GeoSmart Information

# FloodSmart Plus

## Flood Consequence Assessment

### Site Address

Land at Llyndir Lane
Rossett
Wrexham
LL12 0DH

### Grid Reference

336906, 357867

### Report Prepared for

Mr J Berry

### Date

23/05/2025

### Report Status

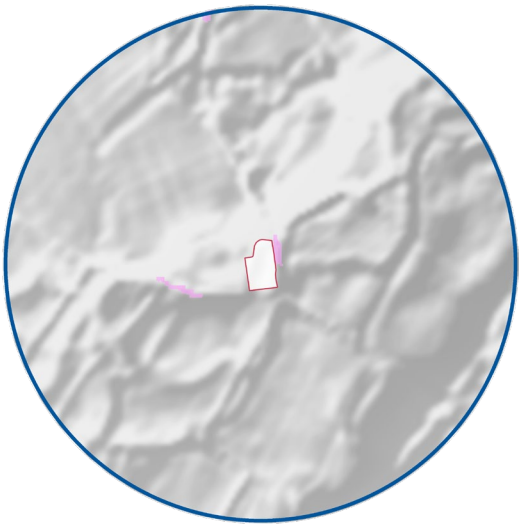
FINAL

### Site Area

1760 $m^2$

### Report Reference

85344R1



## RISK – Very Low to Moderate

The Site is mapped within the NRW's Flood Zone 2 (Medium probability). A Site-specific analysis of flood model data confirms a Very Low risk of flooding associated with the Afon Alun and Lavister Brook.

Surface water (pluvial) flood risks are Very Low. Groundwater flood risks are Low to Moderate and flooding risks from artificial sources (i.e. canals, reservoirs and sewers) are Negligible.

Mitigation measures are recommended in this report to reduce the risks to an acceptable level over the lifetime of the development.


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# 1. Executive summary

The Planning Policy Wales (PPW) 12th edition (2024) and Technical Advice Note 15 (TAN 15) (2025) 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.

## Site analysis

| Source of Flood Risk | Baseline[1] | After analysis[2] | After Mitigation[3] |
|---|---|---|---|
| River (fluvial) flooding | Very Low to Low | Very Low | Very Low |
| Sea (coastal/tidal) flooding | Very Low | | N/A |
| Surface water (pluvial) flooding | Very Low | | Very Low |
| Groundwater flooding | Negligible to Moderate | Low to Moderate | Low |
| Other flood risk factors present | Yes (bridge blockage) | | |
| Is any other further work recommended? | Yes | | 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. Reasons for the change in classification are provided in the text.

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 as agricultural grazing land. Development proposals comprise the change of use of the land to provide a single-family gypsy/traveller pitch together with sewage treatment plant and vehicular access, gravelled hard standing, and turning area. This application is understood to be part retrospective. 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

No historic flooding events are known to have occurred at the Site.

According to NRW's Flood Map for Planning, the Site is located within fluvial Flood Zone 2.

The Site benefits from the presence of flood defences, c. 830 m to the south, designed to provide a 1 in 100 year event standard of protection. It should be noted whilst the Site would not be impacted in the 1 in 100-year undefended event, the defences provide a reduction in the overall flood volume (due to the raised crest levels) in the 1 in 1000-year event; without the impact of these defences, the Site would be anticipated to receive flooding in this event.

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

Baseline mapping indicates a Very Low to Low risk; however, a review of the flood model data and topographic data indicates the risk is likely to be lower.

Modelled flood data obtained from the NRW has been analysed in line with the most up to date guidance on climate change to confirm the flood levels at the Site:

- During a 1 in 100 year plus 20% climate change allowance 'design' flood event the Site would remain flood free, with the nearest extent of flooding mapped over 500 m from the Site boundary.
- During a 1 in 1000 year plus 20% climate change allowance event the flood level at the Site would be 11.83 mAOD.
    - During this event, flood depths on-Site would be up to 0.07 m, localised entirely within a minor topographic low in the north east of the Site. Given that this pocket of flooding is disconnected from any other extent in this event, it is possible that this flooding is an anomaly within the mapping.
    - No flooding is modelled across the area proposed for development in this event.

The Site could potentially be at risk from flooding due to blockage of the Chester Road Bridge located on the Afon Alun c. 1.05 km from the Site:

- In a worst-case, 1 in 100 year plus 20% climate change plus 80% blockage of Chester Road Bridge scenario, flood depths of up to 0.46 could impact the Site, with typical depths of between 0 and 0.20 m in the area proposed for development.
- It should be noted, however, that the significant capacity of the bridge's span across the watercourse would render such an event extremely unlikely.

Emergency evacuation routes are available to the north.

## Surface water (pluvial) flooding

According to NRW's Flood Risk Assessment Wales (FRAW) mapping, the Site has a Very Low risk of flooding from surface water and small watercourses, with surface water anticipated to be confined within the course of the nearby drainage ditches and Lavister Brook in each modelled flood event.

## Groundwater flooding

Groundwater Flood Risk screening data indicates there is a variable potential risk of groundwater flooding at the surface in the vicinity of the Site during a 1 in 100 year event, ranging from Negligible to Moderate. This flood risk is associated with variable permeability superficial deposits overlying a permeable bedrock aquifer.

Baseline mapping indicates a Negligible to Moderate risk; however, a review of the local topography, borehole data, and Site plans indicates the risk is likely to be Low to Moderate.

## Artificial sources of flooding

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

- The EA's Risk of Flooding from Reservoir map confirms the Site is not at risk of reservoir flooding. The potential for a breach of a reservoir to occur and flooding affecting the Site is Negligible.
- Ordnance Survey (OS) data confirms there are no canals near to the Site.
- Whilst no SFCA is readily available for the Wrexham council area to confirm historic sewer flood incidents in the vicinity of the Site, it is understood that no public surface water, combined, or foul water sewers are present within the vicinity of the Site; as such, the risk of flooding from sewers would also be Negligible.

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

The risk to the development has been assessed over its expected 100 year lifetime, including appropriate allowances for the impacts of climate change which could increase the flood risk to the Site. Risks identified include increases in river flooding and appropriate mitigation measures are proposed where required.

Recommendations for flood mitigation are provided below, based upon the flood risk identified at the Site and TAN15 (2025) requirements for residential 'Highly Vulnerable' development:

- *Highly Vulnerable / Less Vulnerable development must be flood free in the 1 in 100-year fluvial event and 1 in 200-year tidal event, including an allowance for climate change.*
    - GeoSmart Comment: Analysis of the Site does demonstrate that the development would be flood free during a 1 in 100-year fluvial event and a 1 in 200-year tidal event with an appropriate allowance for climate change.
- *During an extreme 0.1% flood event including an allowance for climate change, flood depths should not exceed 600 mm at the Site. The maximum permitted velocity of flood*

*waters is 0.15 m/s for Highly Vulnerable development and 0.3 m/s for Less Vulnerable development.*

- GeoSmart Comment: Analysis of the Site demonstrates that, during a 1 in 1000 year plus 20% climate change fluvial event, the maximum flood depth at the Site would be 0.07 m, which reflects a minor isolated pocket in the north east (c. 1% of Site area) and may be an error within the modelling. The area proposed for development is modelled as remaining flood free in this event.

# Recommendations

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

- The proposed development is outside of the modelled flood extents for each present-day and future climate change fluvial scenario. As such, no specific mitigation for fluvial flooding is considered to be required for the development. However, given the residual risk of flooding associated with the worst-case blockage of Chester Road Bridge, it may be prudent to ensure that the static caravan and dayroom thresholds are at least 200 mm above surrounding ground levels. It is noted that this flood event is considered extremely unlikely to occur.
- As there is a risk of flooding from groundwater sources at the surface, thresholds should be raised above surrounding ground levels as described above, and ground levels should slope away from buildings. The risk to buried infrastructure should be considered along with water proofing of ground floor areas where feasible, standard flood resilient design and non-return valves on drainage systems.
- Occupants of the Site should also be signed up to receive NRW Flood Alerts.
- The ongoing management and maintenance of existing and any proposed drainage networks, under the riparian ownership of the developer, should be undertaken in perpetuity with the development.
- A Sustainable Drainage Strategy (SuDS) should be developed for the Site, for effective management of surface water runoff over the lifetime of the proposed 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 (2025) 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 (Flood Zone 3) 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 is 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 | 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 | 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.

# Local policy and guidance

## *Wrexham Unitary Development Plan (Wrexham Council, 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.

## *Strategic Flood Consequence Assessment:*

No Strategic Flood Consequence Assessment has been identified for the Wrexham Council area.

### Guidance

Strategic Flood Consequence Assessments are carried out by local authorities, in consultation with the Natural Resources Wales, to assess the flood risk to the area from all sources both now and in the future due to climate change. They are used to inform planning decisions to ensure inappropriate development is avoided (PPW, 2024).

# 3. Site analysis

## Site information

The Site is located between Broadoak and Rosset within a setting of agricultural land use at National Grid Reference SJ 36906 57867.

