



BUILDING DESIGN NORTHERN

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Flood Consequences Assessment

James Jones & Sons Ltd | Oak Road

Wrexham | LL13 9RG

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1.0 Background

1.1 Brief

BDN Ltd. has been commissioned by James Jones & Sons Ltd to carry out a Flood Consequences Assessment (FCA) and Drainage Strategy (DS) for Oak Rd, Wrexham LL13 9RG (the “Site”) to inform a planning application for a proposed extension to the existing hard standing areas.

1.2 Project Understanding

The aim of this report is to assess the potential flood risk to the Site, the impact of the proposed development on flood risk elsewhere, and the proposed measures which could be incorporated to mitigate the identified risk. This report has been prepared in accordance with the guidance contained in Planning Policy Wales (PPW) and Technical Advice Note 15 (TAN15): Development and Flood Risk.

New legislation (introduced with Schedule 3 of the Flood & Water Management Act) in Wales requires new development to have Sustainable Drainage Systems (SuDS) approval by the SuDS Approval Body (SAB) in conjunction with the planning process. Therefore, the Client has requested a DS to identify water management measures, including Sustainable Drainage Systems (SuDS), to provide surface water runoff reduction and treatment.

1.3 Report Scope

The scope of works has been as follows for this FCA:

- Assess flood risk from all sources using best available information including review of NRW data
- and mapping, topography, and historical records;
- Assess previous relevant studies, local authority plans or strategies;
- Advise on flood mitigation measures and residual risks;
- Assess evacuation routes;
- Advise on availability of flood warnings;
- Identify whether the Site complies with the Justification Test;
- Assess/conduct flood compensatory storage requirements; and
- Prepare FCA report.

This report considers the following national and local policies:

- Planning Policy Wales (PPW) (2018);
- Technical Advice Note 15: development and flood risk (TAN15) (2004);
- CL-03-16 Flood Consequence Assessments: Climate change allowances.; and
- Wrexham County Borough Council (WCBC) Unitary Development Plan (UDP).

1.4 Sources of Information

The following sources of information have been reviewed and assessed for the purpose of this FCA:

- NRW online flood maps;
- British Geological Society (BGS) Interactive Map;
- MAGIC Interactive Map;
- WCBC Preliminary Flood Risk Assessment (2011 PFRA);
- EA River Dee Catchment Flood Management Plan (2010 CFMP);
- WCBC Local Flood Risk Management Strategy (2013 LFRMS);
- WCBC Flood Risk Management Plan 2016 - 2021 (2016 LFRMP); and
- WCBC Preliminary Flood Risk Assessment Addendum Report (2017 PFRA).

2.0 Relevant Policy, Legislation and Guidance

2.1 Introduction

The aim of this section of the report is to discuss the main aspects of the local and national planning policies that are relevant to any proposed development on the Site and relevant guidance and legislation.

2.2 Assessment of Flood Risk

The flood risk from fluvial (Main Rivers) and coastal flooding is assessed using the Welsh Government, TAN15, Development Advice Maps and the NRW 'Flood Map for Planning' (flood risk from rivers or the sea).

The Development Advice Maps define three development advice zones as follows:

- Zone A: Considered to be at little or no risk of fluvial or tidal/coastal flooding.
- Zone B: Areas known to have been flooded in the past evidenced by sedimentary deposits.
- Zone C: Based on Environment Agency extreme flood outline, equal to or greater than 0.1% (river, tidal or coastal) (i.e.: greater than 1 in 1,000 chance of flooding in any one year).

Zone C is divided into C1 and C2.

- C1 is areas of the floodplain which are developed and served by significant infrastructure, including flood defences.
- C2 is Areas of the floodplain without significant flood defence infrastructure.

