GeoSmart Information

FloodSmart Plus

Flood Consequence Assessment

Site Address

Asney Park Farm
Erbistock
Wrexham
LL13 0DS

Grid Reference

336283, 343827

Report Prepared for

Michael Done

Date

2025-01-10

Report Status

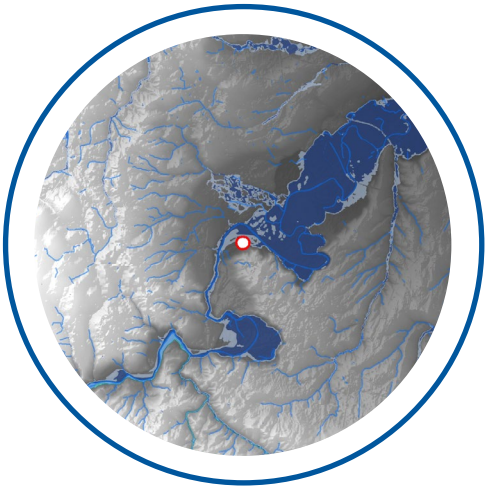
FINAL

Site Area

775 m^2

Report Reference

84198R1



RISK – Very Low to Medium

The Site is mapped within the NRW's tidal Flood Zone 2 (Medium probability) associated with the River Dee. According to the NRW's Development Advice Map the Site is located in Zone B. The risk of flooding from rivers and sea is considered to be Very Low, taking flood defences into account. Detailed flood model data obtained from NRW confirms that the area proposed for development is likely to remain flood free during all modelled fluvial flood scenarios.

The area proposed for development is at Very Low to Medium risk of flooding from surface water and small watercourses. A Very Low risk of flooding has been identified from artificial sources (sewers, reservoirs and canals). The baseline risk of flooding from groundwater sources is Moderate however on further analysis this has been refined to Low.

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1. Executive summary

The Planning Policy Wales (PPW) 12th edition (2024) and Technical Advice Note 15 (TAN 15) (2004) requires Flood Consequence Assessments (FCA) to review flooding from all potential sources. A review has been undertaken of national environmental data sets to assess the potential flood risk to the Site. The review is provided within this concise interpretative report written by an experienced GeoSmart consultant.

It should be noted that the TAN15 (2004) was planned to be updated in June 2023, however, at the time of writing it is understood that this deadline is no longer applicable and a revised TAN is in consultation with the date of publication unknown. The Flood Map for Planning will supersede the NRW's Development Advice Map (DAM) and the conclusions of this report may change as a result. However, this is yet to be implemented and this report is based upon TAN15 (2004) and the DAM.

Site analysis

Source of Flood Risk	Baseline[1]	After analysis[2]	After Mitigation[3]
River (fluvial) flooding	Very Low		N/A*
Sea (coastal/tidal) flooding	Very Low		N/A
Surface water (pluvial) flooding	Very Low to High	Very Low to Medium	Very Low to Low
Groundwater flooding	Moderate	Low	Negligible
Other flood risk factors present	Yes (reservoirs)		N/A
Is any other further work recommended?	Yes (see below)		

1 BASELINE risks assigned for the whole Site, using national risk maps, including the benefit of NRW flood defences.

2 AFTER ANALYSIS modification of risk assessment based on detailed site specific analysis including some or all of the following: flood model data, high resolution mapping, building location, access routes, topographic and CCTV surveys.

3 AFTER MITIGATION risks include risks to the proposed development / asset and occupants if mitigation measures recommended in this report are implemented, including the impacts of climate change.

*N/A indicates where mitigation is not required.

Summary of existing and proposed development

The Site is currently used within an agricultural capacity adjacent to an area of a farm house with numerous outbuildings and a slurry lagoon. Development proposals comprise the construction of a new slurry silo to the south east of the existing development, set on a concrete base c. 0.10 m above existing ground levels. Site plans are included within Appendix A.

Summary of flood risks

The flood risks from all sources have been assessed as part of this report and are as follows:

River (fluvial) and Sea (Estuarine/Coastal) flooding

According to the NRW's Flood Map for Planning, the Site is located within fluvial Flood Zone 2. According to the NRW's Development Advice Map (DAM) the Site is located within DAM Zone B.

According to NRW's Flood Risk Assessment Wales map (FRAW), which considers the type, condition and crest height of flood defences, the Site currently has a Very Low risk of flooding from rivers and the sea.

Modelled undefended flood data was obtained from the NRW, which confirms that the area proposed for development is anticipated to remain flood free during all potential flooding scenarios, up to and including the 0.1% AEP event.

Surface water (pluvial) flooding

According to NRW's Flood Risk Assessment Wales (FRAW) mapping, the Site has a Very Low to High risk of flooding from surface water and small watercourses.

- During the High risk event (>3.3% AEP), flooding is not modelled to impact the area for development and as such the risk rating has been refined accordingly.
- During the Medium risk event (3.3 - 1% AEP) and Low risk event (1 - 0.1% AEP) pluvial flooding of up to 0.32 m is modelled to impact the north-eastern boundary of the Site, extending into the north-eastern part of the Site.

Flood mitigation measures are included overleaf.

A compensatory flood storage area of approximately 80 m^2 has been included within the development plans to the east of the slurry silo which will likely be sufficient to accommodate any displaced pluvial flooding. Based on the depth of flooding and the total area affected, an estimated 9.64 m^3 could be displaced as a result of the development during the Low risk pluvial flooding event. As such, where an average basal depth of 0.15 m can be achieved in this area compensatory storage will be achieved.

Groundwater flooding

Groundwater Flood Risk screening data indicates there is a Moderate potential risk of groundwater flooding at the surface in the vicinity of the Site during a 1 in 100 year event.

- The Site is underlain by permeable superficial deposits above permeable bedrock. Groundwater levels may rise in the bedrock and superficial aquifers in response to prolonged rainfall recharge and high river levels.

Given that the proposed development does not involve any significant subsurface excavation and therefore the risk is deemed to be Low.

Artificial sources of flooding

The risk of flooding from artificial (man-made) sources such as reservoirs, sewers and canals has been assessed:

- NRW's Risk of Flooding from Reservoir map confirms the Site is at risk of reservoir flooding.
- Ordnance Survey (OS) data confirms there are no canals near to the Site.
- An SFCA is not available for the Wrexham Council area. Therefore, no information regarding flooding events from sewers is available for the Site. However, given the remote location of the Site, within a predominantly agricultural setting, the risk of flooding from surcharging sewers is likely to be Very Low.

The risk of flooding from artificial sources is considered to be Very Low.

The risk to the development has been assessed over its expected 25 year lifetime, including appropriate allowances for the impacts of climate change which could increase the flood risk to the Site. Risks identified include sea level rise, increases in river flooding and increased potential for surface water flooding and appropriate mitigation measures are proposed.

As the Site is categorised as Less Vulnerable in DAM Zone B there is no requirement to undertake the Justification Criteria (TAN 15, 2004).

Recommendations

Recommendations for flood mitigation are provided below, based upon the proposed development and the flood risk identified at the Site.

Pluvial flooding risk

- The slurry store should be appropriately sealed / impermeable to prevent water ingress and the release of any stored material for flood depths of up to 0.32 m.
- The proposed flood storage compensation area should be maintained to ensure this is not blocked for the perpetuity of the development and designed such to be freely draining once flooding recedes.

Additional mitigation measures:

- The ongoing management and maintenance of existing drainage networks, under the riparian ownership of the developer, should be undertaken in perpetuity with the development.

GeoSmart recommend the mitigation measures discussed within this report are considered as part of the proposed development where possible and evidence of this is provided to the Local Planning Authority as part of the planning application.

2. Introduction

Background and purpose

A site-specific flood consequence assessment has been undertaken, to assess the flood risk to and from the development Site. This assessment has been undertaken by firstly compiling information concerning the Site and the surrounding area. The information gathered was then used to construct a 'conceptual site model', including an understanding of the appropriateness of the development, as defined in the PPW (2024), and the source(s) of any flood risk present. Finally, a preliminary assessment of the steps that can be taken to manage flood risk to the development was undertaken.

This report has been prepared with reference to the Technical Advice Note (TAN) 15 (2004) which supplements the PPW (2024).

The general approach of PPW, supported by TAN15, is to advise caution in respect of new development in areas at high risk of flooding by setting out a precautionary framework to guide planning decisions. The overarching aim of the precautionary framework is, in order of preference, to:

- Direct new development away from those areas which are at high risk of flooding; and
- Where development is considered to be in high-risk areas (Zone C) only those developments which can be justified on the basis of the tests outlined in Section 6 and Section 7 are located within such areas.

The purpose of this report is to provide clear and pragmatic advice regarding the nature and potential significance of flood hazards which may be present at the Site.

Report scope

A thorough review of a commercially available flood risk report and NRW supplied data has been undertaken, indicating potential sources of flood risk to the Site from rivers and tidal sources, surface run-off (pluvial), groundwater and reservoirs, including historical flood information and modelled flood extent. Appropriate measures are recommended to manage and mitigate the flood risk to the property.

Information obtained from NRW has been used to ascertain local flooding issues and, where appropriate, identify information to support a Justification test and Assessment of Flood Consequences required as part of the PPW (2024). It is noted that a Strategic Flood Consequence Assessment (SFCA) has not been published for the Wrexham Council area. It is understood that a Wrexham County Borough Council Preliminary Flood Risk Assessment (PFRA) (2011 and its November 2017 addendum) and a Local Flood Risk Management Strategy (LFRMS) (2013) have been published however these were not readily accessible at the time of writing.

The existing and future flood risk to and from the Site from all flood sources is assessed in line with current best practice using the best available data. The risk to the development has

been assessed over its expected lifetime, including appropriate allowances for the impacts of climate change. Residual risks that remain after the flood risk management and mitigation measures are implemented, are considered with an explanation of how these risks can be managed to keep the users of the development safe over its lifetime.

An indication of whether the Site will potentially increase flood risk elsewhere is provided, including where the proposed development increases the building footprint at the Site. A drainage strategy to control runoff can be commissioned separately if identified as a requirement within this report.

Report limitations

It is noted that the findings presented in this report are based on a desk study of information supplied by third parties. Whilst we assume that all information is representative of past and present conditions, we can offer no guarantee as to its validity and a proportionate programme of site investigations would be required to fully verify these findings.

The basemap used is the OS Street View 1:10,000 scale; however, the Site boundary has been drawn using BlueSky aerial imagery to ensure the correct extent and proportion of the Site is analysed.

This report excludes consideration of potential hazards arising from any activities at the Site other than normal use and occupancy for the intended land uses. Hazards associated with any other activities have not been assessed and must be subject to a specific risk assessment by the parties responsible for those activities.

Datasets

The following table shows the sources of information that have been consulted as part of this report:

Table 1. Datasets consulted to obtain confirmation of sources of flooding and risk

Source of flooding	Datasets consulted			
	Commercial Flood Maps	Local Policy & Guidance Documents*	Natural Resources Wales (Appendix B)	OS Data
Historical	X	X	X	
River (fluvial) / Sea (tidal/coastal)	X	X	X	

Source of flooding	Datasets consulted			
	Commercial Flood Maps	Local Policy & Guidance Documents*	Natural Resources Wales (Appendix B)	OS Data
Surface water (pluvial)	X	X	X	
Groundwater	X	X		
Sewer		X		
Culvert/bridges		X		X
Reservoir		X	X	

*Local guidance and policy, referenced below, has been consulted to determine local flood conditions and requirements for flood mitigation measures.

National policy

Due to the nature of the development it has been deemed prudent to include the below given the potential interaction of the development with flooding.

The Water Resources (Control of Pollution) (Silage, Slurry and Agricultural Fuel Oil) (Wales) Regulations (2010):

Schedule 2 Requirements for Slurry Storage Systems

The requirements to be satisfied in relation to a slurry storage system are as follows.

- The base of the slurry storage tank, the base and walls of any effluent tank, channels and reception pit, and the walls of any pipes, must be impermeable.
- The base and walls of the slurry storage tank, any effluent tank, channels and reception pit, and the walls of any pipes, must be protected against corrosion in accordance with paragraph 7 of the code of practice on buildings and structures for agriculture published by the British Standards Institution and numbered BS 5502: Part 50: 199351.
- The base and walls of the slurry storage tank and of any reception pit must be capable of withstanding characteristic loads calculated on the assumptions and in the manner

indicated by paragraph 5 of the code of practice on buildings and structures for agriculture published by the British Standards Institution and numbered BS 5502: Part 50: 1993.

- Any facilities used for the temporary storage of slurry before it is transferred to a slurry storage tank must have adequate capacity to store
    - The maximum quantity of slurry that (disregarding any slurry which will be transferred directly into a slurry storage tank) is likely to be produced on the premises in any two day period; or
    - A lesser capacity that the Agency agrees in writing is adequate to avoid any significant risk of pollution of controlled waters.
- Where slurry flows into a channel before discharging into a reception pit and the flow of slurry out of the channel is controlled by means of a sluice, the capacity of the reception pit must be adequate to hold the maximum quantity of slurry that can be released by opening the sluice.
- The slurry storage tank must have adequate storage capacity for the likely quantities of slurry produced from time to time on the premises in question, taking into account.
    - The proposed method utilising the slurry, and the likely rates and times of utilisation; and
    - If it is proposed to use the slurry on the premises by spreading it on the land, the tank need not have a greater storage capacity than is adequate, to hold the maximum quantity of slurry likely to be produced in any four month period.
- No part of the slurry storage tank or any effluent tank, channels or reception pit may be situated within 10 metres of any inland freshwaters or coastal waters into which slurry could enter if it were to escape unless precautions are taken that the Agency agrees in writing are adequate to avoid any significant risk of pollution of controlled waters.
- The slurry storage tank and any effluent tank, channels, pipes and reception pit must be designed and constructed so that with proper maintenance they are likely to continue to satisfy the other requirements for at least 20 years.
- If the walls of the slurry storage tank are not impermeable, the base of the tank must:
    - Extend beyond the walls;
    - Be provided with channels designed and constructed so as to collect any slurry that escapes from the tank
    - Have adequate provision for the drainage of the slurry from those channels to an effluent tank through a channel or pipe.
- If the slurry storage tank or any effluent tank or reception pit is fitted with a drainage pipe there must be two valves in series on the pipe with each valve separated from the other by a minimum distance of 1 metre. Each valve must be capable of shutting off the flow of slurry through the pipe and must be kept shut and locked in that position when not in use. S

- In the case of a slurry storage tank with walls made of earth the tank must not be filled to a level that allows less than 750 millimetres of freeboard.

Local policy and guidance

For this report, several documents have been consulted for local policy and guidance and relevant information is outlined below:

Wrexham Unitary Development Plan (Wrexham Council, February 2005):

Policy EC12

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

- Would not be subject to an unacceptable risk of flooding on-site; and/or
- Does not result in an unacceptable risk of flooding on or off-site; and/or
- Does not adversely affect flood management or maintenance schemes.

Policy EC13

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

Wrexham County Borough Council is preparing the Local Development Plan (LDP) which will replace the current adopted Unitary Development Plan. The LDP will be a long-term land use and development strategy focused on achieving sustainable development. The Deposit Local Development Plan (draft LDP) contains the following policy in relation to flood risk:

Wrexham Local Development Plan (2013 - 2028) - Deposit Plan Consultation (2018)

Policy SP19: Climate change

- Avoiding areas susceptible to flood risk in the first instance in accordance with the sequential approach set out in national guidance; and
- Preventing development that increases flood risk.

Policy DM1: Development Management Considerations

- 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.

3. Site analysis

Site information

The Site is located north of Erbistock, Wrexham in a setting of agricultural land use at National Grid Reference SJ 36283 43827.

Using a 500 m radius around the Site, the topography across the surrounding area typically falls towards the north, in the direction of the River Dee (Figure 2, overleaf).

