

Laurel Farm, Pilning Street,
Pilning, Bristol BS35 4HN

Change of Use of Barns for Residential Purposes

Flood Risk Assessment

5th March 2024 V3



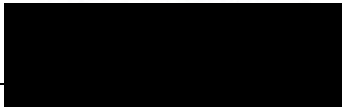
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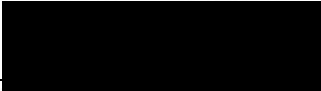
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1.0 Introduction

Mr A Williams proposes to change the use of existing substantial barns at Laurel Farm, Pilning, to form a single residential unit.

According to the Environment Agency's (EA's) Flood Risk Map for Planning the site is located in Flood Zone 3 on land which is defended by the Severn Estuary coastal defences. These defences are currently being improved by the EA, Bristol City Council (BCC) and South Gloucestershire Council (SGC) as part of the Avonmouth and Severnside Enterprise Area (ASEA). The purpose of these improvements is to significantly reduce flood risk to developed areas including Pilning, and to enable commercial development and employment in the defended area.

The proposals involve change of use with no changes to the external envelope form of the buildings, so the proposals are not required to pass the Sequential Test or Exception Test, but a planning application must be accompanied by a site-specific Flood Risk Assessment (FRA), in accordance with Paragraph 168 of the National Planning Policy Framework (NPPF).

Edenvale Young Associates Ltd (EYV) has been appointed to prepare this FRA to show that the development will be safe for its lifetime without increasing flood risk elsewhere.

This revision V2 of the FRA follows the EA's planning consultation response dated 6th February 2024 which objects to the development and following clarification EA explains that Upper End change allowance should be included (now included) and advice that 'some form of flood resilience measures' be introduced. These are now included in the design and as such the objections are overcome.

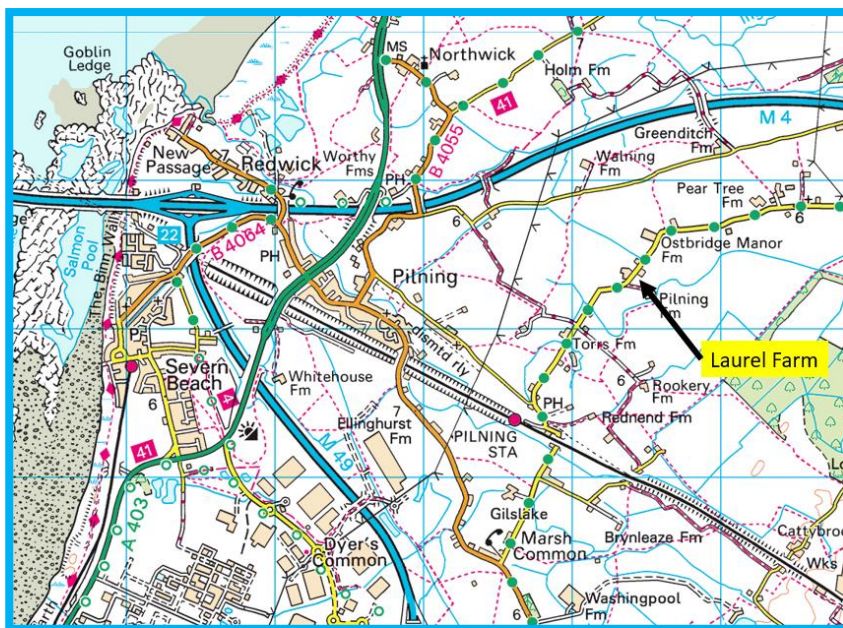


Figure 1 Site location (Streetmap).

