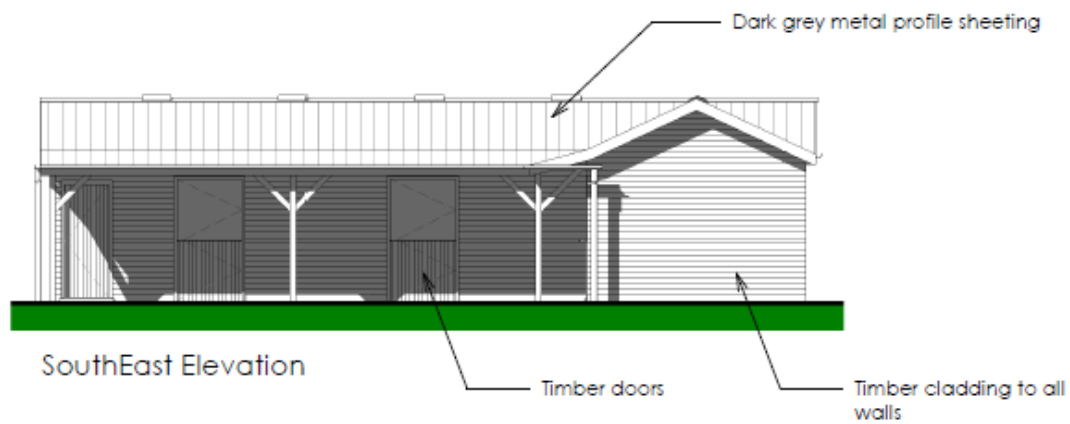


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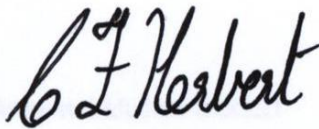
Stables Development Near St. Mary's Church, Marshfield Flood Consequence Assessment Report



May 2025
Final

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Signed 

Date May 2025.....

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1 INTRODUCTION

It is proposed to construct a less vulnerable stable block on a site near St. Mary's Church, Marshfield, Newport. The site is located within a defended Flood Zone 3, as shown on the Flood Map For Planning (see Figure 1.1), referred to in TAN 15. This indicates that the area potentially could be at risk during a 1 in 200 year tidal event or a 1 in 100 fluvial event, taking 100 years of climate change into consideration. The applicant appreciates, therefore, the need to assess the consequence of flooding.

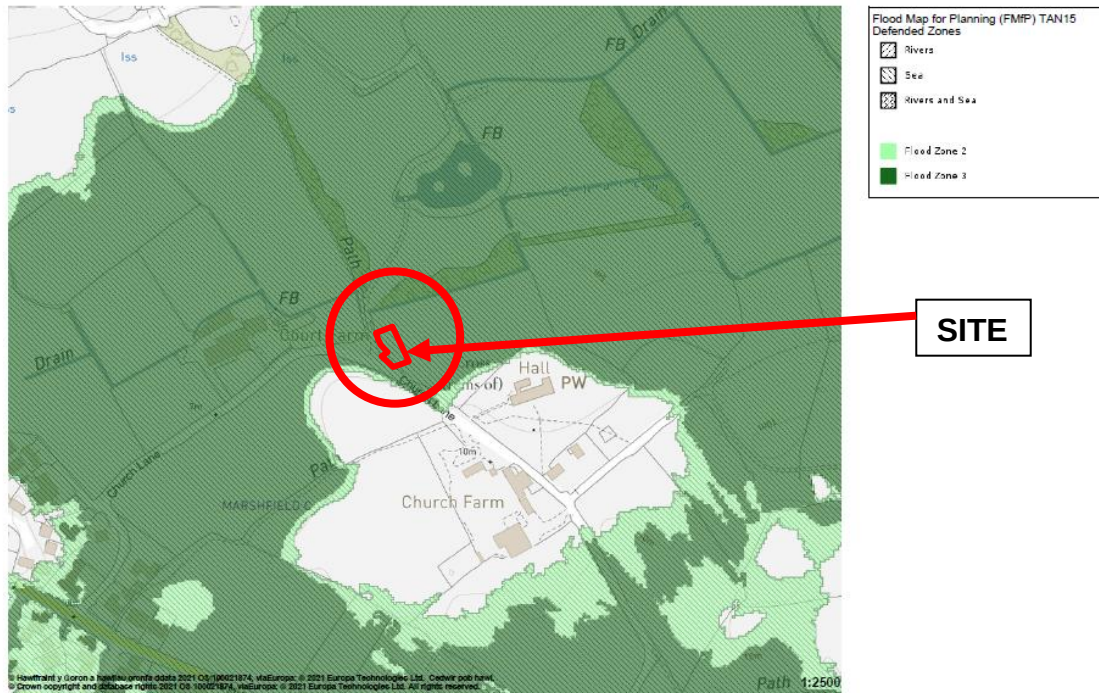


Figure 1.1 – Sea Flood Map For Planning

The prime objective of the Flood Consequences Assessment is to develop an appreciation of:

- The risk and consequences of flooding on the development; and
- The risk and consequences (i.e. the overall impacts) of the development on flood risk elsewhere.

It is noted that no new highly vulnerable development, **on greenfield land**, should be permitted in Zone 3, regardless of the conclusion of any Flood Consequences Assessments. In addition, Welsh Ministers must be notified of any such proposal a planning authority intends to approve. **In this instance, however, the proposals are for a less vulnerable development and the area is afforded protection from recognised defences.**

The assessment should consider a range of potential flooding scenarios including a 1 in 1000 year event with an allowance for climate change in line with current Welsh Government guidance.

It is noted that the Flood Map for Planning allows for 100 years of climate change. Where a new development has a shorter lifetime, it is reasonable that the flood consequences assessment focusses on potential risks during the development's expected lifetime. For a less vulnerable development a design life of 75 years is considered appropriate.

This assessment will help the planning authority determine whether the risk and consequences of flooding are acceptable and can be managed over the lifetime of development. The assessment will also establish whether appropriate measures can be incorporated into the design to ensure that the risk to life, damage to property and disruption to people, over its lifetime, are minimised and that there is no increase in the risk of flooding elsewhere.

The National Strategy recognises that many communities are located in areas at higher risk from flooding. TAN 15, however, recognises that these communities must be allowed to adapt, change, and regenerate in the knowledge of what the science is showing. Nevertheless, development and redevelopment should be avoided where there is a risk of being impacted by coastal erosion over the lifetime of the development.

The Flood Map For Planning are based on the Flood Risk Assessment Maps (see Figure 1.2) plus 100 years of climate change. The maps adopt the precautionary principle and are based on the best known information available at the time. However, a detailed examination of a site can refine an area's risk of flooding.

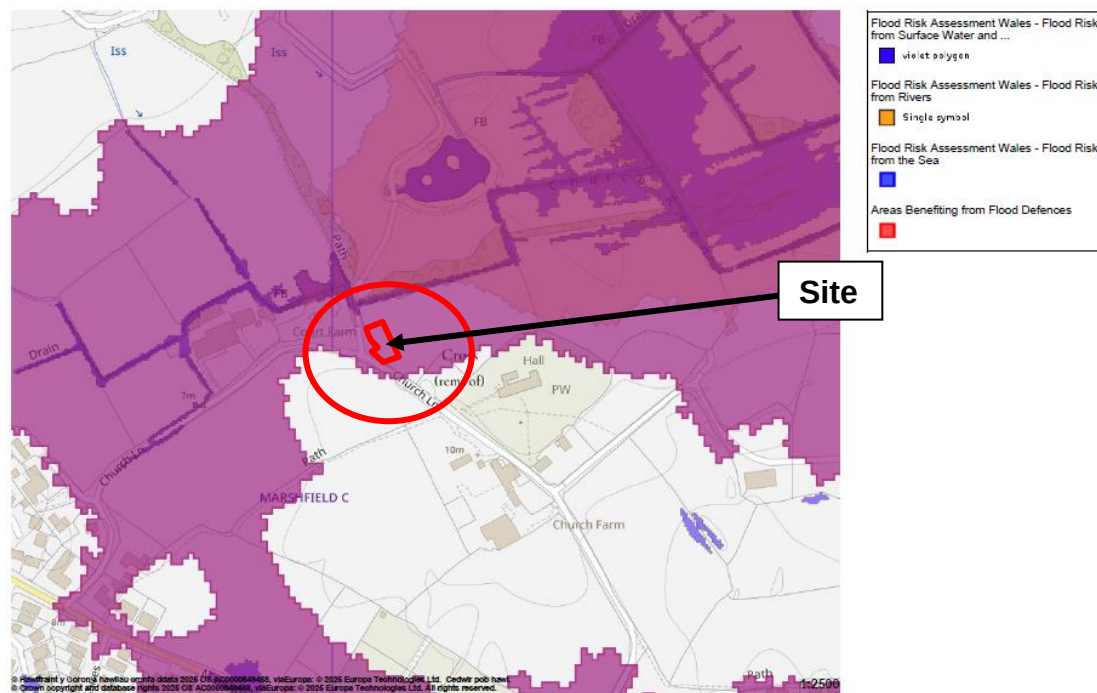


Figure 1.2 – Sea Flood Risk Assessment Map

Considering the site's proximity to the Wentloog flood plain and the drainage systems in the area, it is possible that the development could be at risk from both fluvial and tidal flooding, particularly when taking climate change into consideration. With this in mind, the client recognises the need to undertake a Flood Consequence Assessment to evaluate the risk and the implication of any flooding on the site. The assessment should be in accordance with the requirements of Section 11 of TAN 15. Francis Sant have been employed to undertake this task based on information currently available (ie. no additional modelling).

Section 2 of this report describes the location of the development while the method and risk of flooding, from various sources, are considered in Section 3. Section 4

considers sustainable drainage and potential resilient measures are discussed in Section 5. The conclusions of the study, along with the main recommendations, are provided in Section 6.