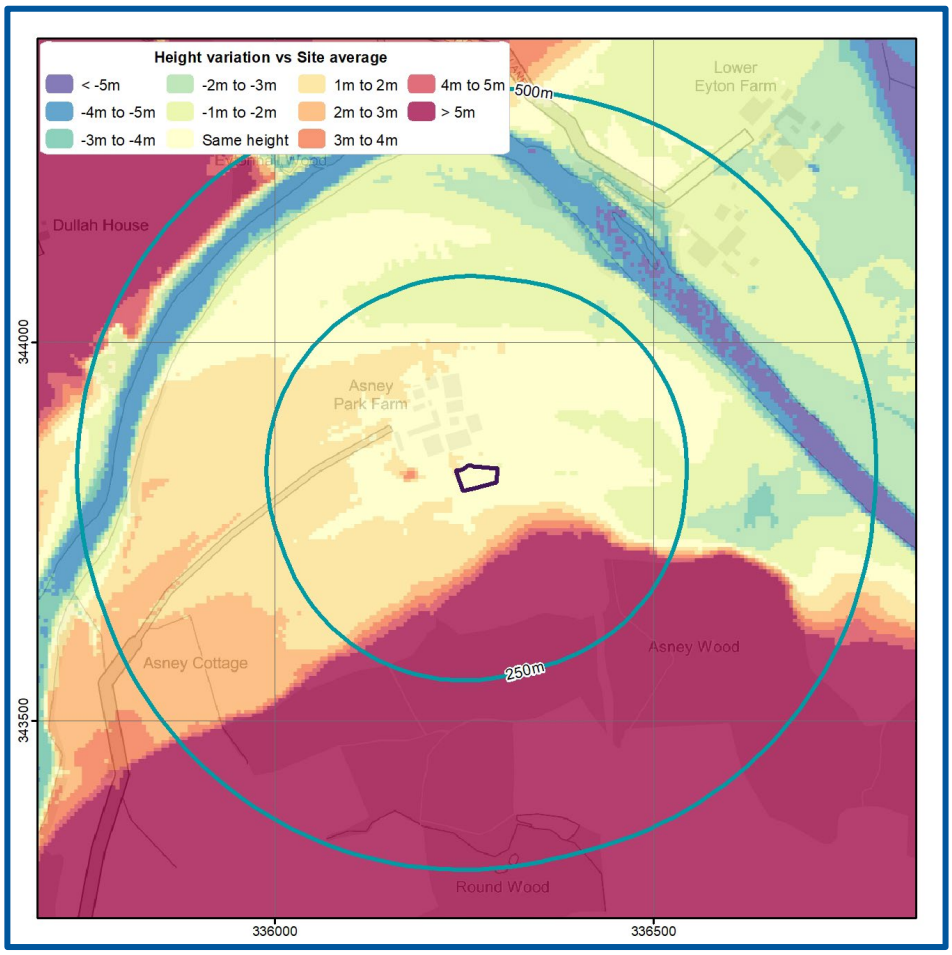
According to OS data, the general level of the Site is between 21.28 mAOD and 21.93 mAOD with the Site falling gradually in a north easterly direction. This is based on NRW elevation data obtained for the Site to a 1 m resolution with a vertical accuracy of ±150 mm.

Figure 1. Aerial imagery of the Site (Bluesky, 2025)



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Figure 2. Site Location and Relative Elevations (GeoSmart, 2025)



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Development

The Site is currently used within an agricultural capacity adjacent to an area of a farm house with numerous outbuildings and a slurry lagoon. Development proposals comprise the construction of a new slurry silo to the south east of the existing development, set on a concrete base c. 0.10 m above existing ground levels. Site plans are included within Appendix A.

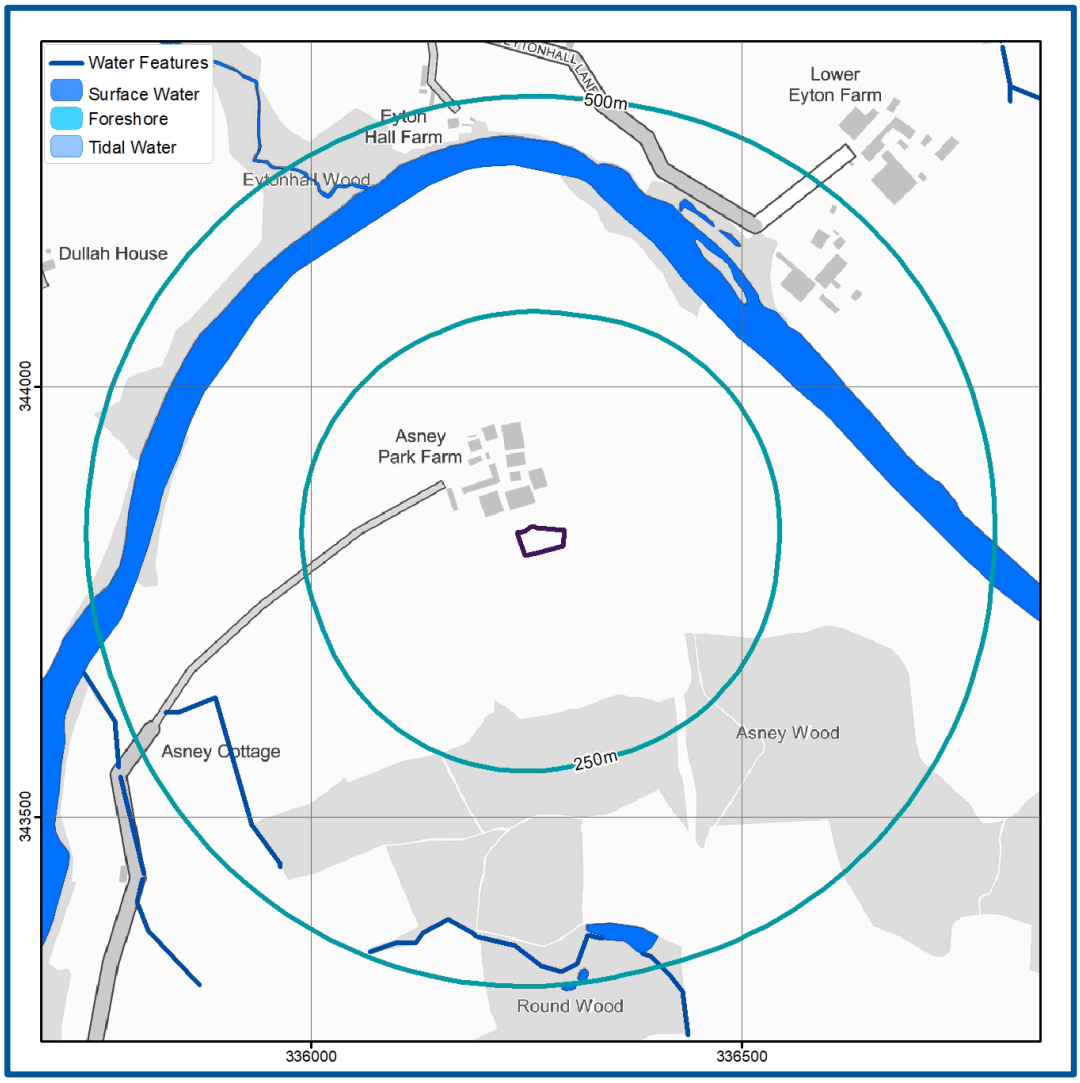
The development is classed as Less Vulnerable according to Figure 2 in TAN 15 (2004). The effect of the overall development will not result in an increase in the number of occupants and/or users of the Site and will not result in the change of use, nature or times of occupation. The estimated lifespan of the development is 25 years.

Hydrological features

According to Ordnance Survey (OS) mapping (Figure 3), there are numerous surface water features within 500 m of the Site.

- The River Dee is located approximately 300 m north east of the Site at its closest, flowing in an easterly direction, at a lower elevation.
- A small, unnamed watercourse is located approximately 440 m north west of the Site, flowing into the River Dee.
- A series of small watercourse and isolated waterbodies are located to the south of the Site, the closest being c. 375 m south west.

Figure 3. Surface water features (OS, 2025)



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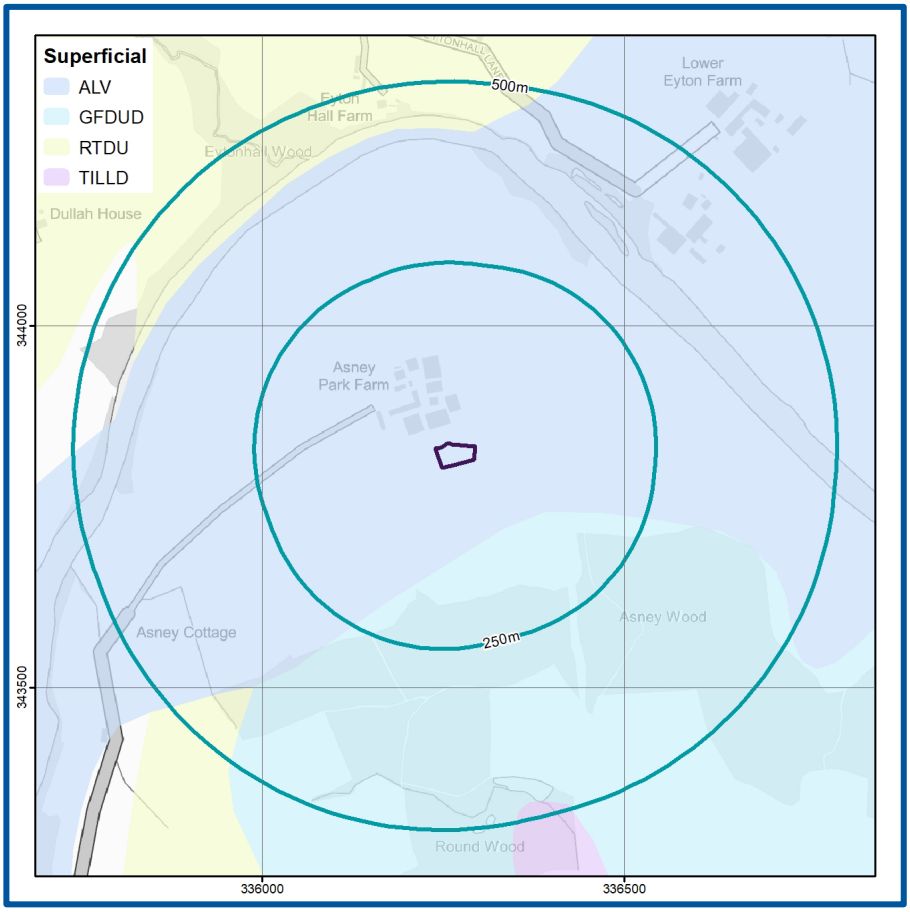
Proximity to relevant infrastructure

No relevant infrastructure with regard to flood risk has been identified within the vicinity of the Site.

Hydrogeological features

British Geological Survey (BGS) mapping indicates that the underlying superficial geology (Figure 4) consists of Alluvium - clay, silt, sand and gravel (ALV) (BGS, 2025) which is classified as a Secondary (A) Aquifer (BGS, 2025). As such, the superficial geology is likely to comprise permeable layers that can support local water supplies, and may form an important source of base flow to rivers.

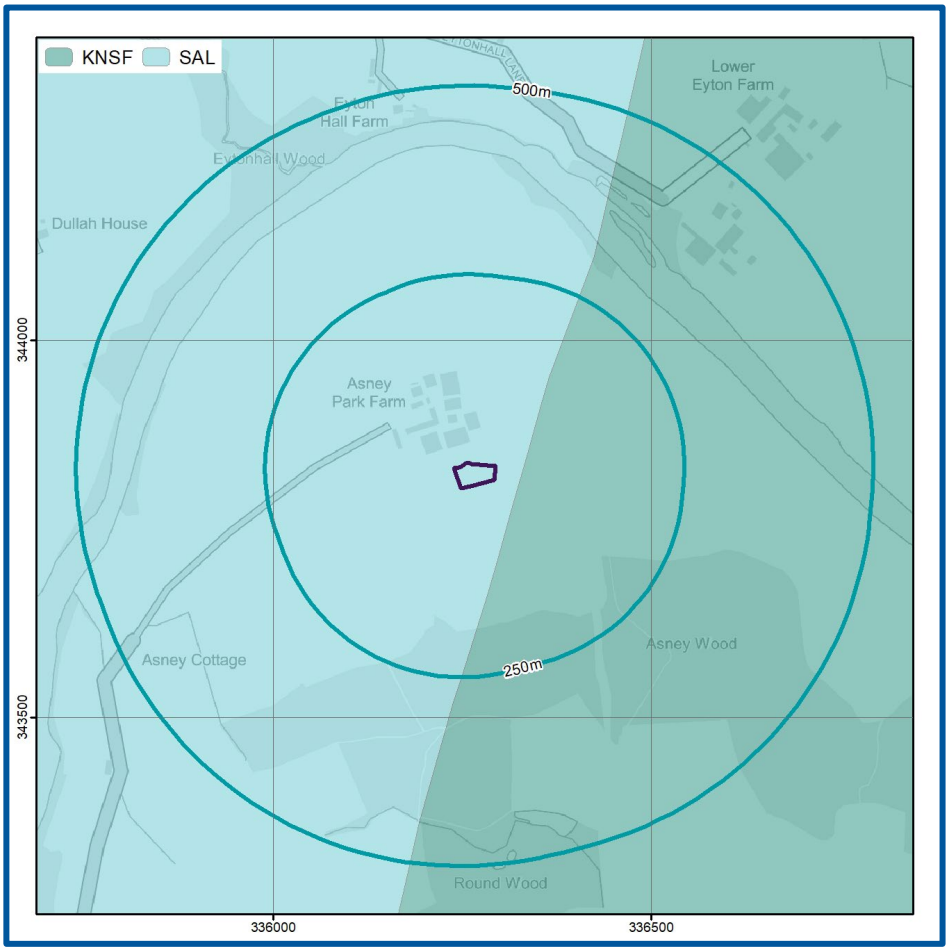
Figure 4. Superficial Geology (BGS, 2025)



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BGS mapping indicates that the underlying bedrock geology (Figure 5) consists of the Salop Formation - mudstone, sandstone and conglomerate (SAL) (BGS, 2025) which is classified as a Secondary (A) Aquifer (BGS, 2025). It should be noted that an area of Kinnerton Sandstone Formation (KNSF) is mapped at outcrop c. 40 m to the east of the Site; the sandstone is classified as a Principal Aquifer (BGS, 2025).

Figure 5. Bedrock Geology (BGS, 2025)



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Geological conditions and groundwater

A review of the BGS borehole database (BGS, 2025) indicates that there are no relevant boreholes within the vicinity of the Site from which the mapped geology or likely depth to groundwater can be confirmed.

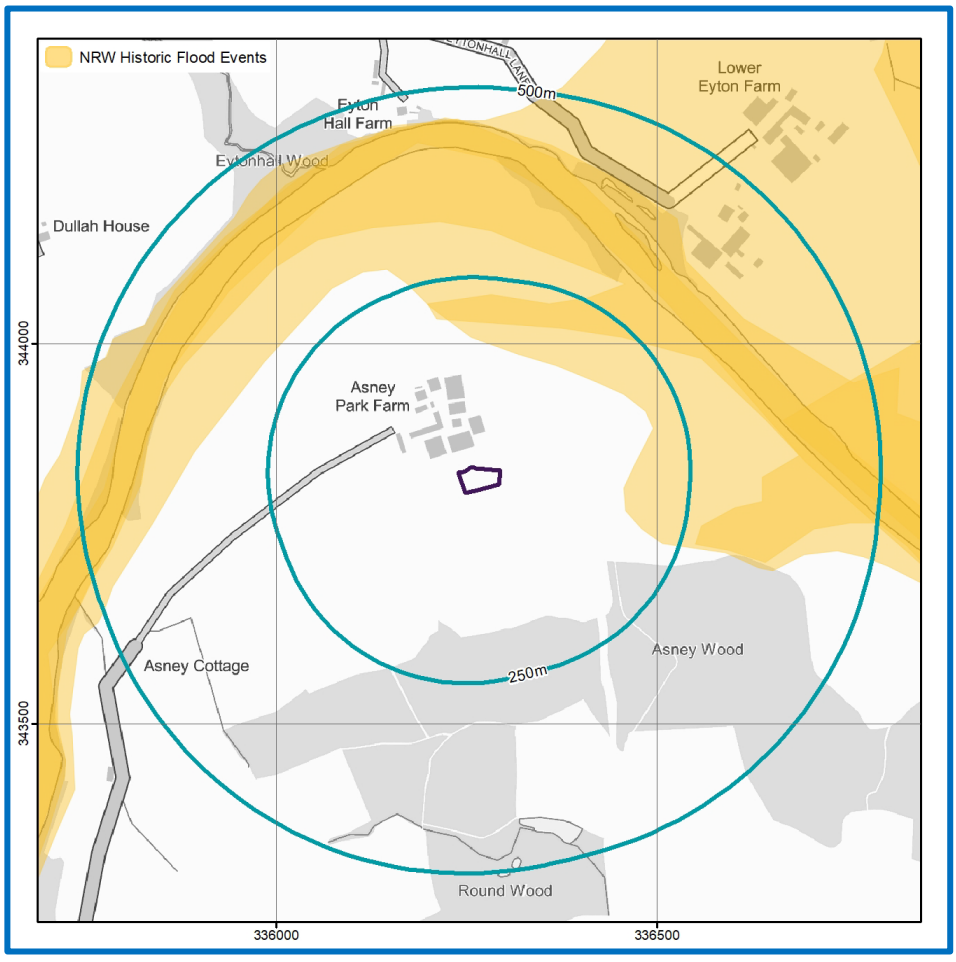
4. Flood risk to the development

Historical flood events

According to the NRW's Recorded Flood Extents Map (Figure 6), no historical flood events have been recorded at the Site (NRW, 2025). The mapping does however show historical flooding within 200 m to the north and c. 170 m to the north east of the Site. The area highlighted on Figure 6 shows the extent of the 1964 flood event and the January 2021 flooding associated with Storm Christoph. For the latter storm, no Section 19 flood investigation could be identified from Wrexham Council confirming the likely return period of this event.

