The Dee Preliminary Flood Risk Assessment.

4.4.2. Surface Waters

According to the Wrexham FRMP the majority of the Borough is located within the River Dee Catchment, with only small areas within the south being part of the watershed of the River Severn. Directly south of the site boundary, there is an ordinary watercourse located around 20m In the topographical survey this is labelled as a pond and the watercourse is likely to drain southwards and eventually join with the River Clywedog, approx. 2km south of the site. Other nearby watercourse includes the Redwither Brook (650m south) which runs along the Wrexham Industrial Estate.

The major river within the area is the River Dee, which is located roughly 3.8km to the east of the site and is the border between Wales and England. (Figure 4.5).

In terms of surface water, a small pond is located on the east side of the boundary (roughly 200m east of the site) and is presumed to be recharged by the nearby field drains.

Other nearby water bodies include a lake 4.8km to the northwest (The Flash), with the closest reservoir in the area being the Marchwiel Reservoir around 4.4km southeast of the site. The nearest coastline is the Irish Sea located 37km to the northeast of the site.



Figure 2.5 Named watercourses near the proposed site

4.4.3. Historic Flood Information

The Preliminary Flood Risk Assessment (PFRA) of the River Dee and the river basin district (RBD) shows that parts of the Dee have a long history of flooding (though noted to be mostly within England), with records dating back to 1890 showing significant flooding with the most recent event in England recorded in 2016.

The FRMP has provided a table of the number of properties that are at risk from different types of flooding within the Borough, this was sourced from StatsWales and last updated in 2021 (Table 4.1).

Table 4.1 Properties at risk of flooding within Wrexham

Flooding Types	Number of Properties at High Risk	Number of Properties at Medium Risk	Number of Properties at Low Risk	Total Number of Properties at Risk
Fluvial	367	186	881	1434
Surface water	767	821	2407	3995

Flooding Types	Number of Properties at High Risk	Number of Properties at Medium Risk	Number of Properties at Low Risk	Total Number of Properties at Risk
Tidal	0	1	0	1

It is noted that tidal flood risk is included in the table, but tidal defences that protect this property are outside of the country borough, and therefore a mitigation plan for tidal flooding was not included in the FRMP.

The FRMP has stated that since 2011 Wrexham has seen continued growth, and this table may not be reflective of the actual situation. Therefore, the council has since produced a table from raw data (2019), which has identified pluvial and fluvial flood risk of communities within the Borough (For the full table refer to Appendix C). This data has identified that the highest risk communities are:

- Bangor-is-y-Coed (Bangor-on-Dee)
- Wrexham City
- Cefn Mawr – Acrefair

With the following other areas showing elevated levels of flood risk:

- Chirk
- Glyn Ceiriog
- Llan-y-Pwll
- Penycae
- Rhosllannerchrugog
- Rossett and Burto

The FRMP doesn't specifically refer to the Wrexham Industrial Estate, instead it is incorporated within the wider Llan-y-pwll community, which is an area that includes the Industrial estate up to Lodge Farm (approximately 3.5km north of the site). It is estimated that overall the population at risk of fluvial flooding within Llan-y-pwll identified is low, with 6 properties predicted to be affected in both the 1 in 100 (1% annual exceedance properties (AEP)) and in the 1 in 1000 (0.1 % AEP) event. Surface water flooding in the community is identified to be more prevalent, affecting 516 properties during a 1 in 1000 event, with the number increasing to 1628 in a 1 in 1000 surface water flooding event.

The following chapters will assess the potential flood risk within the proposed development.

4.5. Fluvial Flood Risk

Fluvial flooding occurs when water levels exceed the banks of the watercourse (rivers, lakes, sea) causing it to overflow into the surrounding areas. This can be caused by excessive rainfall, snowmelts or coastal surges.

According to the FRMP, flooding in the borough is managed by different Risk Management Authorities (RMA). These flooding types include fluvial flooding which is the responsibility of NRW, and sewerage flooding which is the responsibility of Dwr Cymru Welsh Water (DCWW) as the sewerage undertaker for Wrexham CBC. The other types of flooding remain the responsibility of Wrexham CBC as the Lead Local Flood Authority and will be the focus of this FCA.

The NRW maps for planning are digital flood maps that monitor the potential of flood extents (assuming that no defences are in place). The Flood Maps for Planning are updated every year in late May and late November on behalf of the Welsh government, with these updates including; River Flood Zones, Sea Flood Zones, River and Sea Flood Zones and TAN15 Defended Zones. The flood maps will indicate the latest potential flood extent within the location and flood zones are altered based on the latest available data[x].

The flood maps from the NRW indicate that the entire site is within Zone 1 or in the Tan 15 Zone A. This indicates that the site is low risk of flooding from fluvial sources, with the probability of flooding being less than a 1 in 1000 year (>0.1% AEP) of flooding from fluvial sources (River/Seas). The closet Flood Zone 3 extent is located approximately 2.2km east of Park Farm, this is due to the close proximity to the River Dee and by Ash Road South approximately 900 southwest of the site (Refer to Figure 4.6).