2 THE DEVELOPMENT

The development site (coordinates 326100 182580) is located on greenfield land some 70m north west of St Mary's Church, Marshfield, Newport at the edge of the Wentloog Levels between Cardiff and Newport (see Figure 2.1 to 2.3 and Plate 2.1). It is some 1km north west of the Cardiff to London Paddington railway line with the Bristol Channel around 1.6km beyond. The M4 is some 1.5km to the north west.



Figure 2.1 – Location Plan

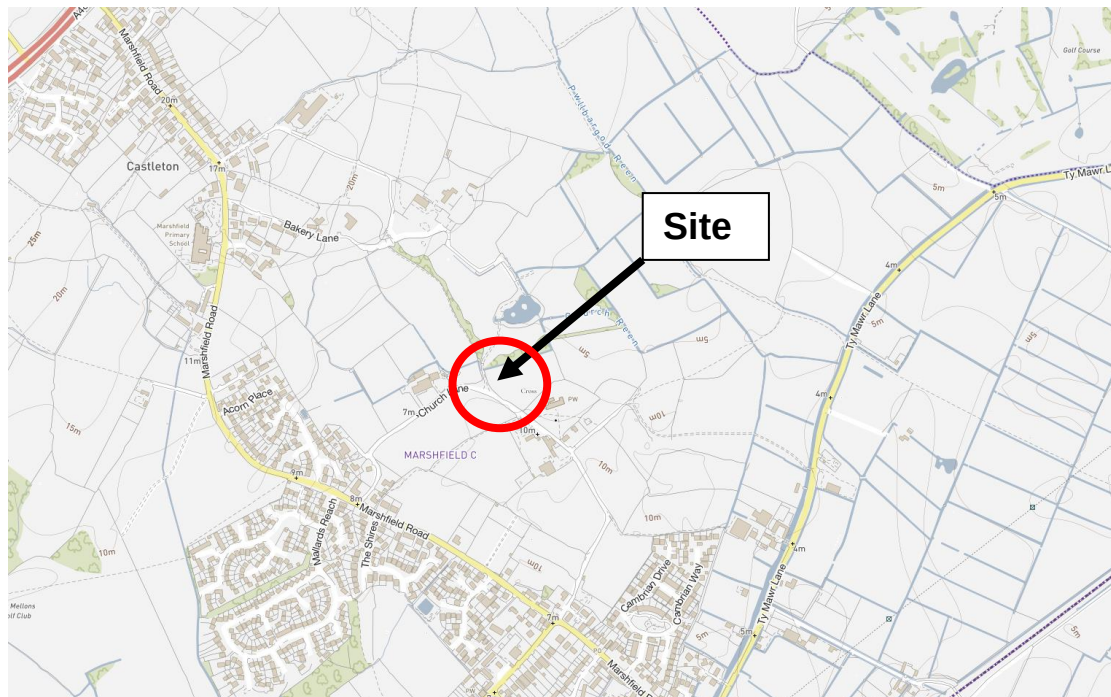


Figure 2.2 – Plan of Area



Figure 2.3 – Plan of Site

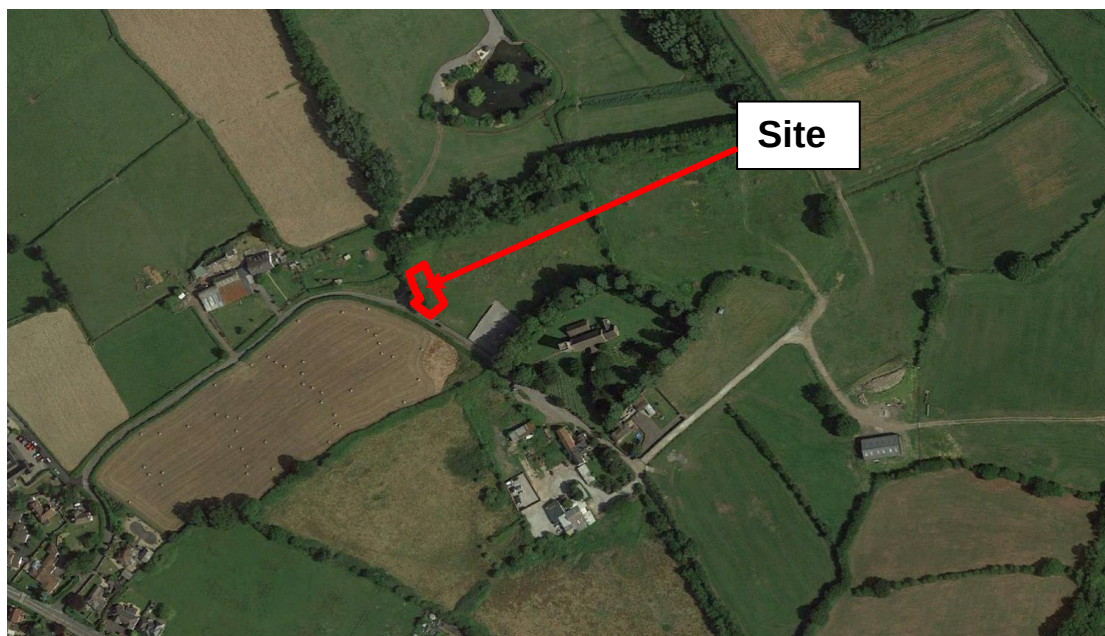


Plate 2.1 – Aerial View of Site

Proposed Development

It is proposed to build a stable block and a new entrance from the adjacent lane (see Figure 2.4 and 2.5).

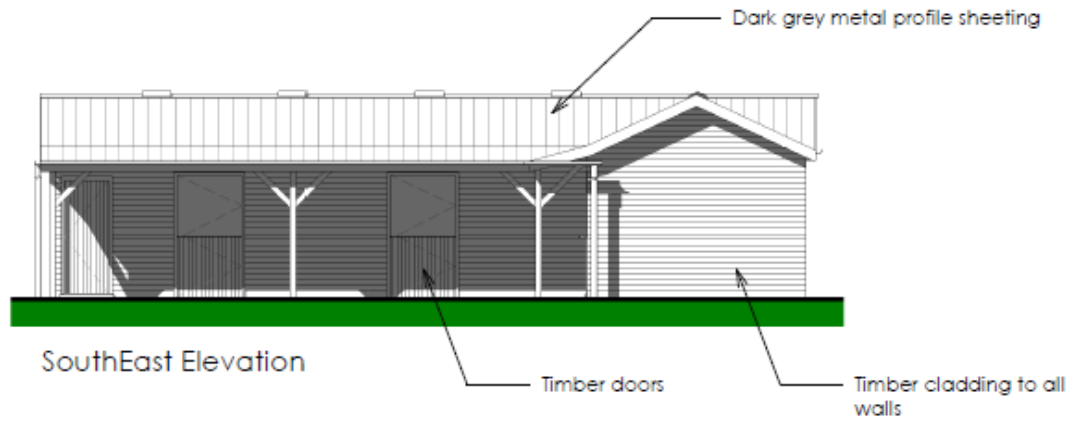


Figure 2.5 – South East Elevation Of proposed Stables

Topography

Lidar data (see Figure 2.6) shows that the site ground levels range between 6.6m AOD and 8.4m AOD with the land generally falling from south east to north west.

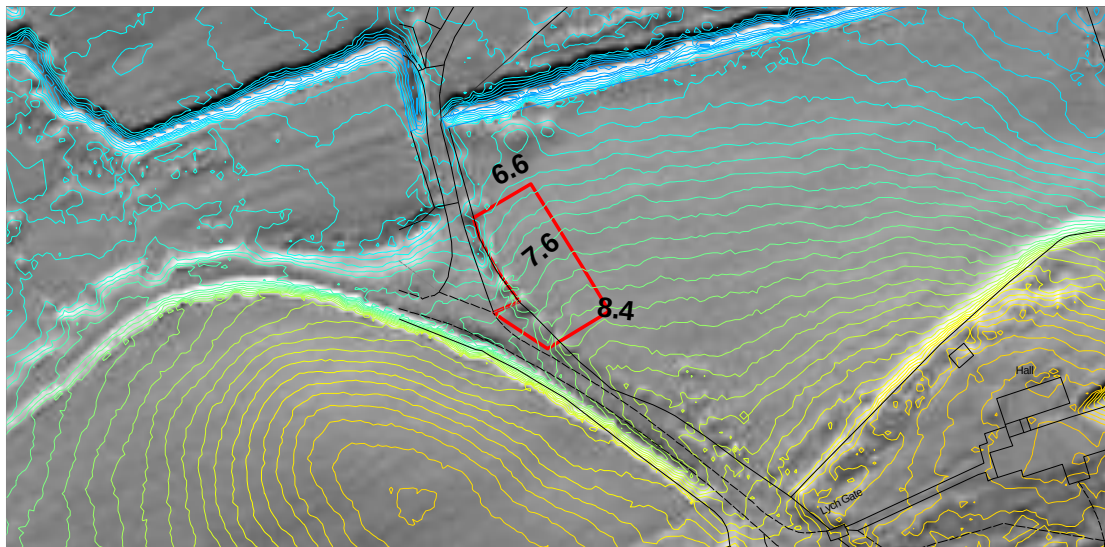


Figure 2.6 – Lidar Data for the Site

3 FLOOD RISK

Flooding can occur from several sources, some of which are considered in this section. The Flood Risk Assessment Wales maps (see Figure 3.1) shows that the site is currently at risk of flooding from the sea but is protected by recognised substantial defences. The site is not expected to be at risk from fluvial or surface water flooding. The maps do not take climate change into consideration.