2.0 Site Location and Setting

The site is located at Laurel Farm, Pilning Street, Pilning, Bristol BS35 4HN, 2.6km east of the Severn Estuary defences, and 1.5km east of Pilning in the following setting:

- To the north are two neighbouring farms and open fields drained by rhines, leading to the M4 which is on embankment. Pilning Street leads north and has main ditches on both sides.
- To the east are more farms and low-lying farmland leading to high ground some 2km east of the site and Almondsbury.
- To the south is a main ditch adjacent the site with further farms within farmland drained by rhines on land leading to the main Bristol Parkway to South Wales railway line and Pilning Station. Main ditches follow Pilning Street to the south.
- To the west the farmland runs into the village of Pilning, leading to the M4 and M32 motorways on embankment and the railway line leading into cutting for the tunnel under the Severn Estuary. The coastal defences being improved by the EA are 2.6km to the west.

Laurel Farm is therefore located within low-lying well drained farmland, 1.6km to the east of Pilning village.

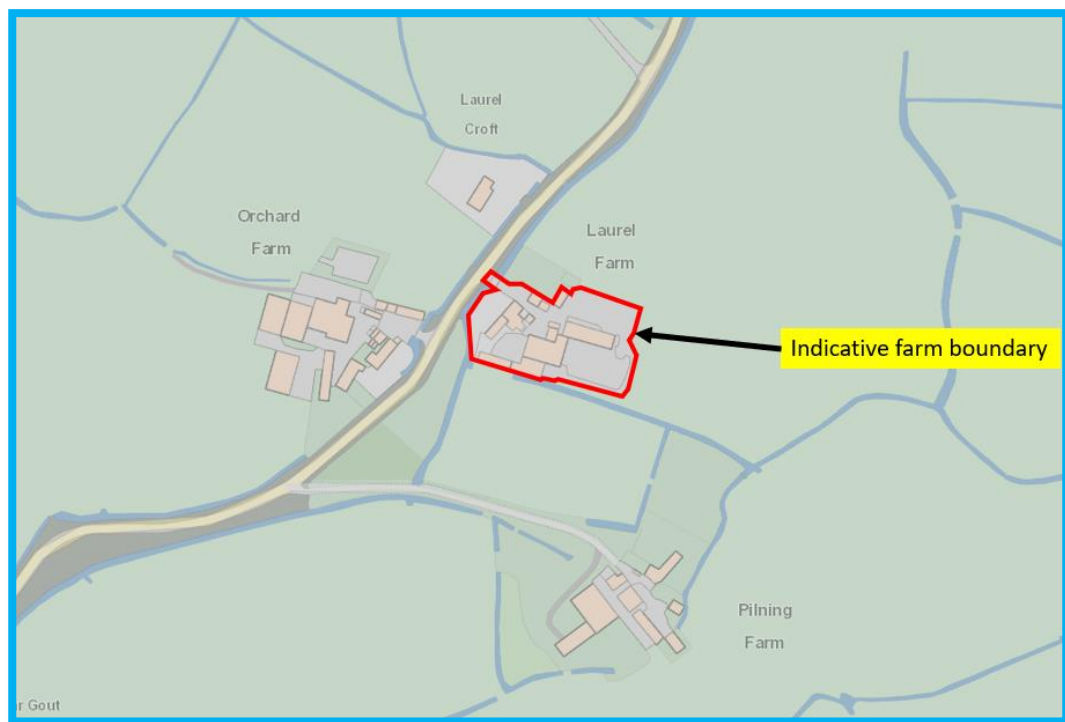


Figure 2 Closer view with indicative farm outline on Bristol Know Your Place.