The purpose of historical flood data is to provide information on where and why flooding may have occurred in the past. The absence of any recorded events does not mean flooding has never occurred on-Site or that flooding will never occur at the Site.

Figure 6. Historic Flood Event Outline (NRW, 2025)



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Rivers (fluvial) / Sea (coastal) / Estuarine (tidal) flooding

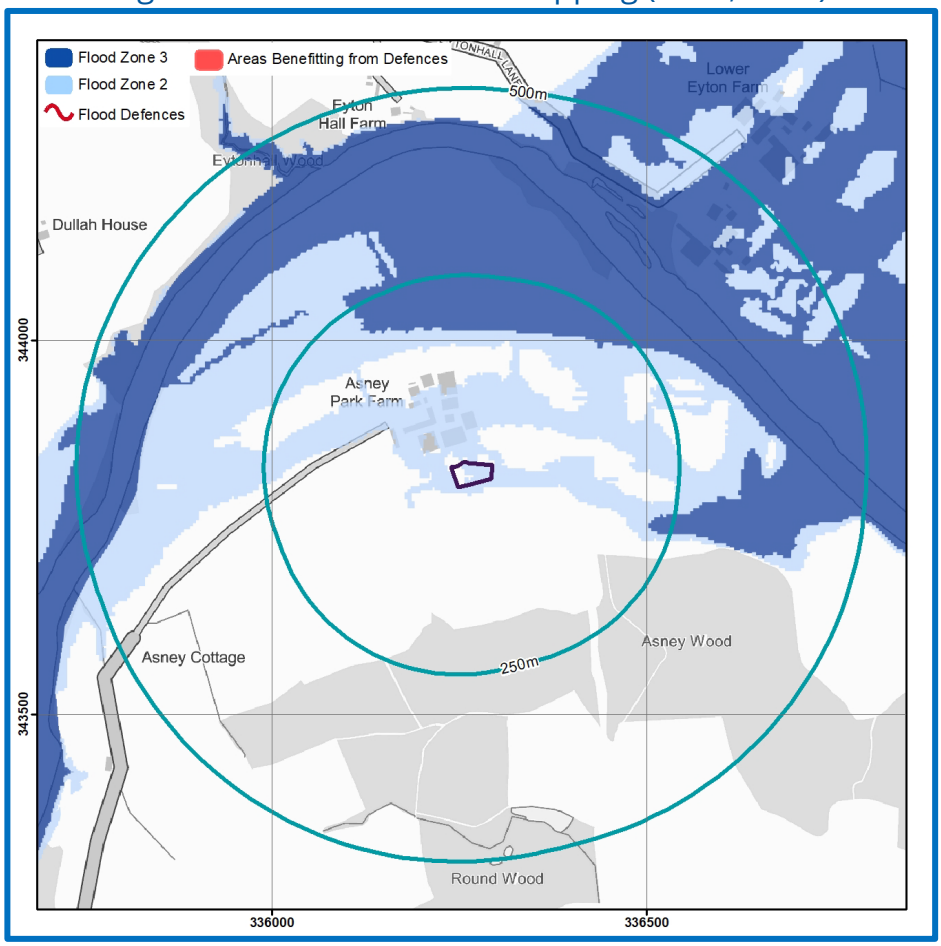
The predominant risk at the Site is from flooding from rivers, termed as fluvial flooding. The Site is located in an inland location and the risk of flooding from coastal and tidal processes are therefore considered to be Very Low.

River (fluvial) flooding occurs during times of heavy rainfall or snow melt when watercourses' capacity can be exceeded, over topping the banks and flood defences.

Flood Zones Map

According to the NRW's Flood Map for Planning (Figure 7), the majority of the Site (c. 90% of the Site area) is located within fluvial Flood Zone 2. Whilst it is noted that areas of the Site are located within Flood Zone 1 (along the northern and western boundaries), given that these areas form isolated, dry islands the Site can be generally classified as having a Medium probability of fluvial flooding from the River Dee.

Figure 7. NRW Flood Zone mapping (NRW, 2025)



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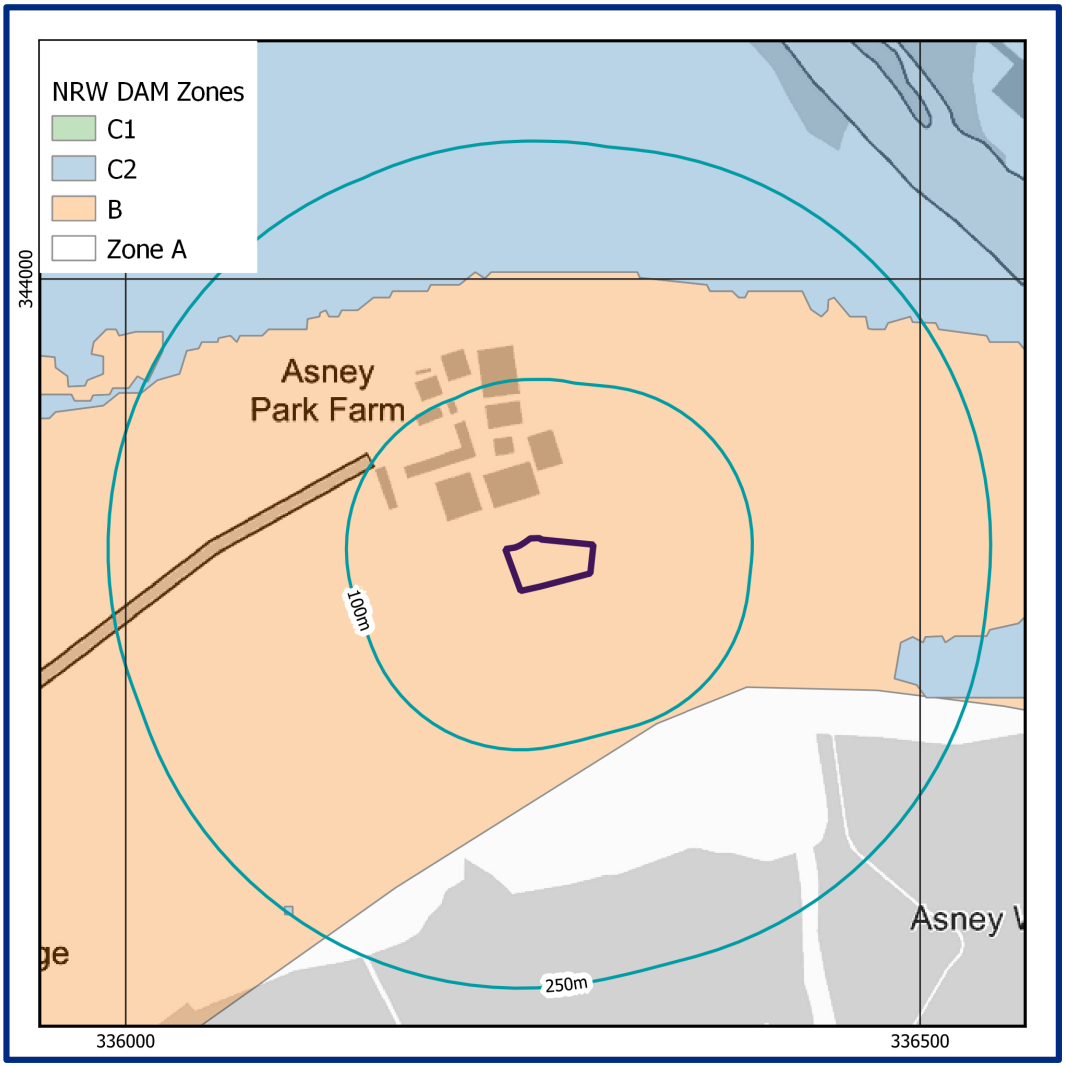
Please note these Flood Zones are not presently used for planning purposes, although they do hold some weight in consideration of flood risks and provide an indicative extent for the 1 in 100 year / 1 in 200 year and 1 in 1000 year fluvial and tidal events, respectively. The Flood Map for Planning also includes an allowance for climate change within the mapped flood extents.

The above Flood Zones will become policy once the revised version of TAN15 is published. In the meantime, the Development Advice Map (DAM) is currently the most up to date mapping for planning purposes in line with TAN15 (2004).

Development Advice Map

The NRW's Development Advice Map (DAM) (Figure 8) confirms that the Site is located within Zone B which is an area understood to have been flooded in the past, evidenced by sedimentary deposits (TAN15, 2004).

Figure 8. Development Advice Map (NRW, 2025)



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Table 2. Development Advice Map Classification

Description of Zone	Zone
Considered to be at little or no risk of fluvial or tidal/coastal flooding.	A
Areas known to have been flooded in the past evidenced by sedimentary deposits.	B
Areas of the floodplain which are developed and served by significant infrastructure, including flood defences.	C1
Areas of the floodplain without significant flood defence infrastructure.	C2

Flood defences

Guidance
Sites that are located close to flood defences are likely to be zones where rapid inundation will occur in the event of the flood defences being overtopped or breached. A Site located close to flood defences (within 250 m) may require a more detailed FCA subject to local topography.

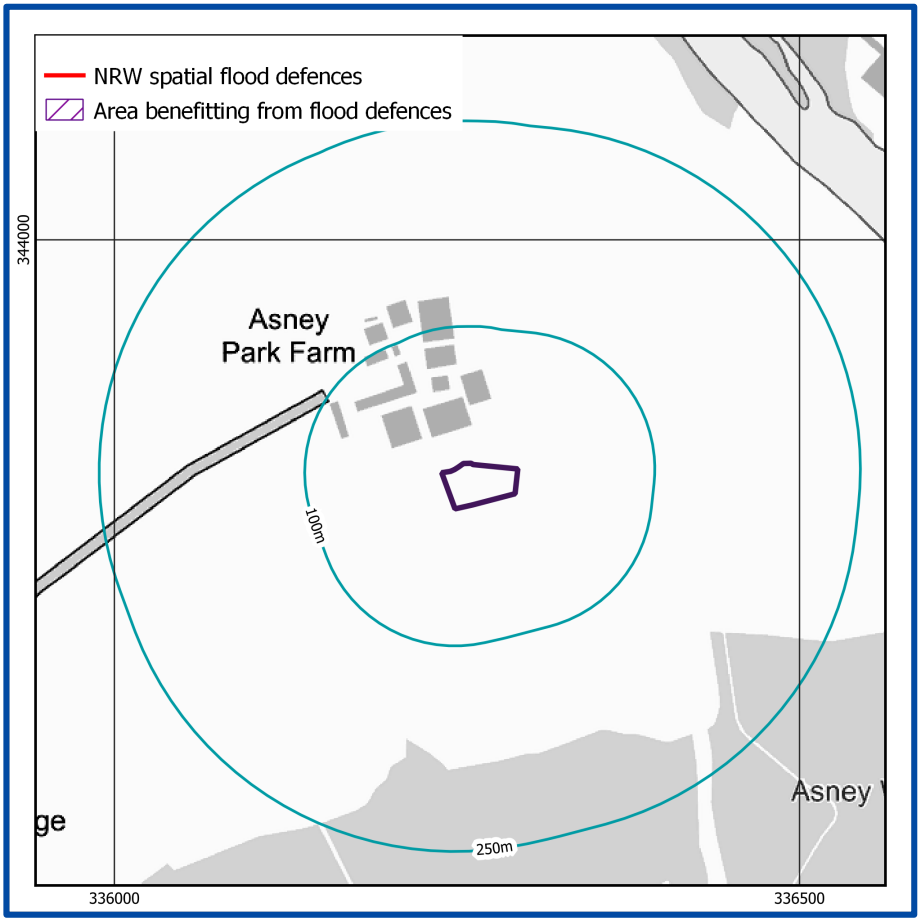
Existing flood defences

According to NRW (2025) Flood Map for Planning, the Site is not located within a TAN15 Defended Zone. Furthermore, there are no formal flood defences within 500 m of the Site (Figure 9, overleaf).

Future flood defences

Given the absence of any accessible Wrexham Council flood information documents, no information as to the likelihood of a future flood defence scheme for the area could be identified. As such, it is assumed that the risk presented by the Bangor on Dee flood modelling study (JBA Consulting, 2012) and subsequent climate change re-runs (Binnies, 2021) is likely to be sufficiently representative of the future fluvial flood risk at the Site for the lifetime of the development.

Figure 9. Areas benefiting from flood defences (NRW, 2025)



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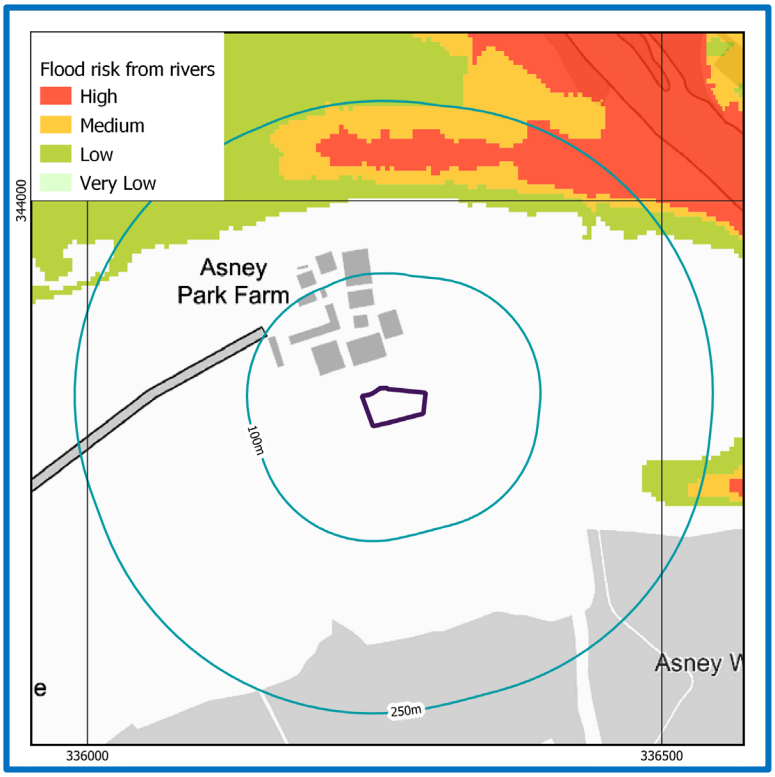
Flood Risk including the benefit of defences

The Flood Risk Assessment Wales (FRAW) maps were published in the Summer of 2020.

The FRAW mapping includes consideration of flood defences that have been built to protect against flooding from rivers and the sea. The defences shown provide different levels of flood protection and this is recognised in the risk classification shown in the Flood Risk Assessment Wales (FRAW) map, which indicates:

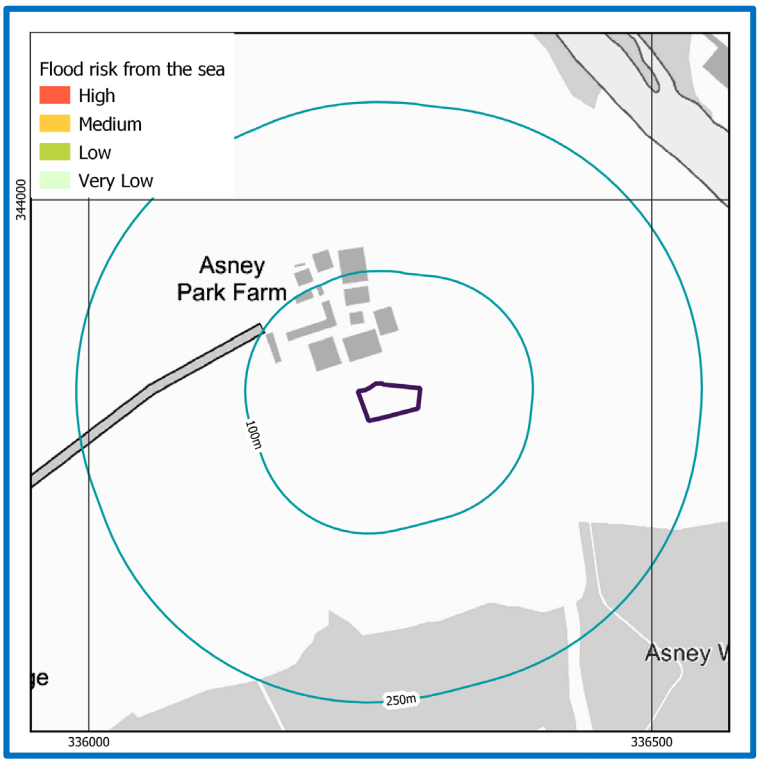
- The flood risk from Rivers is Very Low (Figure 10).
- The flood risk from the Sea is Very Low (Figure 11).
- The flood risk from Surface Water and Small Watercourses is Very Low to High (Figure 12).