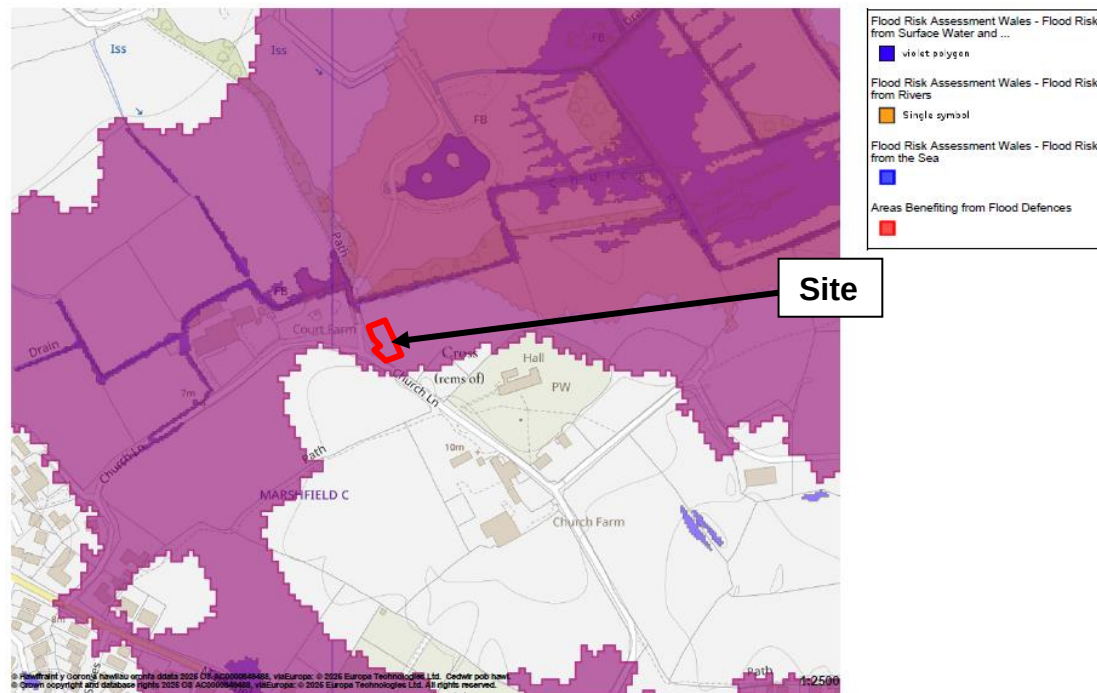


Figure 3.1 – Flood Risk Assessment Map

Fluvial

The Flood Map For Planning, which takes climate change into consideration (100 years), shows that the site is not at risk of flooding from a river during either the Q100 or Q1000 events (see Figure 3.2). It is noted that Church Reen, some 20m to the north, is affected.

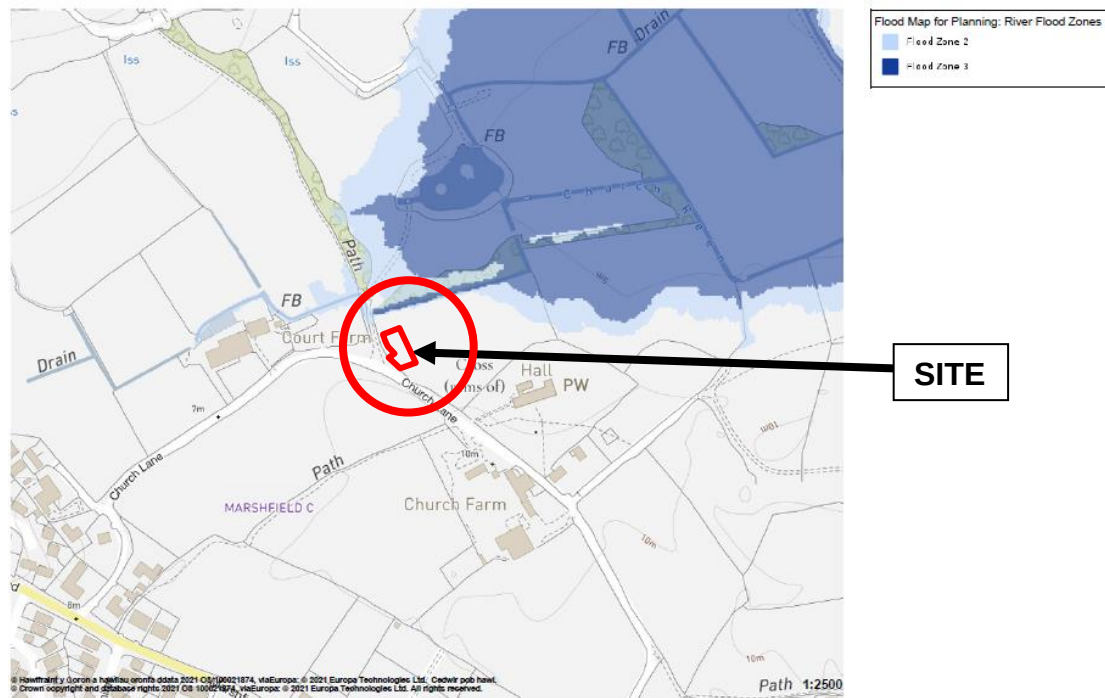


Figure 3.2 – River Flood Map For Planning

3.2 Tidal

The Tidal Flood Maps For Planning would suggest that the site lies in tidal flood Zone 3 and is potentially at risk during a T200 event but is afforded protection from recognised defences (see Figure 3.3).

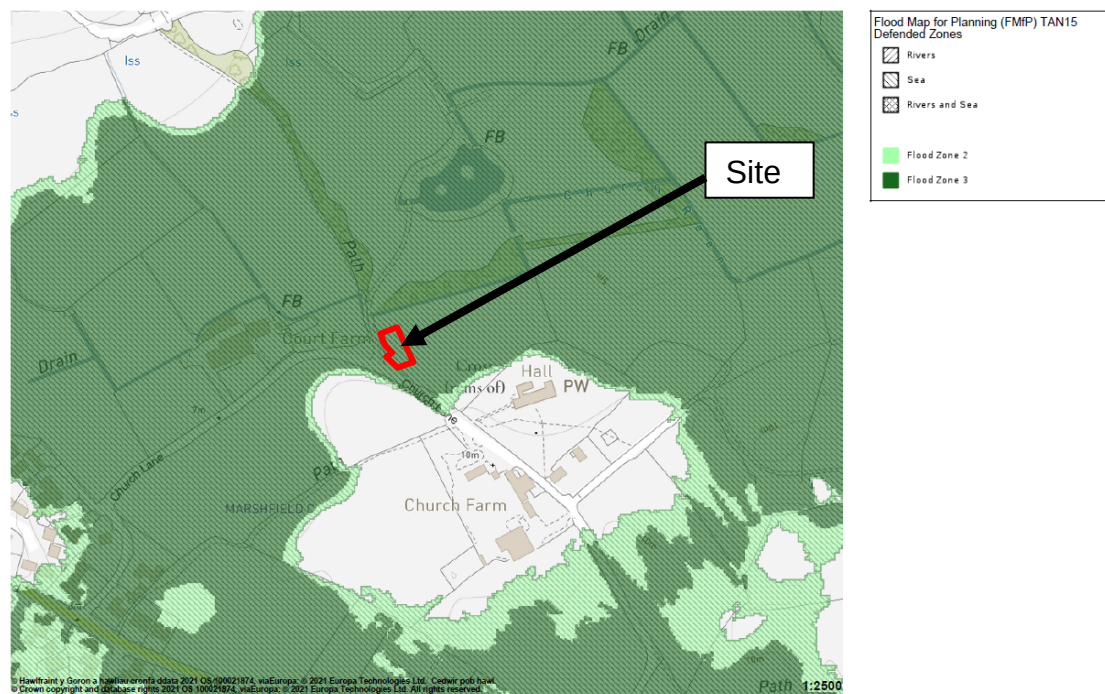


Figure 3.3 – Tidal Flood Map For Planning

In examining this further, the method promoted in the coastal flood boundary conditions (for UK mainland) research project, as amended (2018), is used to determine the T200 and T1000 high tide levels. This accounts for the joint probability

of meteorological (surges etc) and astrological effects (the impact of the sun and the moon on the tide). The levels for the adjacent coastline for the T200 and T1000 events were obtained (see Table 3.1 - base year 2017). The levels have a 95% confidence level although the precautionary levels, with a 97.5% confidence of non-exceedance, are also considered.

Table 3.1 - Water Surface Extreme Tide Elevation (m AOD)			
T200 (0.5%)		T1000 (0.1%)	
Level	97.5% Confidence	Level	97.5% Confidence
8.110	8.570	8.450	9.330

In addition, recommendations from NRW suggest that the current tide levels should be increased by 100 years of sea level rise for a new highly vulnerable development (eg residential developments) and by 75 years of sea level rise for a new less vulnerable development. The derived T200 year and T1000 year levels, using the above approach, are provided in Table 3.2.

Table 3.2 Tide Levels With Sea Level Rise					
	20017	Current	50 years of sea level rise	75 years of sea level rise	100 years of sea level rise
T200	8.11	8.138	8.612	8.944	9.307
T200 Precautionary	8.57	8.598	9.072	9.404	9.767
T1000	8.45	8.478	8.952	9.284	9.647
T1000 Precautionary	9.33	9.358	9.832	10.164	10.527

From Table 3.2 the T200, with 75 years of climate change, is expected to be 8.944m AOD while the T1000 is expected to be 9.284m AOD. Precautionary these levels could be increased to 9.404m AOD and 10.164m AOD respectively. With ground levels on the site ranging from 6.6m and 8.4m AOD the site potentially could be at risk, should the defences fail, with the flood depths ranging between 0.544m and 2.344m during the T200 event and 0.884m and 2.684m during the T1000 event. Preferably the finished floor level of the stables should be set above 8.944m allowing them to be flood free during the T200 event. Being tidal there is unlikely to be a noticeable loss of flood storage capacity and the flow velocity, at the upper end of the tide, is expected to be low.

