



Tier Consult

Richmond House, Sandpiper Court,
Chester Business Park, Chester CH4 9QZ
01244 684900

Flood Consequence Assessment

Land north of Bryn Lane, Wrexham

Client:	Net World Sports
Document Type:	Report
Document No.:	T/2486/FCA
Revision:	1.3
Date:	13/06/2023



Version History

This report has been prepared by Tier Consult with all reasonable skill, care and diligence, within the best practice and guidance current at the time of issue within the scope of works which have been agreed with the client.

This report is confidential to the client and Tier Consult accepts no responsibility whatsoever to third parties to whom this report, or any part thereof is made presented, unless this is formally agreed in writing by a Director of Tier Consult before any reliance is made. Any such party relies upon the report at their own risk. Tier Consult disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

Revision	Date	Notes	Prepared by	Checked by	Approved by
1.1	01/02/2022	First Draft	Keelan Serjeant	Phil Barlow	Phil Barlow
1.2	04/10/2022	Second Draft	Keelan Serjeant	Phil Barlow	Phil Barlow
1.3	13/06/2023	Third Draft	Keelan Serjeant	Phil Barlow	Phil Barlow



Contents

Executive Summary	5
1. Introduction	6
1.1 Background.....	6
1.2 Planning Policy Wales.....	6
1.3 Technical Advice Note 15 (TAN15).....	7
1.4 Natural Resources Wales.....	8
1.5 Wrexham County Borough Council.....	9
1.6 Welsh Water/Dŵr Cymru	10
2. Location & Description	11
2.1 Site Location	11
2.2 Existing Development.....	11
2.3 Proposed Development.....	11
2.4 Ground Levels	12
2.5 Catchment Hydrology.....	12
2.6 Ground Conditions	12
3. Assessment of Flood Risk.....	14
3.1 Sources of Flooding	14
3.2 Climate Change	14
3.3 Historic Flooding	14
3.4 Existing and Planned Flood Defence Measures	14
3.5 Development Advice Map	14
3.6 Flood Map for Planning	16
3.7 Flood Risk Vulnerability	17
3.8 Fluvial (river) Flooding.....	17
3.9 Tidal (coastal) Flooding.....	17
3.10 Groundwater Flooding	17
3.11 Surface Water (pluvial) Flooding.....	18
3.12 Sewer Flooding	18
3.13 Flooding from Artificial Drainage Systems/Infrastructure Failure	19
3.14 Effects of the Development on Flood Risk	19
3.15 Summary of Site-Specific Flood Risk	19



4. Risk Management.....	21
4.1 Introduction	21
4.2 Minimum Floor Level	21
4.3 Flood Resilience and Resistance	21
4.4 Access and Egress.....	21
4.5 Flooding Consequences.....	21
5. Justifying the Location of the Development	22
5.1 Justification Test	22
6. Summary and Conclusion.....	23
6.1 Introduction	23
6.2 Flood Risk.....	23
6.3 Risk Management	23
6.4 Justifying the Location of the Development.....	24
6.5 Conclusion	24



Executive Summary

The proposed commercial development would be expected to remain dry in all but the most extreme conditions, the flood risk to the site can be considered to be limited, with a low or less annual probability of flooding from all sources. Providing the recommendations made in this FCA are instigated, flood risk from all sources would be minimised, the consequences of flooding are acceptable and the development would be in accordance with the requirements of TAN15 and the statutory development plan.

This FCA demonstrates that the proposed development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of TAN15. The development should not therefore be precluded on the grounds of flood risk.



1. Introduction

1.1 Background

This Flood Consequence Assessment (FCA) has been prepared by Tier Consult to support a hybrid planning application for the proposed development on Land north of Bryn Lane, Wrexham.

This FCA has been carried out in accordance with guidance contained in Technical Advice Note 15 Development and Flood Risk (TAN15) and associated Development Advice Maps (DAMs). This FCA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will be managed so that the development remains safe throughout the lifetime, taking climate change into account.

It is recognised that developments which are designed without regard to flood risk may endanger lives, damage property, cause disruption to the wider community, damage the environment, be difficult to insure and require additional expense on remedial works. The development design should be such that future users will not have difficulty obtaining insurance or mortgage finance, or in selling all or part of the development, as a result of flood risk issues.

1.2 Planning Policy Wales

Planning Policy Wales (11th edition), 2021¹, sets out the land use planning policies of the Welsh Government. Chapter 6 'Distinctive and Natural Places' outlines the Welsh Government's objectives in terms of addressing flood risk. The section titled 'Development and Flood Risk the following is stated:

"The climate emergency is likely to increase the risk of flooding as a result of sea-level rises, increased storminess and more intense rainfall. Flooding as a hazard involves the consideration of the potential consequences of flooding, as well as the likelihood of an event occurring. Planning authorities should adopt a precautionary approach of positive avoidance of development in areas of flooding from the sea or from rivers. Surface water flooding will affect choice of location and the layout and design of schemes and these factors should be considered at an early stage in formulating development proposals.

The continued construction of hard engineered flood defences to protect development in areas of floodplain is not sustainable. Government resources for flood and coastal defences are directed at protecting existing developments and are not available to provide defences in anticipation of future development. Account should be taken of shoreline management plans and measures such as managed realignment, the creation of washlands and flood plain restoration as alternatives to engineered flood defences.

Development Advice Maps enable planning authorities to take a strategic approach to flood risk and consider the catchment as a whole by providing a preliminary representation of flood risks, which inform decisions on the location of new development and the requirements necessary to support any

¹ <https://www.gov.wales/planning-policy-wales>



applications which may be proposed. Together with flood consequences assessments they should assist understanding of how natural and man-made defences work as integral components of places and provide a means by which the cumulative effects of development can begin to be understood. Development should reduce, and must not increase, flood risk arising from river and/or coastal flooding on and off the development site itself. The priority should be to protect the undeveloped or unobstructed floodplain from development and to prevent the cumulative effects of incremental development.