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

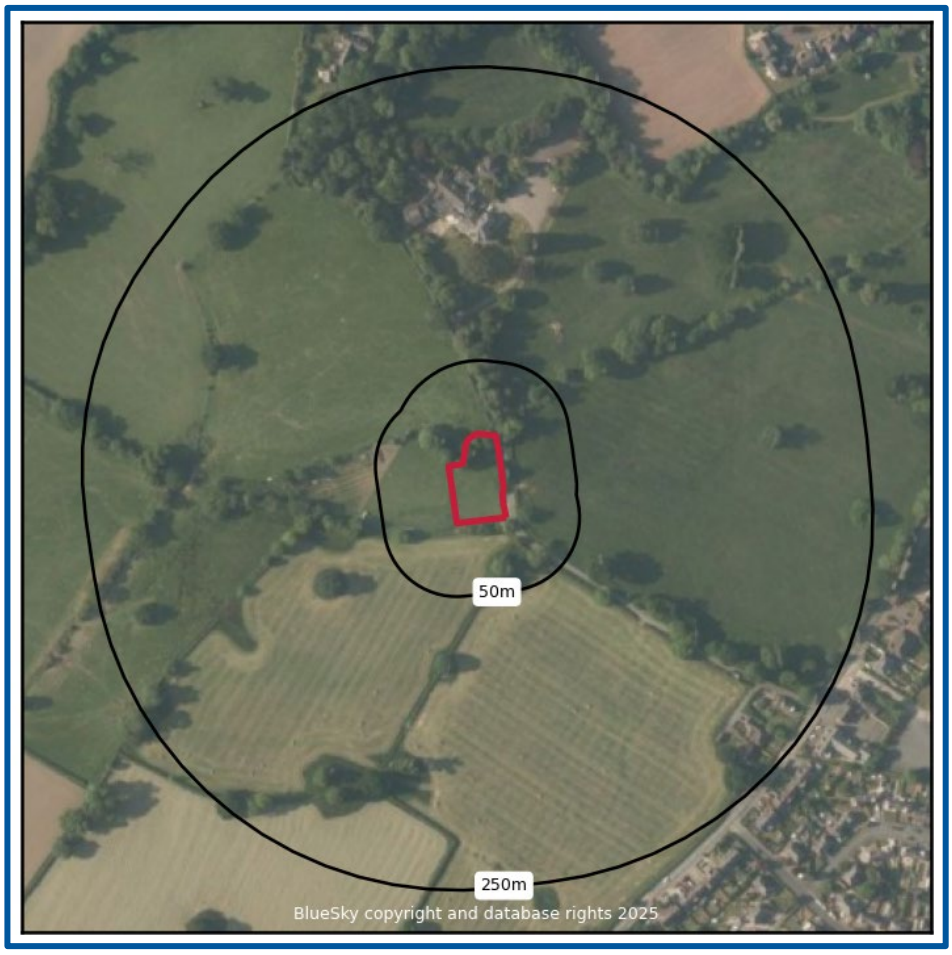
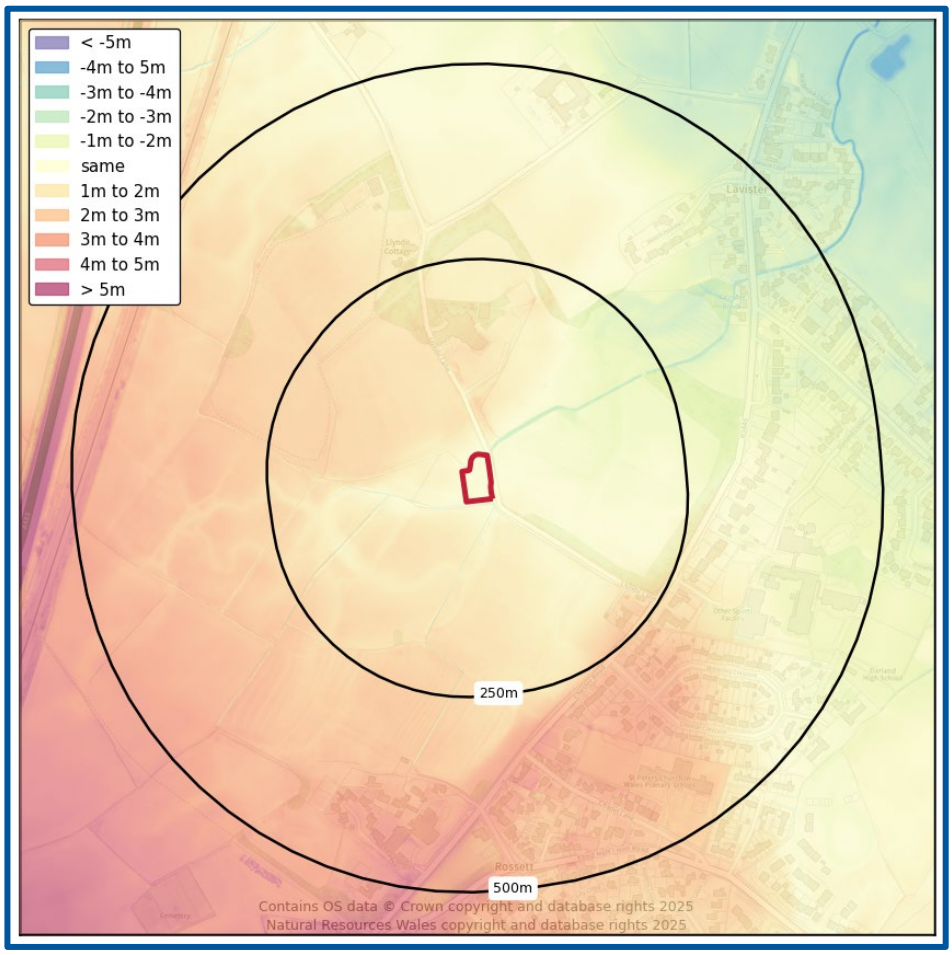



Figure 2 indicates ground levels within 500m of the Site typically fall in a north easterly direction.

The general ground levels on the Site are between 11.76 and 12.48 mAOD with the Site falling gradually in a north easterly direction. This is based upon a Site specific topographic survey undertaken by Trevor Mennell Planning in June 2024 (included within Appendix A).

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




# Development

The Site is currently used as agricultural grazing land. Development proposals comprise the change of use of the land to provide a single-family gypsy/traveller pitch together with sewage treatment plant and vehicular access, gravelled hard standing, and turning area. This application is understood to be part retrospective. Site plans are included within Appendix A.

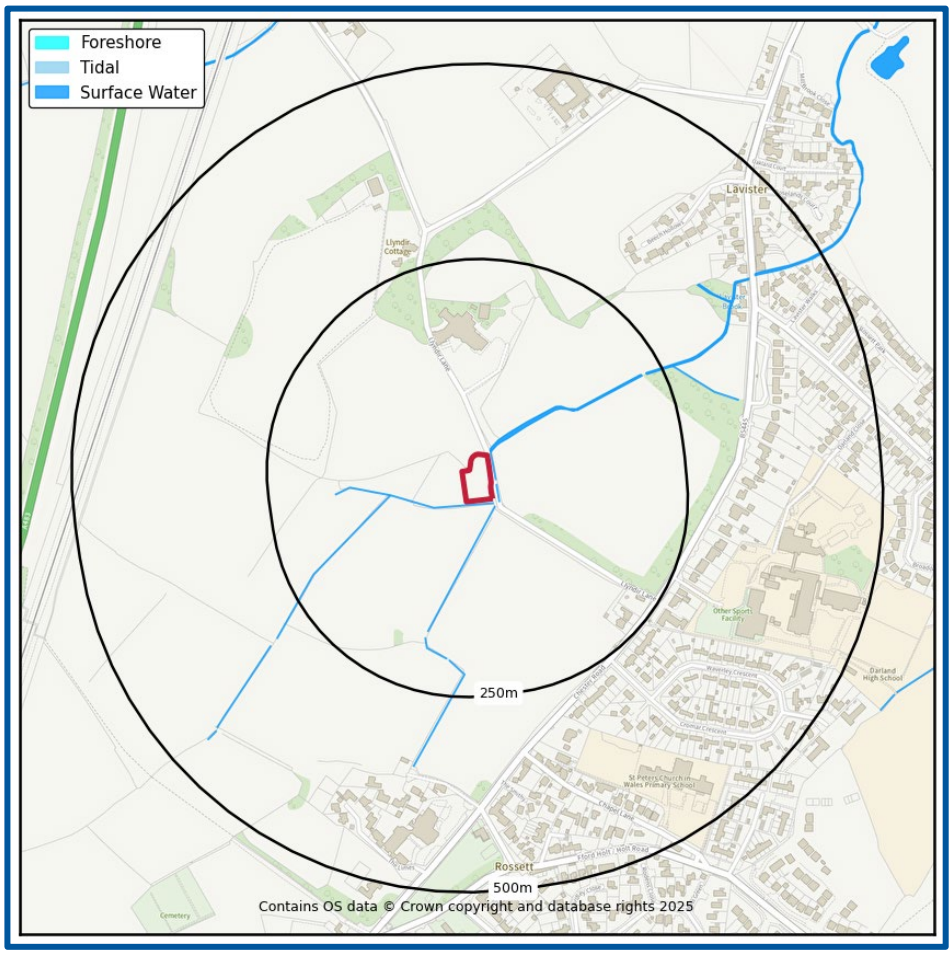
The effect of the overall development will result in an increase in number of occupants and/or users of the Site and will result in the change of use, nature or times of occupation. According to Figure 4 of TAN15 (2025), the vulnerability classification of the existing development is Water Compatible, and the proposed development is Highly Vulnerable. The estimated lifespan of the development is 100 years.

# Hydrological features

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

- The Lavister Brook flows eastwards adjacent to the southern boundary of the Site, and is culverted briefly beneath the highway of Llyndir Lane. The brook then flows northwards within c. 10 m of the eastern Site boundary and eventually flows north east towards Lavister. Several minor water features feed the brook within the vicinity of the Site:
    - The brook itself appears to originate from a spring c. 165 m west of the Site.
    - Two drainage ditches along the boundaries of the nearby fields drain into the brook, c. 95 m to the west and c. 10 m to the south east of the Site. The south eastern ditch appears to join with the brook within the culvert beneath Llyndir Lane.
- The Afon Alun (or River Alyn) flows eastwards c. 750 m south west of the Site at its closest point.

Figure 3. Surface water features (OS, 2025)



# Proximity to relevant infrastructure

Infrastructure has been identified within 500 m of the Site which could influence the risks of flooding throughout the lifespan of the proposed development, including:

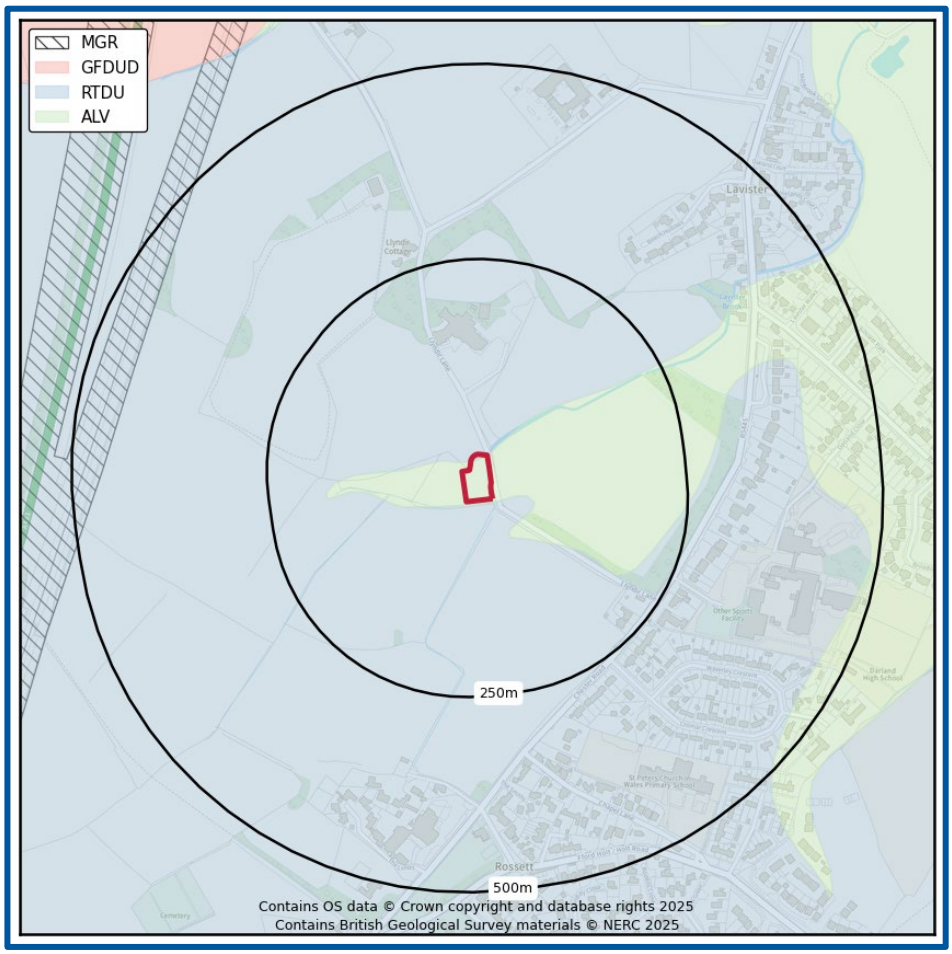
- Two culverts along the course of Lavister Brook within c. 10 m south east and east of the Site. The eastern culvert is associated with a small bridge across the brook to allow access to the neighbouring field.
- A sluice gate downstream along Lavister Brook c. 130 m north east of the Site.
- A major road bridge (Chester Road Bridge) spans across the Afon Alun c. 1.05 km south west of the Site.