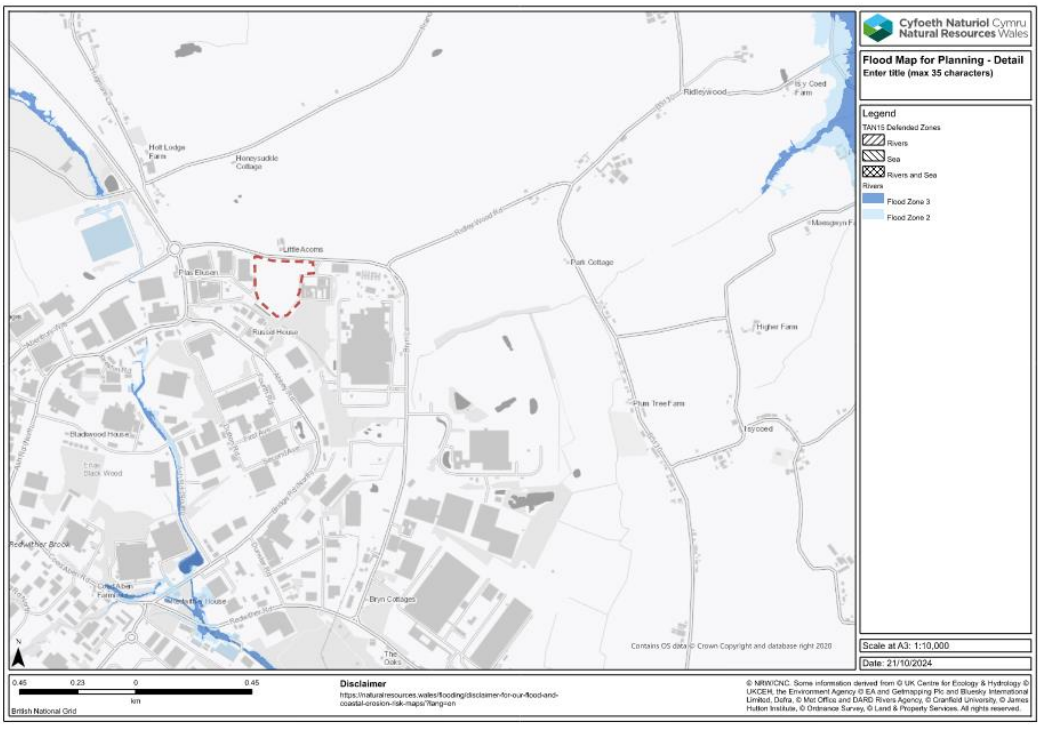


Figure 4.6 NRW Fluvial Flood Maps

4.6. Surface Water (Pluvial)

Surface water flooding occurs when intense, often short-duration, precipitation events are unable to enter a drainage system due to blockages, breakages in water pipes, or where the drainage capacity has been exceeded. This type of flooding is usually short-lived, associated with heavy precipitation events, and highly localised. The surface run-off will tend to flow toward low spots where it collects.

The flood maps indicate that parts of the site are within surface water Flood Zone 3, having a greater than 1% probability of flooding from surface water in a given year. This is located on the southern part of the site where the small watercourse/ pond is located and trends towards the southeast. The flood maps also show that the site access at the north is within a narrow area of Flood Zone 2 indicating a 0.1% to 1% probability of flooding from surface water in a given year (Figure 4.7).

The flood maps do not specify the depth of the flooding, but it is presumed that the surface water is overall shallow and isolated.

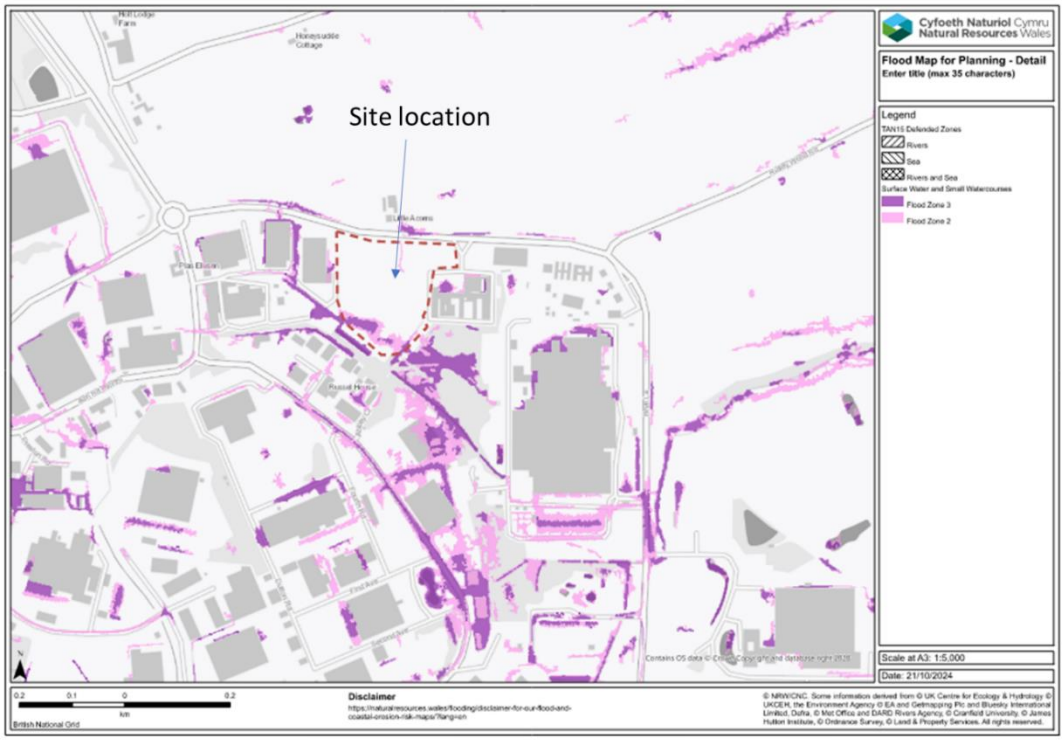


Figure 4.7 Map for planning illustrating surface water flood extent

4.7. Sewer Flooding

During heavy rainfall, flooding from the sewer system may occur if: the rainfall event exceeds the capacity of the sewer system/drainage system; the system becomes blocked (by debris or sediment); or the system surcharges due to high water levels in receiving watercourses. Failures of the underground drainage/sewer systems are often relatively localised and should not preclude development.