In areas of flood plain currently unobstructed, where water flows in times of flood, built development should be wholly exceptional and limited to essential transport and utilities infrastructure. Such infrastructure should be designed and constructed so as to remain operational even at times of flood, to result in no net loss of floodplain storage, to not impede water flows and to not increase flood risk elsewhere. TAN 15: Development and Flood Risk should be referred to for further policy advice on development and flood risk. It will be important to note that developments located within flood risk areas remain at risk from flooding even if mitigation measures are applied.

Planning authorities should be aware of the risk of surface water flooding, usually caused by heavy rainfall, and ensure developments are designed and planned to minimise potential impacts. Development should not cause additional run-off, which can be achieved by controlling surface water as near to the source as possible by the use of SuDS. Care should be taken in places of shallow groundwater or where flooding is caused by combined surface and groundwater processes. In such situations direct infiltration SuDS may not be appropriate. Consultation with drainage bodies and NRW should be undertaken and relevant evidence and information drawn from Area Statements taken into account.

New or improved flood defences in coastal and/or riverside locations should be carefully planned, ensuring all potential environmental effects, both on and off-shore, and relevant Shoreline Management Plan policies are taken into account. Flood defence works can provide opportunities to achieve wider social, economic and environmental benefits, which should be maximised where possible. Nature based solutions should be the first consideration given the opportunity to deliver other multiple benefits, including habitat creation, biodiversity enhancement and water quality improvements. Overall, green infrastructure opportunities can benefit ecosystem resilience and provide opportunities for leisure facilities or renewable energy generation.

The ability of emergency services to respond to flood events should be taken into account when considering if a development in a flood risk area is appropriate. This may involve consultation with emergency planners, local resilience forums and other professional partners such as fire rescue, police and ambulance services."

1.3 Technical Advice Note 15 (TAN15)

Planning Policy Wales is supplemented by a series of Technical Advice Notes (TAN). Technical guidance on development and flood risk is provided by TAN15². TAN15 was introduced in 2004 by the Welsh Assembly Government. It is technical guidance related to development planning and flood risk

² <https://www.gov.wales/technical-advice-note-tan-15-development-and-flood-risk-2004>



using a sequential characterisation of risk based on the Welsh Government's Development and Flood Risk Advice Map (DAM). Its initial requirement is to identify the flood zones and vulnerability classification relevant to the proposed development, based on an assessment of current and future conditions.

One of the key aims of TAN15 is to ensure that flood risk is taken into account at all stages of the planning process; to avoid inappropriate development in areas at risk of flooding and to direct development away from areas of highest risk.

It advises that where new development is exceptionally necessary in areas of higher risk, this should be safe, without increasing flood risk elsewhere, and where possible, reduce flood risk overall. A risk based approach is adopted at stages of the planning process, applying a source pathway receptor model to planning and flood risk. To demonstrate this, an FCA is required and should include:

- whether a proposed development is likely to be affected by current or future flooding from all sources;
- whether it will increase flood risk elsewhere;
- whether the measures proposed to deal with these effects and risks are appropriate; and
- satisfy the justification test, where required, including the acceptability of consequences.

A revised TAN15 was due to be implemented in December 2021 and then June 2023. This was to be supported by the new Flood Map for Planning (FMfP), which includes climate change information to show how this will affect flood risk extents over the next century. It shows the potential extent of flooding assuming no defences are in place. The coming into force of the new TAN15 and the FMfP has been suspended due to a further consultation on the TAN³, ⁴.

The FMfP has no official status for planning purposes at the moment however, Natural Resources Wales may use the FMfP data as the 'best available information' on flood risk to inform their planning advice. As confirmed in the letter from Welsh Government dated 15 December 2021⁵, the FMfP represents better and more up-to-date information on areas at flood risk than the DAM.

1.4 Natural Resources Wales

The Flood and Water Management Act 2010 gives Natural Resources Wales a strategic overview role for all forms of flooding and coastal erosion. They also have direct responsibility for the prevention, mitigation and remediation of flood damage for main rivers and coastal areas. Natural Resources Wales is the statutory consultee with regards to flood risk and planning.

Natural Resources Wales Flood Risk Standing Advice and TAN15 have been consulted and reviewed during this FCA. Information regarding the current flood risk at the site, local flood defences and flood water levels has been obtained from Natural Resources Wales.

³ <https://www.gov.wales/technical-advice-note-tan-15-development-flooding-and-coastal-erosion>

⁴ <https://www.gov.wales/written-statement-tan-15-timeline>

⁵ <https://www.gov.wales/sites/default/files/publications/2021-12/letter-local-authorities-on-the-pause-of-tan-15-15-december-2021.pdf>



Recommended precautionary sensitivity ranges for peak rainfall intensities, peak river flows and sea level rise are outlined in the following documents CL-03-16 - Climate Change Allowances for Planning Purposes⁶, Flood Consequence Assessments: Climate change allowances⁷ and Adapting to Climate Change: Guidance for Flood and Coastal Erosion Risk Management Authorities in Wales⁸.

The 9th of January 2014 Welsh Government letter to all Chief Planning Officers (CPO) in Wales and CL-03-16 - Climate Change Allowances for Planning Purposes clarifies and refers to the Natural Resources Wales recommendations that the lifetime of development for residential development is 100 years, and for other development it is considered to be 75 years.

1.5 Wrexham County Borough Council

Wrexham County Borough Council is the Local Planning Authority (LPA), the Lead Local Flood Authority (LLFA), the SuDS Approving Body (SAB) and therefore, has responsibilities for 'local flood risk', which includes surface runoff, groundwater and ordinary watercourses. Planning guidance written by Wrexham County Borough Council regarding flood risk was consulted to assess the mitigation policies in place. The Wrexham County Borough Council Preliminary Flood Risk Assessment (PFRA) which covers the site has been reviewed.

Wrexham Unitary Development Plan (UDP) (adopted 2005)

The UDP covers the plan period 1996 to 2011 and remains the statutory development plan for Wrexham. Policy GDP1, *Development Objectives*, states that development should not result in, or be subject to, flooding either on or off site.

Policy EC12, *Development and Flood Risk*, relates to development which is proposed within flood plains.

Policy EC13, *Surface Water Run-off*, states that development which would result in unacceptable adverse impact on the water environment due to additional surface water run-off will not be permitted.