# Hydrogeological features

British Geological Survey (BGS) mapping indicates that the Site is underlain by two superficial geologies (Figure 4):

- Alluvium (ALV) (clay, silt, sand, and gravel) underlies c. 95% of the Site area to the south and is classified as a Secondary (A) Aquifer (BGS, 2025).
- River Terrace Deposits (Undifferentiated) (RTDU) (sand and gravel) underlies c. 5% of the Site area along the northern boundary, and is classified as a Secondary (A) Aquifer (BGS, 2025).

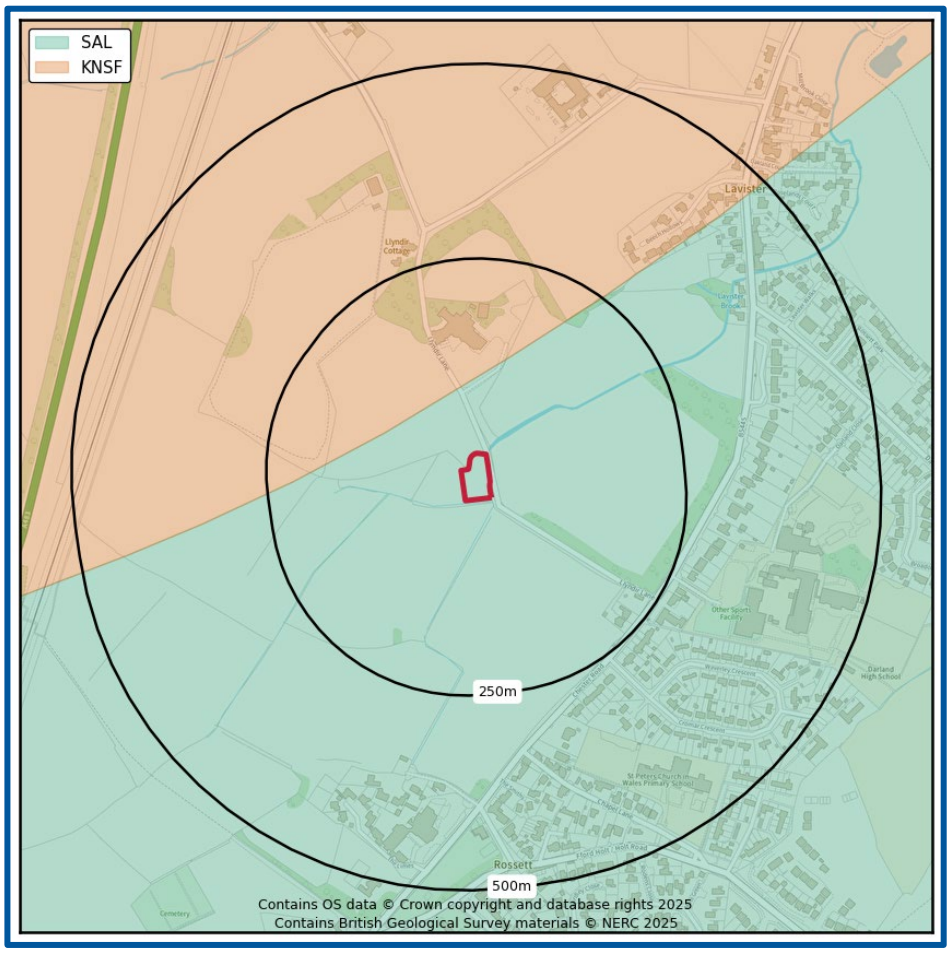
Figure 4. Superficial Geology (BGS, 2025)




BGS mapping indicates the underlying bedrock geology (Figure 5, overleaf) consists of the Salop Formation (SAL) (mudstone, sandstone, and conglomerate), which is classified as a Secondary (A) Aquifer (BGS, 2025).

A nearby mapped bedrock contact (c. 80 m north west at its closest point) comprises the Kinnerton Sandstone Formation (KNSF), which is classified as a Principal Aquifer (BGS, 2025).

Figure 5. Bedrock Geology (BGS, 2025)




## *Geological conditions*

A review of the BGS borehole database (BGS, 2025) indicates the nearest borehole to the Site (ref: SJ35NE148) is located c. 380 m to the south east of the Site boundary at an elevation of c. 11.43 mAOD, mapped within the surface extent of the RTDU deposits.

The nearest borehole mapped within the Alluvium deposits (ref: SJ35NE159) is located c. 550 m to the south east of the Site boundary at an elevation of c. 11.13 mAOD. Whilst this borehole is unlikely to be fully representative of the alluvial deposits at the Site itself (given the typical lateral variation in composition of the deposits as well as the significant distance from the Site), it has been included for completion.

Table 2 provides a summary of the stratigraphy identified within the corresponding BGS borehole records. It is noted that neither borehole appears to have encountered cohesive bedrock geologies; as such, the bedrock contact may be at a depth exceeding 4.50 m below ground level (bgl).

Table 2. Summary of BGS borehole information

| Strata encountered | BGS borehole SJ35NE148 | | BGS borehole SJ35NE159 | |
|---|---|---|---|---|
| | Depth to base of stratum (m bgl) | Strata composition | Depth to base of stratum (m bgl) | Strata composition |
| Topsoil | 0.3 | Topsoil | 0.30 | Topsoil |
| River Terrace Deposits (Undifferentiated) / Alluvium | 2.44 | Stiff light brown sandy stoney clay | 1.50 | Brown clayey sand and gravel |
| | | | 2.40 | Gravel |
| | | | >4.50 (base of borehole) | Stiff dark red/brown slightly stoney clay |
| (Presumed) Till, Devensian* | >6.10 (base of borehole) | Stiff dark brown boulder clay | - | - |

*The boulder clays encountered within SJ35NE148 are presumed to reflect strata comprising Till, Devensian ( (diamicton), which are anticipated to underlie the RTDU and ALV deposits in the area unconformably.

## *Groundwater*

The record for BGS borehole ref: SJ35NE148 confirms that groundwater was not encountered during the excavation of its 6.10 m depth on 17/10/1969. The record for BGS borehole ref: SJ35NE159, however, confirms that a groundwater strike occurred at a depth of 2.15 m bgl (c. 8.98 mAOD) on 07/03/1973, which rose to a maximum level of 1.85 m bgl (c. 9.28 mAOD), subject to seasonal variations.

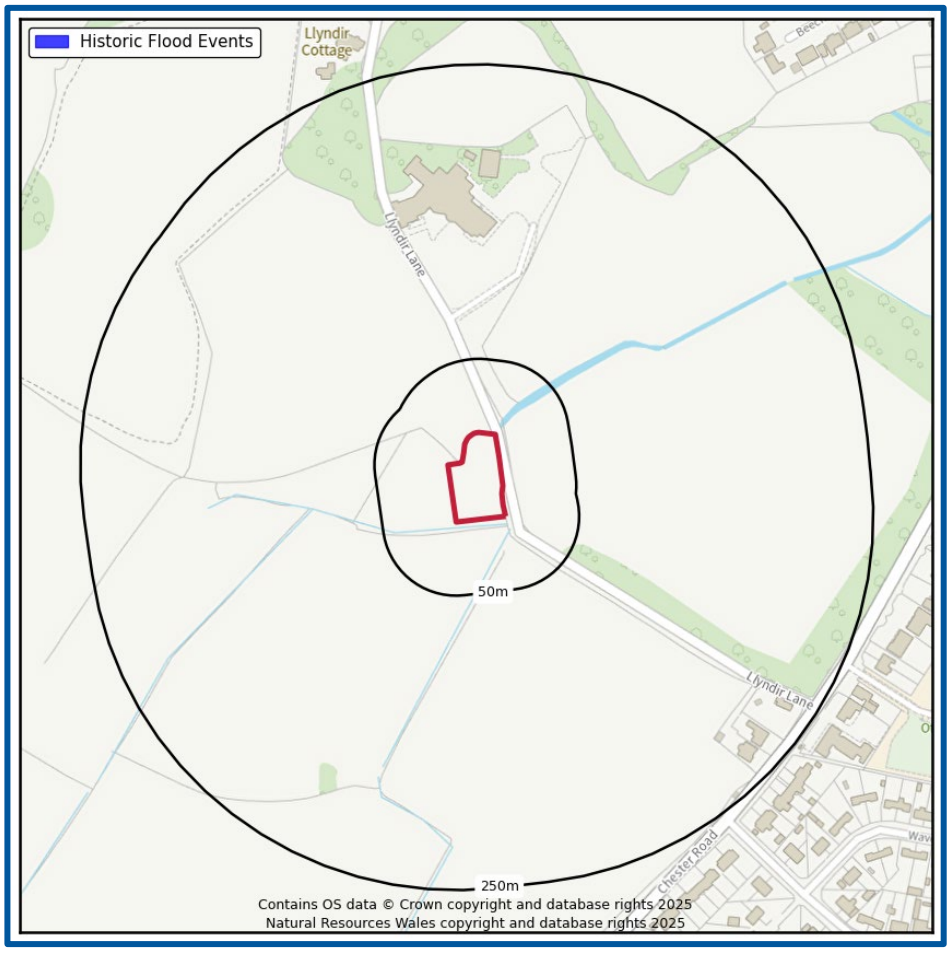
Based upon a comparison with minimum Site ground levels of 11.76 mAOD (according to topographic survey data), groundwater levels could be approximately 2.48m below the Site ground level but are subject to variation with the significant (>250 m) distance from the Site, especially due to the anticipated hydraulic continuity between the nearby watercourse and the groundwater system beneath the Site.

# 4. Flood risk to the development

## Historical flood events

According to the NRW's Recorded Flood Extents Map (Figure 6) as well as information provided through consultation between the LLFA and the NRW regarding the Site (Appendix B), no historic flood events have been recorded at the Site (NRW, 2025).

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




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.