According to the FRMP, within the borough, there have been a total of 155 sewer flooding incidents dated between 2001 and 2016.

According to the Communities at Risk Register (CaRR)[xi], Llan-y-pwll area has been highlighted as a moderate-high rank (Orange) for surface water/ combined flooding. The FRMP states that this pattern is consistent with sewer flooding that has been identified by DCWW (Figure 4.8).

Details of the specific address and locations of sewer flooding are not made available to the public. Management of this type of flooding is the responsibility of Welsh Water (DCWW) as the sewerage undertaker for Wrexham CBC.

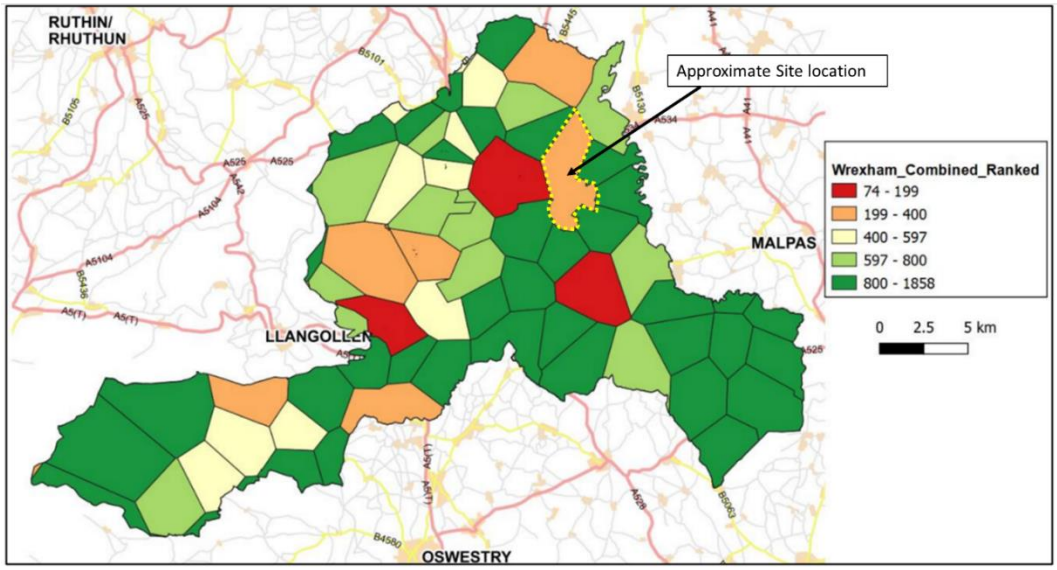


Figure 4.8 Combined surface water and fluvial flood risk across Wrexham CBC based on the national CaRR data generated by NRW in 2019 (Note Llan-y-pwll is highlighted in yellow).

4.8. Groundwater

Flooding from groundwater can happen when the water within the soils and/or rock rises from the water table to the surface. Water can seep through to the surfaces, and basements and cellars are particularly vulnerable to this source of flooding. The areas that are most at risk of flooding from this source are low-lying areas, where the water table is likely to be shallow. The PFRA states that groundwater flooding is rare, and the underlying geology and topography at the site means that groundwater flooding is very

unlikely. In Wales, in the unlikely case of groundwater flooding, the source is likely caused by small-scale disused mines, which should be assessed on a case-by-case basis.

The PFRAs which assessed all types of major flooding within the River Dee catchment area since 2011 have not recorded any groundwater flooding incidents throughout the catchment. Therefore, the risk from this source is deemed to be very low.

4.9. Reservoir and Artificial Waterbodies

A reservoir is a large natural or artificial lake that is designed to collect and store water. Flooding from reservoirs is extremely unlikely. An area is considered at risk if peoples' lives could be threatened in the event of a dam or reservoir failure.

The NRW flood maps also indicate that this area is not affected by flood risk from reservoirs with the nearest area that has the potential risk of reservoir flooding being around 1km to the east.