Wrexham Local Development Plan (2013-2028)

WCBC are preparing a Local Development Plan (LDP) which will replace the current adopted Unitary Development Plan. The LDP is a land use plan that sets out the planning requirements for achieving sustainable development in the Borough over the period 2013-2028. WCBC has decided not to adopt the plan at this stage, however it remains a material consideration with significant weight, as it has been found sound by a Planning Inspector.

Draft Policy SP19, *Climate Change*, states that to mitigate the impacts of climate change, development proposals will need to demonstrate that they avoid areas susceptible to flood risk in the first instance, in accordance with the sequential approach set out in national guidance. Development which would increase flood risk will be prevented. The potential effects of climate change should be assessed when preparing a Flood Consequence Assessment for development sites.

⁶ <https://gov.wales/sites/default/files/publications/2018-11/cl0316-climate-change-allowances.pdf>

⁷ <https://gov.wales/sites/default/files/publications/2018-11/flood-consequence-assessments.pdf>

⁸ <https://gov.wales/sites/default/files/publications/2021-09/adapting-to-climate-change-guidance-for-flood-and-coastal-erosion-risk-management-authorities-in-wales.pdf>



Draft Policy DM1, *Development Management Considerations*, states that development should 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.

Wrexham Preliminary Flood Risk Assessment (2011)

Wrexham County Borough Council, as the LLFA, is required by the Flood Risk Regulations (2009) and EU Floods Directive 2007/60/EC to prepare a Preliminary Flood Risk Assessment (PFRA). PFRAs assess the risk associated with all types of flooding and provide the information required to identify the amount of development permitted in an area; how drainage systems in the area should function and also how risks in vulnerable areas can be reduced and/or mitigated. The purpose of the PFRA is to assess and map all known sources of flood risk including fluvial, surface water, sewer, groundwater and all impounded water bodies, taking into account future climate change predictions.

The PFRA provides a detailed understanding of flood risks across the borough from all sources, surface water flooding is the most prominent cause of flooding within the County Borough. The report identified no records of past groundwater flooding within the County Borough and there are no historic records of canal overtopping or flooding of a canal within the Borough.

1.6 Welsh Water/Dŵr Cymru

Welsh Water/Dŵr Cymru is responsible for the disposal of wastewater and supply of clean water for this area. Information with regards to sewer and water main flooding contained within the Wrexham County Borough Council PFRA has been consulted as part of this FCA. All Water Companies have a statutory obligation to maintain a register of properties/areas which are at risk of flooding from the public sewerage system, and this is shown on the DG5 Flood Register.



2. Location & Description

2.1 Site Location

The site is located on Land north Bryn Lane, Wrexham (see Drawing T/2486/FCA/1). The site is approximately 37.21 hectares (ha) in area and is located to the north of Wrexham Industrial Estate, to the north of Bryn Lane. The site is bound to the north by Francis' Lane, to the east by field boundaries, to the south by Bryn Lane and to the west by Hugmore Lane / Industrial Estate Road.

There are residential properties located in the north west corner of the site, to the north (off Francis' Lane) and to the south (off Bryn Lane). Within the wider area, industrial / commercial properties dominate the area to the south and west of the site (associated with Wrexham Industrial Estate) and agricultural / countryside uses are located to the north and east.

2.2 Existing Development

The site predominantly comprises fields in a greenfield state bound by hedgerows and trees. There are two residential properties on site with associated outbuildings, one of which includes stable buildings.

2.3 Proposed Development

The proposed development is commercial in nature and encompasses:

- Detailed Component:
 - 1) Demolition of existing buildings, site clearance and preparation works, including removal of vegetation and reprofiling of topsoil, where necessary;
 - 2) Construction of a new warehouse unit, providing 33,595 sqm Gross External Area (GEA) for B1c (light industry appropriate in a residential area), B2 (general industrial) and B8 (storage & distribution) uses (Unit 2);
 - 3) Construction of 8 new smaller units (Units 3-7; 14-16), providing a total of 29,659 sqm GEA for B1c (light industry appropriate in a residential area), B2 (general industrial) and B8 (storage & distribution) uses;
- Outline Component:
 - 1) Construction of up to 72,635 sqm GEA for employment uses (B1c (light industry appropriate in a residential area), B2 (general industrial) and B8 (storage & distribution) uses), ancillary retail/drive thru facilities and potential for a hotel and petrol filling station (A1, A3, C1 or sui generis). The overall quantum of A1, A3, C1 or sui generis use would not exceed 16,150 sqm GEA;
 - 2) The proposed buildings will be up to 28.5m in height above ground level;



- Site Wide
 - 1) Access and parking provision, including new access junctions, internal roads, service yards and car and HGV parking. Two new junctions are proposed (in detail) providing vehicular access, as well as cycle and pedestrian access, from Bryn Lane/Industrial Estate Road with an additional access road for a substation. Car parking spaces, HGV trailer spaces and HGV lorry spaces are proposed across the application site;
 - 2) Retention and enhancement of some existing on-site green spaces and provision of landscaping around the application site; and
 - 3) Implementation of drainage/attenuation measures.

The proposed site layout plans are shown in Appendix B.

2.4 Ground Levels

The site is situated on relatively flat and low-lying ground on the western edge to the River Dee Catchment. Ground elevations slope gently across the site from approximately 40m Above Ordnance Datum (mAOD) in the west to between 27mAOD and 31mAOD in the east and northeast, following the general trend in the surrounding area.

2.5 Catchment Hydrology

Several ponds, between 9m to 44m in diameter, are located within the eastern, southern and western parts of the site, which are likely to store surface water. The nearest surface water courses are present roughly between 135m and 225m to the south and 235m to 245m to the southwest of the site and flow towards the northeast and the River Dee. It is anticipated that these surface water features sit on and flow over the Devensian Till deposits that underlie the site and immediate surrounding area. A culverted watercourse is also recorded approximately 110m west of the site and adjacent to the JCB Transmission Ltd building. The River Dee is located roughly 3km to the east of the site.

2.6 Ground Conditions

The British Geological Survey (BGS) maps Sheet 121, "Wrexham", dated 1994 and Sheet 122, "Nantwich", dated 1967 show the following. No artificial ground is shown to cover the site.