The NRW 'Flood Map for Planning' defines three zones of different flood risk, the third of which is subdivided into two categories:

- Zone 1 "Low probability of flooding" – This zone comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%);
- Zone 2 "Medium probability of flooding" – This zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%) in any year;
- Zone 3a "High probability of flooding" – This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year;
- Zone 3b "Functional floodplain" – A sub-part of Zone 3, this zone comprises land where water has to flow or be stored in times of flood. This zone is not normally included within the national Flood Map for Planning and is calculated where necessary using detailed hydraulic modelling.

2.3 Planning Policy Wales

Given the nature and scale of the development, the proposed industrial development is considered to be 'less vulnerable' development in accordance with Figure 2 of the Welsh Government's Technical Advice Note 15 – Development and Flood Risk (TAN15).

The NRW Development Advice Map indicates that the site is located wholly in Flood Zone A. TAN15 states that less vulnerable development can be considered in Flood Zone C2 subject to the application of the TAN15 Justification Test and satisfying specific TAN15 acceptability criteria.

From 7th January 2019, all new developments of more than 1 dwelling house or where the construction area is 100m² or more require Sustainable Drainage Systems (SuDS) for surface water. From this date onwards, SuDS on new developments must be designed and built-in accordance with the Statutory SuDS Standards published by the Welsh Ministers and SuDS Schemes must be approved by the local authority acting in its SAB role, before construction work begins.

2.4 Local Policy

The WCBC Unitary Development Plan (UDP) adopted in February 2005 is the current development plan in place for the county and contains the following policies relating to flood risk and drainage:

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

Development proposals within areas of flood risk are not only at risk of flooding but may also exacerbate existing or create new flooding problems on other land or property through reductions in floodplain storage capacity or by impeding flood flows. Flood alleviation measures can only reduce the risk of flooding and can never eliminate the risk. For these reasons, development within land at an unacceptable risk of flooding will not be permitted. Where detailed information in respect of flood risk is not available, developers will be required to carry out detailed technical investigations to evaluate the extent of the flood risk and ensure that no unacceptable development, including the raising of land, occurs within the flood risk area identified.

In exceptional circumstances, where the Council considers a development essential for the economic viability of the area, and it has been confirmed that there are no other sites capable of providing the necessary stimulus, the development will still only be permitted where the developer can conclusively demonstrate that appropriate and environmentally sympathetic flood protection and mitigation measures can be implemented. The Council will require developers to carry out and provide details of hydraulic investigations to properly determine the implications of the proposed development. Developers should be aware that the responsibility for, and costs of, carrying out of any investigation/mitigation works rests with themselves. Development will not be permitted to commence until any mitigation works required have been implemented to the satisfaction of the Council, and a formal agreement regarding the future maintenance of any flood protection/mitigation structures is in place.’

Policy EC13 – Surface Water Run-off

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

Wherever practicable surface water should be disposed of as close to the source as possible. Where potential risks are identified appropriate flow attenuation facilities or mitigation measures may be a prerequisite for development. Consideration should be given to the use of softer engineering structures referred to as Sustainable Urban Drainage Systems (SUDS). SUDS is a concept that focuses decisions about drainage design, construction, and maintenance on the quality of the receiving environment and people. SUDS are physical structures built to receive surface water runoff. They typically include swales, ponds, infiltration basins and porous surfaces and should be considered as alternatives to conventional drainage where appropriate. The Environment Agency Wales can provide guidance on the design of SUDS and have produced a document entitled "Protecting the Quality of Our Environment, Sustainable Urban Drainage Systems - An Introduction". The Council will require the developer to demonstrate, both financially and practically, how the long-term maintenance of any attenuation facilities or mitigation measures will be achieved'

3.0 Site and Surroundings

3.1 Site Location and Description

The application site is located in Wrexham industrial estate, located at Ordnance Survey Grid Ref: SJ 39356 49238. The site is an irregularly shaped piece of land approximately 0.9 hectares in area.

The site is bound by farmed fields to the north and east with commercial premises to the south and west.