Figure 10. Rivers – FRAW Risk Map (NRW, 2025)



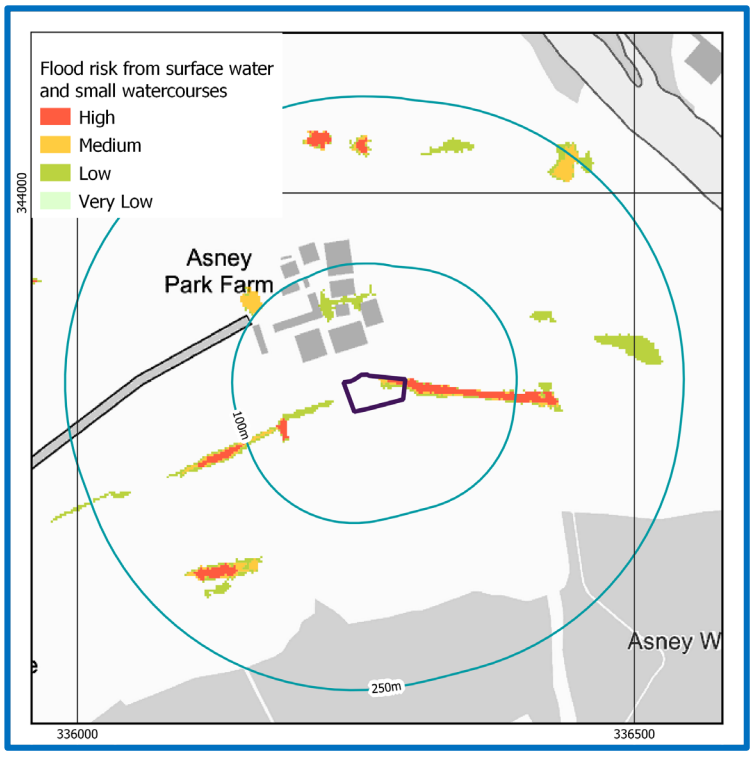
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Figure 11. Sea – FRAW Risk Map (NRW, 2025)



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Figure 12. Surface Water and Small Watercourses – FRAW Risk Map (NRW, 2025)



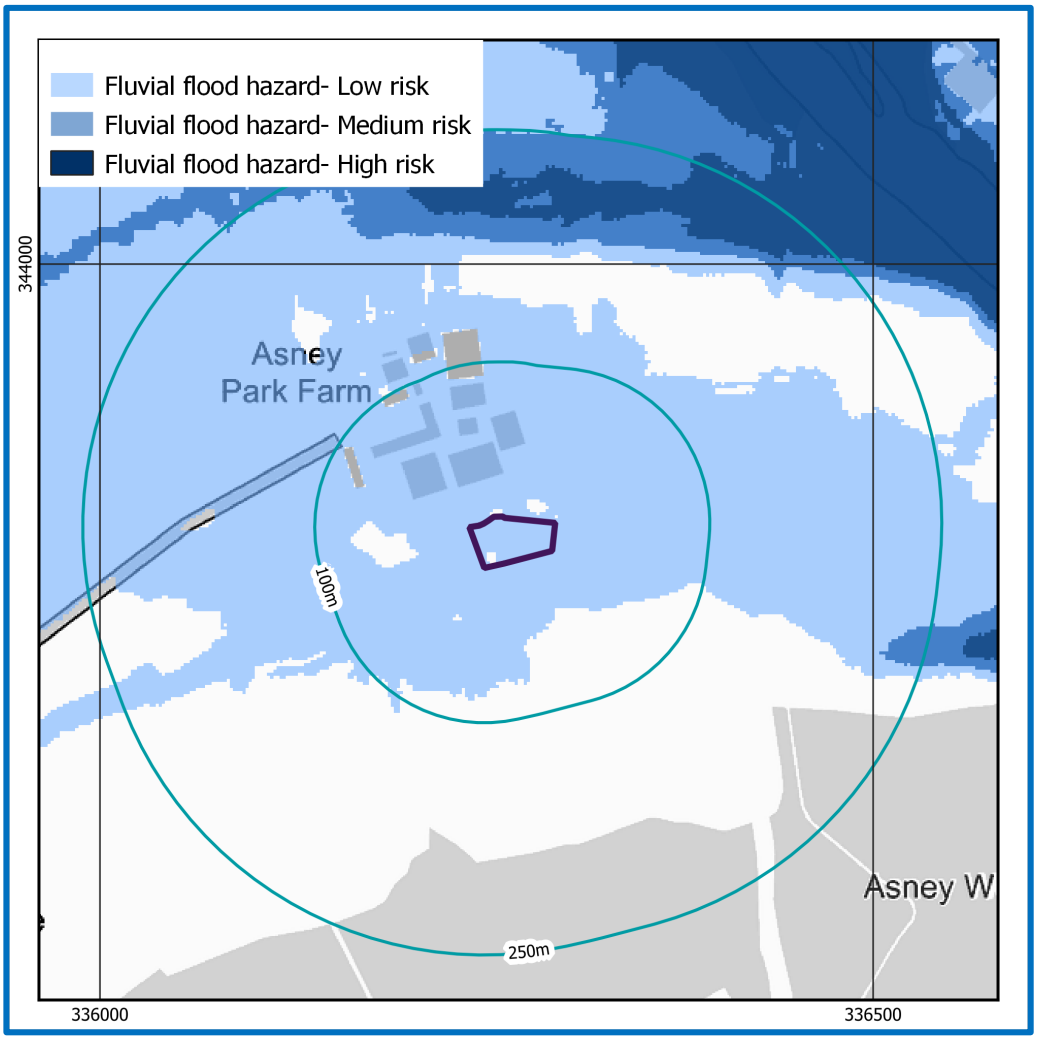
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National Flood Hazard Maps

The National Flood Hazard (NFH) maps were published in the Summer of 2020, these show results for an undefended scenario which means the modelling and mapping process explicitly excluded any flood defences.

NFH maps have been included in order to understand the risk of flooding in a worst-case undefended scenario. It should be noted that NFH mapping is done on a national scale and is superseded by more detailed modelling.

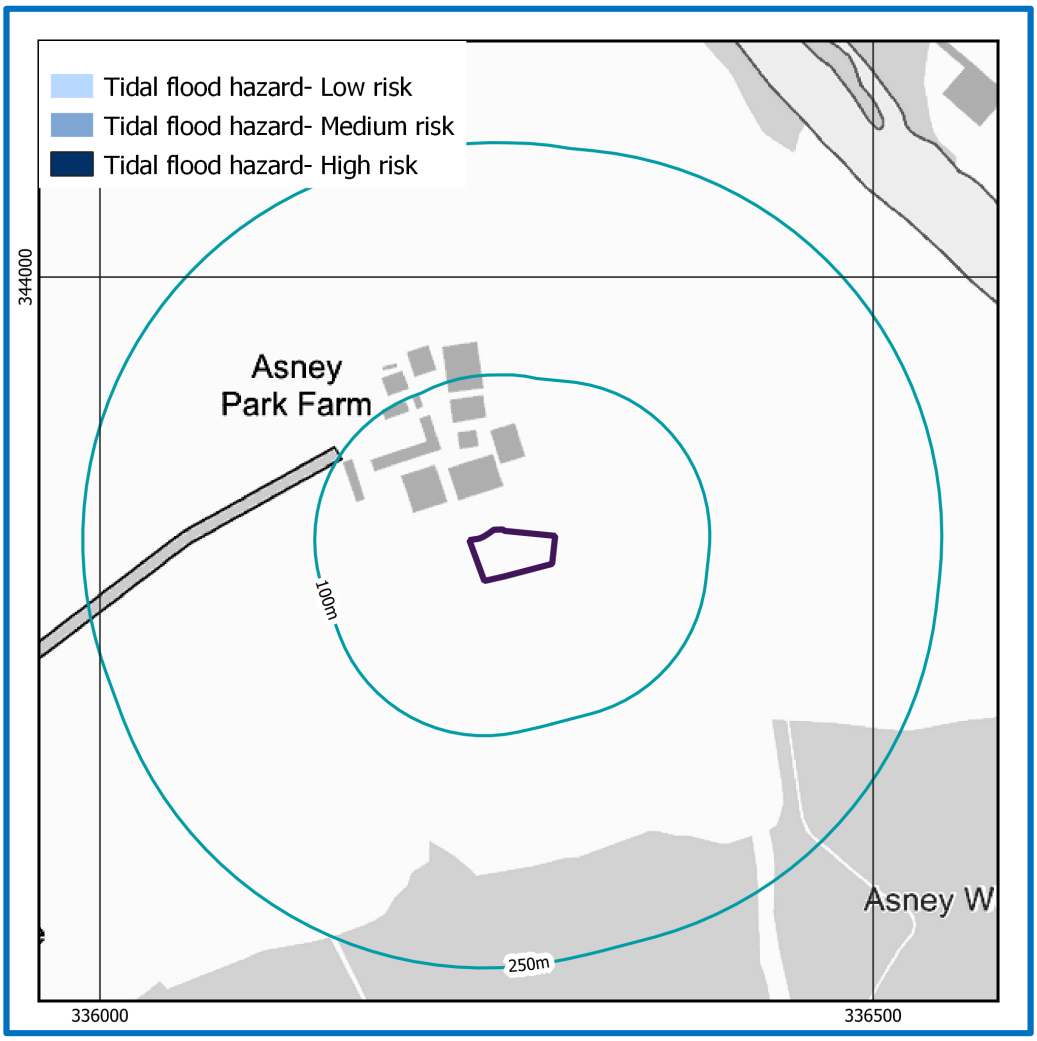
Figure 13. National Flood Hazard Fluvial flood mapping (NRW, 2025)



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- In the High risk (1 in 30 year – 3.3% AEP) and Medium risk (1 in 100 year – 1% AEP) the Site is not modelled to be affected by fluvial flooding.
- In the Low risk (1 in 1000 year – 0.1% AEP) fluvial scenario (Figure 13), flooding is modelled to extend across the vast majority of the Site, with variable flood depths of between 0.30m – 0.90m.

Figure 14. National Flood Hazard Tidal flood mapping (NRW, 2025)



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The tidal flood risk mapping (Figure 14) demonstrate that the Site will not be affected in any undefended tidal flood scenario, up to and including the Low risk (1 in 1000 year) event.

NRW Bangor on Dee flood model

As the Site is located within NRW's fluvial floodplain, flood elevation data were obtained from NRW. The data have been used to assess flood risk and to provide recommendations for mitigation for the proposed development.

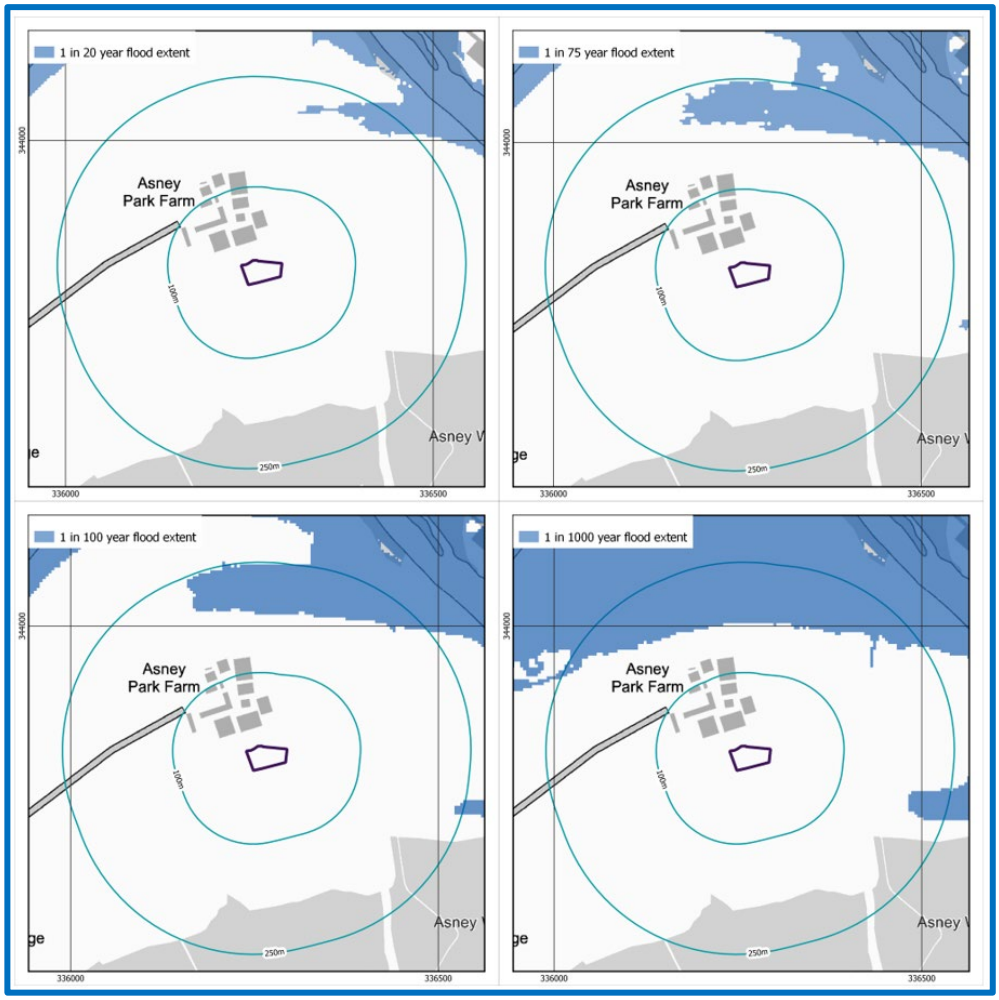
Modelled flood data and flood extents were provided by NRW in the form of raw output .asc grid files and analysed using QGIS, to extract flood levels and flood depths in relation to the Site. The modelled flood data has been taken from the Bangor on Dee flood modelling study (JBA Consulting, 2012) and subsequent climate change re-runs (Binnies, 2021). Table 3 shows the anticipated flood levels on-Site with the flooding extents shown in Figure 15 (both overleaf).

Table 3. NRW present day modelled flood data

Ground levels on-Site (mAOD)	Modelled Flood Levels (mAOD)			
	1 in 20 year	1 in 75 year	1 in 100 year	1 in 1000 year
21.28 to 21.93	N/A	N/A	N/A	N/A
Flood depths (m)	No flooding anticipated			

Figure 15 confirms the flood extent associated with the overtopping of any flood defences in the present day flooding scenarios.

