
Ref: 6697/R1

November 2023

**Hafod Road
Johnstown
Wrexham**

Flood Consequences Assessment



Client: Gladman Developments, Gladman House, Alexandria Way, Congleton, Cheshire. CW12 1LB

REPORT DETAILS

Site Name:

Hafod Road, Johnstown, Wrexham

Report Title:

Flood Consequences Assessment

Report Number:

6697/R1

Revision	Date	Status
-	November 2023	For Reserved Matters Application

Client:

Gladman Developments

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Ref 2010-002 Topo_05_2D Rev A

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Lees Roxburgh Drg. No. 6697/01-05

1.0 **INTRODUCTION**

- 1.1 Lees Roxburgh have been instructed by Gladman Developments to carry out a Flood Consequences Assessment (FCA) for the proposed development of land at Hafod Road, Johnstown.
- 1.2 It is proposed that the land will be developed for residential, retail and commercial purposes.
- 1.3 This FCA has been prepared in support of a reserved matters application (RMA) for residential development of 300 No. dwellings, 465m² B1 business use and 235m² A1 retail use with associated landscape works, public open space and on-site infrastructure.
- 1.4 The development benefits from an outline consent APP/H6955/A/15/3135730 granted at appeal on 14th November 2016. This consent was based on a Flood Risk Assessment prepared by JPB Ref MB616-65-ACJ/HB Rev A of 10th June 2013 supplemented by further work by Weetwood Services comprising an Aberderfyn Modelling Study ref 2585 19th June 2014.
- 1.5 A S73 application was approved on 14th July 2021 which varied the approved vehicular access and extended the time period for the submission of reserved matters. An updated FCA and details of flood risk protection measures are required in accordance with Condition No. 26 of this permission.
- 1.6 The principle and extent of development with respect to flood risk was covered, accepted and approved via the outline consent. This FCA therefore covers this aspect in summary form and focuses on the surface water drainage proposals in the context of the more detailed proposals to be submitted as part of the RMA. This FCA therefore needs to be read in conjunction with the original JPB and Weetwood Services reports.
- 1.7 Within Wales, development is covered by Technical Advice Note 15: Development and Flood Risk (TAN15). The TAN15 development advice map for the area identifies that the site lies within Zone A being land deemed to be at the least risk if flooding.
- 1.8 This FCA has been prepared in accordance with TAN15 and addresses the following with respect to the development drainage proposals;
- The potential for the proposed development to increase the flood risk elsewhere.
 - That mitigation measures introduced to deal with any risks identified can be successfully managed.
 - That the site can be developed and occupied safely.

The views and conclusions contained within this report are subject to the approval of the local planning authority.

- 1.9 This report has been prepared specifically for Gladman Developments for the sole purposes of the planning application and any reliance on its contents must be read in conjunction with the requirements of any subsequent planning conditions.

2.0 SITE LOCATION AND DESCRIPTION

2.1 Location

- 2.1.1 The site is located to the outskirts of Johnstown, about 4km south west of Wrexham Town centre at approximate National Grid Reference SJ 311 461 and occupies 16.99ha in area.
- 2.1.2 Within this overall area, the area being considered for redevelopment occupies approximately 7.1ha. **(Appendix 1A)**

2.2 Surrounding Land Use and Access

- 2.2.1 To the west is woodland within the Aberderfyn Nature Reserve, bounded by a railway line with Johnstown beyond. The site abuts Bangor Road to the south and Hafod Road to the east and from which access is currently gained.
- 2.2.2 To the north is Bonc Yr Hafod Country Park with woodland within the park extending into the nature reserve.
- 2.2.3 To the east beyond Hafod Road are open fields then the A438 with open countryside extending beyond.
- 2.2.4 To the south is a large quarry/landfill site with open fields immediately beyond extending south to development within Ruabon.

2.3 Site Description

- 2.3.1 The site comprises the Ruabon Tile Works located off Hafod Road in Johnstown, Wrexham.
- 2.3.2 The northern site boundary is formed by a steep slope, which slopes upwards by approximately 3m to 4m, whilst as noted the eastern site boundary is formed by Hafod Road, with Bangor Road to the south and the junction of these two roads to the immediate south east of the site.

The western site boundary is predominantly marked by a north to south running public footpath, with hedges and mature trees.