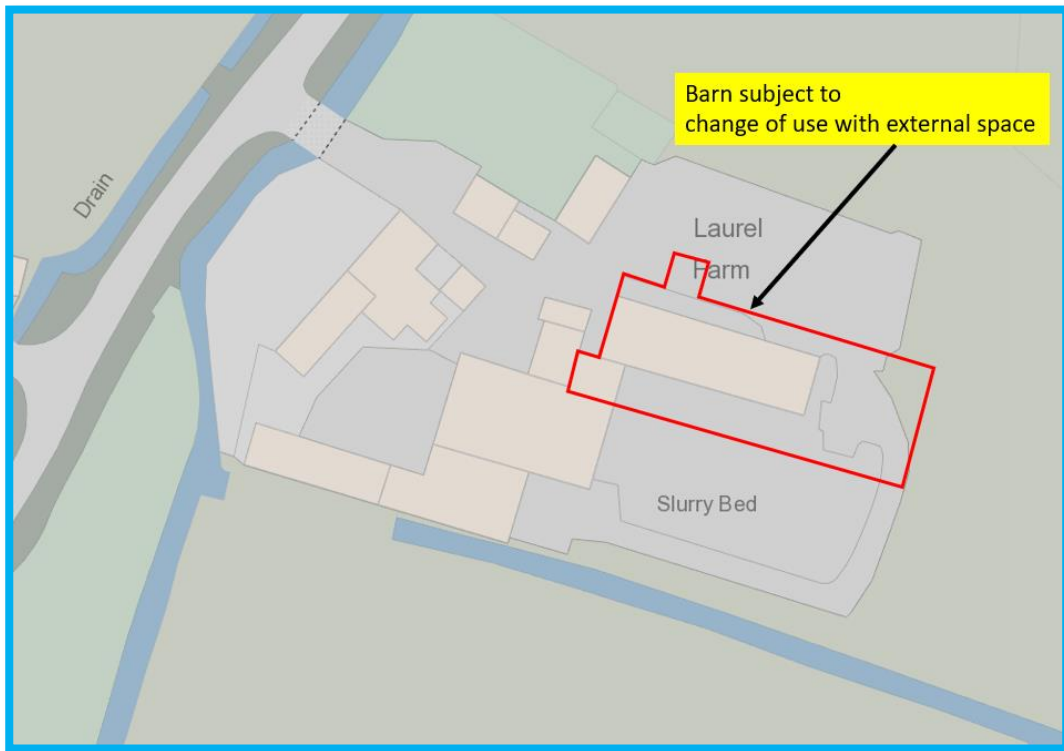


Figure 3 View of Laurel Farm with proposed barn for change of use in red outline (Bristol Know Your Place).



Figure 4 Oblique view of site (looking south) showing general outline of farm building for change of use (Google Earth).

A detailed topographic survey was undertaken by Expanse Surveys on 7th September 2023 and is copied below with key levels annotated.