Figure 15. Bangor on Dee modelled present day flooding scenarios



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Bangor on Dee flood modelling study JBA Consulting, 2012 and Binnies, 2021

Climate change factors

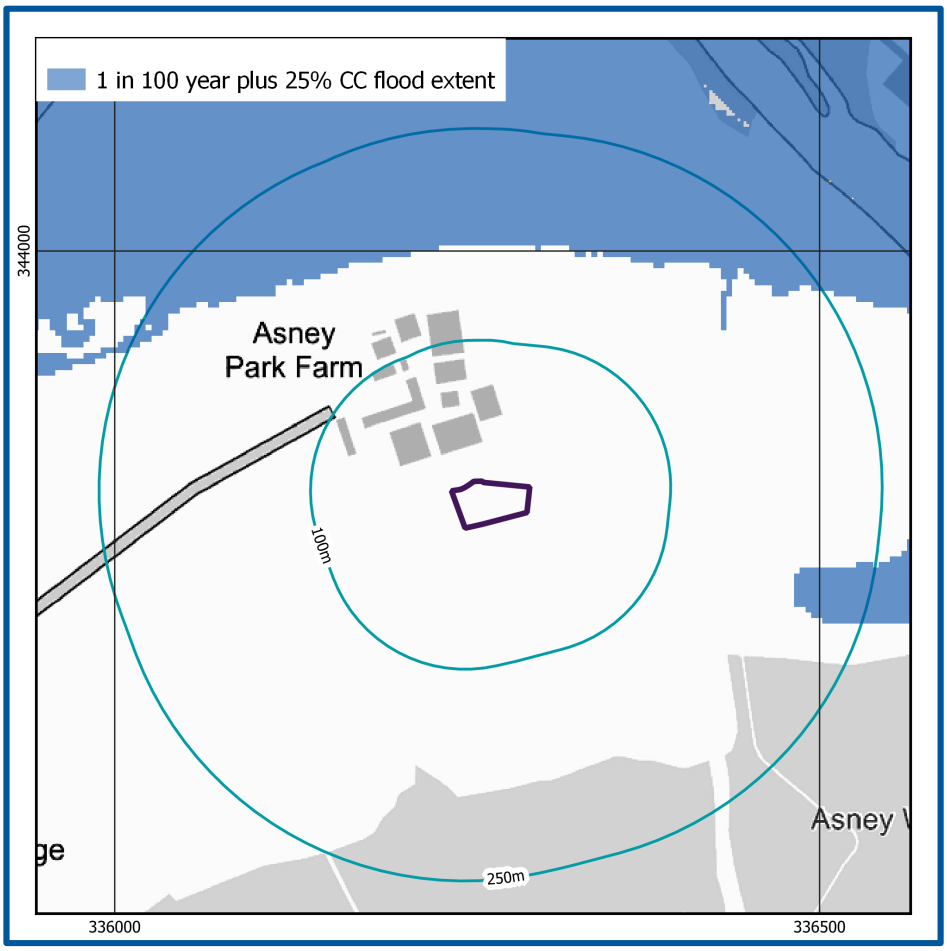
In accordance with the Welsh Governments Climate change allowances for planning purposes, (2021), allowances should be made for increased sea levels to proposed development, where applicable.

As the Site is located within the Dee River Basin and the proposed development is classed as Less Vulnerable, where the proposed lifespan is approximately 25 years, the Central (15%) allowance has been used to determine a suitable climate change factor to apply to river data.

A flood model scenario with a 15% allowance for climate change was not included in the Bangor on Dee flood modelling study, however, given the Site is not affected in the 1 in 100 year plus 25% climate change event, further assessment is not considered necessary.

The modelled flood extent of the 1 in 100 year plus 25% climate change allowance event is shown in Figure 16.

Figure 16. Bangor on Dee modelled future flooding scenarios



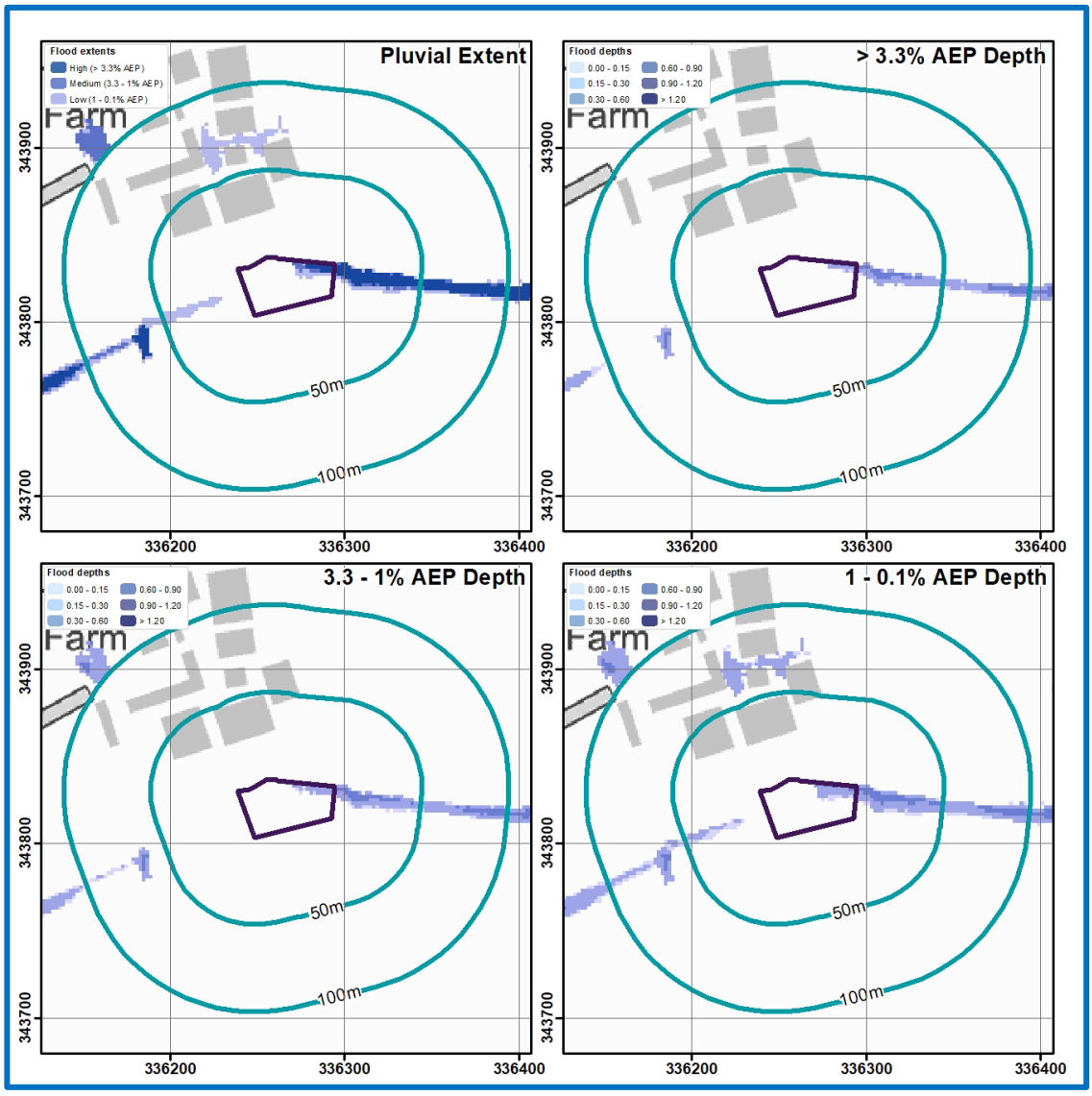
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Bangor on Dee flood modelling study JBA Consulting, 2012 and Binnies, 2021

Surface water (pluvial) flooding

Surface water flooding occurs when intense rainfall exceeds the infiltration capacity of the ground and overwhelms the drainage systems. It can occur in most locations even at higher elevations and at significant distances from river and tidal floodplains.

According to the National Flood Hazard Map's Flood Risk from Surface Water and Small Watercourses flood mapping (Figure 17), the Site has a Very Low to High risk of pluvial flooding.

Figure 17. NRW Surface water flood depth and extent (NRW, 2025)



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Guidance

According to NRW's surface water flood risk map the Site is at:

- Very Low risk - chance of flooding of less than 1 in 1000 (0.1%).
- Low risk - chance of flooding of between a 1 in 1000 & 1 in 100 (0.1% and 1%).
- Medium risk - chance of flooding of between a 1 in 100 and 1 in 30 (1% and 3.3%).
- High risk - chance of flooding of greater than 1 in 30 (3.3%)

- During the High risk event (>3.3% AEP), flooding of up to 0.31 m would impact the areas along the north-eastern Site boundary. It should be noted that whilst flooding is modelled on-Site, based on the proposed layout, this is unlikely to impact the area for development.
- During the Medium risk event (3.3 - 1% AEP) and Low risk event (1 - 0.1% AEP) pluvial flooding of up to 0.32 m is modelled to impact the north-eastern boundary of the Site, with flooding extending into the north-eastern part of the Site, likely impacting the area proposed for development.

Based on the NRW pluvial modelling it is assumed that an unmapped drainage ditch is likely present along the northern Site boundary, extending to the east, into the adjacent field. LiDAR elevation mapping indicates that the depth of this feature is c. 0.25m, resulting in the elevated flood risk within this area.

Analysis of OS mapping, ground elevation data and the NRW's pluvial flood mapping indicates the Site is not located on a potential overland flow route.

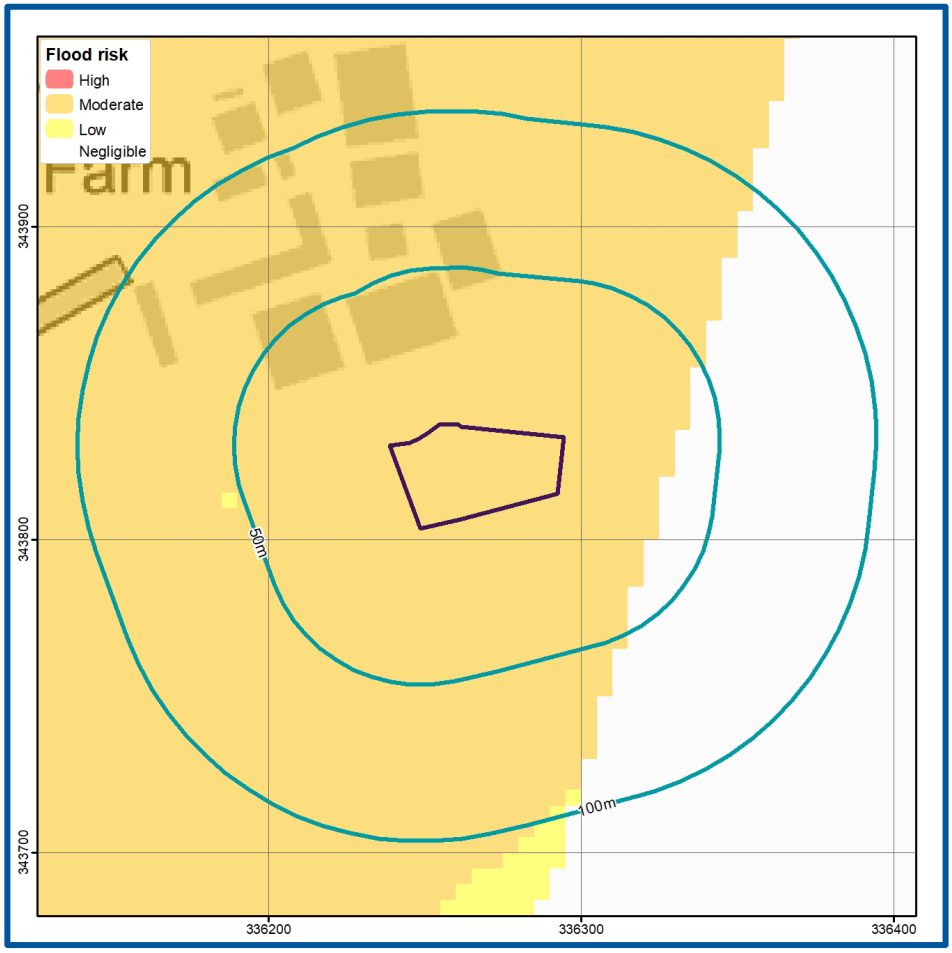
Climate change may lead to an increase in rainfall intensity which affects river levels, land and urban drainage systems. Rainfall intensity for small and urban catchments may increase from 5 to 20% (central estimate) or 10 to 40% (upper estimate) over the period to 2115 (NRW, 2021).

Groundwater flooding

Groundwater flooding occurs when sub-surface water emerges from the ground at the surface or into Made Ground and structures. This may be as a result of persistent rainfall that recharges aquifers until they are full; or may be as a result of high river levels, or tides, driving water through near-surface deposits. Flooding may last a long time compared to surface water flooding, from weeks to months. Hence the amount of damage that is caused to property may be substantially higher.

Groundwater Flood Risk screening data (Figure 18) indicates that there is a Moderate risk of groundwater flooding at surface in the vicinity from permeable bedrock and superficial deposits during a 1 in 100 year event.

Figure 18. GeoSmart GW5 Groundwater Flood Risk Map (GeoSmart, 2025)



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Mapped classes within the screening map combine likelihood, possible severity and the uncertainty associated with predicting the subsurface system. The map is a national scale screening tool to prompt site-specific assessment where the impact of groundwater flooding would have significant adverse consequences. Mapping limitations and a number of local factors may reduce groundwater flood risk to land and property even where it lies within

mapped groundwater flood risk zones, which do not mean that groundwater floods will occur across the whole of the risk area.

A site-specific assessment has been undertaken to refine the groundwater risk screening information on the basis of site-specific datasets (see Section 3) including BGS borehole data, and the NRW's fluvial and tidal floodplain data (where available) to develop a conceptual groundwater model. The risk rating is refined further using the vulnerability of receptors including occupants and the existing and proposed Site layout, including the presence of basements and buried infrastructure. The presence of any nearby or on-Site surface water features such as drainage ditches, which could intercept groundwater have also been considered.

The flood risks are higher for buried infrastructure and soakaway systems which may be affected by high groundwater levels.

- According to a review of the hydrogeology (Section 3), the Site is underlain by permeable superficial deposits above permeable bedrock. Groundwater levels may rise in the bedrock and superficial aquifers in a seasonal response to prolonged rainfall recharge which may cause an unusually high peak in groundwater levels during some years.
- Groundwater levels may also rise in the bedrock and superficial aquifers in response to high river events due to the potential hydraulic continuity with the nearby River Dee.
- Despite the presence of underlying aquifers the Site would only be at risk of groundwater flooding if the water table reaches the base of the Site development or the ground surface when groundwater seepage could lead to overland flow and ponding. The surrounding topography suggests that groundwater seepage is more likely to occur within the unmapped drainage ditch (situated along the north-eastern Site boundary) and other areas of lower-lying ground.
- There are no nearby BGS boreholes from which the underlying groundwater depth can be inferred.
- A potential spring line has been identified approximately 40 m east of the Site (at the contact between the Salop formation and the Kinnerton Sandstone), which could give rise to groundwater seepage.

The hydrogeological characteristics suggest there is potential for a groundwater table beneath the Site. Given that the proposed development does not involve any significant subsurface excavation, and the slurry silo will be located above ground level the risk is deemed to be Low.

Guidance
Low Risk - There will be a remote possibility that incidence of groundwater flooding could lead to damage to property or harm to other sensitive receptors at, or near, this location.

Climate change predictions suggest an increase in the frequency and intensity of extremes in groundwater levels. The impact of climate change on groundwater levels beneath the Site is linked to the predicted risk in river levels and also the variation in rainfall recharge which is uncertain.

- Rainfall recharge patterns will vary regionally resulting in changes to average groundwater levels.
- A rise in peak river levels will lead to a response of increased groundwater levels in adjacent aquifers subject to the predicted climate change increases in peak river level for the local catchment.

Flooding from artificial sources

Artificial sources of flood risk include waterbodies or watercourses that have been amended by means of human intervention rather than natural processes. Examples include reservoirs (and associated water supply infrastructure), docks, sewers and canals. The flooding mechanism associated with flood risk from artificial sources is primarily related to breach or failure of structures (reservoir, lake, sewer, canal, flood storage areas, etc.).

Sewer flooding

An SFCA is not available for the Wrexham Council area. Therefore, no information regarding flooding events from sewers is available for the Site.

However, given the remote location of the Site, within a predominantly agricultural setting, the risk of flooding from surcharging sewers is likely to be Very Low.

Guidance
Properties classified as “at risk” are those that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system either once or twice in the ten year reference period. Records held by the sewage utility company provide information relating to reported incidents, the absence of any records does not mean that the Site is not at risk of flooding.

Canal failure

According to Ordnance Survey (OS) mapping, there are no canals within 500 m of the Site.

Water supply infrastructure

Water supply infrastructure is comprised of a piped network to distribute water to private houses or industrial, commercial or institution establishments and other usage points. In urban areas, this represents a particular risk of flooding due to the large amount of water supply infrastructure, its condition and the density of buildings. The risks of flooding to properties from burst water mains cannot be readily assessed. However, given the remote location of the Site, within a predominantly agricultural setting, the risk of flooding from burst water mains is likely to be Very Low.

If more information regarding the condition and history of the water supply infrastructure within the vicinity of the Site is required, then it is advisable to contact the local water supplier (Hafren Dyfrdwy Water).

Culverts and bridges

The blockage of watercourses or structures by debris (that is, any material moved by a flowing stream including vegetation, sediment and man-made materials or refuse) reduces flow capacity and raises water levels, potentially increasing the risk of flooding. High water levels can cause saturation, seepage and percolation leading to failure of earth embankments or other structures. Debris accumulations can change flow patterns, leading to scour, sedimentation or structural failure.