As the risk of flooding is tidal sufficient warning is expected to enable the site to be evacuated safely. Access could be along Church Lane towards Castleton. As a minimum the horses could be moved to higher land adjacent the church.

Considering the distance between the site and the open coastline the development is not considered to be at risk from wave action and the site is not at risk from coastal erosion.

Extensive 2d TUFLOW hydraulic modelling has been undertaken for the area, to consider tidal risk on behalf of NRW. The model showed that, with the defences in place, the site remains flood free during the T200 event, even the precautionary T200 event (97.5% confidence of non-exceedance), with 100 years of sea level rise (see

Figure 3.4 and Table 3.3 – NB this exceeds the anticipated and recommended design life of 75 years). During the T1000 event, with sea level rise, the site is also expected to remain flood free (see Figure 3.5 and Table 3.3), however, during the precautionary T1000 + CC event the site is expected to be at risk of flooding with flood depths of up to 2m (see Figure 3.6 and Table 3.3). The site could also be affected during the T1000 with 100 years of sea level rise if the defences are breached, with flood depths of up to 800mm (see Figure 3.7 and Table 3.3).

Undefended, the flood depths of up to 2m can be expected on the site during the T200 with 100 years of sea level rise (see Figure 3.8 and Table 3.3), and up to 2.4m during the T1000 + CC event (see Figure 3.9 and Table 3.3). Precautionarily the tide levels and depth could be increased to over 3m during the T200 + CC and 3.8m during the T1000 + CC respectively (see Figure 3.10, 3.12 and Table 3.3). The corresponding flood velocity is expected to reach between 0.6m/s and 1m/s (see Figure 3.11, 3.13 and Table 3.3). The likelihood of the defences being removed is highly unlikely.

Table 3.3 Velocity and Depth Key			
Region	Depth	Region	Velocity
	0-0.1m		0 - 0.15m/s
	0.1m-0.2m		0.15m/s - 0.3m/s
	0.2m-0.3m		0.3m/s - 0.45m/s
	0.3m-0.6m		0.45m/s - 0.6m/s
	0.6m-1m		0.6m/s - 1m/s
	1m-2m		1m/s - 2m/s
	2m-3m		2m/s - 3m/s
	>3m		> 3m/s