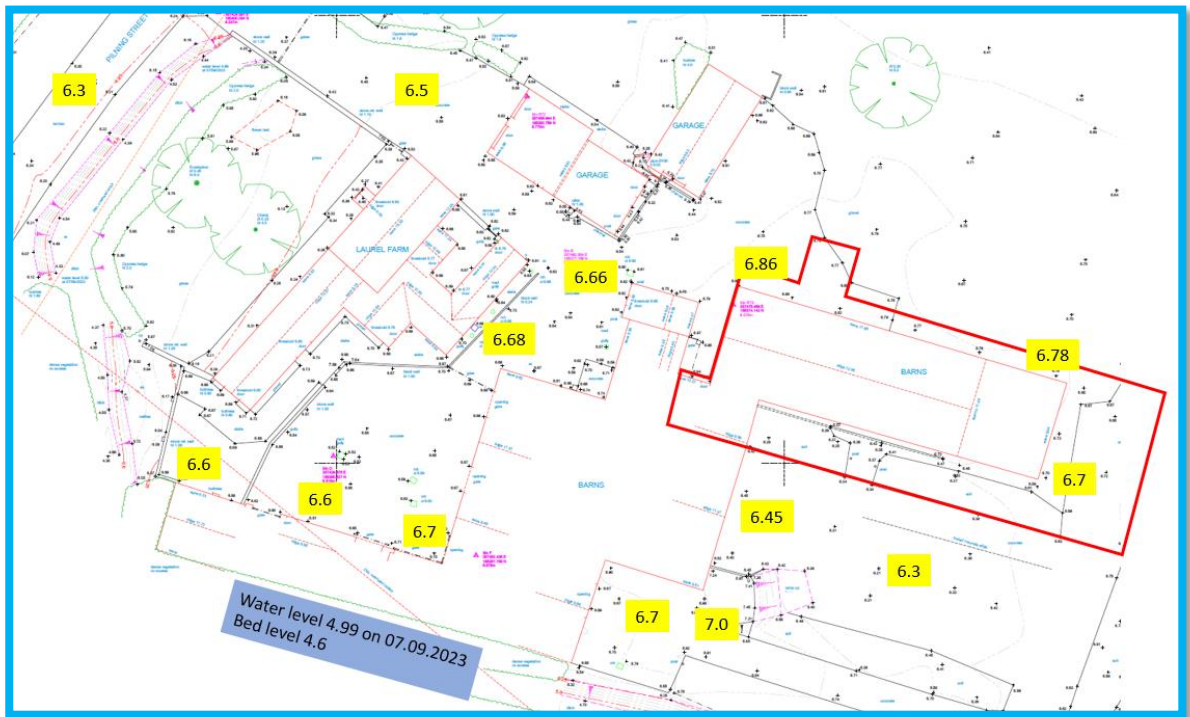


Figure 5 Topographic survey with key levels annotated to m AOD, including rhine along south of site. Existing floor of the barn is generally at 6.7m AOD.

3.0 Proposed Development

The proposal is to change the use of some of the existing barn to form a single residential unit which will remain as part of the existing ownership, ie not sold off. The residential unit will be double storey.

The ground floor level will be raised by 100mm to 6.8m AOD, this will allow for insulation. First floor level will be 9.5m AOD.

Flood resilience construction techniques will be included up to 7.4m AOD (and the construction materials up to ceiling level of the ground floor) as a precautionary measure and as advised by the EA.

Parking will be located on the existing concrete yard, and marked out accordingly

There are no proposals for external works, level changes, etc,

There are no reports of nuisance from rainwater in the area, so rainwater management will continue as existing.

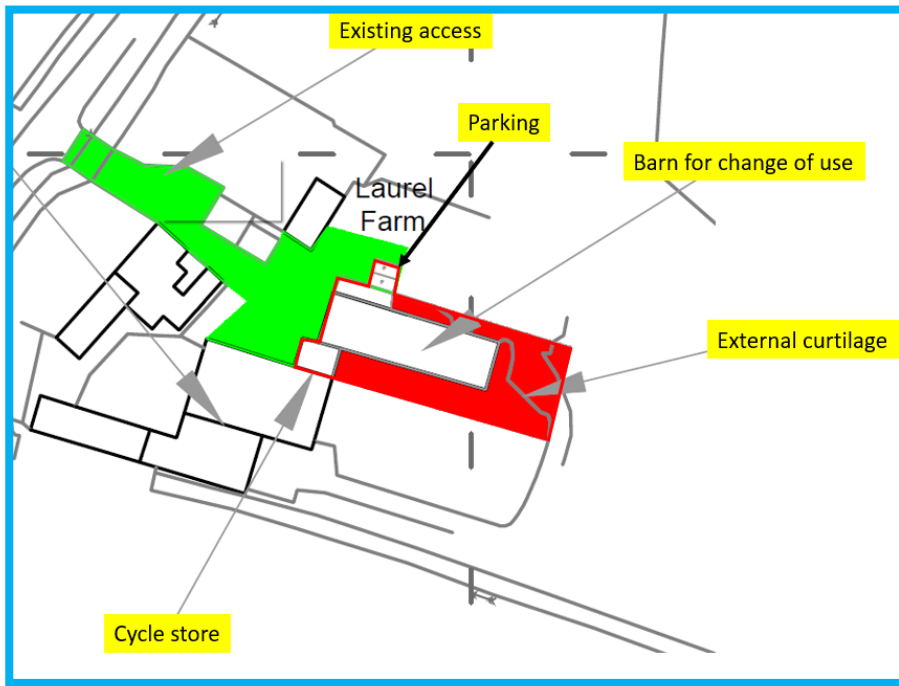


Figure 6 Overlay of proposed unit with parking.