- 2.3.3 The area of the former works occupies the north eastern area of the overall site and is substantially contained within the area proposed for development.

It comprises a cluster of numerous brick buildings abutting directly onto Hafod Road with a large central building occupying the middle of the works area together with associated access areas and parking. It remains operational.

- 2.3.4 Beyond the works area and within the overall site area to the west and south is woodland with open field areas designated as the Aberderfyn Nature Reserve.

2.4 Topography

- 2.4.1 There is an overall fall across the site from north west to south east of approx. 1 in 110.

2.4.2 Reference should be made to the topographical survey (**Appendix 2**) but falls can be summarised as follows;

- Level at north west corner... 105.5m AOD
- Level at the north east corner... 104.5m AOD
- Level at south west corner... 104.5m AOD
- Level at south east corner... 100.8m AOD

2.5 Existing Watercourses and Drainage

2.5.1 A watercourse, the Aberderfyn, a none main river (ordinary watercourse) is fed by numerous land drains and tributaries that originate within the Hafod Woodland to the north of the site. A further tributary also feeds into the Aberderfyn whose source is at a point approximately 1km northwest of the site. (**Appendix 1B**)

The Aberderfyn flows in a general south-easterly direction towards the site within a densely wooded ditch. Its outfall from a 400mm diameter culvert was observed approximately 10m west of the site boundary.

Its route through the site is densely wooded and substantially in open channel, but culverted in part, and is then culverted beneath the crossroads of Bangor Road, Hafod Road and New Hall Road, continuing beyond in a south-easterly direction.

2.5.2 There is a land drain in the far south west corner which is a tributary of the Aberderfyn.

2.5.3 Reference to Welsh Water (WW) records identify that there is a foul sewer running from west to east within the northern site boundary. (**Appendix 3**)

2.5.4 A drainage survey has confirmed the presence of a live foul sewer in the north of the site, with its diameter recorded at 225mm and at a depth of approximately 3m below ground level.

2.5.5 The existing buildings and hardstandings are served by a surface water drainage system, with several catch pits and interceptors noted and which it is understood discharge to the east of the site to a private sewer in Hafod Road.

Surface water gulley pots were noted along the length of Hafod Road, with some directly picking up downspouts from buildings within the site.

It is considered likely that the private sewer in Hafod Road will connect to the culverted section of the Aberderfyn watercourse. On this basis it has been concluded that the site surface water system discharges into the Aberderfyn.

2.5.6 No connectivity from the existing operations has been identified to discharge direct into the Aberderfyn. However buried pipework has been identified in the southwest corner of the site which did discharge into the Aberderfyn. This was identified as an overflow pipe from the WW combined sewer system.

3.0 **FLOOD RISK**

3.1 **Flood Mapping**

3.1.1 **Natural Resources Wales Flood Risk**

- 3.1.1.1 Reference to the Flood Map (**Figure 1**) identifies that the overall site is located within an area of Zone A Flood Risk.

Flood Risk Zone A comprises land assessed as having a 1 in 1000 or less annual probability of flooding (<0.1% in any year).