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

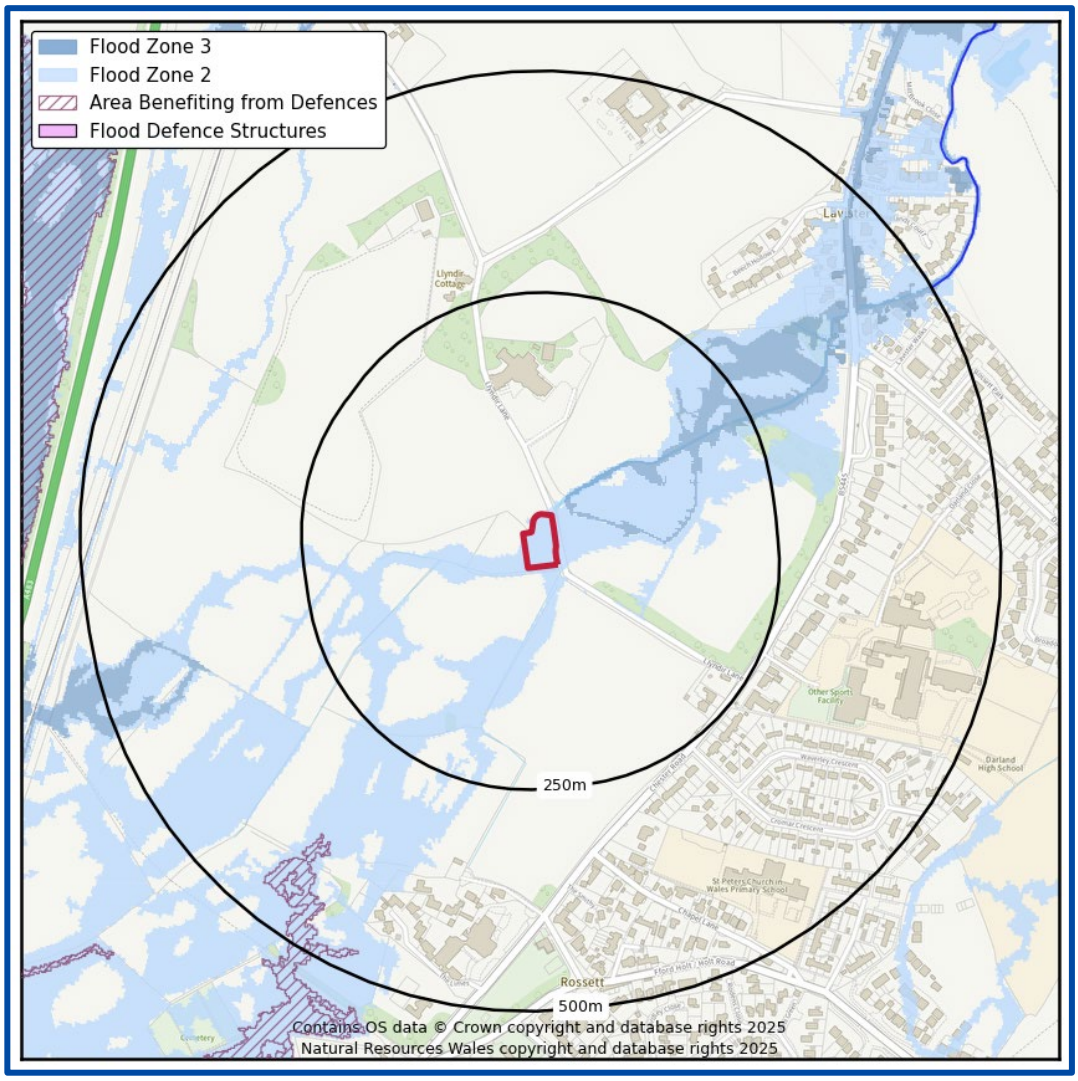
The predominant risk at the Site is from flooding from rivers, termed as fluvial flooding. The Site is located in an inland location and the risk of flooding from coastal and tidal processes are therefore considered to be Very Low.

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 Site is located within a fluvial Flood Zone 2 and is therefore classified as having a Medium probability of fluvial flooding from the nearby watercourses.

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



## 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's Flood Map for Planning (Figure 7), the Site is not located within a TAN15 Defended Zone, with no formal or informal defences identified along the course of Lavister Brook. However, a review of the defended and undefended flood extents provided within the Rossett Flood Risk Study (NRW, 2021) confirms that the Site is modelled as benefitting from the presence of formal flood defences, in the form of walls located c. 830 m to the south west along the northern (left) bank of the Afon Alun.

Information from the NRW relating to the flood defences is outlined below.

- The flood defences in place for this area are rated (as of 2023) to defend up to a 1 in 100 year flood event, with crest levels indicated to range between 16.40 and 17.00 mAOD (according to Appendix B, Table 3-1 of the Rossett Flood Risk Study (NRW, 2021)). No information regarding the current condition of the defences has been identified.

### *Future flood defences*

No information regarding any proposed future flood defence or flood alleviation schemes within the prevailing area has been identified.

# Flood Risk including the benefit of defences

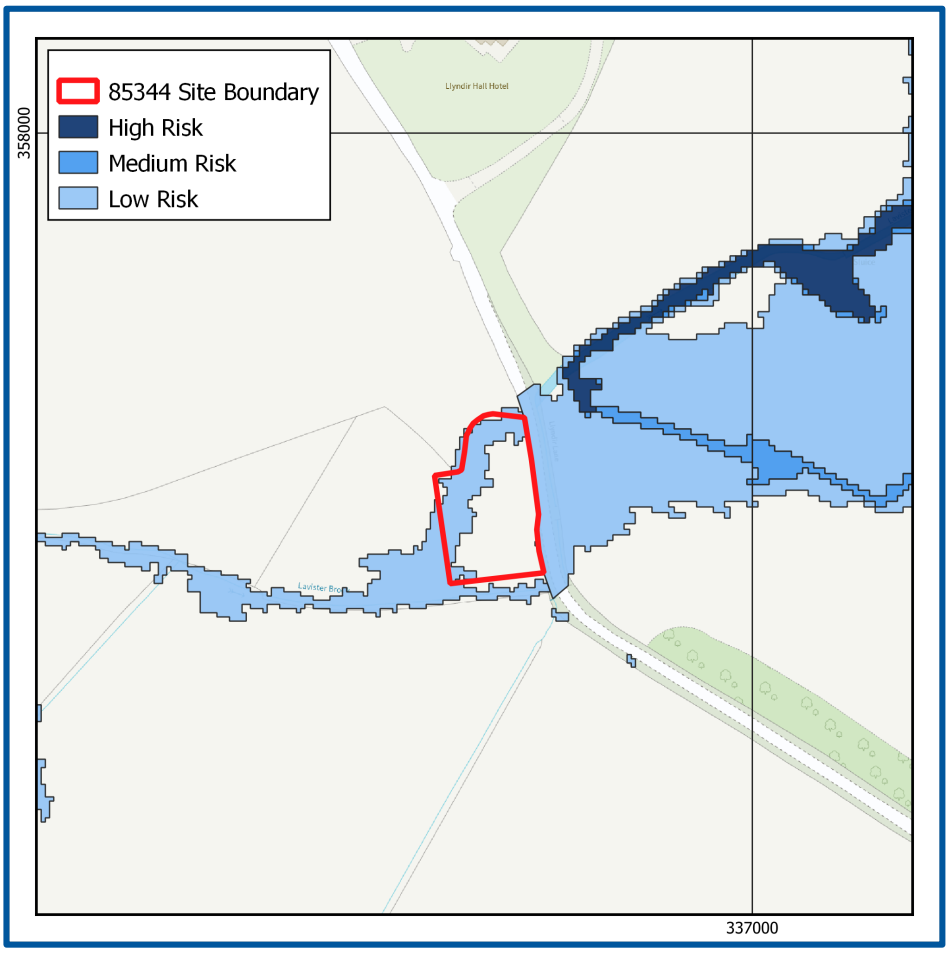
The Flood Risk Assessment Wales (FRAW) maps were published in the Summer of 2020.

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.

The FRAW maps indicate:

- The risk from Rivers is Very Low to Low.
- The risk from the Sea is Very Low.
- The risk from Surface Water and Small Watercourses is Very Low.

## Figure 8. Rivers – FRAW Risk Map (NRW, 2025)




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## Figure 9. Sea – FRAW Risk Map (NRW 2025)




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## Figure 10. Surface Water and Small Watercourses – FRAW Risk Map (NRW 2025)




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# Model data

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

Defended modelled data from the Rossett Flood Risk Study (NRW, 2021) has been extracted from the 2D floodplain data provided at the Site[1], and is provided within Table 3.

### Table 3. NRW defended present day modelled flood data

| Flood data | Flooding scenario | |
|---|---|---|
| | 1 in 100 year | 1 in 1000 year |
| Flood level (mAOD) | N/A (off-Site)† | N/A (off-Site)† |
| Flood depths (m)* | No flooding anticipated | |

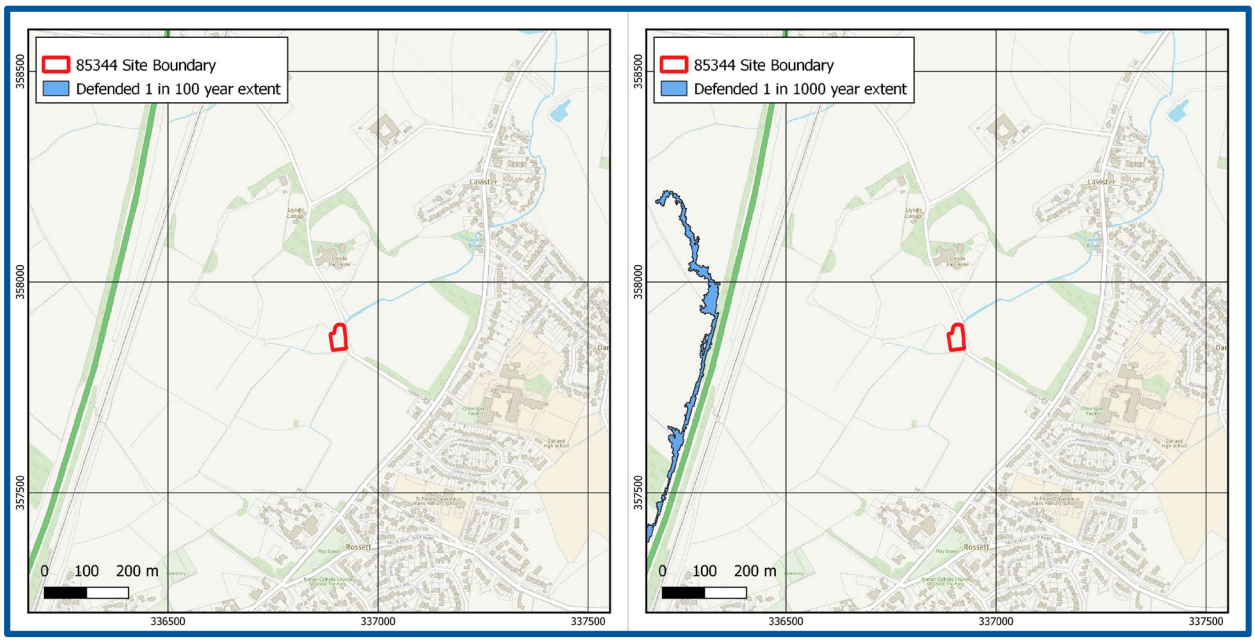
* Compared to ground levels at the Site between 11.76 and 12.48 mAOD, as provided via topographic survey data.