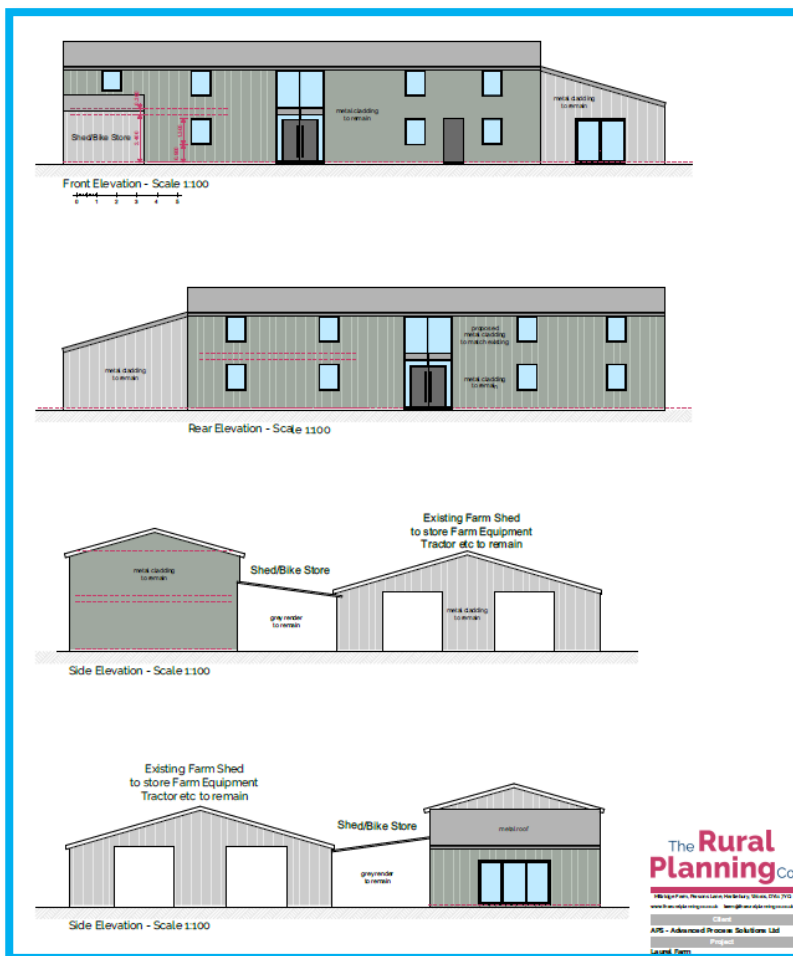


Figure 7 Building elevations showing 2 storeys.

4.0 Flood Risk

4.1 Tidal Flood Risk

Laurel Farm is shown to be in tidal Flood Zone 3, at high risk of flooding, according to the EA Flood Risk Map for Planning, but defended by the existing coastal EA defences. The site is some 2.6km east of the defences, and 1.5km east of the village of Pilning.

The site is also east of the M4 and M49 which are on embankment, and the main railway line which is protected from flooding entering the Severn Tunnel.