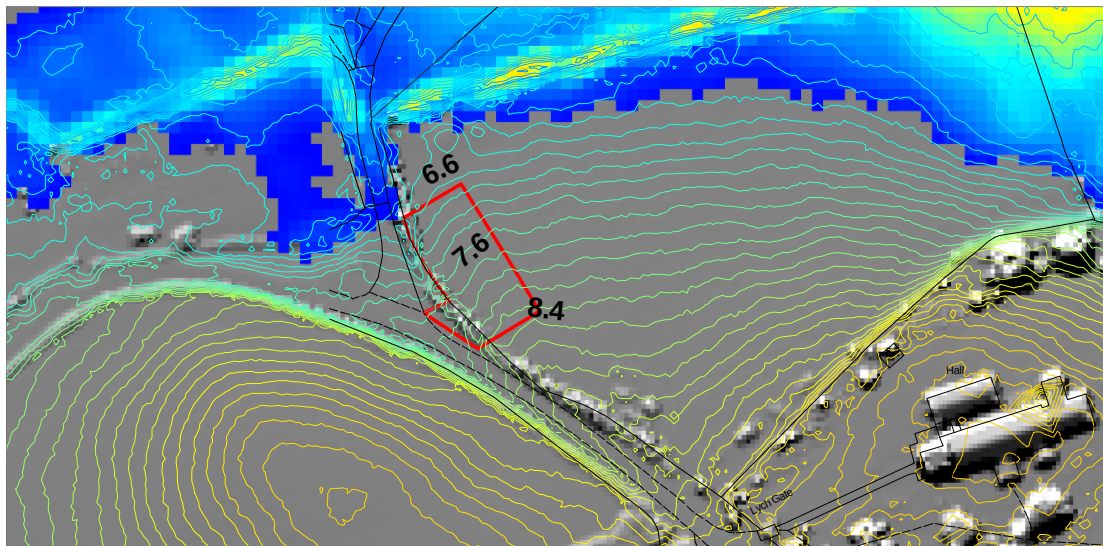


Figure 3.4 – Defended Precautionary T200 Plus 100 Year of Climate Change

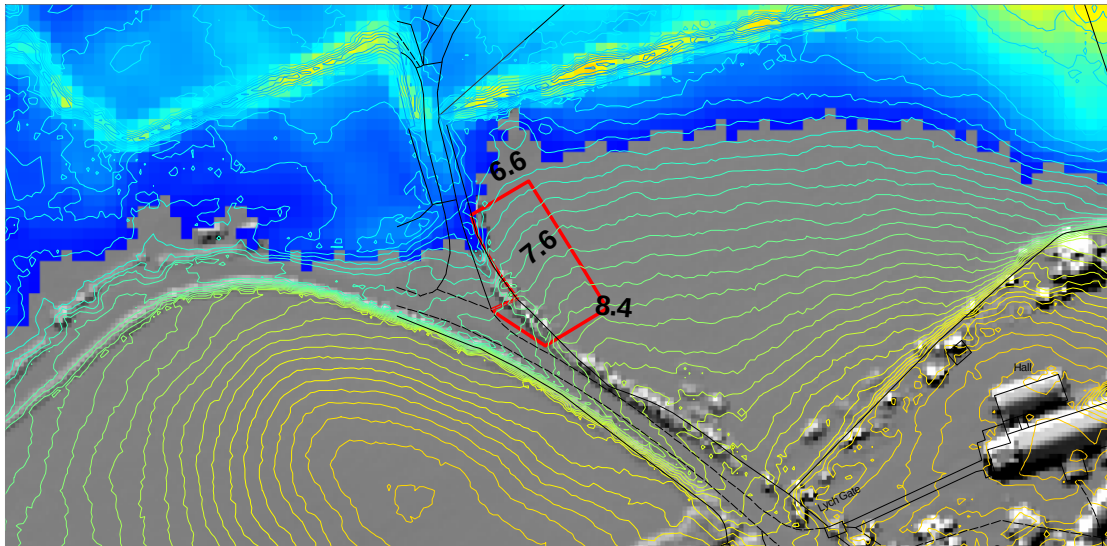


Figure 3.5 – Defended T1000 Plus 100 Year of Climate Change

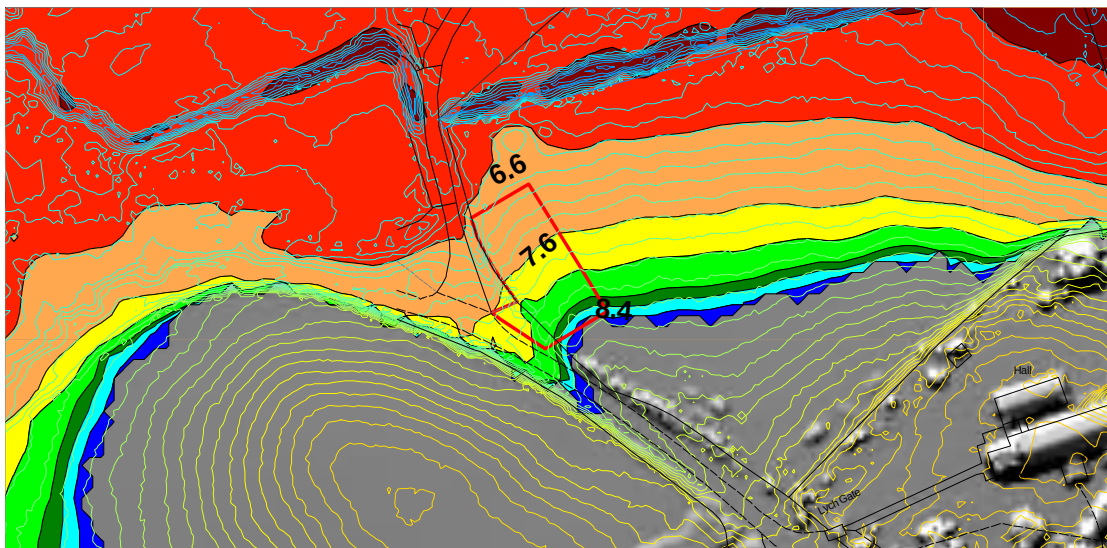


Figure 3.6 – Defended Precautionary T1000 Plus 100 Year of Climate Change

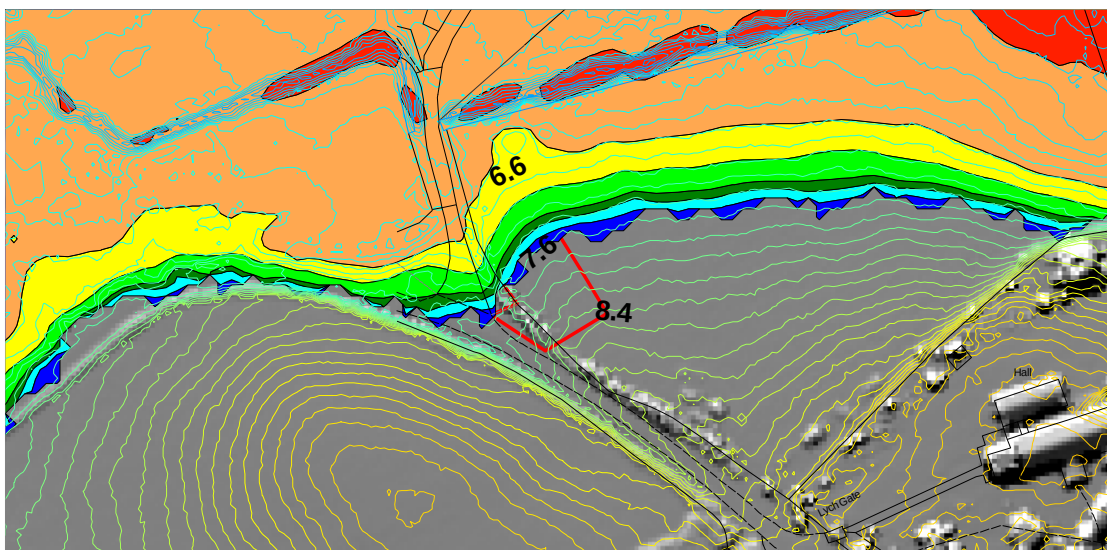


Figure 3.7 – Breached T1000 Plus 100 Year of Climate Change

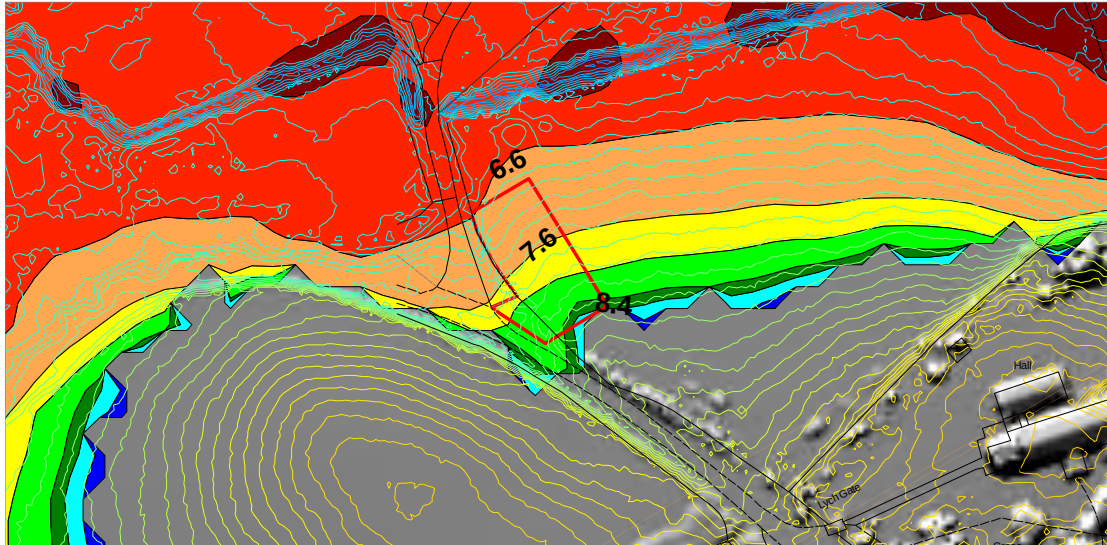


Figure 3.8 – Undefended T200 Plus 100 Year of Climate Change - Depth

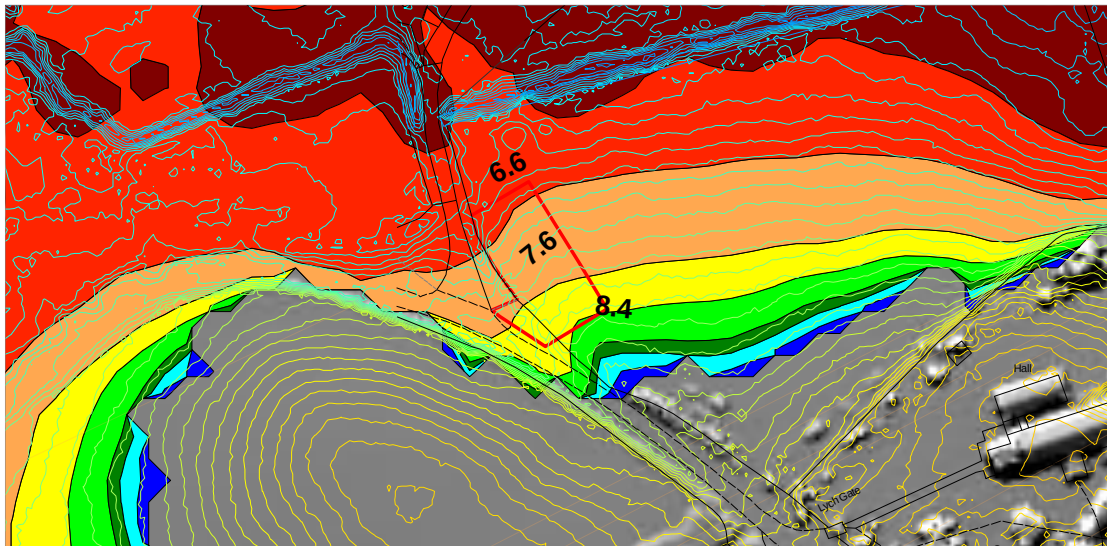
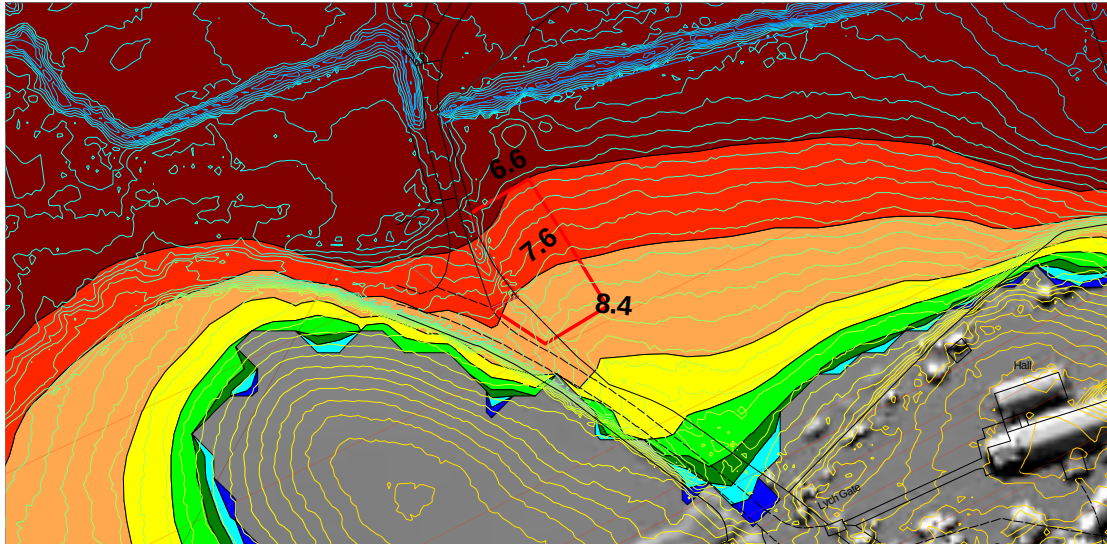
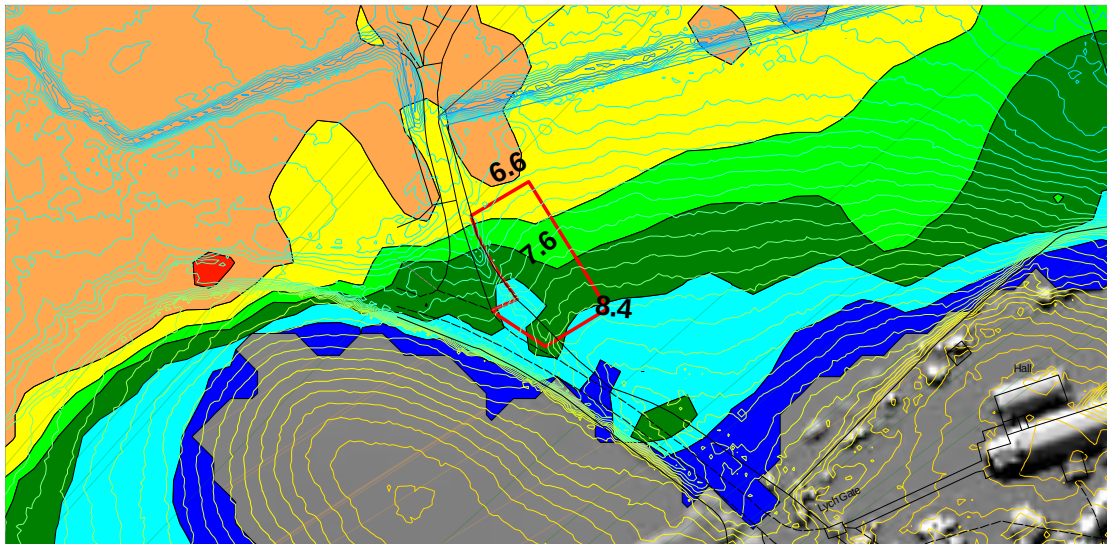