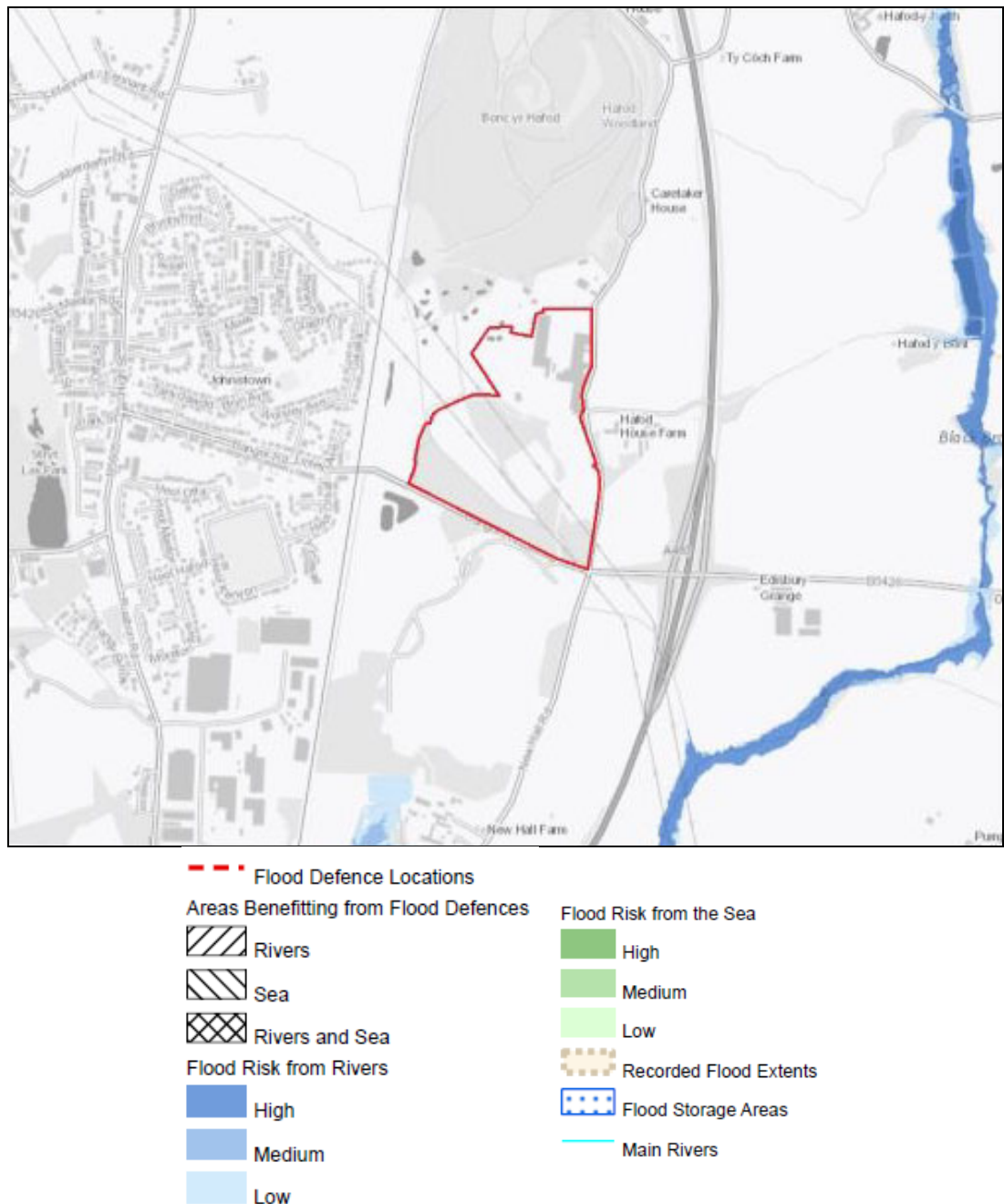


Figure 1: National Resources Wales Flood Risk Map

3.1.2 National Resources Wales Surface Water Flood Risk

- 3.1.2.1 Reference to the Surface Water Flood Risk Map (**Figure 2**) identifies sporadic areas of risk within the general area and locally within the overall site with a more concentrated area within the south east area around the route of the Aberderfyn.