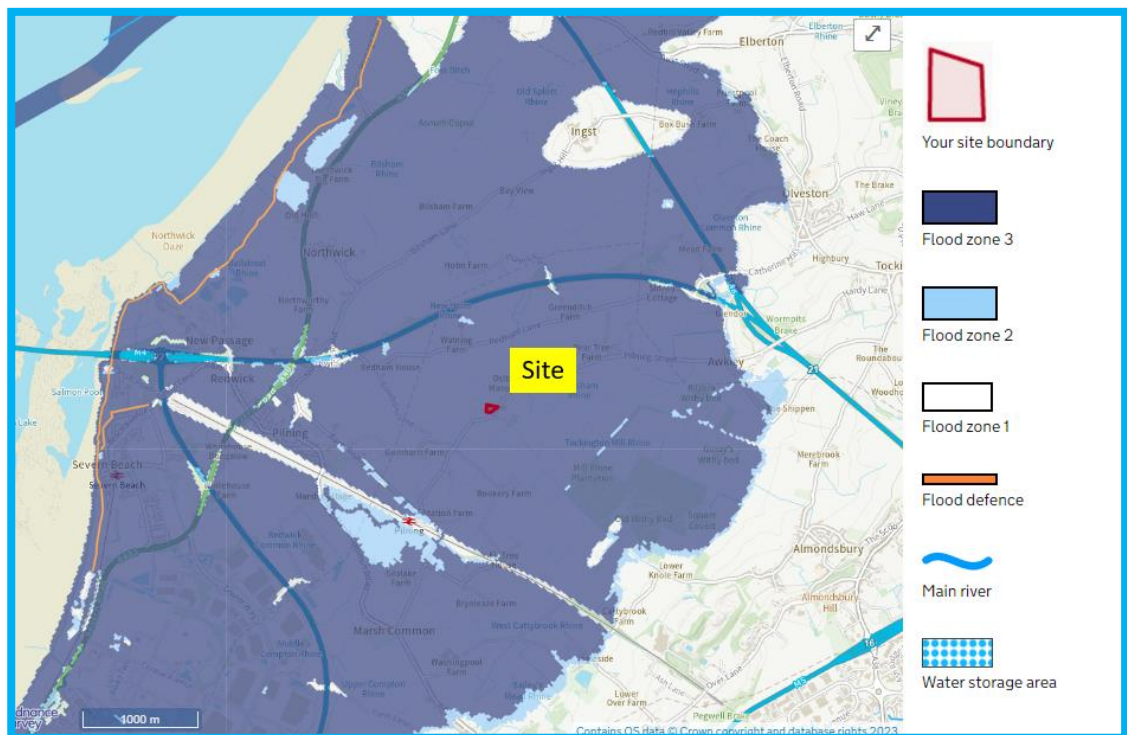


Figure 8 Location of site on EA current Flood Risk Map for Planning, showing defences, M4, M49 and railway which provide additional obstructions to overland flow.

The EA is undertaking improvements to the coastal defences as part of their ASEA works, which are now mostly complete. Consultations have been held with EA Officers responsible for the works and the coastal flood modelling following completion of the works. The updating of the initial modelling has not yet been completed (it is overdue), and the updated modelling will include the flood risk in 2125. However, the predicted flood levels have been supplied by the EA in response to a Product 4 site specific flood data request (EA Ref: 320303-WX 10th August 2023) for 2098. This information shows that in the 1 in 200 year flood event in 2098 the site is predicted to be safe from flooding, based on the node level.

Residential development is categorised as More Vulnerable according to Annex 3 of the National Planning Policy Framework and the Higher Central climate change allowance applies in tidal risk areas. According to the EA Climate Change Guidance an allowance of 13.1mm sea level rise/year over 25 years from 2098 to 2025 gives a predicted precautionary figure of 0.353m.

The EA has taken the site level as 5.84m AOD, so adding 0.353m gives a Design Flood Level (DFL) of 6.19m AOD. The proposed floor levels are therefore safely above this predicted flood level at 6.8m AOD, 0.1m above the existing floor levels, thus reducing the risk of flooding within the buildings.

Post Development 2098 (new defences in place)		
Post Development 2098 0.5% (1 in 200 year) AEP Depth	0.00m	Depth
Post Development 2098 0.1% (1 in 1000 year) AEP Depth	2.00m	Depth
Post Development 2098 0.5% (1 in 200 year) AEP Level	0.00mAOD	Level
Post Development 2098 0.1% (1 in 1000 year) AEP Level	7.84mAOD	Level

Note this shows that the EA has taken existing ground level at 5.84m AOD

Post Development Breach of new defences 2098		
Post Development 2098 0.5% (1 in 200 year) AEP Depth (Breach Composite)	0.00m	Depth

No breach effect at 5.84m AOD

N.B. Levels and depths have been extracted based upon the site boundary plan provided.

Figure 9 EA Product 4 response showing ground level at their measurement node at 5.84m AOD and therefore no predicted risk of flooding at site in 2098 1 in 200 year event.



Figure 10 Site area provided to EA for Product 4 data.

4.2 Surface Water Flood Risk.

The area within which Laurel Farm lies is drained by Viewed Rhines managed by the Lower Severn Internal Drainage Board (LSIDB) as land drainage authority for the area.