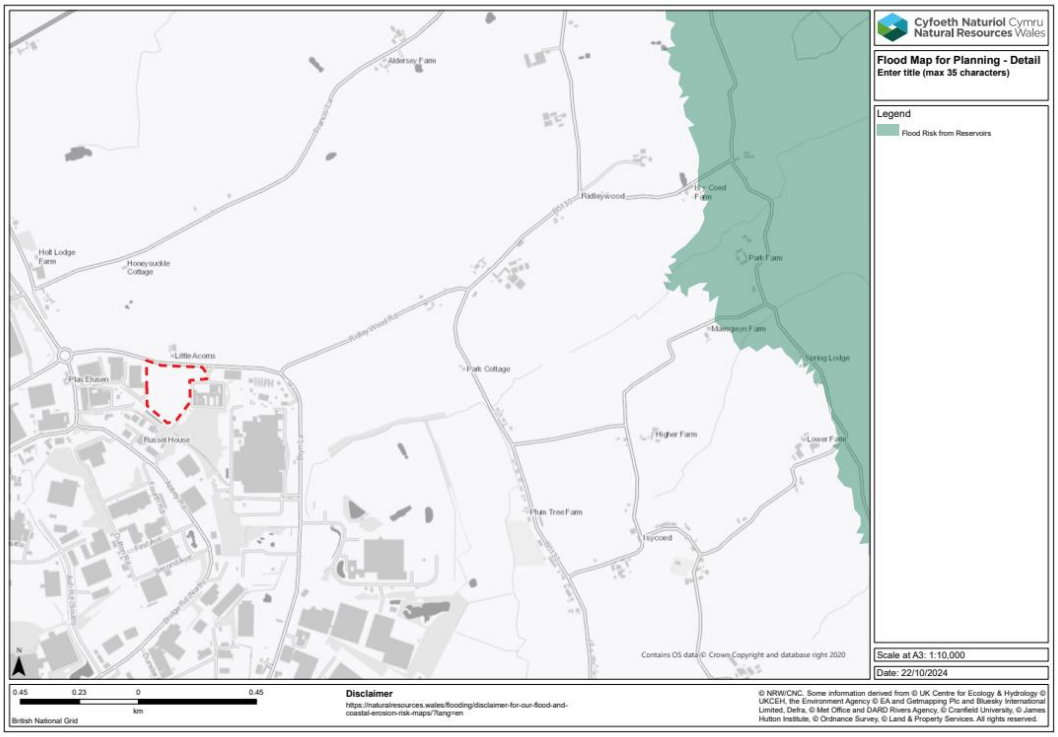


Figure 4.9 Map for planning illustrating reservoir flood risk extent

Reservoir flooding within the UK is overall considered to be low risk. The TAN 15 states that flood risk from reservoirs is managed by NRW and within Wales the reservoirs are maintained to very high standards. In the UK in general, there has not been a loss of life from reservoir flooding since 1925. All large reservoirs within the UK are inspected and supervised by reservoir panel engineers and it has been stressed that businesses and homes within a "*reservoir inundation area*" should not be concerned with reservoir flood risk.[xii]

4.10. Conclusions

The above desk study highlights all of the potential sources of flooding that may affect the proposed site at Land South of Bryn Lane. The flood map for planning has identified the site located within Flood Zone 1 (Zone A), indicating that the site is low risk (less than 1 in 1000 years or 0.1% annual probability of flooding in any given year), from fluvial sources on both coastal and riverine flooding.

Some areas of the site are within Flood Zone 3 for surface water and have the potential risk of greater than 1% chance of flooding from surface water in a given year. These are mainly isolated in the south where the existing pond/ watercourse in is located. Referring back to the proposed development (Section 1.2), the area along the south will have minimal development, with much of the vegetation along the southern and eastern boundary will being retained.The buildings and the proposed carparks will not be affected by the surface water flood risk highlighted within the south of the site.

Other flooding sources (such as groundwater, sewers, and reservoirs) have also been assessed and are deemed as low.

5. Mitigation & Enhancements against Flooding

5.1. Background

The application site measures 3.72ha of greenfield land, and it is proposed to develop the land into office spaces. This will reclassify the land,according to the TAN 15 General industrial (including office spaces) as "Less vulnerable development" (Table 5.1). All such development under the TAN15 policy must be flood-free during the 1% AEP for fluival flooding and 0.5% AEP for coastal flooding, plus an allowance for climate change over the lifetime of the development.

Refer to Table 5.1 for more details.

Table 5.1 Development Category – TAN15

Development Category	Types
Emergency services	Hospitals, ambulance stations, fire stations, police stations, coastguard stations, command centres, emergency depots, and buildings are used to provide emergency shelter in times of flood.
Highly vulnerable development	All residential premises (including hotels and caravan parks), public buildings (e.g. schools, libraries, leisure centers), especially vulnerable industrial development (e.g. power stations, chemical plants, incinerators), and waste disposal sites.
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.

5.2. Assessment of Impact

5.2.1. General Design Considerations

For new development, there is a general expectation that a drainage system should be adequate, particularly for drains created by development subject to Building Regulations. Adequate performance will usually be achieved if the drainage system:

- Conveys the flow via a suitable network or treatment systems to a suitable outfall (a soakaway, a watercourse, surface water, or combined sewer).
- Minimises the risk of blockage or leakage with good access for clearing blockages and any necessary maintenance.
- Has sufficient capacity to carry or retain the expected flow at any point in the system and so does not increase the vulnerability of the development to flooding.
- Provides drainage from roofs or paved areas to an adequately and suitably designed drainage system.

- Where necessary is adequately ventilated such that foul air does not enter buildings. It should be noted that:

    1. The priority for discharge of rainwater is first to an adequate soakaway or infiltration system, if that is not reasonably practicable then to a watercourse, the last option is to a sewer; and
    2. Discharges into the ground (where permitted) should be distributed sufficiently so that the foundations of buildings or structures are not damaged.

5.3. Flood Resilience Measures

To ensure that the development remains flood-free during the operational life of the development and that the development will not cause an increase of flood further downstream, the site will require use of Sustainable Drainage Systems (SuDS).