The site and immediate surrounding area are shown to be covered with superficial deposits comprising Devensian Till (Diamicton). Beneath the Till deposits, sandstone strata belonging to the Kinnerton Sandstone Formation underlie the northern and western parts of the site. Underlying the southeast half of the site are interbedded mudstone, sandstone and conglomerate strata belonging to the Salop Formation.

Historical BGS boreholes are located immediately north, northeast and south of the site. These boreholes recorded dark brown sandy topsoil, to around 1.00m depth, overlying firm and stiff brown and red brown sandy stoney clay soils to a maximum borehole depth at around 26m to 38m bgl. The clay soils are interpreted as Devensian Till (Diamicton). Groundwater was recorded on one borehole record at 16.00m and on a second as being artesian associated with the underlying bedrock.



A single northeast to southwest trending fault is shown traversing the middle of the site, separating the two bedrock strata and downthrown towards the northwest. The underlying strata are indicated to dip at a shallow angle towards the east.



3. Assessment of Flood Risk

3.1 Sources of Flooding

All sources of flooding have been considered, these are fluvial (river) flooding, tidal (coastal) flooding, groundwater flooding, surface water (pluvial) flooding, sewer flooding and flooding from artificial drainage systems/infrastructure failure.

3.2 Climate Change

Projections of future climate change, in the UK, indicate more frequent, short-duration, high intensity rainfall and more frequent periods of long duration rainfall. Guidance included within TAN15 recommends that the effects of climate change are incorporated into FCA. Recommended precautionary sensitivity ranges for peak rainfall intensities and peak river flows are outlined in the Welsh Government Guidance, CL-03-16 - Climate change allowances for Planning purposes.

The 9th January 2014 Welsh Government letter to all Chief Planning Officers (CPO) in Wales and CL-03-16 - Climate change allowances for Planning purposes clarifies and refers to the Natural Resources Wales recommendations that the lifetime of development for residential development is 100 years, and for other development it is considered to be 75 years (i.e. 2098).

3.3 Historic Flooding

The site is not located within the Natural Resources Wales historic flood outline for this area. The British Hydrological Society "Chronology of British Hydrological Event" has no information on flooding within the vicinity of the site. No other historical records of flooding for the site have been recorded. Therefore, it has been concluded that the site has not historically flooded.

3.4 Existing and Planned Flood Defence Measures

It is understood that there are no flood defences in this area.

3.5 Development Advice Map

The Development Advice Map (DAM) which accompanies TAN15 confirms that the site is located within Zone A: Considered to be at little or no risk of fluvial or tidal/coastal flooding (see Figure 3.1). Used to indicate that the justification test is not applicable and there is no need to consider flood risk further.

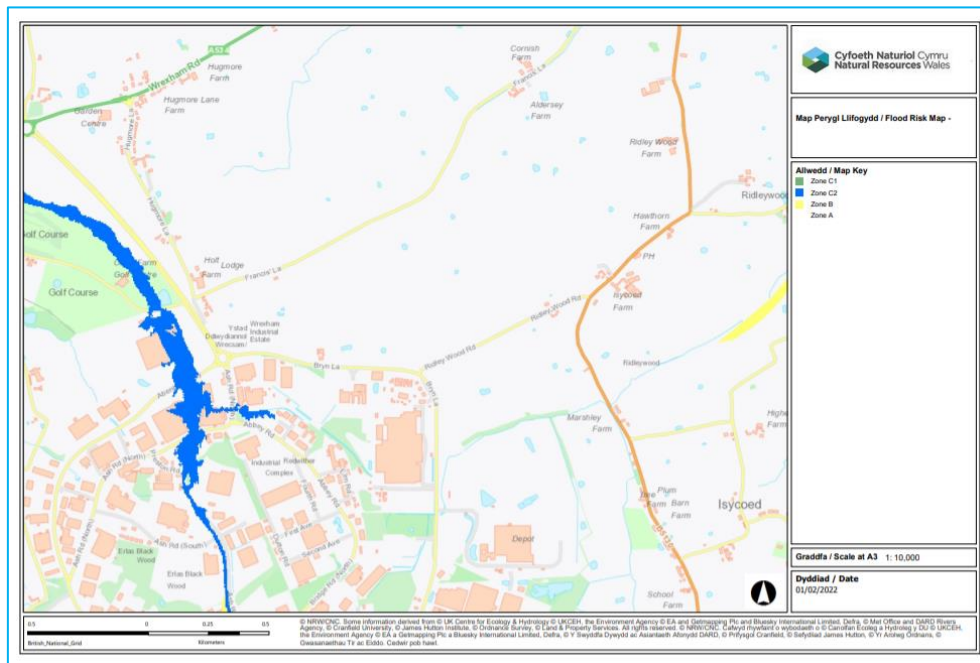


Figure 3.1 - Development Advice Map Zones

Table 3.1 - Development Advice Map Zones

Description of Zone	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 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 outline there is no need to consider flood risk further.
Based on Environment Agency extreme flood outline, equal to or greater than 0.1% (river, tidal or coastal)	C	Used to indicate that flooding issues should be considered as an integral part of decision making by the application of the justification test including assessment of consequences.
Areas of the floodplain which 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.

3.6 Flood Map for Planning

The Flood Map for Planning (FMfP) shows that the site is located within Flood Zone 1 for flooding from rivers and sea however, small areas of the site are located within Flood Zones 2 and 3 for flooding from surface water and small watercourses (see Figure 3.2). Table 3.2 provides details of the FMfP Flood Zones.