The existing site is currently accessed via Oak Road to the south approximately 200m beyond the site ownership boundary.

3.2 Topography

A topographical survey for the site has been completed. Following a review of the topographical survey the land falls from the western to eastern boundary to the identified field drainage system

3.3 Hydrology

The Ordnance Survey maps and NRW maps show that the site is in within the catchment of The River Clywedog, approximately 400m to the south, which discharges to the River Dee approximately 2.5km downstream of the site. An un-named field drainage network is located along the site's eastern boundary, no other named watercourses or drainage ditches are understood to be within the vicinity of the site.

3.4 Drainage

Public sewer records have been requested from Dŵr Cymru Welsh Water; a response is awaited. It is assumed that there are public surface water and / or foul water sewers located within the vicinity of the Site given the urbanised nature of the surrounding land.

3.5 Water Mains

Public sewer records have been requested from Dŵr Cymru Welsh Water; a response is awaited. It is assumed that there are public surface water and / or foul water sewers located within the vicinity of the Site given the urbanised nature of the surrounding land.

3.6 Flood Defence

There are no flood defence structures present within 1km of the site boundary identified on the NRW flood maps.

3.7 Reservoir

There are no reservoirs or bodies of water within 1km of the site boundary.

3.8 Geology and Hydrology

The British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the Site is underlain by superficial deposits of Alluvium in the eastern and western extent of the Site generally comprising clay, silt, sand and gravel and Devensian Till in the central and northern areas. The superficial deposits are

identified as being underlain by a bedrock consisting of mudstone, sandstone, and conglomerate from the Salop Formation.

The geological mapping is available at a scale of 1:50,000 and as such may not be accurate on a Site-specific basis.

4.0 Assessment of Flood Risk

4.1 Tidal Flooding

Coastal flooding occurs when sea levels rise above the normal tidal range. This can happen anywhere around the coast, including the estuaries. Tidal flooding is a result of one or a combination of high tides, storm or tidal surges, wave action and high sea levels combining with high river flows.

The site is located inland and does not lie within an area at risk of tidal flooding. Tidal flooding is therefore not a flood risk associated with this proposed development and requires no further consideration.

4.2 River (Fluvial) Flooding

The proposed site is considered as Less Vulnerable Infrastructure and as such is suitable for development within Flood Zones A and B with the TAN15 Justification test required for developments in Flood Zone C. The NRW 'Flood Map for Planning', which is used to confirm the extent of a flood zone within the vicinity of a site shows that the site is located within Flood Zone A, as shown in Appendix A.

Fluvial flooding occurs when water courses receive an increased volume of surface water run-off. This can be exacerbated by new developments introducing increased areas of impermeable surfaces to the catchment and reducing the time of entry of flows to the water course.

According to the NRW, where there is blue shading, this shows the area where flooding from a river is possible in an extreme event. The site is considered to be at very low risk of fluvial flooding (less than 0.1% annually).

Based on the above data the site is suitably located with respect to fluvial flooding.

4.3 Groundwater Flooding

Groundwater flooding generally occurs during intense, long-duration rainfall events, when infiltration of rainwater into the ground raises the level of the water table until it exceeds ground levels. Groundwater flooding may take weeks or months to dissipate as groundwater flow is much slower than surface water flow and water levels thus take much longer to fall. Groundwater flooding is sporadic in time and location, but when it does occur, it usually lasts longer than surface water flooding and interferes with property and infrastructure (such as roads). Groundwater levels may also rise as a result of reactivating springs.

Based on the geological information available it is unlikely that the geological strata would be highly responsive to rainfall events and therefore the changes in groundwater level over time are unlikely to be significant resulting in groundwater flooding issues.

A review of the ground investigation will need to be carried out. The information available suggests that the site is not at risk from groundwater flooding.