The main rhines can be seen in Figure 1 and Figure 2, which effectively drain the area with no reported nuisance from flooding.

The EA Low Risk Scenario Surface Water Flooding Map shows no flooding nuisance in the area.

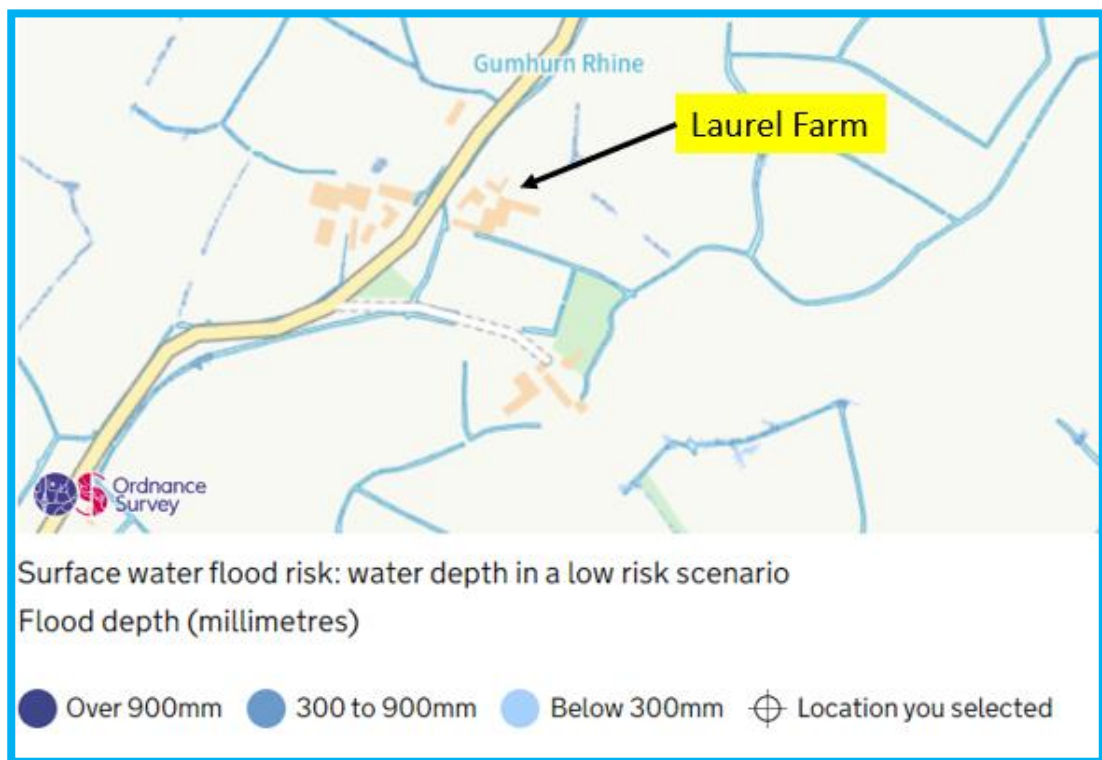


Figure 11 Location of Laurel Farm in the EA Surface Water Flooding Low Risk Scenario showing no predicted nuisance at the site or on the local roads.

The above EA map shows that the site is at very low risk of surface water flooding.

4.3 Other Potential Sources of Flooding

There are no other likely sources of flooding, given that the ground water level is at the rhine water level, and drainage will run by gravity westwards by gravity across the farm into the rhine along Pilning Street.

The EA shows no risk of reservoir flooding in the area.

5.0 Summary of Levels

Table 1 - Summary of Flood Levels

- 5.1.1 The Upper End predicted flood level has been added by referring to the Climate Changes Guidance and adding the simple difference of 0.441m in the guidance to the Higher Central figure.