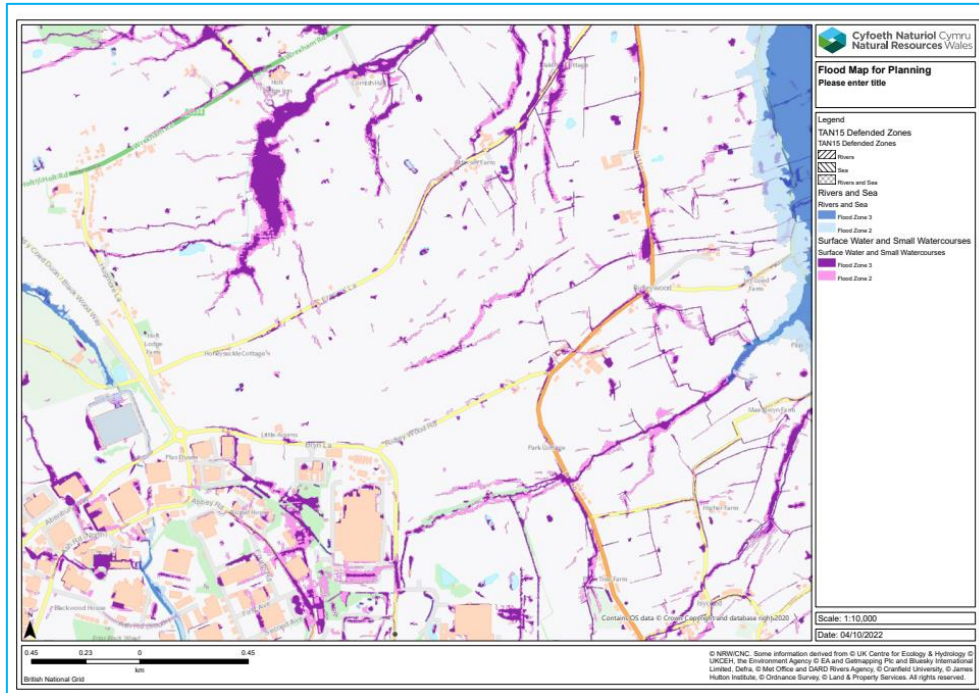


Figure 3.2 - Flood Map for Planning

Table 3.2 - Flood Map for Planning Flood Zones

Flood Zone	Explanation
Rivers - Flood Zone 2	Areas with 0.1% to 1% (1 in 1000 to 1 in 100) chance of flooding from rivers in a given year, including the effects of climate change.
Rivers - Flood Zone 3	Areas with more than 1% (1 in 100) chance of flooding from rivers in a given year, including the effects of climate change.
Sea - Flood Zone 2	Areas with 0.1% to 0.5% (1 in 1000 to 1 in 200) chance of flooding from the sea in a given year, including the effects of climate change.
Surface Water and Small Watercourses - Flood Zone 2	Areas with 0.1% to 1% (1 in 1000 to 1 in 100) chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change.
Surface Water and Small Watercourses - Flood Zone 3	Areas with more than 1% (1 in 100) chance of flooding from surface water and/or small watercourses in a given year, including the effects of climate change.

3.7 Flood Risk Vulnerability

Table 3.1 describes the composition and use of the DAM zones to control and manage development. Applying the Flood Risk Vulnerability Classification in Figure 2 of TAN15, the proposed development is classified as 'less vulnerable'. In TAN15 (Section 9.0) appropriate uses have been identified for the DAM zones and FMfP. The proposed development is classified as 'less vulnerable', TAN15 states that 'less vulnerable' uses are appropriate at this location.

3.8 Fluvial (river) Flooding

The Natural Resources Wales Flood Risk Map shows that the site is not at risk of fluvial flooding (see Figures 3.2 and 3.3). It can therefore be concluded that the risk of fluvial flooding is not significant.

3.9 Tidal (coastal) Flooding

The Natural Resources Wales Flood Risk Map shows that the site is not at risk of tidal flooding (see Figures 3.2 and 3.3). It can therefore be concluded that the risk of tidal flooding is not significant.

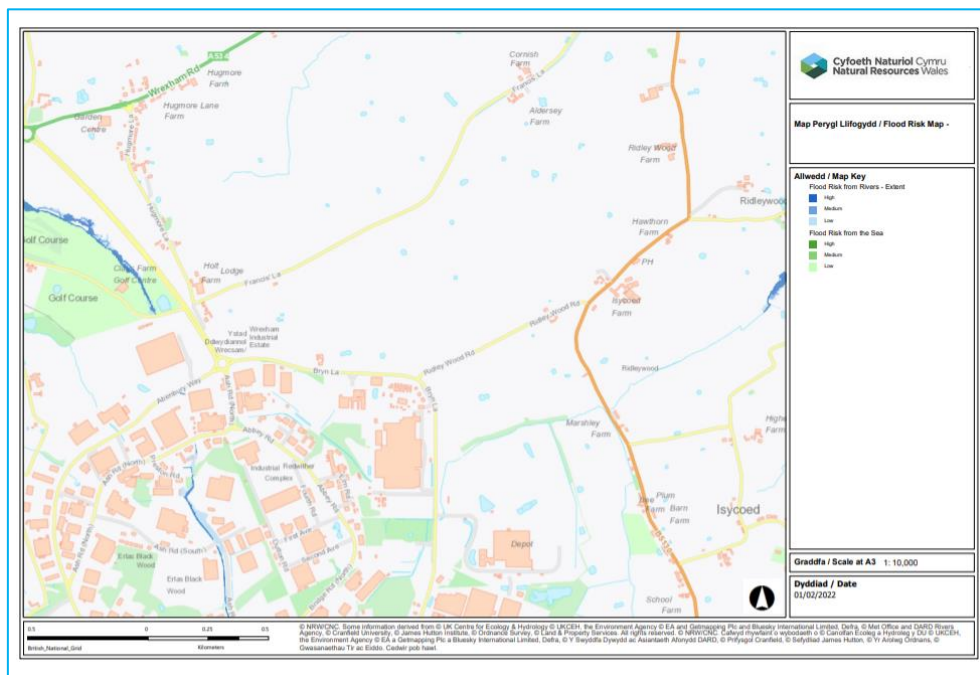


Figure 3.3 - Natural Resources Wales Flood Risk Map: Fluvial and Tidal

3.10 Groundwater Flooding

Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded. Groundwater flooding tends to occur sporadically in both location and time. When groundwater flooding does occur, it tends to mostly affect low-lying areas, below surface



infrastructure and buildings (for example, tunnels, basements and car parks) underlain by permeable rocks (aquifers).

The susceptibility of the site to groundwater flooding, based on the underlying geological conditions, is low. There are no records of groundwater flooding at or near to the site. It can therefore be concluded that the risk of groundwater flooding is not significant.