Culverts and bridges have not been identified within 50 m of the Site.

Reservoir flooding

According to the NRW's Flood Risk from Reservoirs mapping the Site is at risk of flooding from reservoirs (Figure 19) (NRW, 2025).

Figure 19. NRW Flood Risk from Reservoirs Flooding (NRW, 2025)



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5. Flood risk from the development

Floodplain storage

Where flood storage from any source of flooding is to be lost as a result of development, on-site level-for-level compensatory storage, accounting for the predicted impacts of climate change over the lifetime of the development, should be provided. Where it is not possible to provide compensatory storage on site, it may be acceptable to provide it off-site if it is hydraulically and hydrologically linked.

The loss of floodplain storage is less likely to be a concern in areas benefitting from appropriate flood risk management infrastructure or where the source of flood risk is solely tidal.

The development is located within fluvial Flood Zone 2 and involves an increase in the built footprint but would not be impacted by the 1 in 100 year plus 25% climate change event. Therefore, there would be no displacement of flood water and compensatory flood storage is not required.

Whilst minor pluvial flooding is modelled to affect the development footprint, a compensatory storage area of approximately 80 m^2 has been included within the development plans to the east of the slurry silo. Based on the depth of flooding and the total area affected, an estimated 9.6 m^3 could be displaced as a result of the development during the Low risk pluvial flooding event. As such, assuming an average basal depth of 0.15 m can be achieved across the identified area, sufficient compensatory storage will be achieved.

The flood storage area proposed should be maintained to ensure this is not blocked for the perpetuity of the development and designed such to be freely draining once flooding recedes.

Drainage and run-off

The potential surface water run-off generated from the Site during a 1 in 100 year return period should be calculated, using FEH 2022 rainfall data from the online Flood Estimation Handbook (FEH), developed by NERC (2009) and CEH (2016).

The PPW (2024) recommends the effects of climate change are incorporated into FRA's and the recently updated climate change guidance (published in 2016 and updated in 2021) confirms the requirements for inclusion within FRA's.

As the proposed development lifespan is approximately 25 years, the lifespan of the development and requirements for climate change should allow up to the 2050s scenario.

Table 4. Climate change rainfall allowances

Dee river basin district	Total potential change anticipated by the 2020s	Total potential change anticipated by the 2050s	Total potential change anticipated by the 2080s
Upper end	10%	20%	40%
Central	5%	10%	20%

A separate assessment of surface water runoff may be required, as the Statutory requirements in Wales are to include a SuDS strategy, where development proposals are greater than 100m^2 in size. This is to ensure surface water runoff is managed in accordance with the Welsh Statutory requirements over the lifetime of the proposed development.

6. Suitability of the proposed development

The information below outlines the suitability of proposed development in relation to national and local planning policy.

National policy and guidance

The aims of the national planning policies TAN15 (2004) and PPW (2024) are achieved through application of the Justification Test and by assessing Flood Consequences. The key requirements of these are outlined below:

Guidance
Justification Test: New developments should be directed away from Zone C and towards suitable land in Zone A, or Zone B where river or coastal flooding will be less of an issue. In Zone C the tests outlined in sections 6 and 7 of TAN15 will be applied, recognizing, however, that highly vulnerable development and Emergency Services in Zone C2 should not be permitted. All other new development should only be permitted within Zones C1 and C2 if determined by the planning authority to be justified in that location. Assessing Flood Consequences: If a development proposal in Zone C1 or in C2, and if it is defined as being of low vulnerability, it would meet the test outlines in section 6. However, it should be noted that those developments would be more likely to flood and appropriate mitigation would need to be planned accordingly. This section applies to Zone C, and those parts of Zone B where flooding has been identified as a material consideration to allow for localised problems. Assessing whether a development should proceed or not will depend upon whether the consequences of flooding of that development can be managed and reduced to a level which is acceptable for the nature/type of proposed development, including its effects on existing development.

The proposed Site use is agricultural and is classified as "Less Vulnerable" development. The Site is located within DAM Zone B.

Table 5. Flood risk vulnerability and flood zone compatibility (taken from TAN15, 2004)

DAM Zone	Development Type	Planning Requirements	Acceptability Criteria	Development Advice
A	Emergency Services, highly vulnerable development, less vulnerable	• Justification test not applicable • Refer to surface water requirements	No increase in flooding elsewhere	No constraints relating to river or coastal flooding, other than to avoid

	development, other			increasing risk elsewhere
B	Emergency services & Highly vulnerable development	• 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 • Refer to surface water requirements	• Acceptable consequences for nature of use • Occupiers aware of flood risk • Escape/Evacuation routes present • Effective flood warning provided • Flood emergency plans and procedures • Flood resistant design • No increase in flooding elsewhere	Generally suitable for most forms of development. Assessments where required, are unlikely to identify consequences that cannot be overcome or managed to an acceptable level. It is unlikely, therefore, that these would result in a refusal of planning consent on the grounds of flooding.
	Less vulnerable development		• Occupiers aware of flood risk • No increase in flooding elsewhere	
	Other	Refer to surface water requirements	No increase in flooding elsewhere	
C1	Emergency services, highly vulnerable development, less vulnerable development	• Application of justification test including acceptability of consequences • Refer to surface water requirements	• Acceptable consequences for nature of use • Flood defences adequate • Agreement for construction and maintenance costs secured • Occupiers aware of flood risk • Escape/evacuation routes present • Effective flood warning provided • Flood emergency plans and procedures • Flood resistant design • No increase in flooding elsewhere	Plan allocations and applications for all development can only proceed subject to justification in accordance to section 6 of TAN 15 and acceptability of consequences in accordance to section 7 and Appendix 1 of TAN 15
	Other	• Application of acceptability of consequences	• Acceptable consequences for nature of use	Plan allocations and applications for development

		(TAN 15 section 7 and Appendix 1) • Refer to surface water requirements	• Occupiers aware of flood risk • Desirable if effective flood warning and evacuation routes/procedure provided depending on nature of proposal • No increase in flooding elsewhere	should only be made if considered acceptable in accordance with section 7 and Appendix 1 of TAN 15
C2	Emergency services, highly vulnerable development	The flooding consequences associated with Emergency Services and highly vulnerable developments are not considered to be acceptable. Plan allocations should not be made for such developments and planning applications not proposed		
	Less vulnerable development	• Application of justification test (section 6 of TAN 15), including acceptability of consequences (section 7 and Appendix 1 of TAN 15) • Refer to surface water requirements	• Acceptable consequences for nature of use • Flood defences adequate • Agreement for construction and maintenance costs secured • Occupiers aware of flood risk • Escape/evacuation routes present • Effective flood warning provided • Flood emergency plans and procedures	Plan allocations or applications for less vulnerable development can only proceed subject to justification in accordance with section 6 of TAN 15 and acceptability of consequences in accordance with section 7 and Appendix 1 of TAN 15
	Other	• Application of acceptability of consequences (section 7 and Appendix 1 of TAN 15) • Refer to surface water requirements	• Flood resistant design • No increase in flooding elsewhere • Acceptable consequences for nature of use • Occupiers aware of flood risk • Effective flood warning provided • No increase in flooding elsewhere	Plan allocations and applications for development should only be made if considered acceptable in accordance with section 7 and Appendix 1 of TAN 15.

As the Site is categorised as Less Vulnerable in DAM Zone B there is no requirement to undertake the Justification Criteria (TAN 15, 2004).

Environment Agency Flood Risk Standing Advice for Sites located in Flood Zones 2 or 3[1]

For all relevant vulnerable developments (i.e. more vulnerable, less vulnerable and water compatible), advice on the points should be followed:

- Surface water management;
- Access and evacuation; and
- Floor levels.

Surface water management

Plans for the management of surface water need to meet the requirements set out in either the local authority's:

- Surface water management plan where available; OR
- Strategic flood consequence assessment.

They also need to meet the requirements of the approved building regulations Part H: drainage and water disposal. Read section H3 rainwater drainage.

Planning permission is required to use a material that can't absorb water (e.g. impermeable concrete) in a front garden larger than 5 square metres.

Access and evacuation

Details of emergency escape plans should be provided for any parts of a building that are below the estimated flood level:

Plans should show:

- Single storey buildings or ground floors that don't have access to higher floors can access a space above the estimated flood level, e.g. higher ground nearby;
- Basement rooms have clear internal access to an upper level, e.g. a staircase; and
- Occupants can leave the building if there's a flood and there's enough time for them to leave after flood warnings.

Floor levels

The following should be provided:

- Average ground level of the building; and
- Finished floor level of the lowest habitable room in the building.

Finished floor levels should be a minimum of whichever is higher of 300mm above the:

[1] Please note in the absence of NRW FRSA the EA guidance (2022) has been used in lieu providing a clear framework for Flood Risk assessment and mitigation strategies and deemed sufficiently applicable

- average ground level of the site
- adjacent road level to the building
- estimated river or sea flood level

Ground floor levels should be a minimum of whichever is higher of:

- 300 millimeters (mm) above the general ground level of the site; OR
- At least 600 mm above the estimated river or sea flood level.

7. Resilience and mitigation

Based on the flood risk identified at the Site, the national and local policies and guidance and proposed development, the mitigation measures outlined within this section of the report are likely to help protect the development from flooding.

Sea (coastal/tidal) flood mitigation measures

As the proposed development is not identified as being at risk of flooding from tidal sources, mitigation measures are not required.

Rivers (fluvial) flood mitigation measures

As the proposed development is not identified as being at risk of flooding from fluvial sources (see Table 6), mitigation measures are not required.

Table 6. NRW Modelled flood levels compared to ground levels in the area proposed for development

Ground levels at the Site (mAOD)	Modelled Flood Levels (mAOD)		
	1 in 100 year	1 in 100 year plus 25% CC allowance	1 in 1000 year
21.28 to 21.93	N/A	N/A	N/A
Flood depth (m)	No flooding anticipated		

Surface water (pluvial) flood mitigation measures

A Very Low to High surface water (pluvial) flooding risk has been identified at the Site. In order to ensure the development includes sufficient flood mitigation measures to reduce the risk of pluvial flooding over its lifetime, the flood depths, levels and appropriate mitigation measures have been assessed.

The slurry store should be appropriately sealed / impermeable to prevent water ingress and also the release of any stored material for flood depths of up to 0.32 m. Slurry store covers may be considered to prevent the incurrence of rainwater.

The regular maintenance of any drains and culverts surrounding/on the Site under the riparian ownership of the developer should be undertaken.

Groundwater flood mitigation measures

The hydrogeological characteristics suggest there is potential for a shallow groundwater table beneath the Site which could potentially reach ground surface under certain conditions. Given that the proposed development does not involve any significant subsurface excavation, and the slurry silo will be located above ground level the risk is deemed to be Low.

It is likely the flood mitigation measures recommended for the surface water (pluvial) flood risk will reduce the groundwater flood risk at the development.

Reservoir flood mitigation measures

The Site is not a risk of flooding from reservoirs; therefore, mitigation measures are not required.

Other flood risk mitigation measures

As the Site is not identified as at risk from other sources, mitigation measures are not required.

Residual flood risk mitigation measures

The risk to the Site has been assessed from all sources of flooding and appropriate mitigation and management measures proposed to keep the users of the development safe over its lifetime. There is however a residual risk of flooding associated with the potential for failure of mitigation measures if regular maintenance and upkeep isn't undertaken. If mitigation measures are not implemented or maintained, the risk to the development will remain as the baseline risk.

Further flood mitigation information

More information on flood resistance, resilience and water entry can be found here: http://www.planningportal.gov.uk/uploads/br/flood_performance.pdf

www.knowyourfloodrisk.co.uk

Emergency evacuation - safe access / egress and safe refuge

Emergency evacuation to land outside of the floodplain should be provided if feasible. Where this is not possible, 'Less Vulnerable' developments and, where possible, development in general (including basements), should have internal stair access to an area of safe refuge within the building to a level higher than the maximum likely water level. An area of safe refuge should be sufficient in size for all potential users and be reasonably accessible to the emergency services.

Emergency evacuation from the development and the Site should only be undertaken in strict accordance with any evacuation plans produced for the Site, with an understanding of the flood risks at the Site including available mitigation, the vulnerability of occupants and preferred evacuation routes.

Flood warnings

NRW operates a flood warning service in all areas at risk of flooding; this is available on their website: https://www.gov.uk/check-flood-risk. The Site is not located within a NRW Flood Alert or Flood Warning area (Figure 20).

Figure 20. NRW Flood Warning Coverage for the local area (NRW, 2025).



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Emergency evacuation

Where possible, a safe access and egress route with a 'very low' hazard rating from areas within the floodplain to an area wholly outside the 1 in 100 year flood event including an allowance for climate change should be demonstrated.

It is advised that evacuation from the premises would be the preferred option in a flood event if safe to do so. It is recommended that occupants prepare to evacuate as soon as an NRW Flood Warning is issued in order to completely avoid flood waters.

8. Conclusions and recommendations

Table 7. Risk ratings following Site analysis

Source of Flood Risk	Baseline[1]	After analysis[2]	After Mitigation[3]
River (fluvial) flooding	Very Low		N/A*
Sea (coastal/tidal) flooding	Very Low		N/A
Surface water (pluvial) flooding	Very Low to High	Very Low to Medium	Very Low to Low
Groundwater flooding	Moderate	Low	Negligible
Other flood risk factors present	Yes (reservoirs)		N/A
Is any other further work recommended?	Yes (see below)		

1 BASELINE risks assigned for the whole Site, using national risk maps, including the benefit of NRW flood defences.

2 AFTER ANALYSIS modification of risk assessment based on detailed site specific analysis including some or all of the following: flood model data, high resolution mapping, building location, access routes, topographic and CCTV surveys.

3 AFTER MITIGATION risks include risks to the proposed development / asset and occupants if mitigation measures recommended in this report are implemented, including the impacts of climate change.

*N/A indicates where mitigation is not required.

The table below provides a summary of where the responses to key questions are discussed in this report. Providing the recommended mitigation measures are put in place it is likely that flood risk to this Site will be reduced to an acceptable level.

Less vulnerable developments in a DAM Zone C1 are acceptable according to TAN15 (2004) and providing the recommended mitigation measures are put in place (see previous sections) it is likely that flood risk to this Site will be reduced to an acceptable level.

Table 8. Summary of responses to key questions in the report

Key sources of flood risks identified	Pluvial and groundwater (see Section 4).
Are standard mitigation measures likely to provide protection from flooding to/from the Site?	Yes (see Section 7).
Is any further work recommended?	Yes (see executive summary and Section 7).

9. References and glossary

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GeoSmart Information

Glossary

General terms

BGS	British Geological Survey
NRW	National Resource Wales
GeoSmart groundwater flood risk model	GeoSmart's national groundwater flood risk model takes advantage of all the available data and provides a preliminary indication of groundwater flood risk on a 50m grid covering England and Wales. The model indicates the risk of the water table coming within 1 m of the ground surface for an indicative 1 in 100 year return period scenario.
Dry-Island	An area considered at low risk of flooding (e.g. In a Flood Zone 1) that is entirely surrounded by areas at higher risk of flooding (e.g. Flood Zone 2 and 3)
Flood resilience	Flood resilience or wet-proofing accepts that water will enter the building, but through careful design will minimise damage and allow the re-occupancy of the building quickly. Mitigation measures that reduce the damage to a property caused by flooding can include water entry strategies, raising electrical sockets off the floor, hard flooring.
Flood resistance	Flood resistance, or dry-proofing, stops water entering a building. Mitigation measures that prevent or reduce the likelihood of water entering a property can include raising flood levels or installation of sandbags.
Flood Zone 1	This zone has less than a 0.1% annual probability of river flooding
Flood Zone 2	This zone has between 0.1 and 1% annual probability of river flooding and between 0.1% and 0.5 % annual probability sea flooding
Flood Zone 3	This zone has more than a 1% annual probability of river flooding and 0.5% annual probability of sea flooding
Functional Flood Plain	An area of land where water has to flow or be stored in times of flood.
Hydrologic model	A computer model that simulates surface run-off or fluvial flow. The typical accuracy of hydrologic models such as this is ±0.25m for estimating flood levels at particular locations.
OS	Ordnance Survey
Residual Flood Risk	The flood risk remaining after taking mitigating actions.