4.4 Overland/Surface Water (Pluvial) Flooding

The NRW 'Flood Risk from Surface Water' map (Appendix B) indicates that the Site is at Very Low risk of surface water flooding, meaning it has a less than 0.1% AEP. There are areas of Medium (between a 3.3% and 1% AEP) surface water flood risk along the banks of nearby watercourses and within the sites access roads.

Surface water flood extents along the access roads represent out of flows that are overwhelming of the existing drainage infrastructure during a rainfall event, the Site is not located within these extents therefore any surface water flooding associated with the adjacent access road is considered Low.

The NRW Flood Map indicates flood depths are expected to remain below 300mm during the 1% AEP flood event. This is deemed to be passable by pedestrians and vehicles and therefore access and egress is considered achievable from the Site during the 1% AEP rainfall event. There are no records of surface water flooding at or in the immediate vicinity of the Site.

It can therefore be concluded that the Site is at Low risk of surface water flooding.

4.5 Sewer Flooding

Sewer records have been requested from Dwr Cymr Welsh Water; a response is awaited. It is assumed that there are surface / foul sewers present within Bridge Road North given the urbanised surroundings. The sewer network is generally designed to accommodate the 1 in 30 year (3.3% AEP) frequent rainfall event, ensuing no flooding occurs above ground level for this return period.

The 2011 PFRA states that 'there were no records of properties affected by sewer flooding with significant consequences' in WCBC. There are no distinct flow routes in the area which would direct any potential flooding towards the Site.

It can therefore be concluded that the risk of sewer flooding is Low.

4.6 Canals and Artificial Waterways

There are no canals within the vicinity of the Site and the Site, and its surroundings are not shown to lie within the extents of a reservoir breach or overtopping event on the NRW 'Flood Risk from Reservoirs' map. Therefore, the risk flooding associated with these sources is considered Negligible.

It can therefore be concluded that there is Negligible to Low risk of flooding from artificial sources.

5.0 Conclusions and Recommendations

5.1 Conclusion

The proposed development is for an extension to the existing production facility with associated hardstanding and infrastructure.