Figure 3.9 – Undefended T1000 Plus 100 Year of Climate Change - Depth



**Figure 3.10 – Undefended Precautionary T200 Plus 100 Year of Climate Change
- Depth**



**Figure 3.11 – Undefended Precautionary T200 Plus 100 Year of Climate Change
- Velocity**

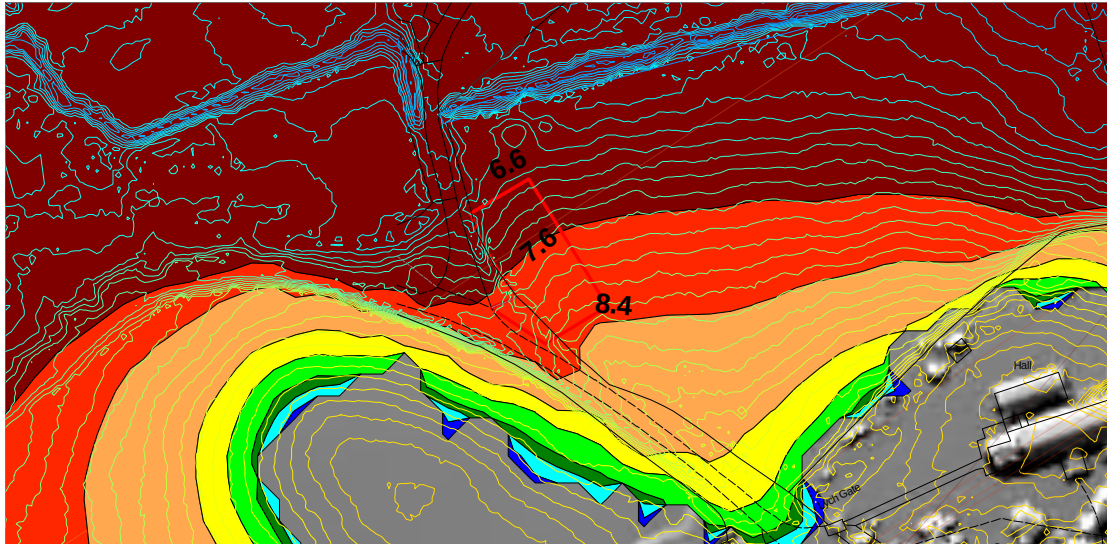


Figure 3.12 – Undefended Precautionary T1000 Plus 100 Year of Climate Change - Depth

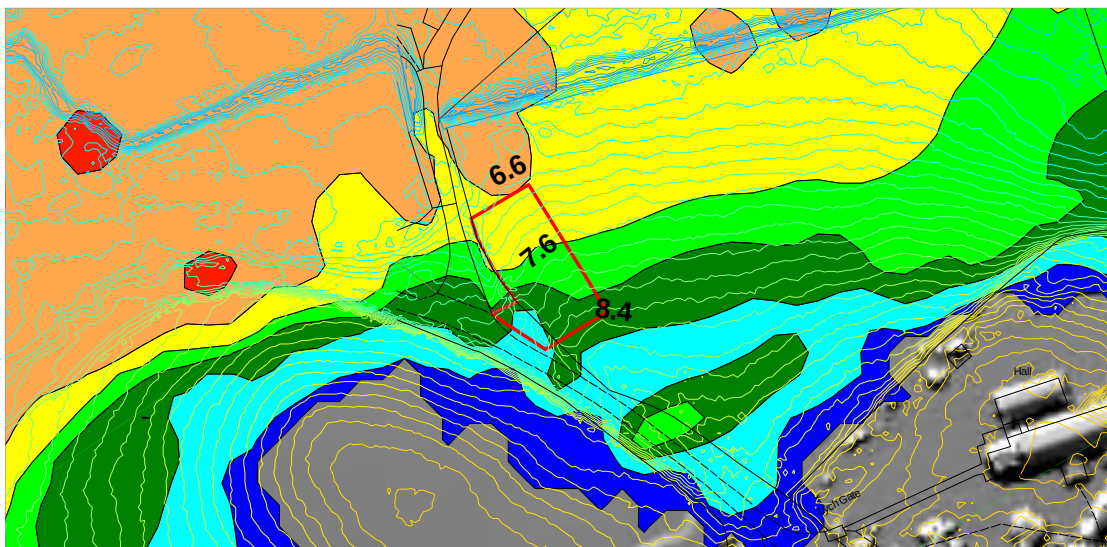


Figure 3.13 – Undefended Precautionary T1000 Plus 100 Year of Climate Change - Velocity

3.3 Surface Water

The surface water and minor watercourse Flood Map For Planning (see Figure 3.14) suggests that the site is not at risk of flooding from surface water flooding. Standard precautionary measures are expected to be sufficient to prevent flooding from this source.

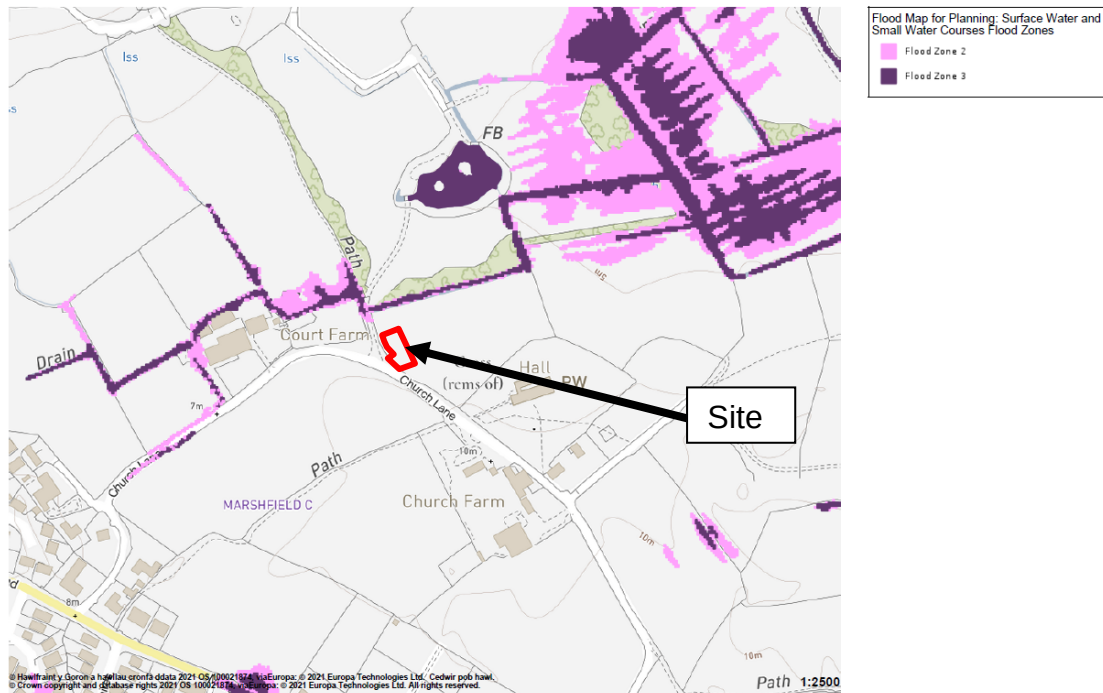


Figure 3.14 – Surface Water Flood Map For Planning

3.4 Sewage Backflow.

If a foul sewer system is proposed, care should be taken to ensure that surface and flood water is not able to flow into the foul sewer system.

3.5 Reservoir Failure

The development is not considered to be at risk from reservoir failure.

3.6 Ground Water

The superficial geology for the area consists of Diamicton from Devensian Till overlaying a bedrock geology of Interbedded Argillaceous Rocks and Sandstone of the St Maughans Formation (see Figure 3.15 and 3.16). When also taking the terrain into account the risk of groundwater flooding is considered to be low.