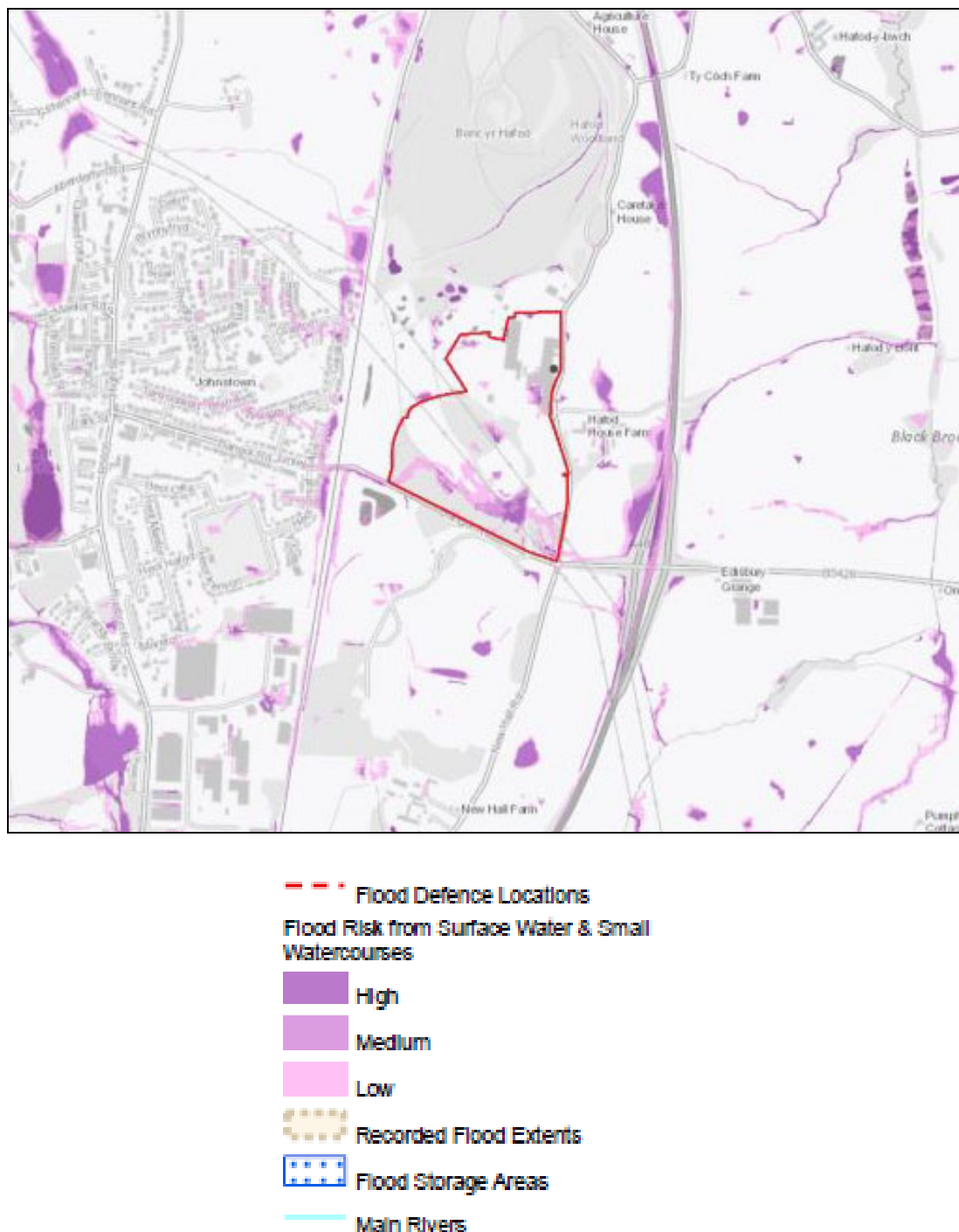


Figure 2: Natural Resources Wales Surface Water Flood Map

3.1.3 National Resources Wales Flood Risk From Reservoirs

- 3.1.3.1 Reference to the Flood Risk from Reservoirs Map (**Figure 3**) identifies that the site is not at risk of flooding from reservoirs.