3.11 Surface Water (pluvial) Flooding

The soil condition at the site and within the vicinity of the site and the topography of the site suggest that the site is relatively well drained and surface water flooding would not be expected to accumulate to any significant depths. Surface water flooding tends to occur sporadically in both location and time such surface water would tend to be confined to the streets around the development.

Figure 3.2 confirms that the majority of the site has a very low risk of surface water flooding with a chance of flooding of less than 1 in 1000 years (0.1%) in any year, including the effects of climate change. However, small areas of the site have a low risk of surface water flooding with a chance of flooding of between 1 in 1000 (0.1%) and greater than 1 in 100 (1%) years, including the effects of climate change. This is associated with low spots on the site.

It can therefore be concluded that the risk of surface water flooding is of low significance. The risk from the surface water sources will be managed and mitigated by using a number of flood mitigation measures to manage and reduce the overall flood risk at the site (see Section 4.0).

3.12 Sewer Flooding

Sewer flooding occurs when urban drainage networks become overwhelmed and maximum capacity is reached. This can occur if there is a blockage in the network causing water to back up behind it or if the sheer volume of water draining into the system is too great to be handled. Sewer flooding tends to occur sporadically in both location and time, such flood flows would tend to be confined to the streets around the development.

Any sewer will inevitably have a limited capacity so in extreme conditions there would be surcharges, which may in turn cause flooding. Flood flows could also be generated by burst water mains, but these would tend to be of a restricted and much lower volume than weather generated events and so can be discounted for the purposes of this assessment. Given the design parameters normally used for drainage design in recent times and allowing for some deterioration in the performance of the installed systems, which are likely to have been in place for many years, an appropriate flood risk probability from this source could be assumed to have a return period in the order of 1 in 10 to 1 in 30 years.

The provision of adequate level difference between the ground floors and adjacent ground level would reduce the annual probability of damage to property from this source to 1 in 100 years or less. Therefore, sewer flooding poses a low flood risk to the site. It can therefore be concluded that the risk of sewer flooding is not significant.

3.13 Flooding from Artificial Drainage Systems/Infrastructure Failure

There are no other nearby artificial water bodies including the small ponds, water channels and artificial drainage systems that could be considered a flood risk to the site. The Natural Resources Wales Reservoir flood map shows that the site is not at risk of reservoir flooding (see Figure 3.4). The risk of flooding from these sources is considered to be not significant.

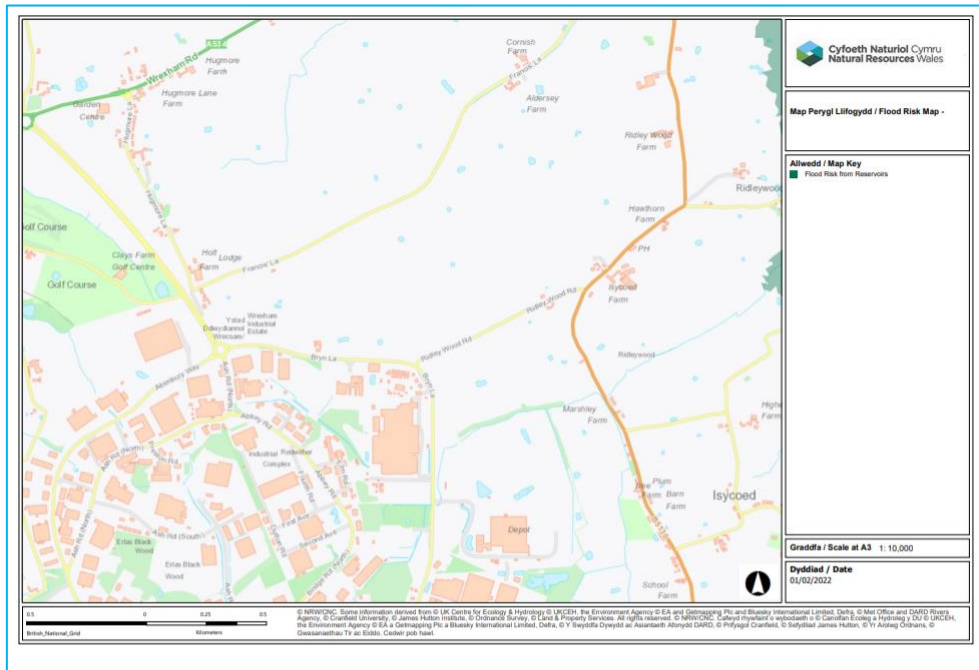


Figure 3.4 - Natural Resources Wales Flood Risk Map: Reservoir

3.14 Effects of the Development on Flood Risk

The proposed development will have no impact on the movement of floodwater across the site. The overall direction of the movement of water will be maintained within the developed site and surrounding area. The conveyance routes (flow paths) will not be blocked or obstructed. There will be no increase in the floodwater levels due to the proposed development. There will be no loss in flood storage capacity and no change in the on-site and off-site flood risk. Therefore, the site is compliant with A1.12 of TAN15 and will not increase flood risk elsewhere.

3.15 Summary of Site-Specific Flood Risk

A summary of the sources of flooding and a review of the risk posed by each source at the site is shown in Table 3.3.

The site is not at risk of flooding from a major source (e.g. fluvial and/or tidal). The DAM which accompanies TAN15 confirms that the site is located within Zone A: Considered to be at little or no risk of fluvial or tidal/coastal flooding. Used to indicate that justification test is not applicable and no



need to consider flood risk further. The FMfP shows that the site is located within Flood Zone 1 for flooding from rivers and sea however, small areas of the site are located within Flood Zones 2 and 3 for flooding from surface water and small watercourses.

A secondary flooding source has been identified which may pose a low risk to the site. This is:

- Surface Water (pluvial) Flooding

The risk of flooding from all sources is considered to be low or not significant. The flooding sources will only inundate the site to a relatively low water depth and water velocity, will only last a short period of time, in very extreme cases and will not have an impact on the whole of the proposed development site.

The proposed development is classified as 'less vulnerable', TAN15 states that 'less vulnerable' uses are appropriate at this location. Furthermore, the site is compliant with A1.12 of TAN15 and will not increase flood risk elsewhere. The flood risk at the site, will be further managed and mitigated by using a number of risk management techniques, and mitigation strategies to manage and reduce the overall flood risk at the site. In conclusion, the flood risk to the site can be considered to be limited, with a low or less annual probability of flooding from all sources.