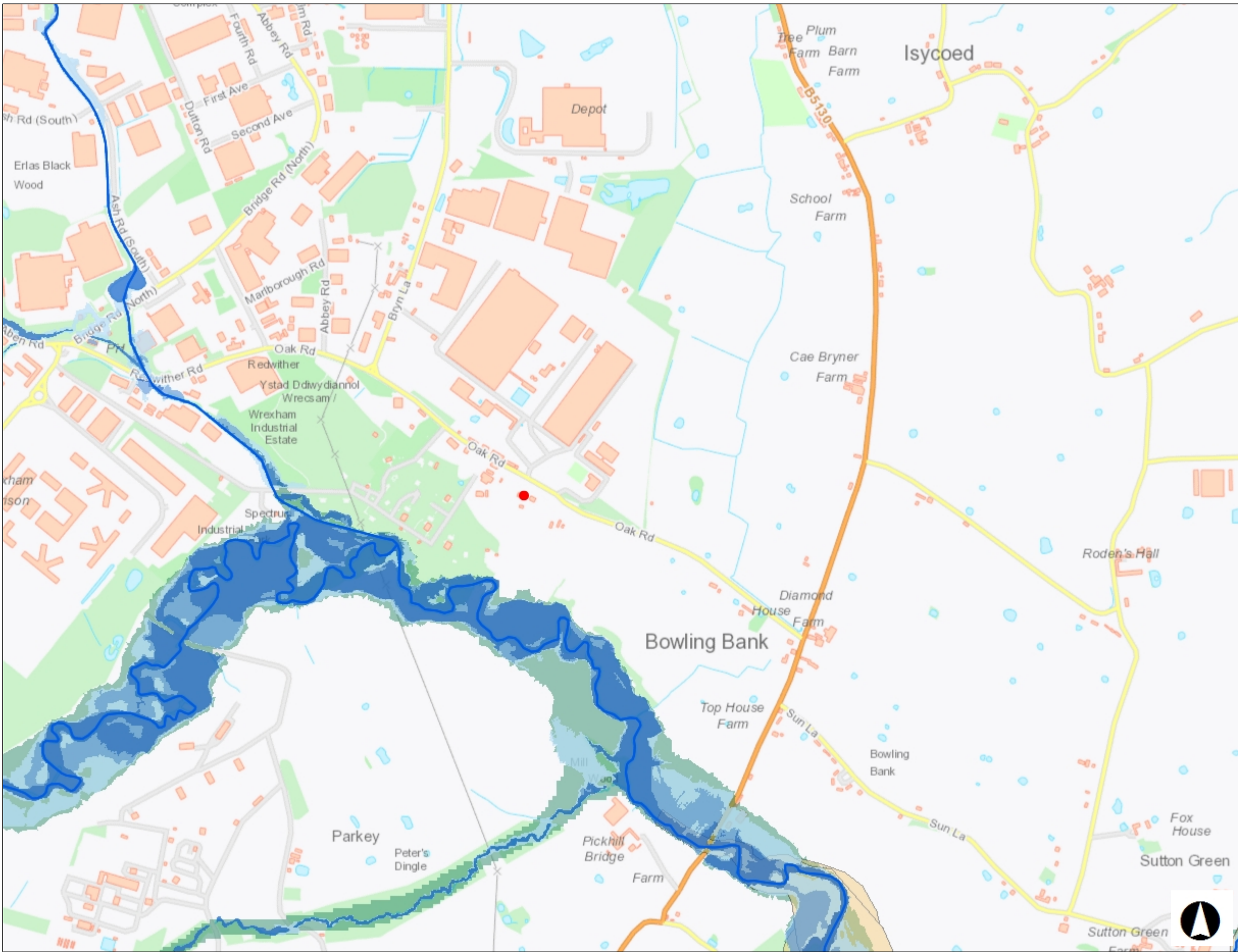
The Welsh Government Development Advice Map shows that the site is located within Flood Zone A - Considered to be at little or no risk of fluvial or tidal/coastal flooding.

Based on information available, the risk of flooding from all sources has been assessed and the flood risk to the site is considered to be low. However, there is a residual risk of flooding during extreme fluvial events when accounting for climate change or blockage scenarios. Any equipment that is sensitive to water should be raised above the 0.1% AEP plus climate change and blockage events, flood extents during these extreme events.

5.2 Recommendations

The proposed development will introduce impermeable drainage area in the form of buildings and access. This will result in an increase in surface water runoff. In order to ensure the increase in surface water runoff will not increase flood risk elsewhere, flow control will be used, and attenuation provided on site to accommodate storm events up to and including the 1 in 100 year plus 20% climate change event.

Appendix A – Flood Risk Map (Fluvial Flooding)