This is in alignment with the Welsh Government's Sustainable Drainage Systems Standards, which states:

"From 7th January 2019, all new developments in Wales that are greater than 1 dwelling or where the construction area is 100m^2 or more, will require SuDS for surface water. The SuDS must be designed and built in accordance with the Welsh Government's Statutory SuDS Standards[xiii] *and SuDS Schemes must be approved by the local authority acting in its SuDS Approving Body (SAB) role, before construction work begins."*

The SuDS design, consultation with the SAB (Wrexham SuDS Approving Body), and drainage strategy for the development will be undertaken by Tier Consult Group.

5.4. Flood Warnings

In the event of flooding within Wrexham, the NRW provides live warnings and alerts on their website (refer to **https://naturalresources.wales/flooding/check-flood-warnings/?lang=en**), which also provides information on the flood risk outlook for Wales for the next five days.

Alternatively, NRW provides a 24-hour phone service 0345 988 1188 (Flood line) which includes direct operator advice & frequently updated flood warning information. It is intended that the site owners would subscribe to the NRW's Flood Warning Service, which will produce live flood warnings and alerts.

5.5. Flood Resilient Construction

In addition to the above, as a precautionary measure against extreme coastal and future groundwater flooding, building specific flood resistant measures will be included in the scheme (in line with the UK Government's "Improving the Flood Performance of New Buildings: Flood Resilient Construction" guidance), i.e.:[xiv]

- No air bricks within the floor slab construction;
- External walls/windows capable of withstanding a hydrostatic head up to 600 mm;

- Use of building materials that are effective for a 'water exclusion strategy' including engineering bricks, cement-based materials including water retaining concrete and dense stone; and
- The provision of non-return valves in the drainage system to prevent back-flow of diluted sewage, should local surface water flooding be associated with surcharging of the combined sewer system.

5.6. Justification for Development

Section 6 of TAN15 outlines the requirements of justification for developments within different flood risk zones. Since the site is within Fluvial Flood Risk Zone A and is low in flood risk from fluvial sources, the justification of the test is not applicable. There is no need to consider flood risk further and therefore the site is appropriate for development in terms of flood risk grounds.

6. Summary & Conclusions

Hilson Moran was instructed by Net World Sports (the 'Client') to undertake a Flood Consequences Assessment (FCA) and Sustainable Drainage Systems (SuDS) Strategy, appropriate to the nature and scale of the Proposed Development at the Land South of Bryn Lane, Wrexham LL13 9UT.

The site comprises two fields (grassland) previously grazed by livestock, with trees and scrub around the northern, eastern and southern perimeters. A concrete structure is located in the north-eastern corner of the site and may have been associated with the former Royal Ordnance Factory (ROF Wrexham). The factory was demolished in the late 20th century; however, the concrete structure remains extant. The site is situated in the north-east of the Industrial Estate, with a large pharmaceutical site directly to the west and Bryn Business Centre directly to the east, with smaller units and a Kellogg's Factory beyond.

The purpose of the FCA is to provide formal support for the full planning application of the construction of a new commercial/industrial unit at the site.

The above desk study highlights all of the potential sources of flooding that may affect the proposed site at Land South of Bryn Lane. The Flood Map for planning has identified the site as located within Flood Zone 1 (Zone A), indicating that the site is low risk (less than 1 in 1000 years or 0.1% annual probability of flooding in any given year), from fluvial sources from both coastal and riverine flooding.

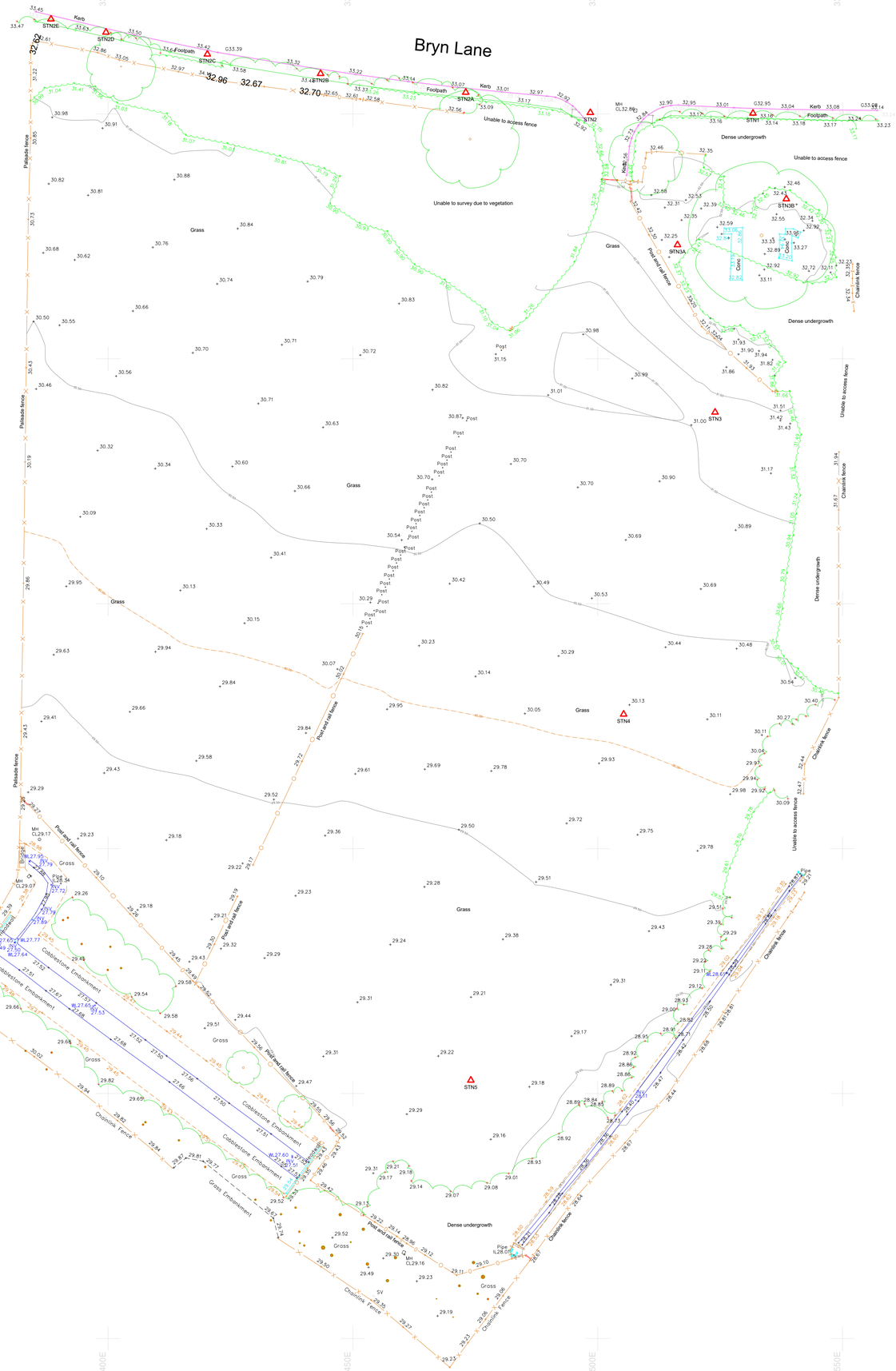
Some areas of the site are within Flood Zone 3 for surface water and have the potential risk of greater than 1% chance of flooding from surface water in a given year. These are mainly isolated in the south where the existing pond/watercourse is located. The southern area of the site will have minimal development, with much of the vegetation along the southern and eastern boundaries being retained to provide a Strategic Ecological Network around the southern and eastern perimeter of the site. The buildings and the proposed car parks will not be affected by the surface water flood risk highlighted within the south.