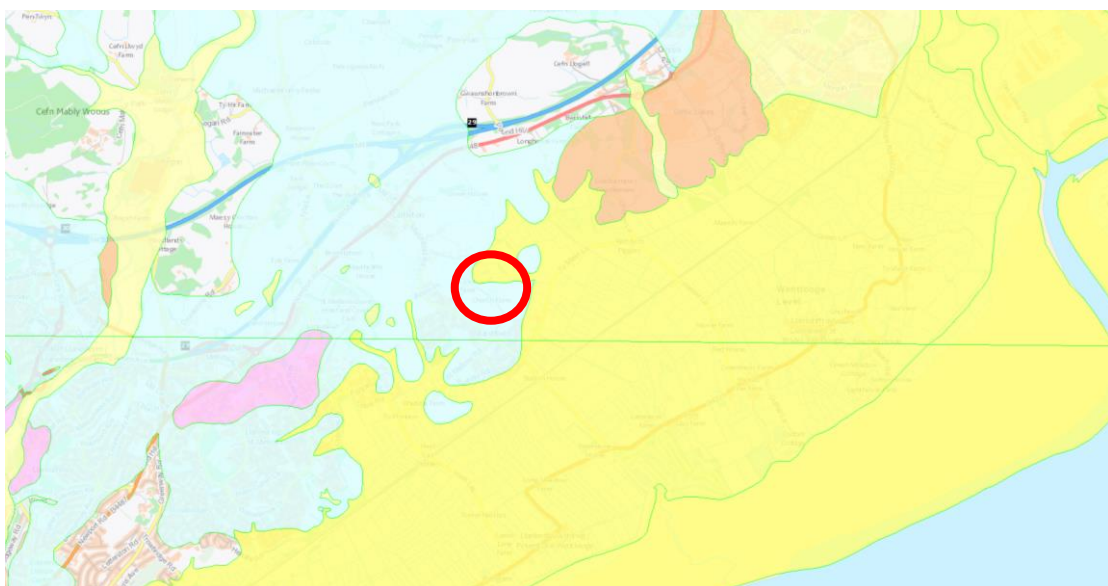


Figure 3.15 – Superficial Geology

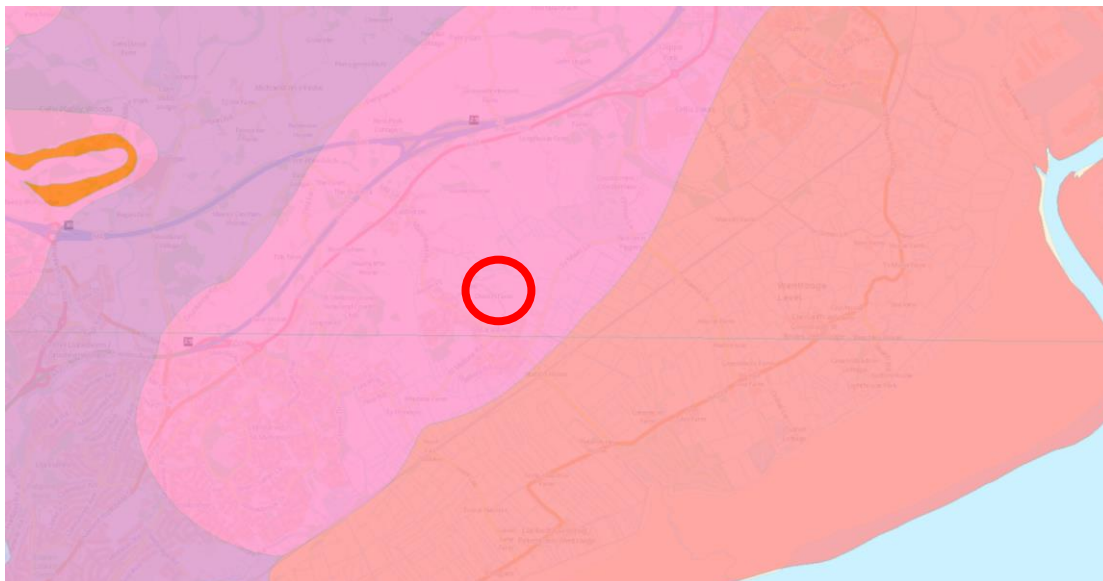


Figure 3.16 – Bedrock Geology

4 SUSTAINABLE DRAINAGE

A sustainable drainage solution, in accordance with the Welsh Government Standards and the SUDS Manual, should be incorporated into the design. SAB approval is also likely to be required which should be confirmed with the local authority.

The rain water falling on the roof of the day room will be stored for use, by means of a water butt, meeting the requirement of level 1 of Welsh Government sustainable drainage standard 1. It is expected that the overflow from the water butts, along with the remaining surfaces, will be dissipated using infiltration solution designed to accommodate the 1 in 100 year event plus climate change. This can be achieved in a number of ways, such as using a permeable surface (eg reinforced gravel) with an appropriate thickness of Type 3 subbase. However, if infiltration is not possible the rainwater will be drained into the nearby watercourse at a greenfield runoff rate with the water being attenuated in a swale. Sediment will be removed from the swale and the catch pit of the flow control chamber as necessary.

Plants can be placed around the perimeter of the compound to help absorb the water, enhance biodiversity and provide an amenity.

The proposed solution, which will need to be designed in detail, can be cost effective to construct and maintain. Appropriate measures will be undertaken during the construction phase, in accordance with the recommendations given in the appropriate Guidance for Pollution Prevention (eg GPP 6 Working at construction and demolition sites) to minimise the risk of polluting the nearby watercourse.

It is important that construction material, such as cement, or even silt, do not impair or damage the integrity of the proposed drainage system. As such the SUDS system quite often will not come online until most of the construction work is completed. This could result in a temporary increase in the rainfall runoff rate, although being temporary it will not have an accumulative effect or be affected by climate change. Considering the size and the location of the development the likely impact will be low. Nevertheless, measures can be taken to reduce the rainfall runoff rate.

It is important also that the rainfall runoff does not wash contaminants from the site to any sensitive receptor. The contaminants could include:

- Silt, from when the ground becomes striped;
- Cement and grout;
- Oils and chemicals from construction materials and from plant;
- Fuel from plant (eg an excavator);
- Non Native Species that currently might be growing on the site;
- Construction waste.

Measures can be taken to minimize the risk as identified in Table 3 below:

Table 3 - Pollution Prevention Tasks	
Ref	Action
1	Where necessary place sandbags along the boundary of the site to help prevent silt from washing from the site into the road.
2	Ground is not to be stripped during periods of heavy rainfall.
3	All soil heaps to be covered.
4	The adjacent road will be monitored and, if necessary, periodically swept clean.

5	Grout/cement/concrete to be mixed in a designated location where the ground is protected.
6	Any waste to be disposed of in an appropriate receptor (eg skip) and taken off site to a licenced tip.
7	Used water, from washing tools used in working with cement (eg trowels) to be disposed of off site.
8	Where possible all chemicals will be stored off site. Any chemicals stored on site will be securely kept in a waterproof area and bunded where appropriate (eg using a hazardous substance storage cabinets).
9	Any cement kept on site will be stored in a secure waterproof area.
10	Ground protection will be present where chemicals are to be used and any spills are to be cleaned immediately using spill kits stored on site.
11	Site staff to be trained to use the spill kits.
12	Where possible plant will be fuelled off site. If this is not possible plant should be refuelled in a designated area where the ground is protected.
13	Prior to starting on site all workers will receive an induction training and advised of the chemicals used on site, where they are stored, pollution prevention measures to adopt, where the spill kits are stored and how to use them.
14	A waste minimisation audit will be undertaken prior to commencement on site. Where possible any residual waste will be recycled. All waste, however, will be cleaned immediately and placed in a covered collection receptor (eg a skip) and removed from site regularly.
15	Pollution incident response plan is prepared in accordance with current best practice (GGP21). An incident that could threaten the environment should be reported to NRW immediately on 0300 065 3000 (24hrs) .

5 FLOOD RESILIENCE

Section 3 indicates that the development could be at risk from tidal flooding should the tidal defences fail or be removed. Flooding can result in the need for expensive repairs. As well as the direct damage caused to the stables flooding can impact in many other, and possibly more stressful, ways. The inconvenience of cleaning up a site, and the loss of shelter and potential the loss of valuable animals can be immeasurable. There are methods, however, to limit and mitigate against the consequence of flood damage. Some of these are discussed in this section and should be considered as part of the development where applicable.

Water can enter a building:

- Around the edges of closed doors;
- Through airbricks;
- Backflow through overloaded sewers;
- Seepage through walls especially cracks;
- Seepage through the ground;
- Around cable / services entrance into the building.

Dryproofing - Preventing the water from entering the building.

In the first instance it is possible to take measures to prevent the ingress of water (dryproof).

- There are several propriety barriers available, however, these can be expensive.
- Providing temporary covers to any low air vents. These covers should be removed once the risk of flooding is over.
- Erecting a temporary barrier in front of any external doors of the buildings or installing flood protection doors;
- Installing a valve allowing the sewer system to be shut preventing any back flow.

With the defences in place the site is expected to remain flood free, however, should the defences fail the water depth would be unsafe and the above dry proofing measures will be unrealistic. Consideration could, however, be given to relocate the stables to higher land adjacent to the church.

Wetproofing – Limiting the damage once water has entered a building.

It may not be feasible to eliminate the risk of flooding, however, it is possible to limit the damage that the water can cause once in the stables (wetproof). Where appropriate the following could be considered:

- Move valuable items to a higher level;
- Have solid concrete floors.;
- Use block construction with water resistant render for walls;
- Use non water absorbing insulation if required;
- Use corrosion resistant fittings such as galvanised or stainless steel;
- Ensure that, if installed, the electric cables are fed from above with the sockets kept high;
- Use an appropriate damp proof course;
- Consider freestanding movable equipment;
- Install solid doors effectively sealed.

A flood response plan could be prepared and regularly maintained. All future owners and visitors of the stables should be made aware of the flood risk and what actions

are to be undertaken during an event, such as evacuating the horses to higher land. It is important to also have as much warning as possible to allow the flood response plan to be followed safely. This can be achieved by registering on the flood warning scheme provided by NRW (see Figure 5.1).

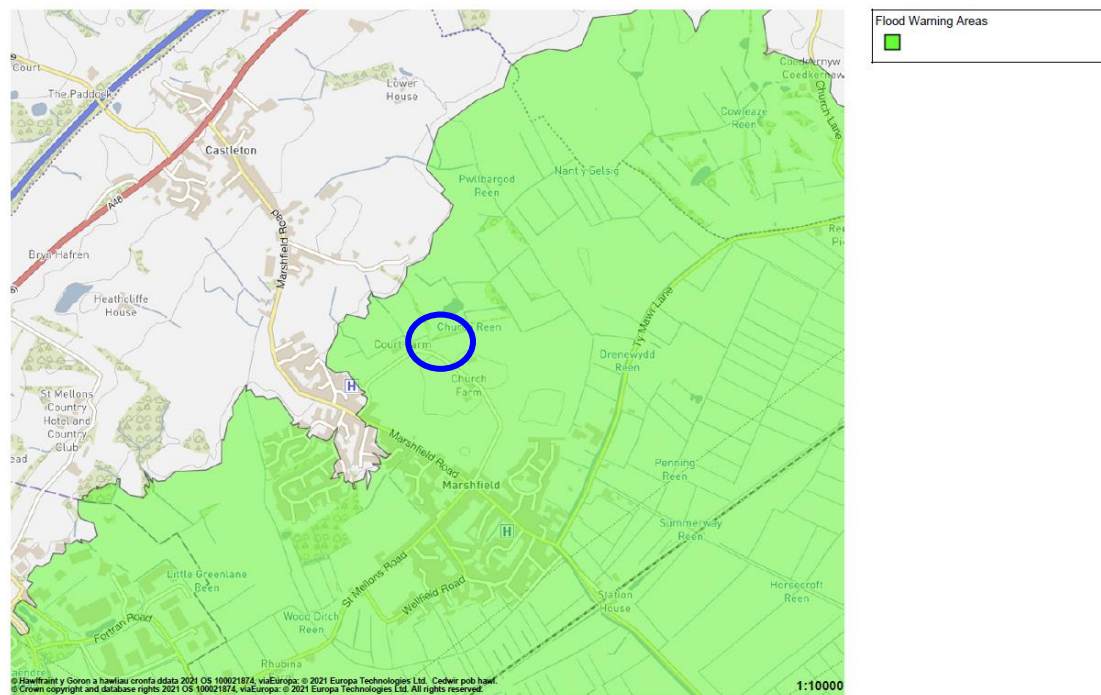


Figure 5.1 – NRW Flood Warning Area

It should be noted, however, that the site is only considered to be at risk if the tidal defences are removed which is an unlikely scenario, or during a precautionary T1000 tidal event.