Table 3.3 - Risk Posed by Flooding Sources

Sources of Flooding	Potential Flood Risk	Potential Source	Probability/Significance
Fluvial (river) Flooding	No	None Reported	Not significant
Tidal (coastal) Flooding	No	None Reported	Not significant
Groundwater Flooding	No	None Reported	Not significant
Surface Water (pluvial) Flooding	Yes	Low Spots	Low
Sewer Flooding	No	None Reported	Not significant
Flooding from Artificial Drainage Systems/Infrastructure Failure	No	None Reported	Not significant



4. Risk Management

4.1 Introduction

In DAM Zone A, developers and local authorities should seek opportunities to reduce the overall level of flood risk in the area through the layout, form of the development and the use of flood mitigation measures including SuDS techniques. The flooding sources will have to be mitigated on the site by using a number of techniques, and mitigation strategies to manage and reduce the overall flood risk at the site. These will be used to ensure the development will be safe and there is:

- Minimal risk to life;
- Minimal disruption to people living and working in the area;
- Minimal potential damage to property;
- Minimal impact of the proposed development on flood risk generally; and;
- Minimal disruption to natural heritage.

4.2 Minimum Floor Level

There is no minimum finished floor level proposed as a result of flooding. However, it is recommended that generally all buildings are located above the highways by 150mm to enable the full capacity of any secondary flood conveyance to be utilised.

4.3 Flood Resilience and Resistance

The development of the layout should always consider that the site is potentially at risk from an extreme event and as such the implementation of flood resilience and resistance methods should be assessed. Relatively simple measures such as raising utility entry points, using first floor or ceiling down electrical circuits and sloping landscaping away from properties can be easily and economically incorporated into the development of the site.

4.4 Access and Egress

The site and surrounding area is not located within the floodplain therefore a permanently safe and dry access can be maintained.

4.5 Flooding Consequences

The mitigation measures detailed above show that the flood risk can be effectively managed and therefore the consequences of flooding are acceptable. In conclusion, the flood risk to the site can be considered to be limited, with a low annual probability of flooding from all sources.



5. Justifying the Location of the Development

5.1 Justification Test

The Justification Test sets out the details required to justify siting a new development in an area believed to be at risk of flooding and is defined in Section 6 of TAN15. The site is located within DAM Zone A. The development proposals should be considered by the LPA to satisfy the Justification Test as set out in TAN15.



6. Summary and Conclusion

6.1 Introduction

This report presents an FCA in accordance with TAN15 for the proposed development on Land north of Bryn Lane, Wrexham. This FCA identifies and assesses the risks of all forms of flooding to and from the development and demonstrates how these flood risks will need to be managed so that the development remains safe throughout the lifetime, taking climate change into account.

6.2 Flood Risk

The site is not at risk of flooding from a major source (e.g. fluvial and/or tidal). The DAM which accompanies TAN15 confirms that the site is located within Zone A: Considered to be at little or no risk of fluvial or tidal/coastal flooding. Used to indicate that justification test is not applicable and no need to consider flood risk further. The FMfP shows that the site is located within Flood Zone 1 for flooding from rivers and sea; however, small areas of the site are located within Flood Zones 2 and 3 for flooding from surface water and small watercourses.

A secondary flooding source has been identified which may pose a low risk to the site. This is:

- Surface Water (pluvial) Flooding

The risk of flooding from all sources is considered to be low or not significant. The flooding sources will only inundate the site to a relatively low water depth and water velocity, will only last a short period of time, in very extreme cases and will not have an impact on the whole of the proposed development site.

The proposed development is classified as 'less vulnerable', TAN15 states that 'less vulnerable' uses are appropriate at this location. Furthermore, the site is compliant with A1.12 of TAN15 and will not increase flood risk elsewhere. The flood risk at the site will be further managed and mitigated by using a number of risk management techniques, and mitigation strategies to manage and reduce the overall flood risk at the site. In conclusion, the flood risk to the site can be considered to be limited, with a low or less annual probability of flooding from all sources.

6.3 Risk Management

The flooding sources will be managed on the site by using a number of mitigation strategies to manage and reduce the overall flood risk at the site and will ensure the development will be safe. Measures to be used comprise:

Minimum Floor Level - There is no minimum finished floor level proposed as a result of flooding. However, it is recommended that generally all buildings are located above the highways by 150mm to enable the full capacity of any secondary flood conveyance to be utilised.

Flood Resilience and Resistance - The development of the layout should always consider that the site is potentially at risk from an extreme event and as such the implementation of flood resilience and



resistance methods should be assessed. Relatively simple measures such as raising utility entry points, using first floor or ceiling down electrical circuits and sloping landscaping away from properties can be easily and economically incorporated into the development of the site.

Access and Egress - The site and surrounding area is not located within the floodplain therefore a permanently safe and dry access can be maintained.

6.4 Justifying the Location of the Development

The proposed development should be considered by the LPA to satisfy the Justification Test as set out in TAN15.