Other flooding sources (such as groundwater, sewers and reservoirs) have also been assessed and are deemed as low.

Referencing TAN15 the site is within a Fluvial Flood Risk Zone A and is low in flood risk from fluvial sources, therefore the justification test is not applicable. There is no need to consider flood risk further, and therefore the development is appropriate for development in terms of flood risk grounds.

Appendices

Appendix A – Topographical Survey



Survey Grid and Datum

The derived coordinate system used for this survey is related to Ordnance Survey national grid using Smartnet RTK (OSTN15 Transformation), orientated to north with a scale factor of 1.000.

The derived level datum used for this survey is related to Ordnance Survey (OSGM15 Geoid Model) using Smartnet RTK.

To avoid discrepancies any coordinated data used in conjunction with this survey must be derived directly from this control data.

The survey control listed is only to be used for topographical surveys at the stated scale. All control must be checked and verified prior to use.

Legend

Top/Bottom of bank
Building
Channel
Concrete slab
Cleadward fence
Chainlink fence
Concrete post & panel fence
Iron railing fence
Palisade fence
Post & Panel fence
Post & rail fence
Post and Wire Fence
Hedge
Invert
Kerb line (bottom)
Kerb line (top)
Overhead Power lines
MBA
Switchbox
Steel
Tree spread
Verge
Wall
Bin — Bin
Bollard — Bol
Cable tv — CATV
Electric cover — Elec
Electricity pole — EP
Earth rod — Earth
Fire hydrant — FH
Gulley — G
Gas cover — GAS
Inspection cover — IC
Lamp post — LP
Manhole — MH
Marker post — Marker
OSBM — OSBM
Rodding eye — RE
Road sign — RS
Sign post — SP
Stump — Stump
Stone Valve — SV
Telegraph Pole — TP
Trees — TRL
Traffic lights
Trial pit — Trial pit P1
Tree Trunk
Water cover — W
Bus Stop
BT — BT rectangle 3 pts
Bus stop

Notes

The contractor must ensure that adequates checks on building dimensions, levels, features are completed prior to commencing any construction works.

Any errors or discrepancies must be notified to Powers UK Ltd immediately.

The accuracy of the digital data is the same as the plotting scale implies.

All dimensions are in metres unless otherwise stated.

Topographical Surveys

Any surveyed boundary features may not be representative of the legal boundary of the site

All reasonable effort has been made to survey features and detail that are unobstructed/visible during at the time of survey

Grouped trees have been shown as a tree spread, individual trees are drawn to scale showing a bole diameter taken at approximately 1.5m above GL and an average spread

Measured Building Surveys

All measurements to internal wall are taken at approximately 1.5m above floor level and assumed to be vertical

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Do not scale from this drawing.