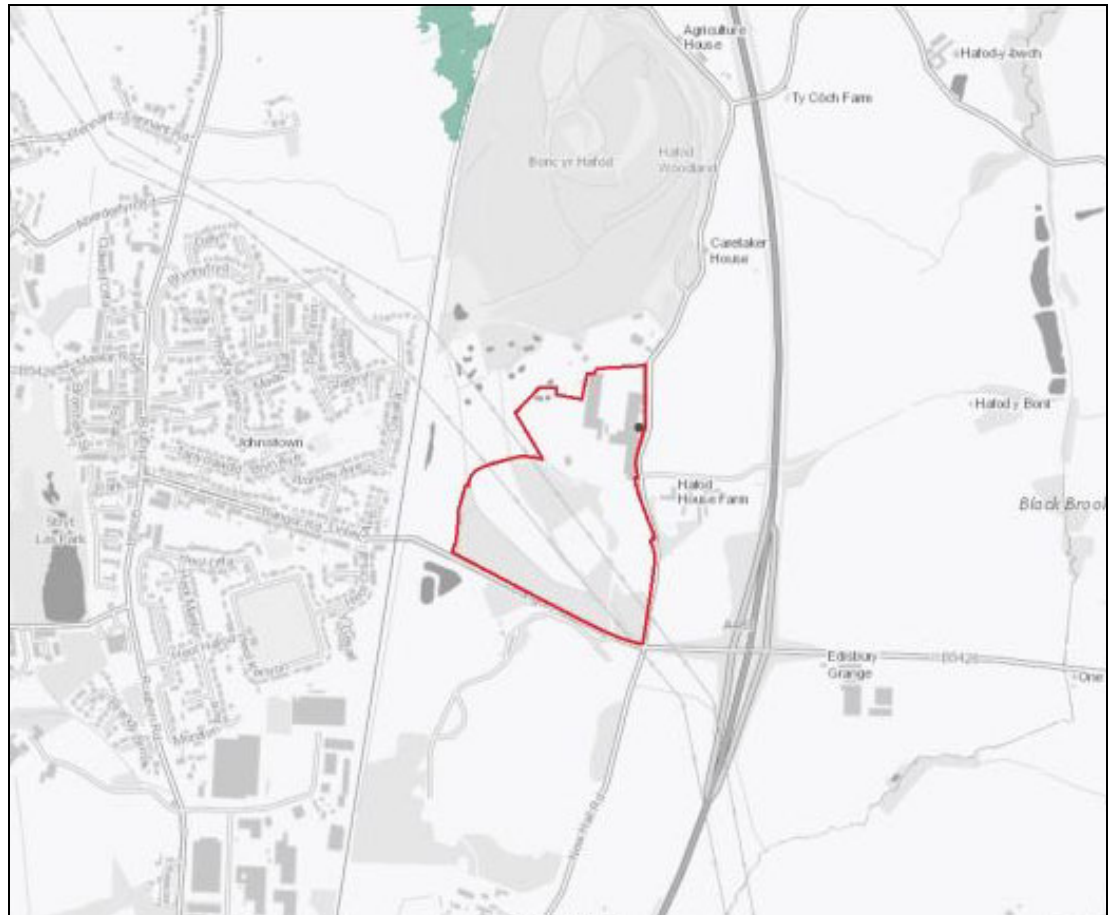


Figure 3: Natural Resources Wales Flood Risk from Reservoirs Map

3.2 **TAN 15 Approach**

3.2.1 The Development Advice Maps determine the zoning based on flood mapping.

TAN 15 adopts a precautionary approach with the zoning categories defined in **Figure 3** below.

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 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 further flood risk.
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.

Figure 3: TAN15 Zoning

3.2.2 The site lies within Zone A and the Justification Test has not been deemed applicable.

3.3 **Sources of Flood Risk**

3.3.1 **Aberderfyn and Surface Water Flooding**

3.3.1.1 As noted, the Aberderfyn flows south to the west of the site then turns south easterly within the land located between the works site and Bangor Road.

3.3.1.2 Modelling work was undertaken to define the extent of the 1 in 1000 year flood zone associated with the Aberderfyn within the JPB report and developed further in response to consultations with Natural Resources Wales (NRW) by Weetwood Services (WS).

As the result of the WS work the 1 in 1000 year post development flood extent was identified and this has been incorporated within the development drainage proposals contained in **Appendix 4**.

3.3.2 **Existing Sewers and Drainage**

3.3.2.1 Copies of Welsh Water's public sewer records have been obtained and identify the presence of adopted drainage infrastructure in the area of the site. These records have been incorporated in **Appendix 3**.

3.3.2.2 Reference to the public sewer records indicates the following;

- Foul and surface water sewer systems within the residential development to the west including a surface water sewer which terminates in Bangor Road and is conjectured to connect into Aberderfyn.
- Combined sewer system running within Bangor Road from the west, picking up a connection from the south west and continuing up to the A438 before turning north.

This system incorporates a now redundant overflow into the Aberderfyn.

- Foul system running from the residential development to the west through the northern area of the site before turning north easterly beyond Hafod Road.

3.3.3 Land Drainage and Groundwater

3.3.3.1 Given the availability of the Aberderfyn, no land drainage or groundwater issues are therefore anticipated which cannot readily be addressed within the normal design and construction process.

3.3.4 Comment

- 3.3.4.1 It is concluded that in the context of the referenced previous work the risk associated with the following needs to be addressed by this FCA;
- Development drainage proposals.