† Whilst the flood level within the channel of the Afon Alun in these events would exceed the maximum ground-level on-Site, the nearest extent of flooding is > 500 m from the Site (see Figure 11) due to the presence of intervening land of higher elevation; as such, the Site would remain flood free.

The following figure confirms the flood extent associated with the present-day flooding scenarios. The Site is anticipated to remain flood free in each of the present-day defended scenarios; As such, the present-day fluvial flood risk at the Site is considered to be Very Low.

[1] The accuracy of the modelled flood levels are not known. These are dependent on the accuracy of input datasets such as LiDAR data, used to model the impacts of flooding within the 2D domain. Confirmation of the accuracy of the modelled flood data can be obtained separately from Natural Resources Wales.

## Figure 11. Modelled present day flooding scenarios




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# Climate change factors

In accordance with the Welsh Government's Climate Flood Consequences Assessments: Climate change allowances guidance (2021), allowances should be made for the impact of increased river and sea levels and flows to the proposed development.

Due to recent changes in guidance on the allowances for climate change, the 20% increase in river flows is no longer the national allowance for development design purposes, unless the guidance stipulates that this is the correct allowance to use (depending on the river basin and development proposals).

In this case, as the Site is located within the Dee River Basin and the proposed development is classed as Highly Vulnerable, where the proposed lifespan is 100 years, the Central (20%) allowance has been used to determine a suitable climate change factor to apply to river data. This climate change allowance has been modelled for the 1 in 100 year and 1 in 1000 year events as part of the Rossett Flood Risk Study (NRW, 2021), with the associated modelled flood levels shown in the below table.

### Table 4. Flood levels plus climate change allowances

| Ground levels on-Site (mAOD) | Modelled Flood Levels (mAOD) | |
|---|---|---|
| | 1 in 100 year plus 20% 2080 central allowance for climate change | 1 in 1000 year plus 20% 2080 central allowance for climate change |
| Flood level (mAOD) | 15.53 (off-Site)† | 11.83 (on-Site) |
| Flood depths (m)* | No flooding anticipated | Up to 0.07 (c. 1% of Site area to the north east) ** |

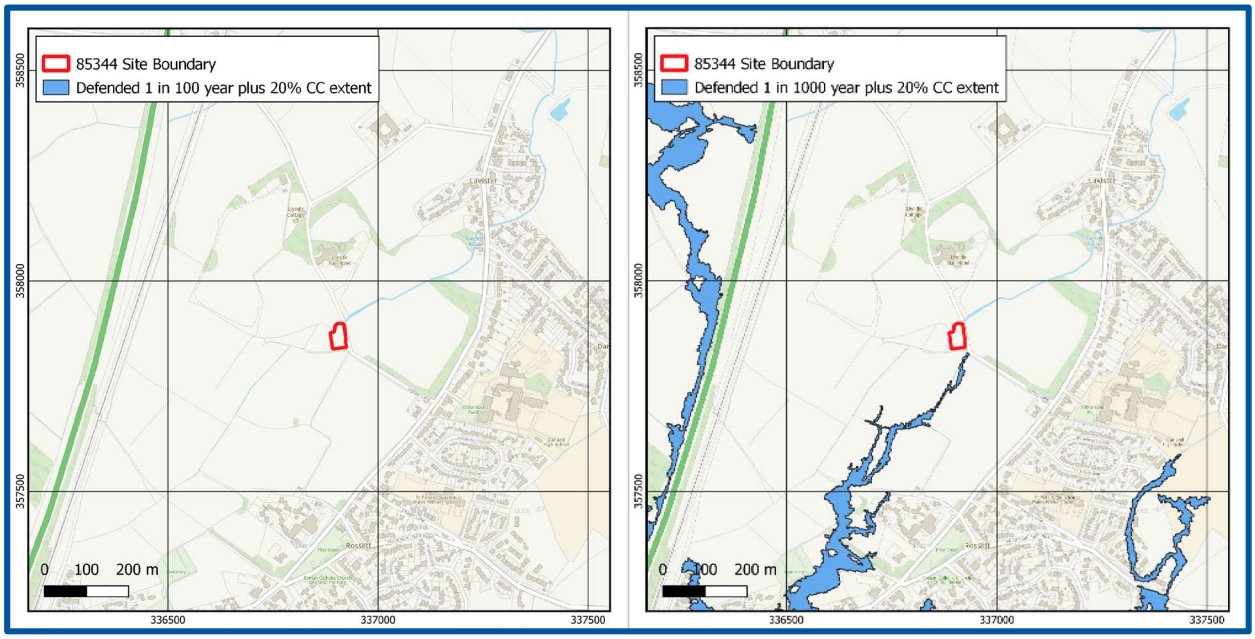
* Compared to ground levels at the Site between 11.76 and 12.48 mAOD, as provided via topographic survey data.

† Whilst the flood level within the channel of the Afon Alun in this event would exceed the maximum ground-level on-Site, the nearest extent of flooding is > 500 m from the Site (see Figure 12) due to the presence of intervening land of higher elevation; as such, the Site would remain flood free.

**The flooding on-Site in this event reflects an isolated pocket within the low-lying area in the north east of the Site. It is uncertain whether this is an error within the modelling or is associated with the adjacent Lavister Brook. Given the limited extent and shallow depth of this flooding, it is not considered to reflect a risk to the development itself.

The modelled climate change scenarios indicate that the area proposed for development is not modelled as experiencing flooding in the defended 1 in 1000 year plus 20% ('Central') climate change allowance event (as shown within Figure 12); as such, the fluvial risks to the Site are considered to remain Very Low.

Figure 12. Modelled climate change flooding scenarios




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# 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 NRW's Flood Risk from Surface Water and Small Watercourses flood mapping (Figure 13), the Site has a Very Low risk of pluvial flooding and is mapped as remaining flood free in each of the modelled pluvial scenarios.

Some flooding is mapped within c. 10 m of the eastern Site boundary in each of the modelled scenarios, associated with the Lavister Brook; however, this flooding is anticipated to be confined within the course of the watercourse itself, with the ground levels in this area ranging from 0.3 m and 0.7 m beneath the nearest Site ground levels.

Figure 13. NRW Low surface water risk map (NRW, 2025)




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Guidance

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

- Very Low risk - chance of flooding of less than 1 in 1000 (0.1%).

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, 2024).

Any existing and proposed on-Site surface water drainage systems should be designed and maintained appropriately to manage the run-off over the lifetime of the proposed development.

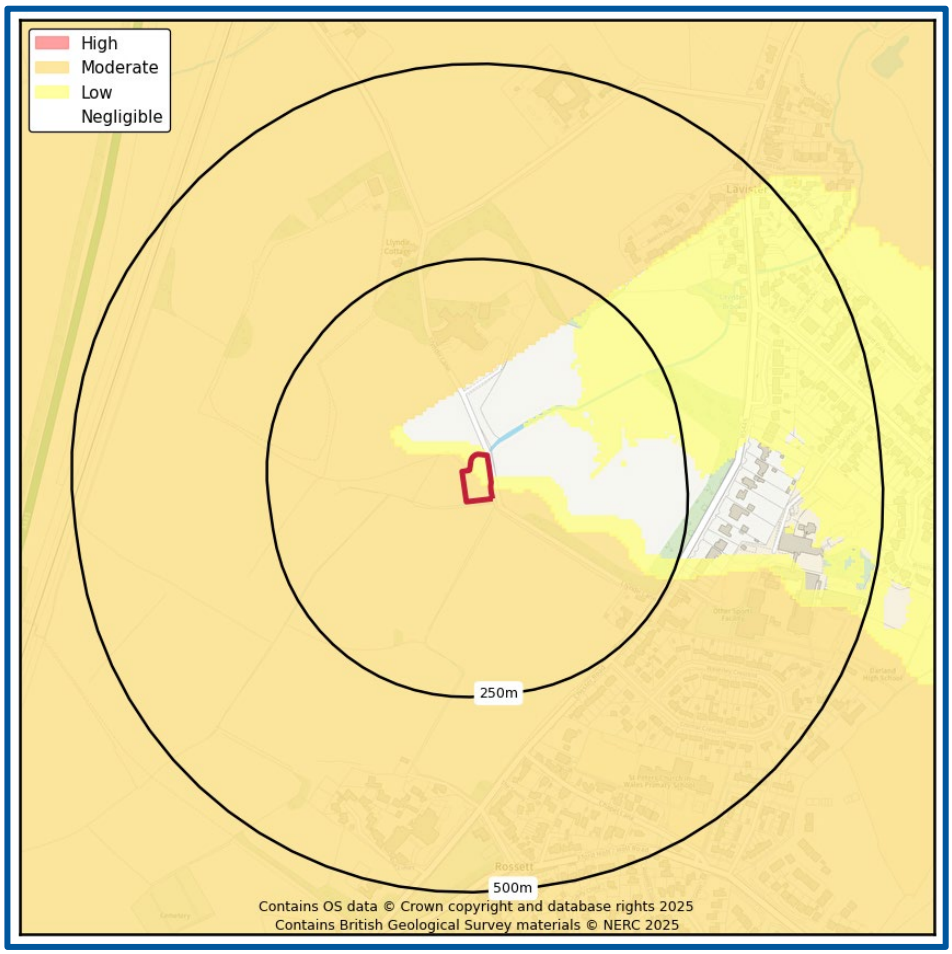
# Groundwater flooding

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 14) indicates there is a Negligible to Moderate risk of groundwater flooding at the surface within the vicinity of the Site from permeable bedrock and superficial deposits during a 1 in 100-year event:

- Approximately 59% of the Site area (in the west and the south) is at Moderate risk.
- Approximately 40% of the Site area (in the north and centre) is at Low risk.
- Approximately 1% of the Site area (along the eastern boundary) is at Negligible risk.

Figure 14. GeoSmart GW5 Groundwater Flood Risk Map (GeoSmart, 2025)




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.

It is understood there are no existing basements, and a basement is not proposed as part of the development (NB: The risks are higher for basements, 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 watercourses.

It is noted groundwater flooding may occur in response to prolonged high-water levels, by-passing flood defences even if overtopping does not occur.

Despite the presence of an aquifer 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 nearest BGS borehole (ref: SJ35NE148, c. 380 m south east) remained dry through the excavation of its 6.10 m depth; however, another borehole (ref: SJ35NE159, c. 550 m south east) struck groundwater at a depth of 2.15 m bgl, which rose to a maximum level of 1.85 m bgl.