Station Listing

SURVEY STATIONS

Name	Easting	Northing	Height
STN1	338531.706	350850.133	33.144
STN2	338498.488	350850.267	32.854
STN3	338523.966	350789.093	31.324
STN3A	338516.289	350823.273	32.328
STN3B	338538.514	350832.633	32.540
STN4	338505.298	350727.442	30.045
STN5	338474.088	350652.710	29.129
STN2A	338473.049	350854.393	33.225
STN2B	338443.397	350858.231	33.431
STN2C	338420.272	350862.198	33.598
STN2D	338399.566	350866.675	33.679
STN2E	338388.334	350869.364	33.641

Layout Key

(1)

Rev	Date	Description	Check
A	21/10/24	Added brook to south of site	JL

powers
Integrated Survey Partner
Meridian House, 58-60 Hillside Road, Frodsham, Cheshire WA6 6AG
Tel: 01928 734473
Email: surveyors@powersuk.com
www.powersuk.com

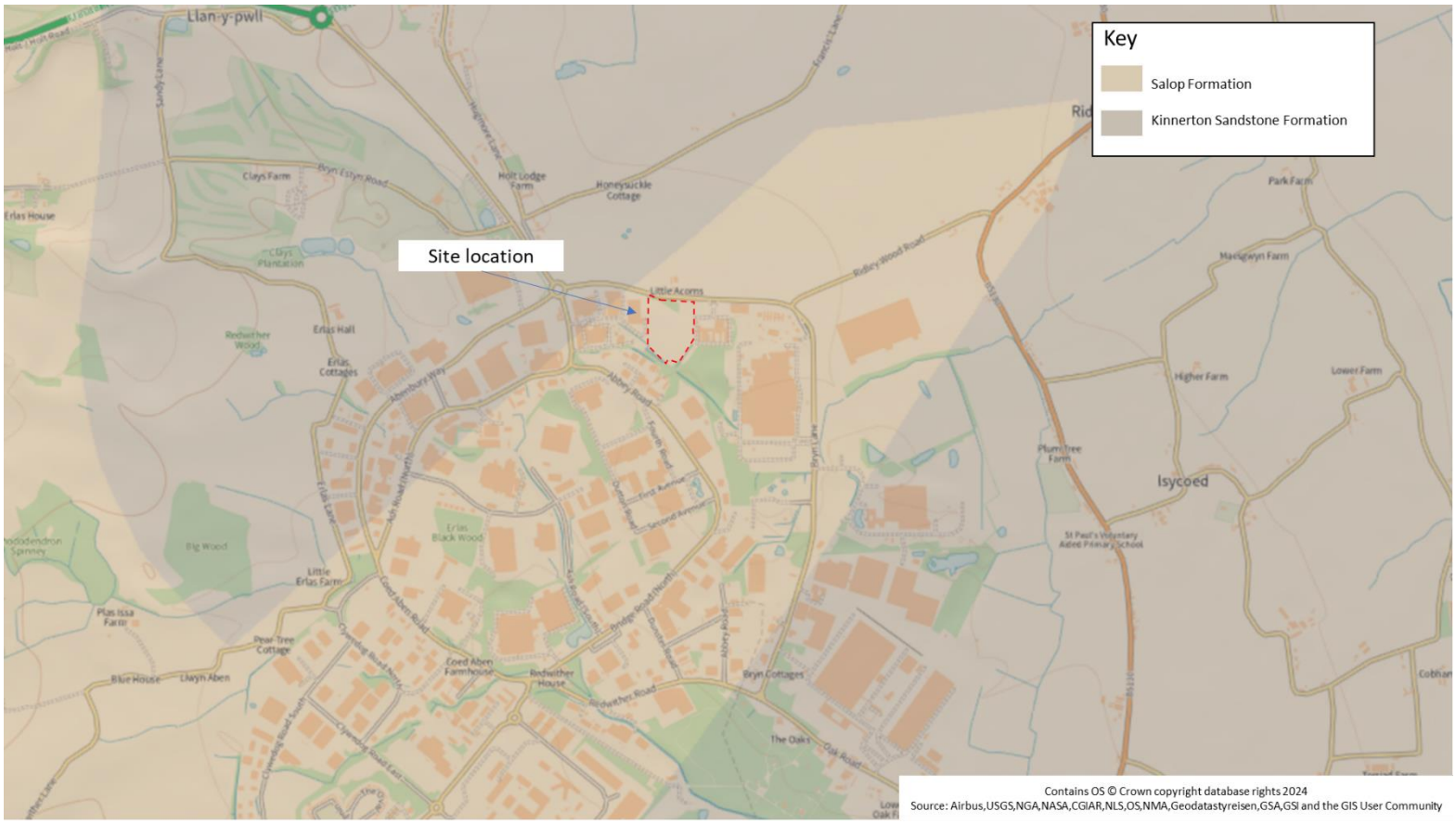
Client: CBRE

Site: Bryn Lane, Wrexham, LL13 9XW

Title: Topographical Survey

Survey by	DW	Drawn by	JW
Check by	GM	Date	03/11/23
Scale [A1 Sheet]	1:500	Project No.	FP6441
Status	FINAL		
Drawing No.	FP6441-T-01	Revision	Rev A

Appendix B – Bedrock Geology



Appendix C – Number of people at risk from fluvial and surface water flooding -FRMP