Map Perygl Llifogydd / Flood Risk Map -

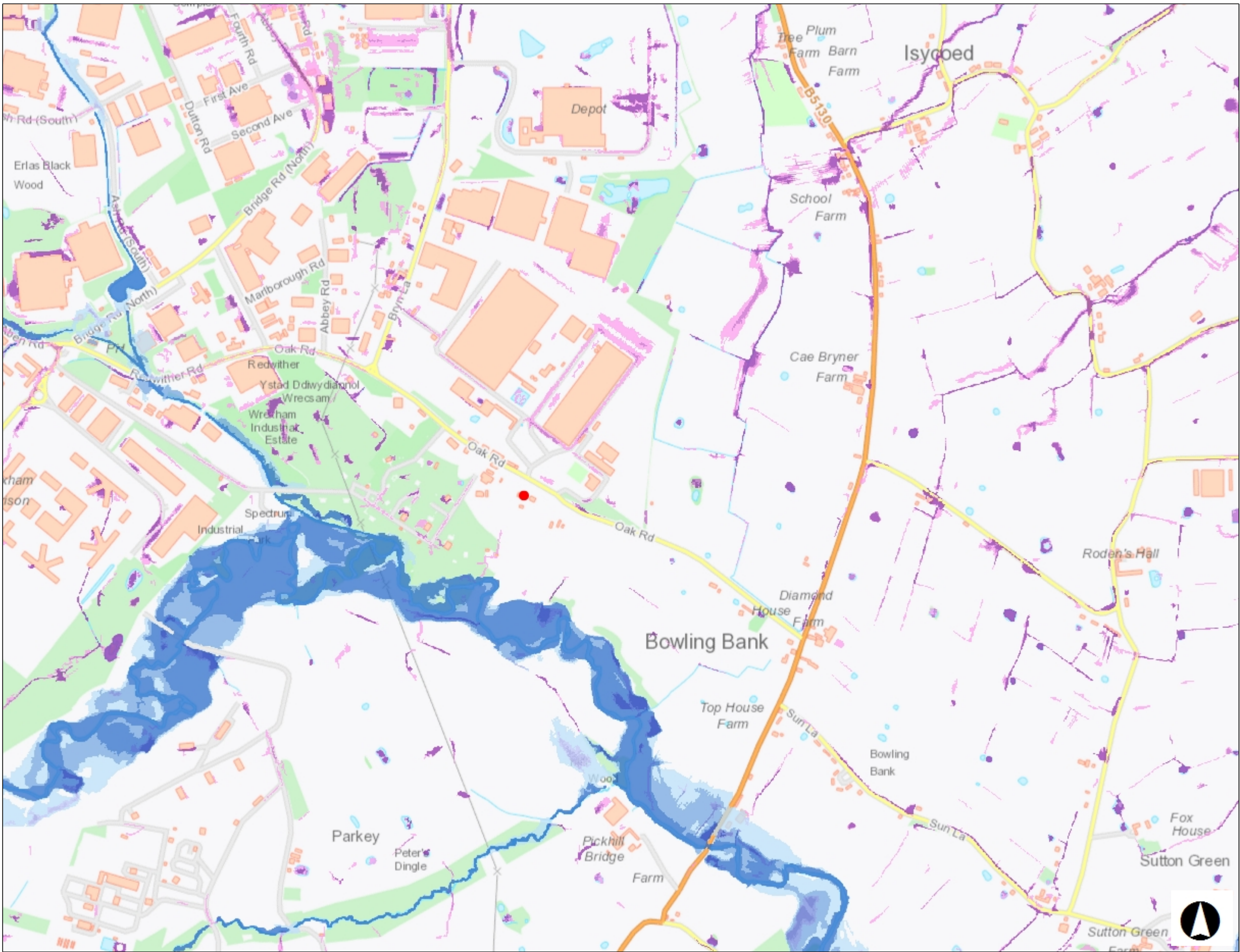
Allwedd / Map Key

- Main Rivers
- Flood Defence Locations
- Areas Benefitting from Flood Defences
 - Rivers
 - Sea
 - Rivers and Sea
- Flood Storage Areas
- Risk Level Under Review
- Flood Risk from Rivers - Extent
 - High
 - Medium
 - Low
- Flood Risk from the Sea
 - High
 - Medium
 - Low
- Recorded Flood Extents
- Flood Risk from Reservoirs

Graddfa / Scale at A3 1: 9,999

Dyddiad / Date
11/01/2021

Appendix B – Flood Risk Map (Pluvial Flooding)



Map Perygl Llifogydd / Flood Risk Map -

Allwedd / Map Key

Risk Level Under Review

Flood Risk from Rivers - Extent

High

Medium

Low

Flood Risk from the Sea

High

Medium

Low

Flood Risk from Surface Water & Small Watercourses - Extent

High

Medium

Low

Graddfa / Scale at A3 1: 9,999

Dyddiad / Date
11/01/2021