4.0 SURFACE WATER RUN OFF

4.1 Requirements for Surface Water Drainage of the Site

- 4.1.1 TAN15 recommends that surface water generated by the development site should, as far as is practicable, be managed in a sustainable manner to mimic the surface water flows arising from the site prior to the proposed development.
- 4.1.2 Proposals should ensure that peak flow rates of surface water leaving the developed site are no greater than those prior to development, reducing surface water run off where possible.

4.2 Site Area

- 4.2.1 The site area comprises 16.99 ha of which 6.7 ha is proposed for the residential development and 0.4 ha for the retail/commercial development.

4.3 Proposed Run Off Rates

- 4.3.1 The proposed total run off rate was set by JPB in their report for the two developable areas as 267.5 litres/sec.
- 4.3.2 For design purposes it is proposed to restrict flows from the two development areas to the following:
- Residential 260 litres/sec
 - Retail/commercial 5 litres/sec

5.0 DRAINAGE HIERARCHY

5.1 Planning Policy Guidelines

- 5.1.1 It is the aim that surface water run off should be discharged as high up the drainage hierarchy as reasonably practicable;
- Into the ground (infiltration)
 - To a surface water body or watercourse
 - To a surface water sewer, highway drain or other drainage system
 - To a combined sewer

The following measures have therefore been considered and identified.

5.2 Potential for Ground Infiltration Based Drainage

- 5.2.1 A Geoenvironmental Investigation Report has been undertaken by REFA (Ref. 21128/GEIR May 2022) and has concluded that based on the ground conditions encountered, the site is unsuitable for adoption of an infiltration based surface water drainage system.
- 5.2.2 Positive surface water outfalls from the two development areas are therefore proposed.

5.3 Surface Water Outfall

- 5.3.1 It is therefore proposed to connect surface water run off from the two development areas to the Aberderfyn.

6.0 MITIGATION MEASURES

6.1 Aberderfyn and Surface Water Flooding

6.1.1 As noted in the introduction, reference should be made to the JPB and WS work in respect of mitigation measures with respect to the Aberderfyn and surface water flooding.

6.1.2 This work identified the following measures which are required to inform the development levels and drainage design;

- Access road from Bangor Road should incorporate a 1.8m high by 2.1m wide box culvert where the road crosses the Aberderfyn and this proposal will satisfy the requirement that the access road will remain dry for all events up to the 0.1% AEP fluvial flood event.
- Finished floor levels for both the residential properties and the commercial buildings should be set at a minimum of 150mm above adjacent ground levels and this will ensure that the development platforms will remain dry during all modelled events up to the 0.1% AEP, and will also provide a significant freeboard above the in-channel water level for a 1% AEP plus allowance for climate change event.

It is noted that with respect to finished floor levels that these will be set at greater than 150mm above existing ground levels in order to deliver the drainage proposals, thus achieving additional mitigation.

6.1.3 Maintenance provision for the Aberderfyn will be incorporated into the layout.

6.1.4 It is noted that development will inherently mitigate uncontrolled surface water run off from within the areas occupied.

6.2 Development Drainage Proposals - Residential

6.2.1 A positive surface water outfall solution is proposed.

6.2.2 Piped System with Geocell System and Attenuation Basin

A geocell system and attenuation basin is proposed with flows to be restricted to the rate set out under 4.3.2.

Highways, houses and associated hard surfaces will be served by a piped surface water system discharging into a geocell system designed to Sewers for Adoption 7th Edition to contain flows up to the 1 in 30 year event and which will surcharge into a basin located above the geocell system.

Overall flows up to the 1 in 100 year event plus allowance for 30% climate change will be contained on site within the pipe, geocell and basin system.

The system has been sized accordingly.

6.2.3 **Future Maintenance**

- 6.2.3.1 It is proposed that the main piped and geocell systems and the outfall will be adopted under a S104 agreement by Welsh Water with the basin to be adopted by Wrexham County BC the SUDS Approval Body (SAB).
- 6.2.3.2 These two parties will therefore become responsible for the long term maintenance of the overall system.

6.2.4 **Water Quality**

- 6.2.4.1 Whilst ground conditions are not suitable for the incorporation of infiltration based drainage techniques, the risk to water quality from housing developments is categorised as low to very low.
- 6.2.4.2 The incorporation of trapped gullies to roads and the provision of the basin will nonetheless provide two levels of treatment.