Community Name	River Basin District	Population at Risk from Fluvial Flooding				Population at Risk from surface water Flooding			
		1 in 10	1 in 30	1 in 100	1 in 1000	1 in 10	1 in 30	1 in 100	1 in 1000
Bangoris-y coed	Dee	3	358	627	909	13	33	56	180
Bersham	Dee	6	17	28	96	0	2	10	79
Bettisfield	Severn	0	0	0	0	0	0	10	52
Borras Head	Dee	0	0	0	0	0	0	1	10
Bowling Bank	Dee	0	0	0	6	10	10	10	29
Bradley	Dee	0	0	4	8	0	3	5	56
Bronington	Severn	0	0	0	0	0	0	3	9
Bryrmbo	Dee	0	0	0	0	0	0	41	123
Brynteg	Dee	0	0	0	0	13	45	55	92
Burton Green	Dee	0	0	0	0	6	10	15	57
Bwlchgwyn	Dee	0	0	0	0	10	17	21	59
Cefn-mawr Acrefair	Dee	282	355	416	491	232	355	566	974
Chirk	Dee	0	0	2	16	31	136	895	1284
Coedpoeth	Dee	0	0	0	0	18	41	123	367
Crabtree Green	Dee	0	0	0	0	0	15	21	41
Craignant	Dee	0	0	0	0	1	3	7	7
Cross Lanes	Dee	0	0	0	1	15	17	36	66
Eglwys Cross	Dee	3	3	3	3	0	0	0	7
ErbStock	Dee	0	0	1	13	2	6	16	36
Eylon	Dee	0	0	0	54	0	0	0	8
Froncysyllte	Dee	0	0	0	0	16	17	40	53
Garth	Dee	0	0	0	0	9	26	45	84
Glyn CeirOg	Dee	48	50	57	116	60	82	105	139
Gresford	Dee	0	0	7	7	18	31	66	220
Gwersyllt	Dee	0	0	0	0	5	29	128	584
Gyfelia	Dee	0	2	2	50	11	48	69	87
Halton	Dee	0	0	0	0	3	5	29	92
Hanmer	Dee	0	0	0	0	0	2	2	8
Higher Wych	Dee	0	0	0	0	0	0	0	0
Holt and Plas Devon	Dee	9	17	35	79	11	11	17	35
Horseman's Green	Dee	0	0	0	2	0	18	21	29
Isycoed	Dee	0	0	0	9	0	4	7	15

Lightwood Green	Dee	0	0	0	0	7	14	19	33
Llanarmon Dyffryn Ceiriog	Dee	22	34	34	52	0	8	11	11
Llan-y-pwll	Dee	2	5	6	6	95	239	516	1628
Llay	Dee	0	0	0	0	59	131	274	508
Llechrydau	Severn	0	0	0	0	24	24	24	24
Llwynmawr	Dee	0	0	0	48	42	64	79	89
Marchwiel	Dee	0	0	0	4	10	10	47	99
Minera	Dee	0	0	0	0	79	81	118	176
Moss	Dee	0	0	0	0	18	36	107	231
New Broughton	Dee	0	16	161	206	0	7	33	209
Oldcastle Heath	Dee	0	0	0	0	0	0	0	0
Overton	Dee	0	0	0	0	0	0	0	24
Pandy	Dee	0	0	7	34	2	15	17	47
Penley	Dee	4	4	4	4	26	29	43	78
Pentre	Dee	2	2	2	2	0	0	0	0
Pentre	Dee	0	0	0	0	6	6	6	13
Penycae	Dee	0	0	3	12	73	115	191	363
Plas Nantyr	Dee	0	3	3	7	3	3	3	31
Pontfadog	Dee	0	4	16	84	17	21	32	58
Rhosllanerchrugog	Dee	0	0	0	0	117	193	394	961
Rhostytllen	Dee	0	0	0	6	0	18	44	182
Ridleywood	Dee	0	0	0	12	10	12	12	12
Rossett and Burton	Dee	31	53	114	440	0	8	32	128
Ruabon	Dee	8	19	25	46	43	71	94	214
Tallarn Green	Dee	2	5	5	5	0	0	0	6
The Chequer	Dee	0	0	0	0	0	3	31	53
Tregeiriog	Dee	0	0	0	0	33	35	57	67
WOrthenbury	Dee	23	23	23	23	10	15	23	62
Wrexharm (City)	Dee	103	143	258	756	36	231	909	2587

References

[i] Welsh Government (2021)- Planning Policy Wales (11th Edition)

[ii] Planning Policy Wales (2004) – Technical Advice Notes (TANs) 15: Development and Flood Risk

[iii] Wrexham County Borough Council (2023) - Wrexham Local Development Plan 2 (LDP2) 2013 to 2028

[iv] EA/NRW (2018) - Dee preliminary flood risk assessment

[v] Wrexham County Borough Council (2005) Unitary Development Plan 1996-2011

[vi] CIRIA (2015) – The SuDS Manual

[vii] British Geological Survey - Geoindex internet website: https://mapapps2.bgs.ac.uk/geoindex/home.html

[viii] Cranfield Soil and Agrifood Institute- Soilscapes website: https://www.landis.org.uk/soilscapes/

[ix] Wrexham County Borough Council (2023) – Flood Risk Management Strategy (Draft version 3)

[x] NRW (2024)- Flood map for planning / development advice map web: https://naturalresources.wales/flooding/flood-map-for-planning-development-advice-map/?lang=en

[xi] Welsh Government (2024) - https://datamap.gov.wales/maps/new?layer=geonode:nrw_communities_at_risk_register#/

[xii] NRW (2023) - Flooding from reservoirs: https://naturalresources.wales/flooding/managing-flood-risk/flood-risk-map-guidance/risk-of-flooding-from-reservoirs/?lang=en#:~:text=There%20has%20been%20no%20loss,safety%20work%20is%20carried%20out.

[xiii] Welsh Government (2018) - Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems.

[xiv] Communities and Local Government/ EA (2007) - Improving the Flood Performance of New Buildings, Flood Resilient Construction.