SFCA	Strategic Flood Consequence Assessment. This is a brief flood risk assessment provided by the local council
SuDS	A Sustainable drainage system (SuDS) is designed to replicate, as closely as possible, the natural drainage from the Site (before development) to ensure that the flood risk downstream of the Site does not increase as a result of the land being developed. SuDS also significantly improve the quality of water leaving the Site and can also improve the amenity and biodiversity that a Site has to offer. There are a range of SuDS options available to provide effective surface water management that intercept and store excess run-off. Sites over 1 Ha will usually require a sustainable drainage assessment if planning permission is required. The current proposal is that from April 2014 for more than a single dwelling the drainage system will require approval from the SuDS Approval Board (SABs).

Aquifer Types

Principal aquifer	These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.
Secondary A aquifer	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
Secondary B aquifer	Predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.
Secondary undifferentiated	Has been assigned in cases where it has not been possible to attribute either category A or B to a rock type due to the variable characteristics of the rock type.
Unproductive Strata	These are rock layers or drift deposits with low permeability that has negligible significance for water supply or river base flow.

Data Sources

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Bedrock & Superficial Geology	Contains British Geological Survey materials © NERC 2025

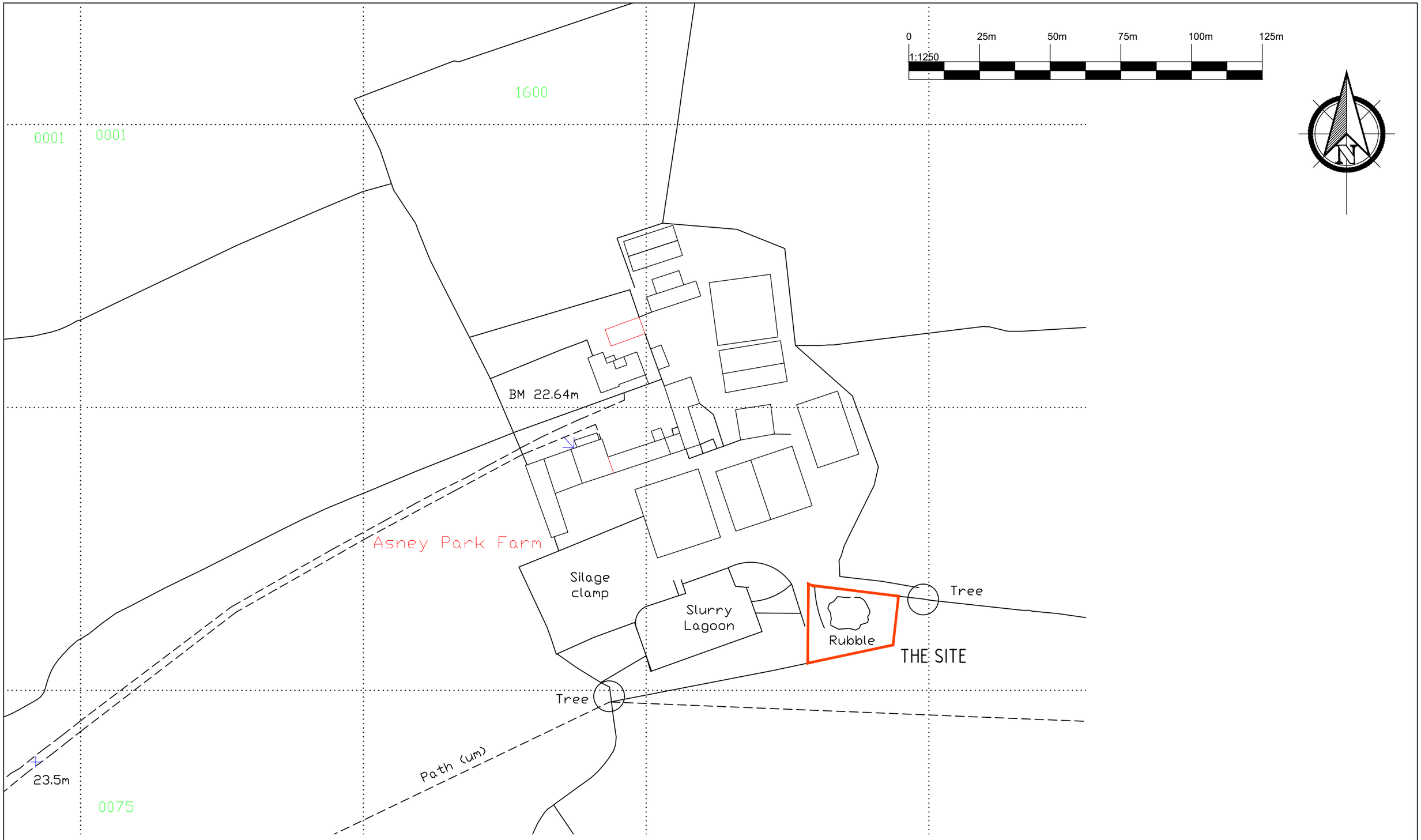
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Flood Risk (Flood Zone/RoFRS/Historic Flooding/Pluvial/Surface Water Features/Reservoir/ Flood Alert & Warning)	Natural Resource Wales copyright and database rights 2025 Ordnance Survey data © Crown copyright and database right 2025
Flood Risk (Groundwater)	GeoSmart, BGS & OS GW5 (v2.4) Map (GeoSmart, 2025) Contains British Geological Survey materials © NERC 2025 Ordnance Survey data © Crown copyright and database right 2025
Location Plan	Contains Ordnance Survey data © Crown copyright and database right 2025
Topographic Data	OS LiDAR/NRW Contains Ordnance Survey data © Crown copyright and database right 2025 Natural Resource Wales copyright and database rights 2025

10. Appendices

GeoSmart Information

Appendix A

Site plans



PROJECT

Proposed Agricultural SLURRY TOWER and associated works @
Asney Park Farm, Erbistock, Wrexham, LL13 0DS
for Mr M Lone

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BRIAN LEWIS
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Chartered Institute of Architectural Technologists

DWG. TITLE:
BLOCK PLAN AS EXISTING

DWG No:	REV:	SCALE:	DATE:
24 - 001	-	1 / 1250 @ A3	10/24

0 25m 50m 75m 100m 125m

1:1250

N

Bird Bowls

Bat Box

Bird Bowls

BM 22.64m

@

#

@

GL 10.000

Asney Park Farm

Proposed Slurry Silo

Existing Tree

Existing Hedge

Silage clamp

SLURRY L 10.300

Slurry Lagoon

GL 10.250
+ SL 10.350

$

Bird Box

Existing Stock Fence

GL 10.200

Public Footpath

Bird Box

$

Existing Tree

Public Footpath

PROJECT

Proposed Agricultural SLURRY TOWER and associated works @
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for Mr N Lone

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DWG. TITLE:
BLOCK PLAN AS PROPOSED

DWG No:	REV:	SCALE:	DATE:
24 - 002	-	1 / 1250 @ A3	11/24

0 50m 100m 150m 200m 250m
1:2500

A528

Eytonhall Wood
Pond
Path (um)

38.7m

Nant Dingle

Nant-y-Lladron
Erbistock Mews
Nant House
39.3m
Nant-y-Lladron Barn
Nant-y-Lladron Cottages

FB

River Dee (Afon Dyfrdwy)

Path (um)

Cattle Grid
BM 24.22m
Asney Cottage
23.8m

Asney Cottage
25.6m

BM 22.64m
Asney Park Farm
Silage clamp
Slurry Lagoon
Rubble
Tree
Tree

SJ3643 2188

23.5m
0075
Path (um)
Path (um)
1165
0060
0060
Pond

Brook

Charles' End
0047
Charles' End
0047
Well
8842

Maes Slencyn
2643

N

PROJECT
Proposed Agricultural SLURRY TOWER and associated works @
Asney Park Farm, Erbistock, Wrexham, LL13 0DS
for Mr N Lloyd

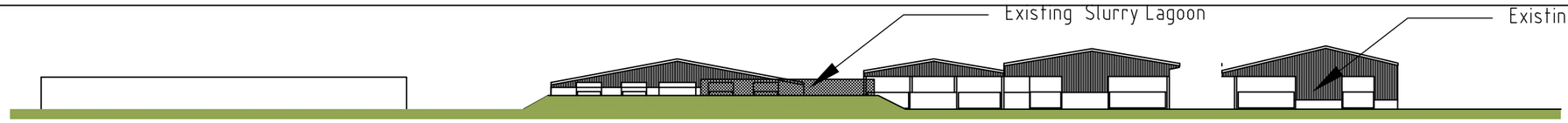
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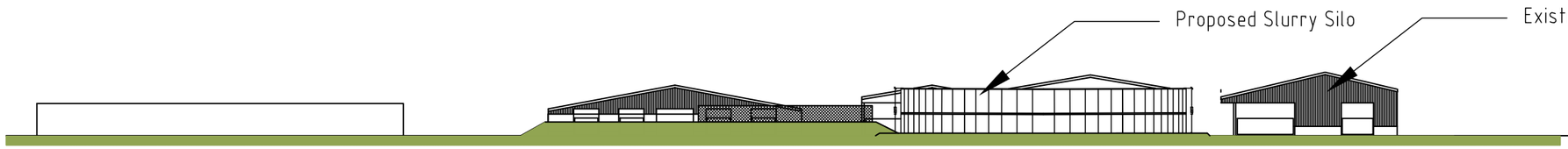
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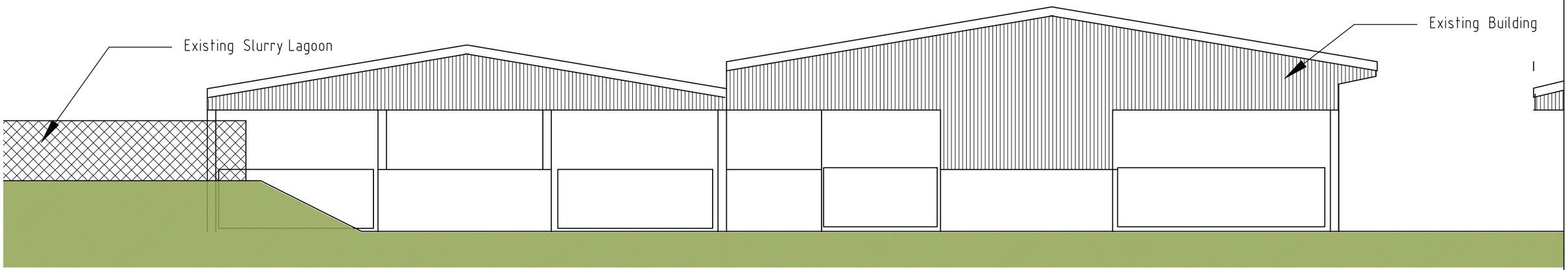
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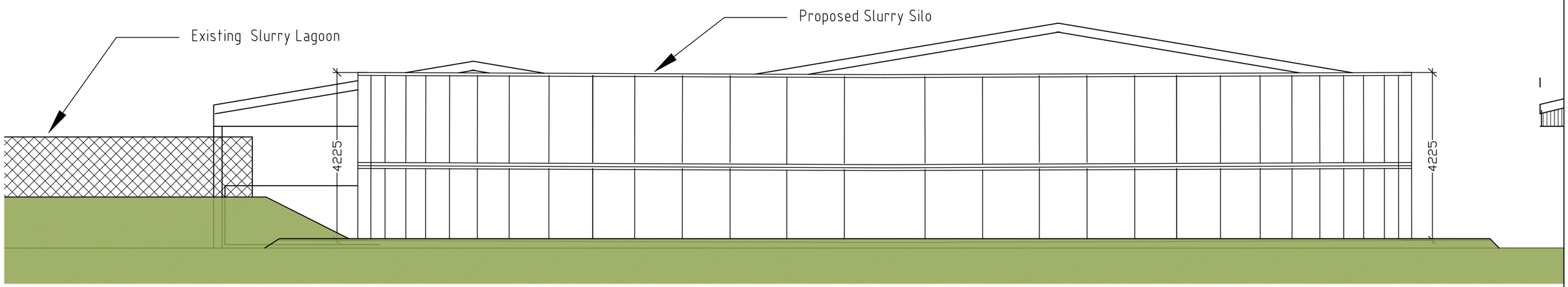
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LOCATION PLANS AS EXISTING

DWG No:	REV:	SCALE:	DATE:
24 - 003	-	1 / 2500 @ A3	11/24









0 50m 100m 150m 200m 250m

1:2500

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for Mr M Lone

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DWG. TITLE:
LOCATION PLANS AS EXISTING

DWG No:	REV:	SCALE:	DATE:
24 - 004	-	1 / 100/500 @ A3	11/24

Pipe work to pump slurry into Silo

Permastore 92 15 Slurrystore
1 ring extendable Colour: Blue
Capacity: 2634 cu Metres with
a minimum 300mm freeboard.

Extended concrete base 900mm
beyond tank walls

R13250
13250

Existing Slurry Lagoon

PROPOSED SLURRY SILO

Base and erection to BS5502 part 50
ode of Practice for Design Construction
and Use of Storage Tanks and Reception
Pits for livestock Slurry and BS8007 Code
of Practice for design of structures for
retaining aqueous liquids.

New new flood storage
excavation to accommodated
volume of displaced flood
water, see FCA

New Trees

New Trees

Proposed Slurry Silo Channel

New hedge

Existing fence

SEE DRAWING 002 FOR BIRD AND BAT BOXES

ALL LEVELS AND DIMENSIONS TO BE
CHECKED ON SITE PRIOR TO COMMENCEMENT
OF WORKS AND SHALL BE AGREED WITH CLIENT

0 50m 100m 150m 200m 250m
1:2500

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PROJECT
Proposed Agricultural SLURRY TOWER and associated works @
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for DM Jones