6.3 **Development Drainage Proposals – Retail/Commercial**

- 6.3.1 A positive surface water outfall solution is again proposed.

6.3.2 **Piped System**

Inpipe attenuation is proposed with flows restricted to the set out under 4.3.2.

The initial section of access road and the commercial buildings together with associated hard surfaces will be served by a piped surface water system with geocell units designed to adoptable standards to overall contain flows up to the 1 in 100 year event plus allowance for 30% climate change.

The system has been sized accordingly.

6.3.3 **Future Maintenance**

- 6.3.3.1 It is proposed that the main piped system and outfall will be adopted under a S104 agreement by Welsh Water with the exception of the section which will drain adopted highway only and which will be adopted under a S38 agreement by Wrexham County BC Highways as part of the overall development proposals.
- 6.3.3.2 These two parties will therefore become responsible for the long term maintenance of their respective systems.

6.3.4 **Water Quality**

- 6.3.4.1 Whilst ground conditions may not prove to be suitable for the incorporation of infiltration based drainage techniques, the risk to water quality from housing developments is categorised as low to very low.
- 6.3.4.2 The incorporation of trapped gullies will nonetheless provide one level of treatment.

6.4 **Drainage Strategy**

- 6.4.1 The drainage strategy for the development has been prepared accordingly and is incorporated in **Appendix 4**.

6.5 Exceedance Flows

- 6.5.1 More generally, floor levels will be set a minimum of 0.15m above external ground level and will encourage any flows generated by an exceedance event (i.e. greater than the 1 in 100 year plus climate change design event) to pass safely through the development.

Again reference is made to **Appendix 4**.

6.6 Land Drainage Consents

- 6.6.1 Formal land drainage consents will be required for culverting works, the outfalls and associated maintenance provision.