A nearby spring line has been identified approximately 170 m west of the Site; however, this reflects a tributary of the Lavister Brook and as such the potential seepage and overland flow from the spring line would be confined within the channel of the watercourse itself, according to the NRW's pluvial flood risk mapping.

The local topography and drainage are such that the development threshold is likely to be higher than the area where groundwater emerges in adjacent low points.

The hydrogeological characteristics suggest there is potential for a groundwater table beneath the Site.

The baseline groundwater flood risk rating is Negligible to Moderate; however, a Site-specific analysis of the hydrogeological conditions would suggest a Low to Moderate risk to the development.

**Guidance**

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

- 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.

The impact of climate change on groundwater levels beneath the Site is linked to the predicted rise in peak river levels and the variation in rainfall recharge, which is uncertain.

# 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

No information regarding historic flooding events from sewers has been made available, with no SFCA identified for the Wrexham County Borough Council area. As such, the risk of sewer flooding cannot be quantified within the scope of this report; however, it is noted that no public sewers are understood to be present within the vicinity of the Site from which a risk of flooding due to surcharging sewers could originate.

| 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.

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; Dŵr Cymru / Welsh 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, as well as associated bridge, have been identified along the course of Lavister Brook within 50 m of the Site that could pose a flood risk to the Site should they become blockage or damaged; however, given the limited information available regarding the condition and capacity of the culverts as well as the absence of detailed blockage scenarios, the potential impacts of the blockage of these nearby culverts cannot be quantified within the scope of this report.

The Rossett Flood Risk Study (NRW, 2021) includes three scenarios associated with the blockage of Chester Road Bridge / Alyn Bridge (located c. 1.05 km south west of the Site). Each scenario comprises a 1 in 100 year plus 20% ('Central') climate change allowance flood with 5%, 25%, and 80% blockages, respectively.

Table 5 indicates the modelled flood levels in the 1 in 100 year plus 20% climate change blockage scenarios:

### Table 5. NRW modelled Chester Road Bridge blockage scenarios and maximum on-Site flood levels

| Flood Data | 1 in 100 year plus 20% climate change blockage scenario | | |
|---|---|---|---|
| | 5% Blockage | 25% Blockage | 80% Blockage |
| Flood level (mAOD) | N/A (off-Site)† | N/A (off-Site)† | 12.57 (on-Site) |
| Flood depths (m)* | No flooding anticipated | | Up to 0.46** |

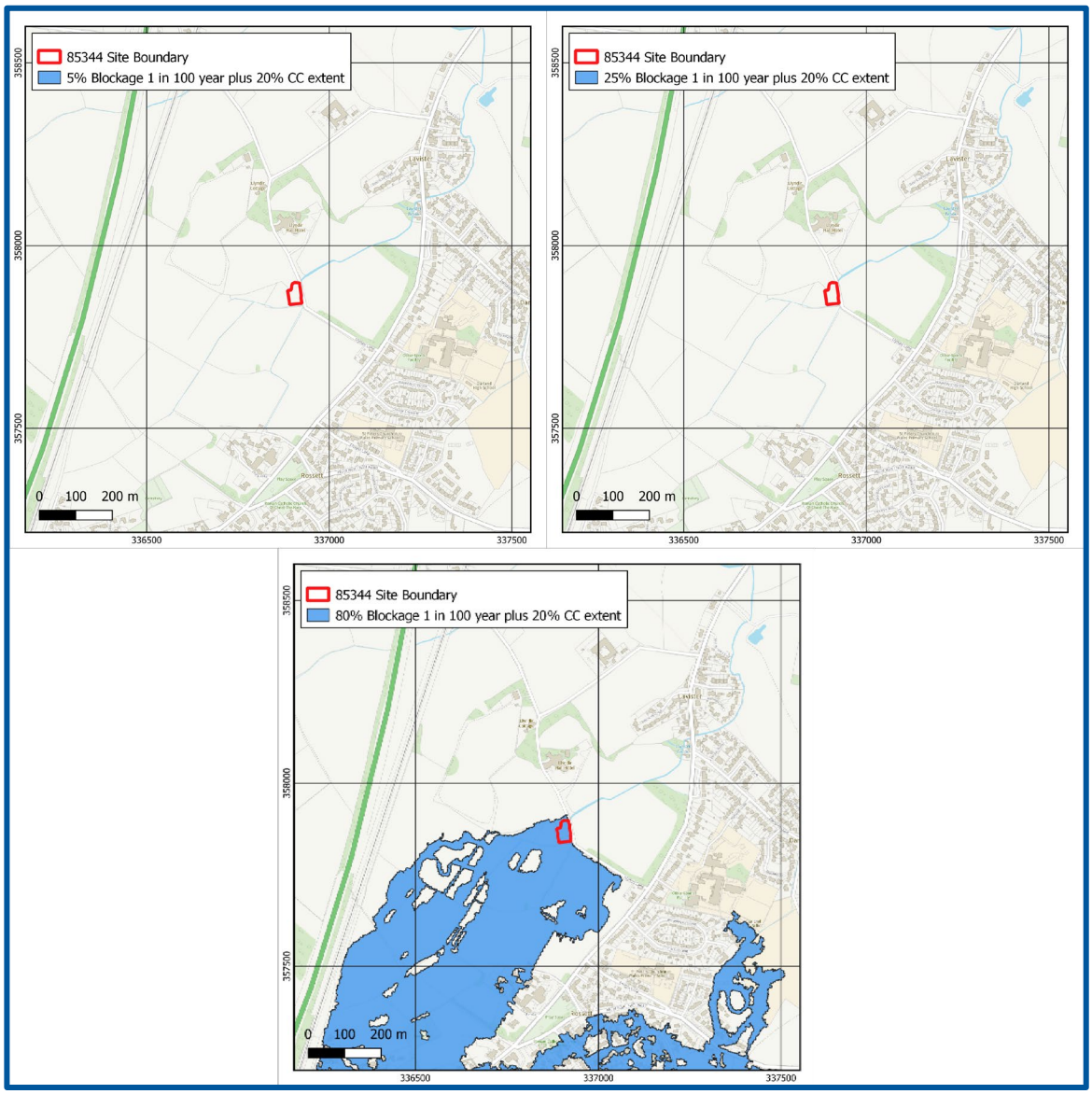
† Whilst the flood level within the channel of the Afon Alun in these events would exceed the maximum ground-level on-Site, the nearest extent of flooding is > 500 m from the Site (see Figure 15) due to the presence of intervening land of higher elevation; as such, the Site would remain flood free.

* Compared to ground levels at the Site between 11.76 and 12.48 mAOD, as provided via topographic survey data.

** The maximum flood level in this event would be 0.81 m above the lowest-lying areas on-Site; however, due to the slope of the Site, the flood level generally decreases to the east, and much of the area proposed for development would typically receive flooding with depths of between 0 and 0.20 m.

Table 5 and Figure 15 (overleaf) indicate that the Site would not be impacted by flooding in the 5% and 25% blockage scenarios. In the worst-case, 1% AEP 80% blockage scenario, flood depths of up to 0.46 m are mapped across entirety of the Site area. It is noted that given the size of the bridge, an 80% blockage occurring would be extremely unlikely.

## Figure 15. Modelled present day flooding scenarios

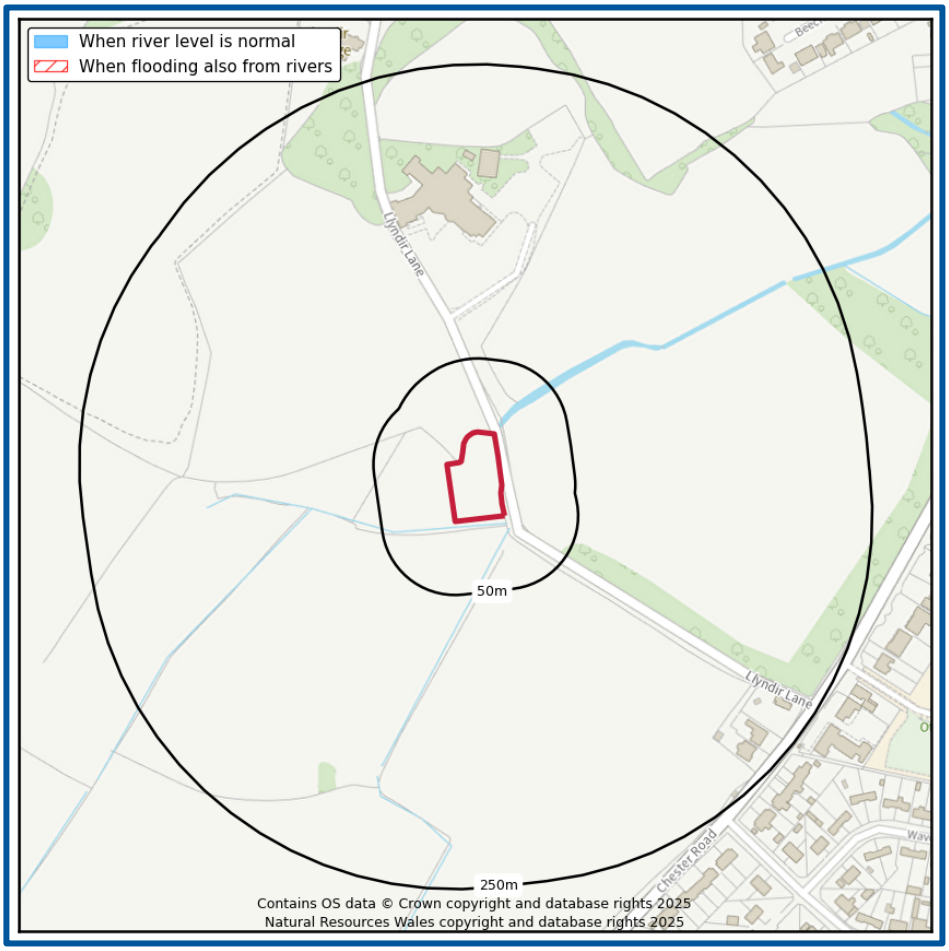



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## Reservoir flooding

According to the NRW's Flood Risk from Reservoirs mapping the Site is not at risk of flooding from reservoirs (Figure 16) (NRW, 2025).

Figure 16. NRW Flood Risk from Reservoirs Flooding (NRW, 2025)




### Guidance

The risk of reservoir flooding is related to the failure of a large reservoir (holding over 25,000 $m^3$ of water) and is based on the worst-case scenario. Reservoir flooding is extremely unlikely to occur (NRW, 2025).

# 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 building footprint but would not be impacted by the 1 in 100 year plus 20% climate change event. Therefore, there would be no displacement of flood water and compensatory flood storage is not required.

## Drainage and run-off

Based on the topography and Low surface water flood risk in the vicinity, interference or interaction with overland flow paths and inflows from offsite is considered unlikely.

However, the proposed development involves an increase of impermeable surfaces at the Site. An estimation of run-off is therefore required to permit effective Site water management and prevent any increase in flood risk to off-Site receptors from the Site.