Location	Levels (m AOD)
Site Levels - Existing	
Perimeter of barns	6.66 – 6.86m AOD
Barn floor level	6.7m AOD
EA interpreted ground level at site	5.84m AOD
Pilling Street in vicinity of entrance	6.3m AOD
Proposed levels	
Proposed floor ground floor	6.8m AOD
Proposed first floor	9.5m AOD
External levels	As existing
Proposed flood resilience level	7.4m AOD
Predicted flood levels post ASEA	
0.5% (1 in 200 year) Predicted flood level in 2098	Does not reach site
0.5% + Higher Central climate change allowance in 2125 (EA ground level + sea level rise)	
Precautionary DFL	6.19m AOD
0.5% Upper End 2125 flood level	6.60m AOD
0.1% (1 in 1000 year) predicted flood level 2098	7.84m AOD
0.5% (1 in 200 year) Breach Composition 2098	Does not reach site
Predicted breach scenario level at site in 2125 – say add precautionary 600mmm to 5.84m AOD	6.64m AOD

6.0 Safety

The site is shown to be safely above the 1 in 200 year flood level in 2098 and the predicted level in the event of a breach in the defences 2098.

By adding climate change allowances in accordance with the EA's guidance (Higher Central), the increase in predicted flood level is 0.353m.

The topographic survey shows Pilning Street at the site entrance to be 6.3m AOD; the proposed floor levels are 0.5m above Pilning Street level and both are above the calculated 2125 1 in 200 year predicted flood level of 6.19m AOD (DFL).

In a breach event, in a 1 in 200 year event in 2098 and in 2125 the building floor level is shown to be above the EA's predicted breach scenario flood levels.

The site is therefore safe in the DFL and in the breach scenario in 2125 and no safe refuge etc is required. However, a first floor is part of the design and can serve as a safe refuge.

7.0 Mitigation

Given that the proposed floor levels, at 6.8m AOD, are 0.63m above the DFL, 0.19m above the Upper End predicted flood level and 0.16m above the estimated breach level in a 0.5% flood event in 2125 the site is shown to be safe above the current predicted flood levels with climate change allowance.

In a more serious event, Laurel Farm has upper floors and Unit 3 has a proposed first floor (at 9.5m AOD) giving significant additional safe refuge provision.

There are no changes to the proposed external levels and the proposal does not impact flood defences, or flood volume (in fact the removal of some small sheds reduces flood risk overall).

The predicted DFL is below the level of Pilning Street and therefore safe access is available.

However, in response to the EA's consultation response and a follow up clarification email it is proposed to provide flood resilience to a minimum of 600mm above the floor level, ie 7.4m AOD.

In reality the wall coverings and dividing walls will be uniform up to the first floor, providing fabric flood resilience up to about 9.2m AOD. This will allow quick return to the property after a flood, without the need for building works.

The heating facility and sockets will be raised above 7.4m AOD or higher.

This mitigation responds to the advice from the EA which states *'Therefore, given these uncertainties, we advise that further consideration be given in the FRA to including some flood risk mitigation in the ground floor construction, in the form of flood resilient measures. We do acknowledge that the proposed development has an upper floor 'safe refuge'*.

8.0 Conclusions and Recommendations

An existing barn at Laurel Farm, Pilning, which is 2.6km from the sea defences, is proposed for change of use to form a single, 2-storey residential unit ancillary to the Farm.

The proposals will not be change the shape of the barn

The site is shown to be in Flood Zone 3 on the current EA Flood Risk Map for Planning which ignores the defences and shows current day flood risk.

However, the flood defences provide improved protection (the site is 'defended') and the defences in this area are being upgraded as part of the ASEA project, which is largely complete.

Assessment of the EA site-specific predicted flood levels with the defences or in the event of a breach show that the proposed residential unit is safely above the predicted flood levels and provides addition a protection with the upper floor providing a safe refuge.

Furthermore, in response to the EA's consultation response dated 6th February 2024, a preliminary clarification was sought, and in response to the EA's advice 600mm of flood resilience has been introduced, which in the fabric will extend to first floor. This will enable rapid return to use after a flood. The EA's objection is consequently overcome.

The site is therefore shown to be safe for the lifetime of the development without increasing flood risk off-site and therefore complies with the requirements of the NPPF.

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