A flood response plan should be prepared for the development. All visitors should be made aware of the flood risk and what actions to take during an event (eg using signs). It is important to also have as much warning as possible to allow the flood response plan to be followed safely. If available, this can be achieved by registering on the flood warning scheme provided by NRW.

Flood Response

Although the site is expected to remain flood free during both the T200 and T1000 events, assuming 100 years of sea level rise, it, potentially, could be at risk should the defences be breached or if we consider the precautionary T1000 event.

The stables will subscribe to the Natural Resources Wales flood warning scheme, which uses the latest technology 24 hours a day to monitor rainfall, river levels and sea conditions. Combined with weather data and tidal reports from the Met Office, they can provide local area forecasts on the possibility of flooding and its likely severity.

Four different kinds of flood warning codes are issued. Three of the codes indicate the severity of the warning, and a fourth is an 'all clear', meaning the threat has passed. NRW ensure warnings are broadcasted on local radio and television, and information can also be obtained through their dedicated Floodline information

service (0345 988 1188) or on their website, which is updated regularly when there is a flood risk.

The amount of warning that can be expected prior to an event depends on the source of the floodwater. A few days warning could be provided before a tidal event while only a few hours (or less) can be expected during a fluvial or surface water event. In some circumstances it may not be possible to provide a warning. In this instance as the main source of potential flooding is tidal a reasonable evacuation period is anticipated (days or less can be expected should the defences fail catastrophically).

The owners will designate one person to act as a Flood Warden (the name is not important, but it will be the person in charge of making flood related decisions particularly during an event). Others with an interest in the land and the stables will be made aware who this person is and will be made aware of the risk of flooding and the procedures in place in the event of a warning being received.

On arriving on site visitors will be made aware, via a notice, of the risk of tidal flooding at the site (simple signage). When necessary, they will also be made aware of the procedures that are in place, and should be followed, if a warning is issued.

On receipt of a flood warning from NRW, interested parties will be made aware that a warning has been issued and its severity. A decision will be made on whether to evacuate the animals to a safe location away from the area or to remain on site. The field gate will be opened, and the animals will be guided to the higher land near the church where food and clean water will be provided. All utilities at the stables will be switched off at the mains (electricity, water etc). People should evacuate the area once the horses have been made safe. No person will be allowed to return to the site until after the "all clear" has been given by NRW.

If, for whatever reason, water is seen to flow onto the adjacent road preventing a flood free access route then all should retreat to the higher land near the church or the church itself for people, which is expected to remain flood free during all considered events, and stay until the flooding has dissipated. An emergency flood kit will be kept in the stables and maintained on a regular basis. The kit will include a torch, radio, food, water and a first aid kit.

A clear plan, showing the flood response procedure, is to be kept in a prominent position. The plan will be accessible to all to make them aware that the area is in a flood risk zone and what procedures are in place to safely evacuate the site.

This plan is to be reviewed as necessary, but at least annually, and is to be kept in good order

Evacuation Route

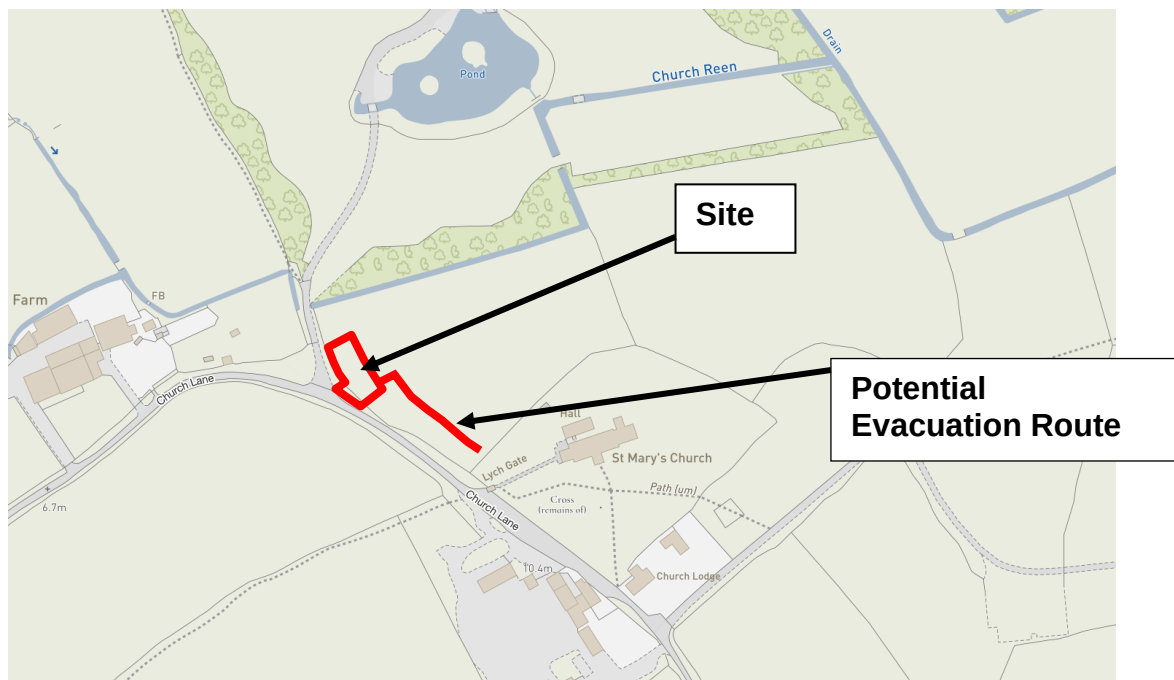


Figure 5.2 – Potential Emergency Evacuation Route

Flood response instructions

1 When a flood warning is issued to these premises, please advise the Flood Warden as named below:

Flood Warden _____

Work Hours Tel. _____

Out of Office Tel. _____

2 Ensure all present at the stable or with an interest in the stable are aware that a flood warning has been issued, by Natural Resources Wales.

3 A decision is made by the Flood Warden whether time is available to evacuate the horses away from the area.

4 If the horses are to remain, the stables and the gate into the adjacent field should be opened and the horses led to higher land where food and clean water will be provided.

5 Prior to evacuating the site, all utilities are to be switched off.

6 People should evacuate from the area.

6 In the event that flood water is seen on the highway, refuge should be sought on higher land adjacent to the church, or at the church, until the flood waters have dissipated.

7 Once evacuated, do not re-enter the area until instructed, by the recognised authority, that it is safe to do so.

6 CONCLUSIONS AND RECOMMENDATION

Conclusions

The client wishes to develop stables on land near to St Mary's Church, Marshfield, Newport. The site, however, lies in a defended Zone 3 flood area, as shown on the Flood Map For Planning, and potentially could be at risk of flooding during a 1 in 200 year event with 100 years of sea level rise, should the defences fail. Francis Sant were, therefore, asked to undertake a Flood Consequence Assessment to evaluate the risk to the Less Vulnerable Development.

Even with 100 years of climate change the site is not at risk from fluvial or surface water flooding. In addition, the site is also not expected to be at risk from reservoir failure and the risk of ground water flooding is considered to be low.

A TUFLOW 2D model showed that, with the defences in place, the site is considered to be flood free during both the T200 and the T1000 events, even with 100 years of sea level rise taken into consideration. However, should the defences be breached or if the anticipated flood levels be exceeded, the stable could be affected with flood depth of up to 2m during a precautionary T1000 event. If the defences are removed flood depths of up to 2.0m and 2.4m can be expected during a T200 and T1000 events (with climate change) respectively. Precautionary, these levels could be increased to up to 3.0m and 3.8m respectively with a corresponding velocity of up to 1m/s.

Considering the distance to the open coastline the development will not be affected by direct wave action and, as the risk is tidal, a long warning period is expected if it becomes necessary to evacuate the site. A Flood Response Plan should be prepared to facilitate this. If necessary, a safe place of refuge can be obtained for the animals on higher land, towards the church, in the adjacent field. A flood free place of refuge is available in the nearby church for any person unable to evacuate prior to an event.

A sustainable drainage solution, in accordance with the Welsh Government Standards and the SUDS Manual, should be incorporated into the design. SAB approval may also be required which should be confirmed with the local authority.

A summary of the schemes compliance with TAN 15 is provided in Table 6.1.

Table 6.1 – Compliance With Tan15		
Ref	Criteria	
	What Zone does the development lie in?	Defended Zone 3
	Vulnerability of the development?	Less vulnerable
	Is the development located on greenfield or developed land?	Greenfield Land
	Is the development flood free during a 1 in 100 fluvial or 1 in 200 tidal events?	Yes while defended
	Is the flood depth less than 600mm during a 1 in 1000 year event?	Yes while defended
	Is the velocity expected to be less than 0.15 for a highly vulnerable development or less than 0.3 for a less vulnerable development during a 1 in 1000 year event?	Yes while defended
	Is there a safe access route?	Yes while defended and a safe refuge when not defended
	Is the development at risk from costal erosion?	No
	Is the development in a defended zone?	Yes
	Is there a record of a previous flood event?	No
	What is the flood hazard for the development?	Very Low
	Does the development have a detrimental impact on third parties' risk of flooding?	No

Recommendations

In developing the site, it is recommended that:

- flood proofing measures, as identified in Section 4, should be considered for inclusion in the scheme;
- consideration should be given for the inclusion of a non return valve on the foul sewer system;
- a sustainable drainage system should be included in the design;
- SAB approval should be applied for if required;
- the site is registered on the flood warning scheme provided by NRW, if available;
- a flood response plan is prepared, maintained and effectively disseminated to all future occupiers of the development.