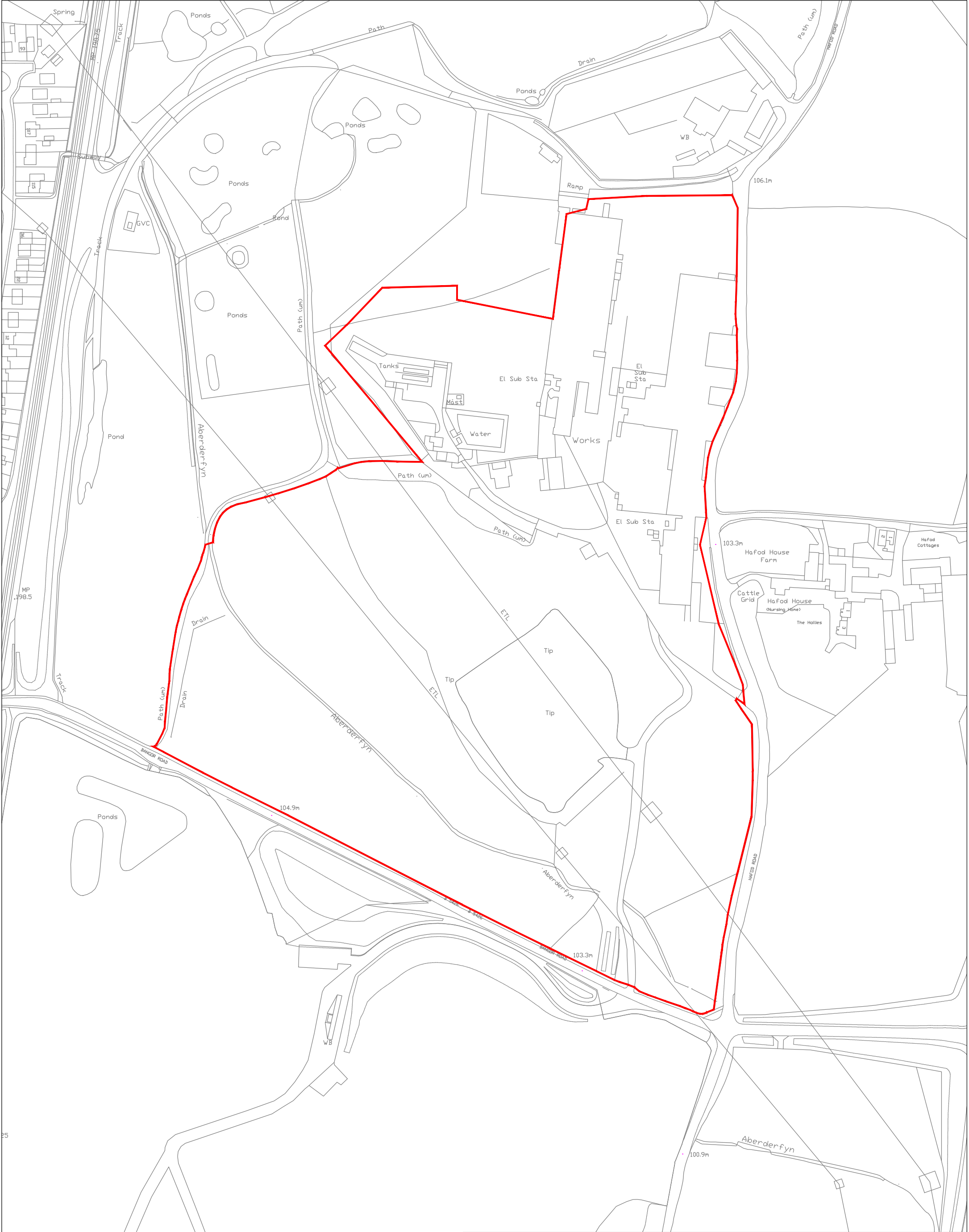
7.0 **CONCLUSIONS**

- 7.1 The proposal is for residential and retail/commercial development.
- Flood mapping identifies that the overall site is located within an area of Zone A Flood Risk and on this basis the Justification Test has not been deemed applicable.
- 7.2 A watercourse, the Aberderfyn, flows south to the west of the site then turns south easterly within the land located between the works site and Bangor Road.
- Modelling work has been undertaken to define the extent of the 1 in 1000 year flood zone associated with the Aberderfyn and the 1 in 1000 year post development flood extent has been identified and incorporated within the development proposals.
- 7.3 Geoenvironmental Investigation work has been undertaken and has concluded that based on the ground conditions encountered the site is unsuitable for adoption of an infiltration based surface water drainage system.
- Positive surface water outfalls from the two development areas are therefore proposed.
- 7.4 To the residential area, a geocell system and an attenuation basin are proposed with flows to be restricted to the agreed rate.
- Highways, houses and associated hard surfaces will be served by a piped surface water system discharging into the geocell system and which will surcharge into a basin located above. The system will overall contain flows up to the 1 in 100 year event plus allowance for 30% climate change.
- To the retail/commercial area, inpipe attenuation is proposed with flows restricted to the agreed rate.
- The initial section of access road and the commercial buildings together with associated hard surfaces will be served by a piped surface water system with geocell units to overall contain flows up to the 1 in 100 year event plus allowance for 30% climate change.
- 7.5 It is proposed that the main piped systems, geocell units and outfalls will be adopted by Welsh Water with the exceptions of the basin which will be adopted by the SAB and the section at the access which will drain adopted highway only and which will be adopted under a S38 agreement by Wrexham County BC Highways as part of the overall development proposals.
- 7.6 Although the risk to water quality from housing developments is categorised as low to very low, the incorporation of trapped gullies to roads and the basin will nonetheless provide two levels of treatment to the substantial part of the site.
- 7.7 Floor levels will be set to encourage any flows generated by an exceedance event to pass safely through the development.
- 7.8 Formal land drainage consents will be required for culverting works, the outfalls and associated maintenance provision.

- 7.9 It is therefore concluded that that the development can be delivered in accordance with the TAN 15 so as not to be at risk of flooding from external sources or from within the development, and so as not to increase flood risk to the surrounding area and is therefore appropriate.

Appendix 1: Site Details

Appendix 1A: Location Plan



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Rev	Date	By	Revision notes
Status			
Legal			

Project	Bangor Road Johnstown	
Title	Location Plan	

Drawn by dmf	Issue date 03-01-20
Scale(s) 1:2500@A3	
Drawing No 2010-002-1001	

Appendix 1B: Watercourse Systems



WATERCOURSE SYSTEMS

HAFOD ROAD, JOHNSTOWN, WREXHAM

Appendix 2: Topographical Survey

Ref. 2010-002 Topo_05_2D Rev A

Appendix 3: Welsh Water Public Sewer Records