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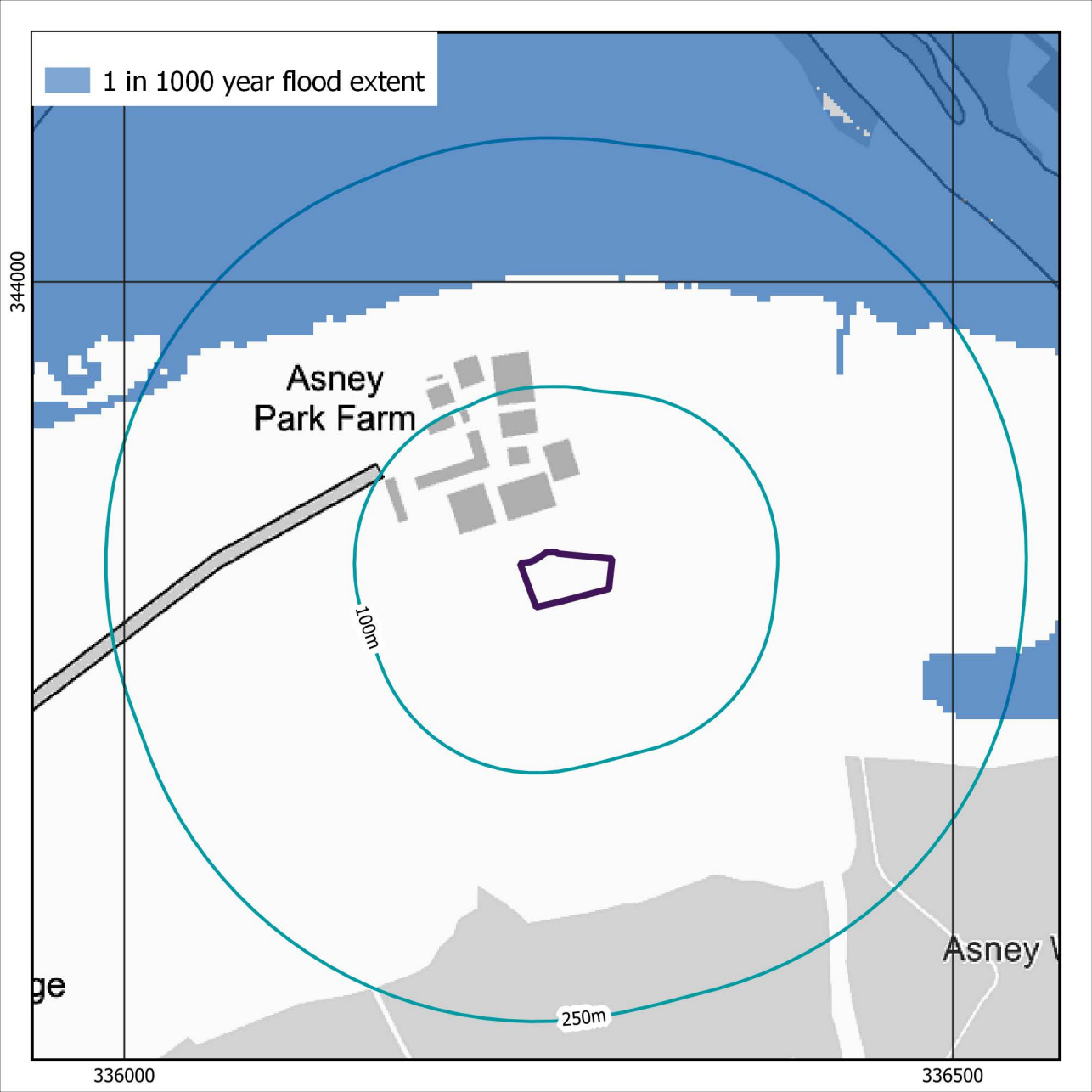
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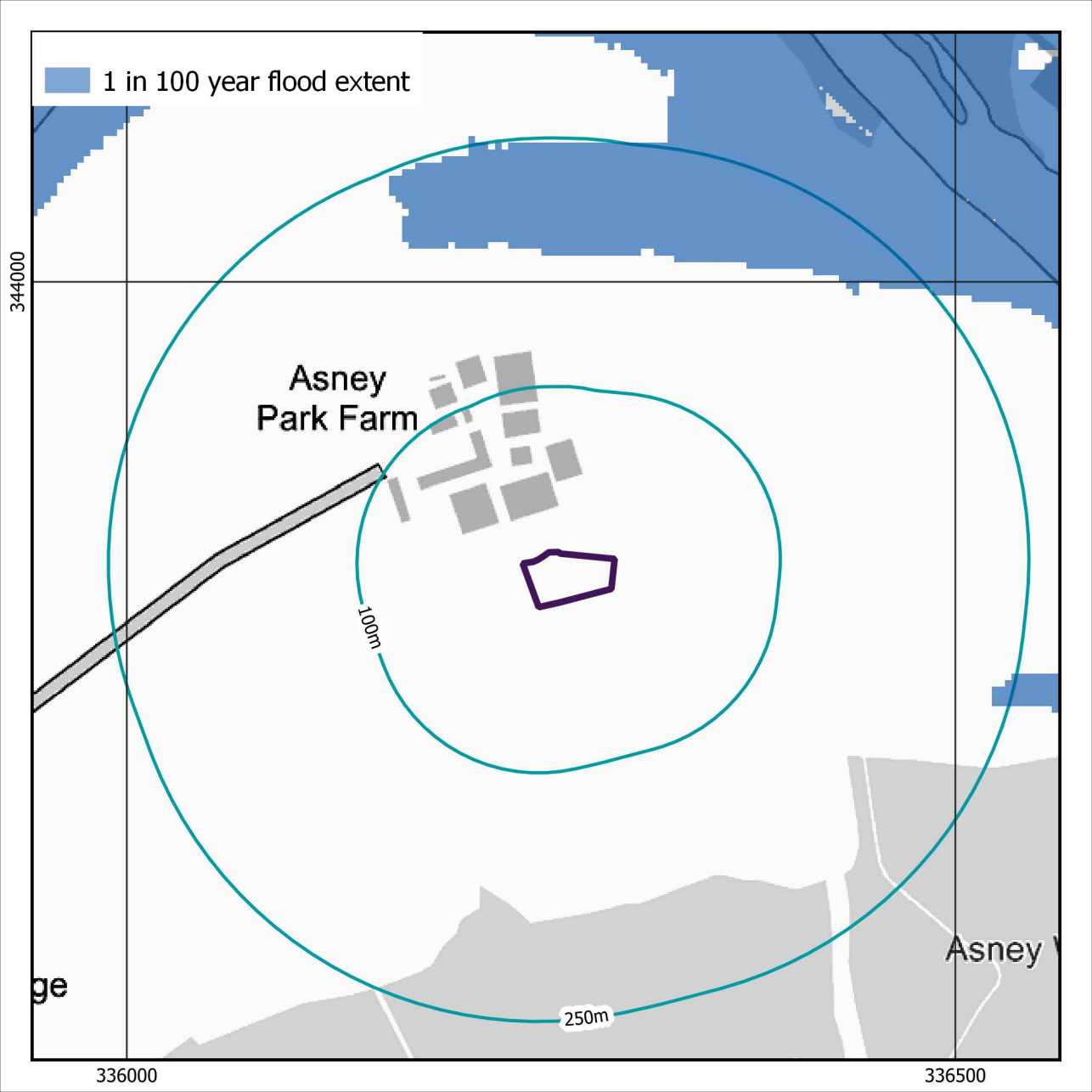
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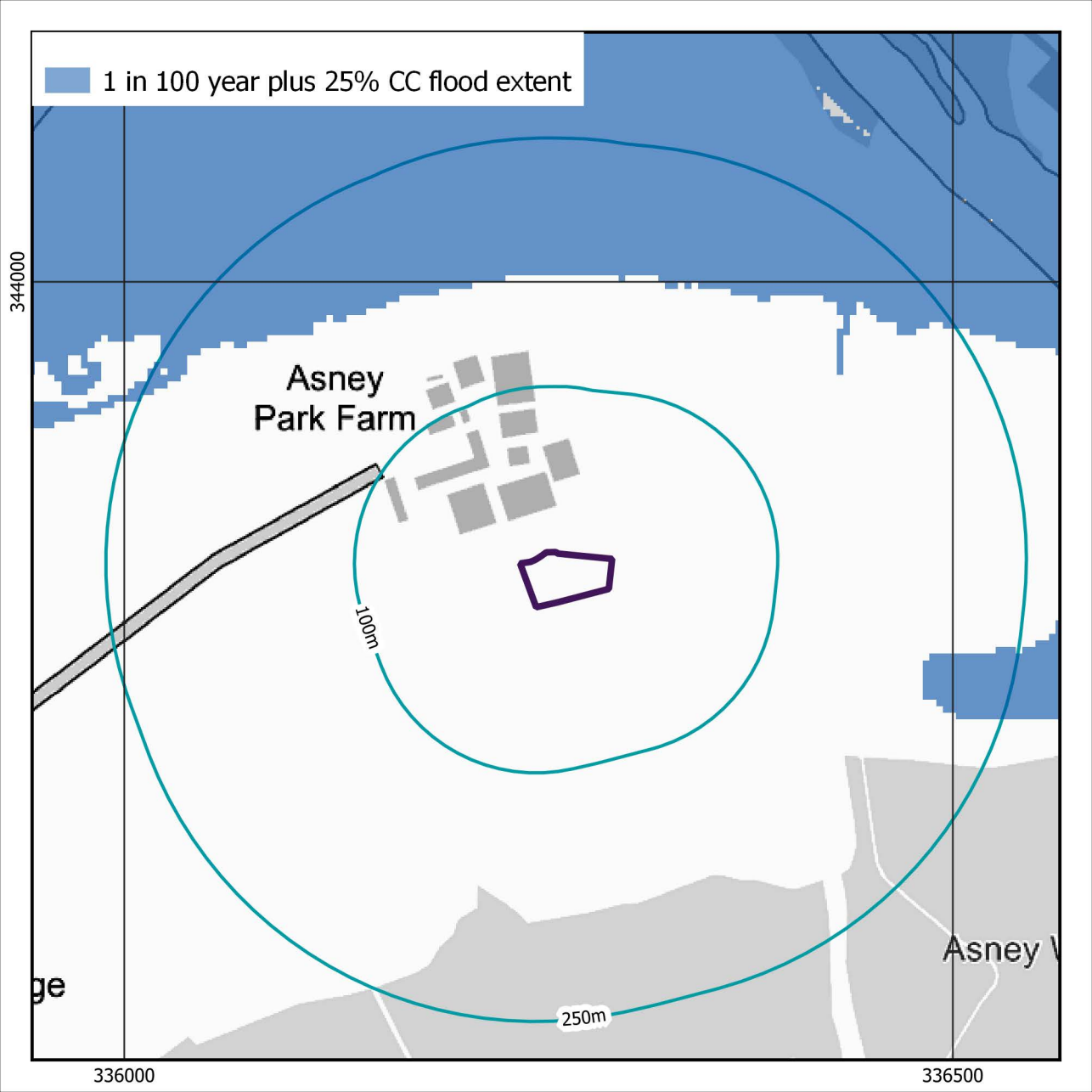
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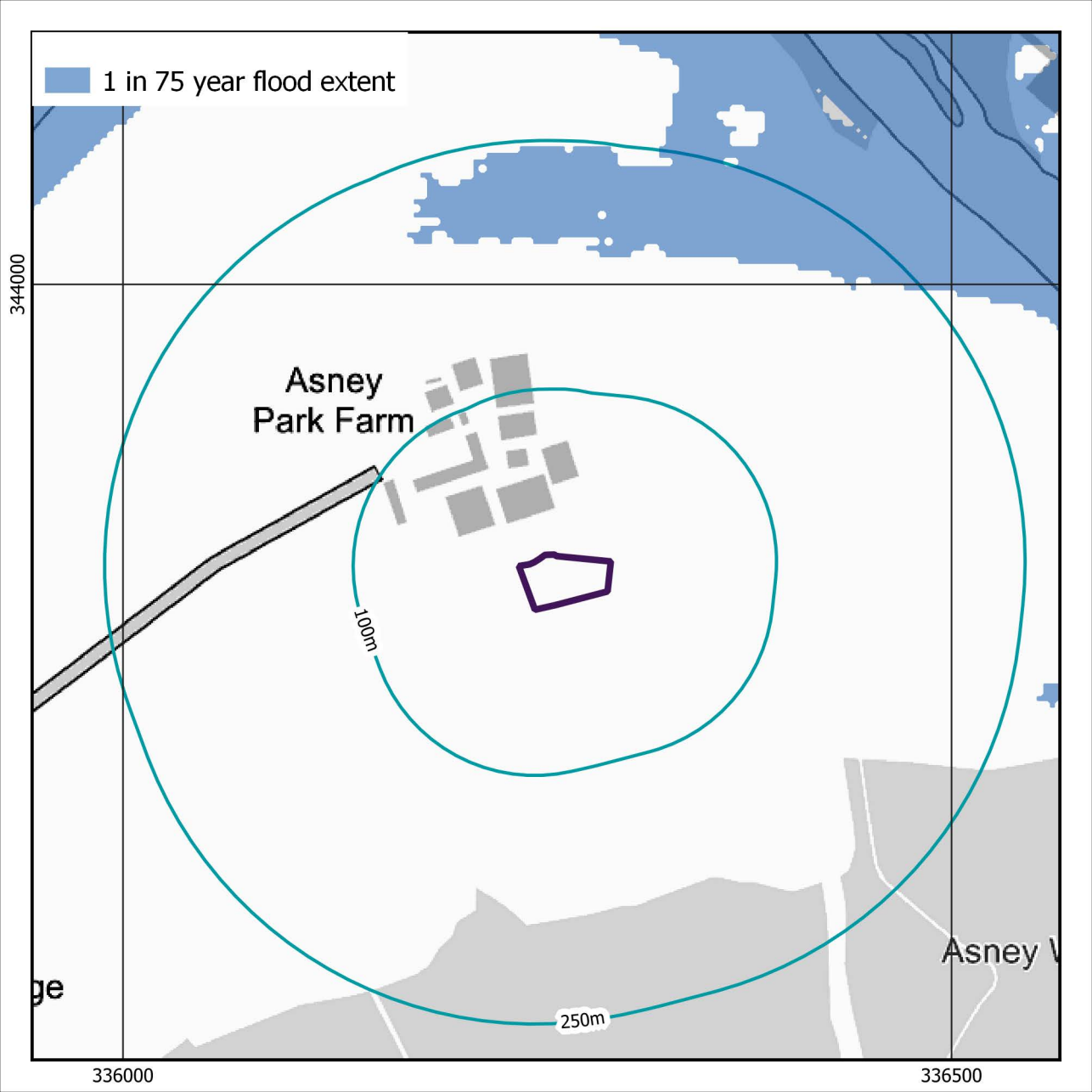
Appendix B

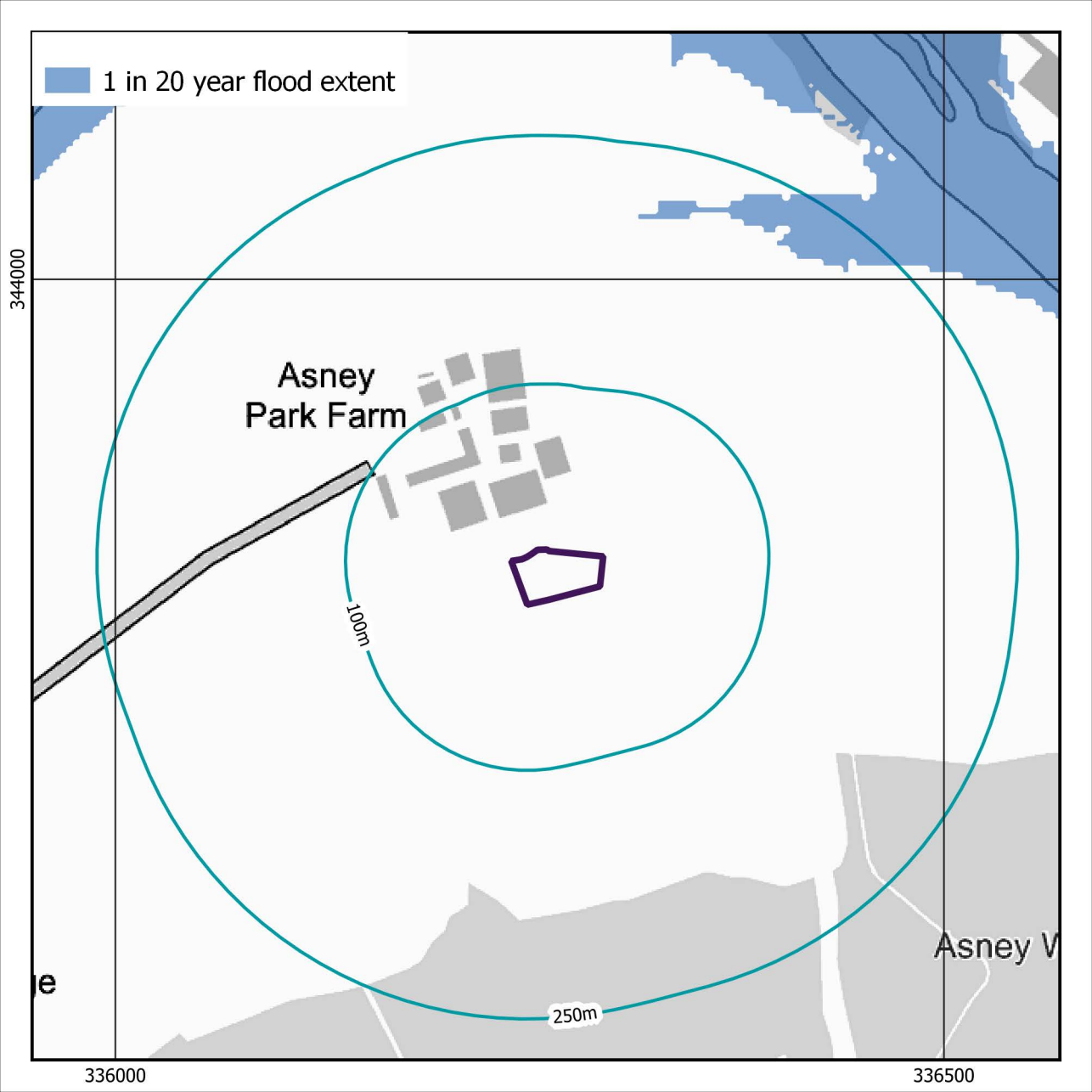
Natural Resource Wales data


1 in 1000 year flood extent
344000
Asney
Park Farm
100m
250m
336000
336500


1 in 100 year flood extent
344000
Asney
Park Farm
100m
250m
336000
336500


1 in 100 year plus 25% CC flood extent
344000
Asney
Park Farm
100m
250m
Asney
ge
336000
336500


1 in 75 year flood extent
344000
Asney
Park Farm
100m
250m
336000
336500


1 in 20 year flood extent
344000
Asney
Park Farm
100m
250m
Asney V
336000
336500

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GeoSmart Information

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43-55 Milford Street

Salisbury

Wiltshire SP1 2BP

Tel: 01722 333306

Fax: 01722 332296

Email: admin@tpos.co.uk

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- Keep you informed by letter, telephone or e-mail, as you prefer, if we need more time.
- Provide a final response, in writing, at the latest within 40 working days of receipt.
- Liaise, at your request, with anyone acting formally on your behalf.

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Martin Lucass

Commercial Director

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martinlucass@geosmartinfo.co.uk

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