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 is being changed to residential, the lifespan of the development and requirements for climate change should allow up to the 2115 scenario.

### Table 6. 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 | 20% | 30% | 45% |

| | | | |
|---|---|---|---|
| Central | 10% | 15% | 20% |

## Sustainable Drainage System (SuDS)

It is recommended that attenuation of run-off is undertaken on-Site to compensate for proposed increases in impermeable surface areas. Attenuation may comprise the provision of storage within a Sustainable Drainage System (SuDS). SuDS can deliver benefits from improving the management of water quantity, water quality, biodiversity and amenity. Potential SuDS options are presented in the table below, subject to further investigation:

### Table 7. SuDS features which may be feasible for the Site

| Option | Description |
|---|---|
| Rainwater harvesting | Rainwater harvesting can collect run-off from the roofs for use in non-potable situations, using water butts for example. |
| Permeable paving | Permeable pavements can be used for driveways, footpaths and parking areas to increase the amount of permeable land cover. Suitable aggregate materials (angular gravels with suitable grading as per CIRIA, 2007) will improve water quality due to their filtration capacity. Plastic geocellular systems beneath these surfaces can increase the void space and therefore storage but do not allow filtration unless they are combined with aggregate material and/or permeable geotextiles. |
| Swales | Shallow, wide and vegetated channels that can store excess run-off whilst removing any pollutants. |
| Soakaways | An excavation filled with gravel within the Site. Surface water run-off is piped to the soakaway. |
| Attenuation basins/pond | Dry basin or a permanent pond that is designed to hold excess water during a rainfall event. |

# 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 (2025) 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 |
|---|---|
| **Acceptability criteria for flooding consequences**: All developments should be designed to be flood free during the 1% river flood and 0.5% flood from the sea, plus an allowance for climate change over the lifetime of development.<br><br>**Tolerable conditions**: During an extreme 0.1% flood event, flood depths should not exceed 600 mm at the Site. The maximum permitted velocity of flood waters is 0.15 m/s for Highly Vulnerable development and 0.3 m/s for Less Vulnerable development. | |

The proposed Site use is residential and is classified as "Highly Vulnerable" development. The Site is mapped within Flood Zone 2.

Table 8. Flood risk vulnerability and flood zone compatibility (taken from TAN15, 2025)

| Flood risk vulnerability classification | Highly vulnerable | Less vulnerable | Water compatible |
|---|---|---|---|
| Zone 1 | ✓ | ✓ | ✓ |
| Defended Zone | Must satisfy acceptability criteria and tolerable conditions | ✓ | ✓ |
| Zone 2 | Must satisfy acceptability criteria and tolerable conditions | Must satisfy acceptability criteria | ✓ |
| Zone 3 | X (greenfield land) / brownfield land | Must satisfy acceptability criteria | ✓ |

| Flood risk vulnerability classification | Highly vulnerable | Less vulnerable | Water compatible |
|---|---|---|---|
| | must satisfy acceptability criteria and tolerable conditions | | |

Acceptability criteria for flooding consequences:

Highly Vulnerable development must be flood free in the 1 in 100-year fluvial event and 1 in 200-year tidal event, including an allowance for climate change.

- GeoSmart Comment. Analysis of the Site does demonstrate that the development would be flood free during a 1 in 100-year fluvial event and a 1 in 200-year tidal event with appropriate allowance for climate change.

Tolerable conditions:

During an extreme 0.1% flood event including an allowance for climate change, flood depths should not exceed 600 mm at the Site. The maximum permitted velocity of flood waters is 0.15 m/s for Highly Vulnerable development and 0.3 m/s for Less Vulnerable development.

- GeoSmart Comment. Analysis of the Site demonstrates that in a 1 in 1000 year plus 20% climate change fluvial event, the maximum flood depth at the Site would be 0.07 m, which reflects a minor isolated pocket in the north east (c. 1% of Site area) and may be an error within the modelling. The area proposed for development is modelled as remaining flood free in this event.

## Natural Resources Wales Flood Risk Standing Advice for Sites located in Flood Zones 2 or 3

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.

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

- 300 millimetres (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 Site is not identified as being at risk of flooding from the sea, mitigation measures are not required.

## Rivers (fluvial) flood mitigation measures

The Site is located within an area which is affected by flooding from rivers. The following table confirms the flood depths associated with the area proposed for development:

### Table 9. Flood levels compared to ground levels on-Site

| Flood data | Modelled Flood Levels (mAOD) | | | |
|---|---|---|---|---|
| | Present-day 1 in 100 | Present-day 1 in 1000 | 1 in 100 plus 20% climate change | 1 in 1000 plus 20% climate change |
| Flood levels (mAOD)* | 15.43 (off-Site)† | 15.68 (off-Site)† | 15.53 (off-Site)† | 11.83 (on-Site) |
| Flood depths (m) | No flooding anticipated | | | Up to 0.07 (c. 1% of Site area to the north east)** |

* Compared to ground levels at the Site between 11.76 and 12.48 mAOD, as provided via topographic survey data.

† Whilst the flood level within the channel of the Afon Alun in this event would exceed the maximum ground-level on-Site, the nearest extent of flooding is > 500 m from the Site due to the presence of intervening land of higher elevation; as such, the Site would remain flood free.

**The flooding on-Site in this event reflects an isolated pocket within the low-lying area in the northeast of the Site. It is uncertain whether this is an error within the modelling or is associated with the adjacent Lavister Brook. Given the location, limited extent, and shallow depth of this flooding, it is not considered to reflect a risk to the development itself.

### Raising minimum floor levels

The vulnerability classification of the Site and the Flood Zone means proposals for the Site fall under the NRW's Flood Risk Standing Advice (FRSA) for Highly Vulnerable developments.

In this instance, no raising of finished floor levels nor specific fluvial flood mitigation measures would be considered to be required, as the 1 in 100 year plus 20% climate change 'design' flood event would not impact the Site, with the worst-case 1 in 1000 year plus 20% climate change scenario resulting in shallow (up to 0.07 m depth) flooding outside of the area proposed for development.

There remains a residual risk of flooding associated with the worst-case 1% AEP 80% blockage of Chester Bridge scenario. Whilst this event is considered to be extremely unlikely to occur, it may be prudent to ensure that the development thresholds of the static caravan and dayroom are set at least 200 mm above surrounding ground levels where feasible.

# Surface water (pluvial) flood mitigation measures

As the Site is not identified as being at risk of pluvial flooding, mitigation measures are not required.

As part of best practice, the regular maintenance of any drains and culverts surrounding/on the Site should be undertaken to maintain the Very Low flood risk.

A Sustainable Drainage Strategy (SuDS) should also be developed for the Site, for effective management of surface water runoff from the proposed development.

# Groundwater flood mitigation measures

A Low to Moderate risk of groundwater flooding has been identified at the Site. In order to ensure the development includes sufficient flood mitigation measures to reduce the risk of groundwater flooding over its lifetime, the following mitigation measures are recommended:

- Finished floor levels of the proposed dayroom should be set at least 0.2 m above the adjacent ground levels where feasible;
- Waterproof tanking of the ground floor of the dayroom;
- Interceptor drains;
- Automatic sump to extract flood water; and
- Non-return flap valves on the proposed foul and surface water drainage networks.

If these mitigation measures are implemented this could reduce the flood risk to the development from Low to Moderate to Low.

# Reservoir flood mitigation measures

The Site has not been identified as at 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 are not undertaken. If mitigation measures are not implemented or maintained, the risk to the development will remain as the baseline risk.

As discussed within the fluvial flood mitigation measures, a residual risk of flooding is present in the worst-case 1 in 100 plus 20% climate change 80% blockage of Chester Road Bridge scenario, where flood depths could reach up to 0.46 m on-Site (with typical depths of between 0 and 0.20 m). Whilst this event is considered extremely unlikely to occur due to the size of the bridge itself, it may be prudent to ensure that the FFLs of the dayroom building are set at least 200 mm above surrounding ground levels, where feasible.

# 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, 'highly 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.

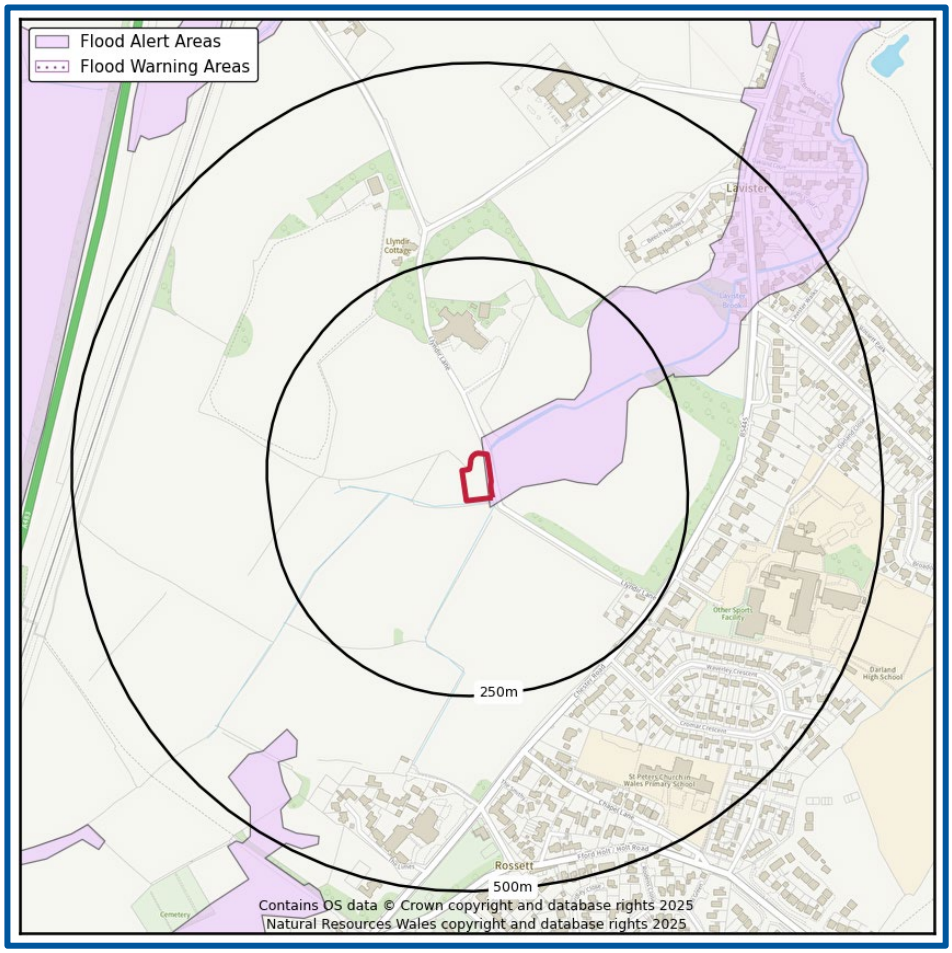
Emergency evacuation from the development and the Site should only be undertaken in strict accordance with any evacuation plans produced for the Site, with an understanding of the flood risks at the Site including available mitigation, the vulnerability of occupants and preferred evacuation routes.