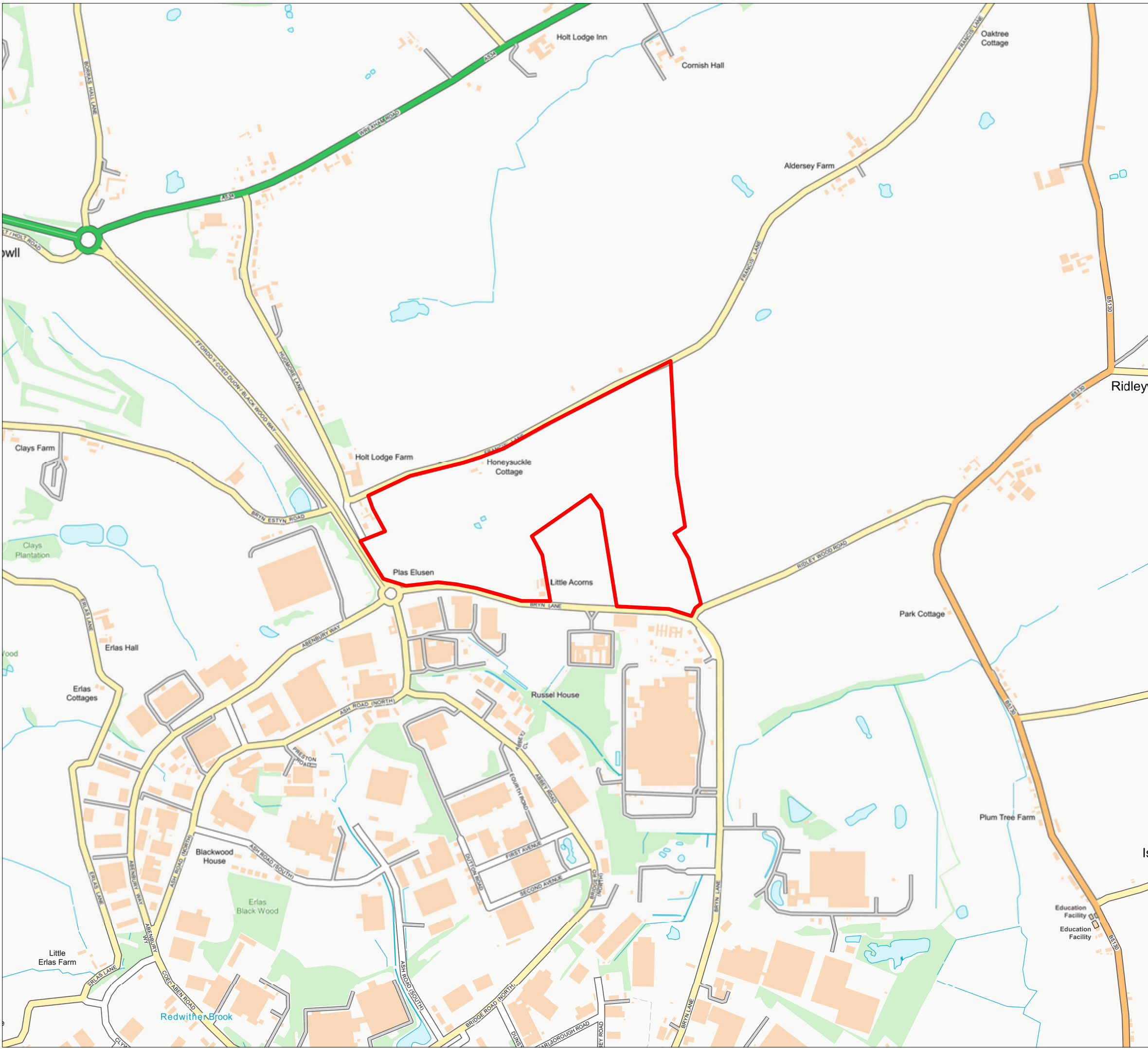
6.5 Conclusion

In conclusion, the proposed commercial development would be expected to remain dry in all but the most extreme conditions, the flood risk to the site can be considered to be limited, with a low or less annual probability of flooding from all sources. Providing the recommendations made in this FCA are instigated, flood risk from all sources would be minimised, the consequences of flooding are acceptable and the development would be in accordance with the requirements of TAN15 and the statutory development plan.

This FCA demonstrates that the proposed development would be operated with minimal risk from flooding, would not increase flood risk elsewhere and is compliant with the requirements of TAN15. The development should not therefore be precluded on the grounds of flood risk.



Appendix A – Drawings



KEY

Site Boundary



PROJECT	Land north of Bryn Lane, Wrexham
CLIENT	Net World Sports
TITLE	Site Location
PROJECT REF	T/2486/FCA
DRAWING NO	T/2486/FCA/1
SCALE	NTS@A3
DATE	February 2022



Appendix B – Proposed Site Layout

Rev	Date	By	Description
A	24/02/2023	JWS	Revised in line with comments received from NWS
B	19/03/2023	JWS	Revised in line with comments received from NWS
C	27/03/2023	AZ	Drawing revised in line with comments received on design team meeting on 27.03.2023
D	26/03/2023	AZ	Area schedule updated
E	26/03/2023	AZ	Drawing revised in line with comments received on design team meeting on 26.03.2023
F	06/04/2023	JWS	Design panel feedback added
G	24/04/2023	AZ	Revised landscape layout received from NWS on 15/04/2023
H	19/05/2023	AZ	New Landscape and Proposed Surface Drainage layout incorporated

LEGEND	
	Application Boundary 37.21Ha II 91.94Ac
	Ownership Boundary 89.30Ha II 220.66Ac
	Development Boundary
	Retained Trees
	Proposed Bunds
	Retained Ponds
	Proposed Ponds
	Veteran Tree Buffer
	Proposed Green Corridor
	Outline Zone Boundary
	Easement Zone

Note: Plan is for illustrative purposes only - not for approval.
Refer to landscaping plan for landscaping details.



SGP

Architects + Masterplanners

Waterfront House
2a Smith Way
Grove Park
Enderby
Leicester LE19 1SX

t: +44 (0)116 247 0557
www.stephengeorge.co.uk

Wrexham
Bryn Lane

Drawing Name:
Illustrative Masterplan

Drawing Stage: **PLANNING**
Status: **S2**

SGP File Ref: 22136-SGP-ZZ-ZZ-M3-A-000001

22-136 03/02/2023 AZ MMS 1:1250 @ A0 H

SGP Project No. Date Drawn Team Scale Rev

Drawing Number:
22136-SGP-ZZ-ZZ-DR-A-110001

Project Code: Original: Valuable: User: Type: Role: Number:

Proposed Illustrative Site Masterplan

1 : 1250

This drawing, the works and concepts depicted are copyright of Stephen George + Partners LLP and may not be reproduced or made use of, either directly or indirectly without express written consent. All heights, levels, sizes and dimensions to be checked on site before any work is put to hand.
Information shown on this drawing that is produced by others has not been verified by Stephen George + Partners LLP and no liability is accepted for its accuracy.
This document is prepared for the sole use of the documented recipient and Stephen George + Partners LLP accepts no liability for use of this document by parties other than the party for whom it was prepared or for purposes other than those for which it was prepared.

SCALE 1:1250
25m 125m