## Flood warnings

The 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 located within an NRW Flood Alerts area (ref: 101WAFLD10) so is able to receive alerts (Figure 17, overleaf). All warnings are also available through the NRW's 24 hour Floodline Service, 0345 988 1188.

The NRW aims to issue Flood Warnings 2 hours in advance of a flood event. Flood Warnings can provide adequate time to enable protection of property and evacuation from a Site, reducing risk to life and property.

Figure 17. NRW Flood Warning Coverage for the local area (NRW, 2025)




## 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.

Based on the NRW's Flood Zone Map the closest dry evacuation area within Flood Zone 1 is along Llyndir Lane (c. 10 m north – direct measurement). 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 residents prepare to evacuate as soon as an NRW Flood Alert is issued in order to completely avoid flood waters.

## On-Site refuge

Evacuation should be the primary action in preference, as no first-floor areas are understood to be proposed on-Site.

## Other relevant information

Occupants should be signed up to receive NRW Flood Alerts.

Registration to the Natural Resource Wales flood warning scheme can be done by following this link: https://www.gov.uk/sign-up-for-flood-warnings.

It is recommended that main communication lines required for contacting the emergency services, electricity sockets/meters, water supply and first aid stations and supplies are not compromised by flood waters. Where possible these should all be raised above the extreme flood level.

# 8. Conclusions and recommendations

## Table 10. Risk ratings following Site analysis

| Source of Flood Risk | Baseline[1] | After analysis[2] | After Mitigation[3] |
|---|---|---|---|
| River (fluvial) flooding | Very Low to Low | Very Low | Very Low |
| Sea (coastal/tidal) flooding | Very Low | | N/A |
| Surface water (pluvial) flooding | Very Low | | Very Low |
| Groundwater flooding | Negligible to Moderate | Low to Moderate | Low |
| Other flood risk factors present | Yes (bridge blockage) | | |
| Is any other further work recommended? | Yes | | 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. Reasons for the change in classification are provided in the text.

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.

'Highly Vulnerable' developments in fluvial Flood Zone 2 are acceptable according to TAN15, subject to the acceptability criteria. As the proposed development would meet the acceptability criteria and tolerable conditions, providing the recommended mitigation measures are put in place (see previous sections), it is likely that the flood risks to the Site would be reduced to an acceptable level.

## Table 11. Summary of responses to key questions in the report

| | |
|---|---|
| Key sources of flood risks identified | Fluvial, 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 exec summary and Section 7) |

# 9. References and glossary

## References

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**GeoSmart (2025).** GeoSmart groundwater flood risk (GW5) map (version 2.4).

**Natural Resources Wales [NRW] (2025).** Flood Map for Planning. Accessed from: https://flood-map-for-planning.naturalresources.wales/ on 12/05/25.

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**Trevor Mennell Planning (2024).** Topographic Survey. Drawing No. 71422:1005.

**Welsh Government (2021).** Flood Consequence Assessments: Climate change allowances. Accessed from: https://gov.wales/sites/default/files/publications/2021-09/climate-change-allowances-and-flood-consequence-assessments_0.pdf on 12/05/25.

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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

| | |
|---|---|
| Aerial Photography | Contains Ordnance Survey data © Crown copyright and database right 2025<br>BlueSky copyright and database rights 2025 |
| Bedrock & Superficial Geology | Contains British Geological Survey materials © NERC 2025<br>Ordnance Survey data © Crown copyright and database right 2025 |
| Flood Risk (Flood Zone/RoFRS/Historic Flooding/Pluvial/Surface Water | Natural Resource Wales copyright and database rights 2025 |

| | |
|---|---|
| Features/Reservoir/ Flood Alert & Warning) | Ordnance Survey data © Crown copyright and database right 2025 |
| Flood Risk (Groundwater) | GeoSmart, BGS & OS<br>GW5 (v2.4) Map (GeoSmart, 2025)<br>Contains British Geological Survey materials © NERC 2025<br>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/EA<br>Contains Ordnance Survey data © Crown copyright and database right 2025<br>Natural Resource Wales copyright and database rights 2025 |

# 10. Appendices

GeoSmart Information

# Appendix A

## Site plans

Static Caravan

Amenity Block / Dayroom

Existing Compacted Gravel

Grass

Bituminous Tarmacadam

Post & Sheep Fencing

Post & Sheep Fencing

Pony Paddock

Pony Paddock

Dence undergrouth

Static Caravan

Entrance Refer to Drawing: 71442:1004

Play Area

Amenity Block / Dayroom

soakaway

IC1

IC2

IC3

100ø 1in40

100ø 1in40

Bio Disc

Bin Storage

Parking Spaces

Drainage Field

CARAVAN

Post

Tourer Caravan

Newly Seeded Grass Verge

Access Gates to Pony Paddock (re-located)

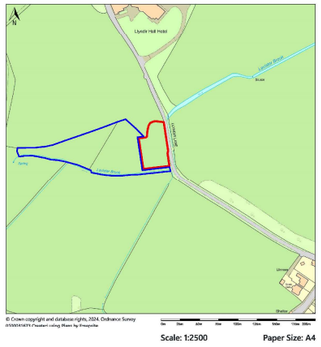
Llyndir Lane leading to B5445 Chester Road & Rossett

Vertical Lapboard Perimeter Fence

1:500

10m 0 10m 20m 30m 40m 50m

Land At Llyndir Lane, Rossett, Wrexham (Easting: 336904 / Northing: 357865)



Scale: 1:2500 Paper Size: A4

Notes:

Partner

EMAPSITE™ PLANS

**NOTES:**

All dimensions must be checked on site and not scaled from this drawing.

**Client**

Mr Jerry Berry Jnr
Land on Llyndir Lane
Rossett, Wrexham

**Job Title**

Change of Use of Land to Gypsy / Traveller Site for single family plot to include Static Caravan, Dayroom, Tourer caravan and Bio-Disc Treatment Plant

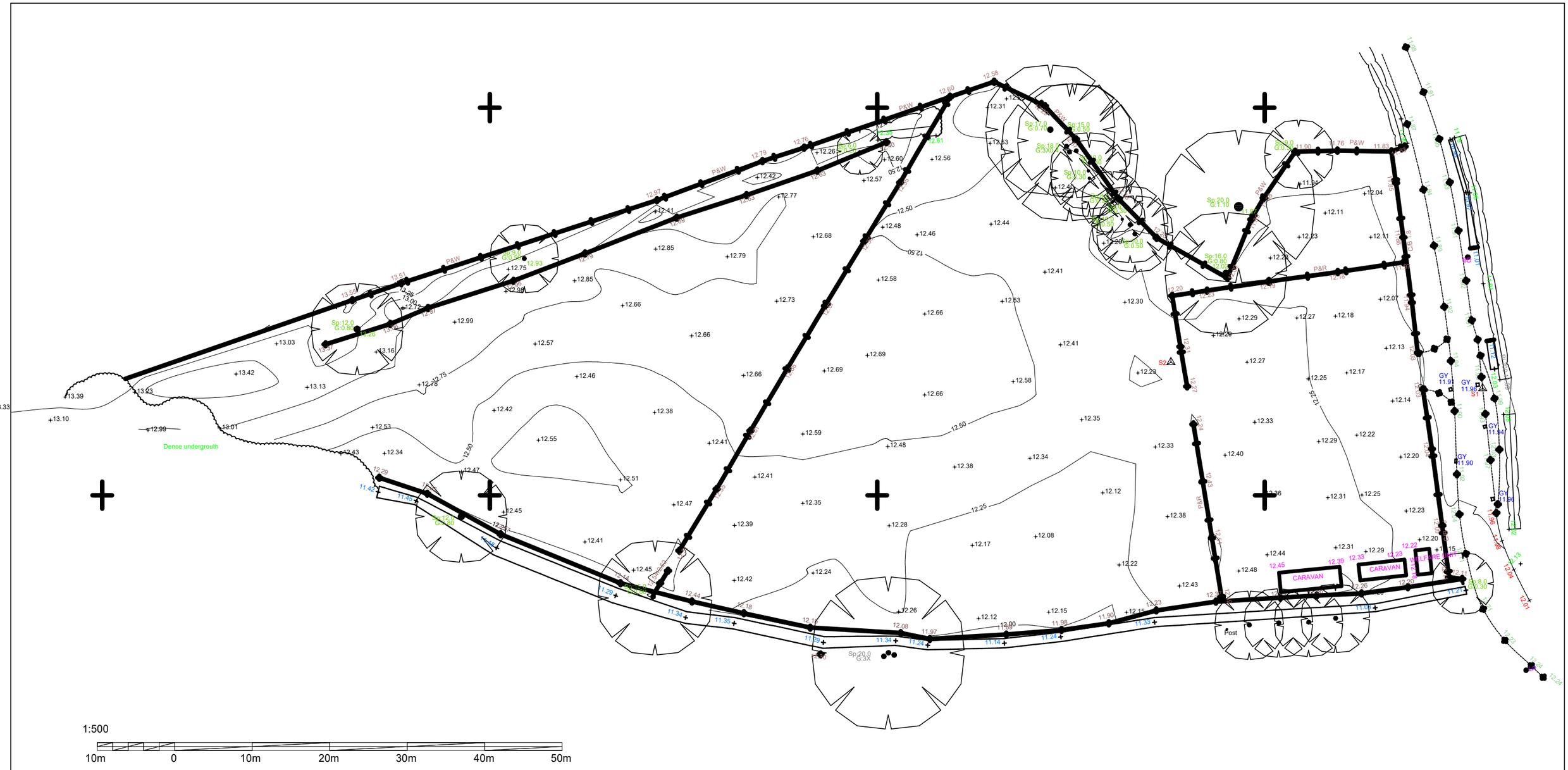
**Drawing Title**

Proposed Block Plan with Drainage Details

| Scale | 1:500 A3 | | |
|---|---|---|---|
| Date | JUNE 2024 | Drawn by | T.M. |

| Drg No. | Rev |
|---|---|
| 71422:1001 | - |


**Trevor Mennell Planning**
Planning & Architectural Consultants
The Gables | Kendricks Bank |
Bayston Hill | Shrewsbury |
Shropshire | SY3 0EH




**NOTES:**

All dimensions must be checked on site and not scaled from this drawing.

**Client**

Mr Jerry Berry Jnr
Land on Llyndir Lane,
Rossett, Wrexham
Easting: 336904
Northing: 357865

**Job Title**

Change of Use of Land to Gypsy / Traveller Site for single family plot to include Static Caravan, Dayroom, Tourer Caravan and Bio-Disc Treatment Plant

**Drawing Title**

Topographical Survey

**Scale** 1:500 A3

**Date** JUNE 2024

**Drawn by** T.M.

**Drg No.** 71422:1005

**Rev** -

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