



Flood Consequence Assessment AEG0603_SA8_Swansea_07

Lb Group

Site Address: 6 James Street
Pontardawe
Swansea
SA8 4LR

**UK Experts in Flood Modelling, Flood
Consequence Assessments, and Surface Water
Drainage Strategies**



Document Issue Record

Project: Flood Consequence Assessment

Prepared for: Lb Group

Reference: AEG0603_SA8_Swansea_07

Site Location: 6 James Street, Pontardawe, Swansea, SA8 4LR

Consultant		Date	Signature
Author	Oliver Manston	31/08/2022	
Document Check	Kirsty Tolson	07/09/2022	
Authorisation	Nick Darling-Drewett	05/09/2022	

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Summary

Development Description	Existing	Proposed
Development Type	Public House	Residential Apartments
EA Vulnerability Classification	Highly Vulnerable (Public Building)	Highly Vulnerable (Residential Dwelling)
Ground Levels	Between approximately 37.89m AOD and 39.91m AOD based on 1m LiDAR for the site. Within the proposed footprint boundary, the ground levels vary between 37.95m AOD and 38.50m AOD.	Finished Floor Levels (FFLs) will be set no lower than the 1 in 200 year event (as the 1.0% AEP +CC proxy) flood level of 38.36m AOD as shown on the development plans in Appendix B. The existing FFLs range between 38.16m AOD and 38.31m AOD at the ground floor.
Level of Sleeping Accommodation	First Floor	Ground Floor and First Floor
Impermeable Surface Area	Approximately 430m ²	No change.
Surface Water Drainage	N/A ¹	Surface Water Drainage Strategy recommended
Site Size	Approximately 430m ²	No change
Risk to Development	Summary	Comment
NRW Advice Zone	C2	Areas of the floodplain without significant flood defence infrastructure.
Flood Source	Fluvial	Upper Clydach River
SFCA Available	Yes – Neath Port Talbot County Borough Council (2014)	
Management Measures	Summary	Comment
Ground floor level above extreme flood levels	N/A	Finished Floor Levels (FFLs) will be set no lower than the 1 in 200 year event (as the 1.0% AEP +CC proxy) flood level of 38.36m AOD as shown on the

		development plans in Appendix B. The existing FFLs range between 38.16m AOD and 38.31m AOD at the ground floor.
Safe Access/Egress Route	N/A	Site owners and tenants should sign up to the NRW Flood Warning Service –Alloy Industrial Estate, health centre and Tawe Terrace, and property adjacent to the Upper Clydach including Herbert Street (Quickdial number 603067). Safe access/egress is understood to be possible to the north on Dynevor Terrace for the 1 in 100 year +CC event.
Flood Resilient Design	Yes	Recommendations suggested in Section 5 of this report.
Site Drainage Plan	N/A	Surface Water Drainage Strategy recommended
Flood Warning & Evacuation Plan	N/A	Tenants and management should sign up to the NRW Flood Warning Service (Alloy Industrial Estate, health centre and Tawe Terrace, and property adjacent to the Upper Clydach including Herbert Street (Quickdial number 603067))
Offsite Impacts	Summary	Comment
Displacement of floodwater	Negligible	As the proposed development is for a change of use with a reduction in overall footprint, as such there should be no significant impact on floodplain storage.
Increase in surface run-off generation	N/A ¹	Surface Water Drainage Strategy recommended
Impact on hydraulic performance of channels	Negligible	No change

¹ not required for this assessment

² data not available.

1. Introduction

- 1.1. Aegaea were commissioned by Lb Group to undertake a Flood Consequence Assessment (FCA) to accompany a full planning application for the proposed development. This FCA has been prepared in accordance with the requirements set out in the Technical Advice Note 15 (TAN15) and Planning Policy Wales.
- 1.2. This FCA is intended to support a full planning application and as such the level of detail included is commensurate and subject to the nature of the proposals.

Site Overview

- 1.3. The site of the proposed development is 6 James Street, Pontardawe, Swansea, SA8 4LR (Figure 1). It is understood that the proposed development is for the conversion of the public house into 6 flats. The proposed development includes a reduction in the building's footprint. Figure 1 shows that the footprint has been reduced from those areas including the proposed and existing footprints, to just those areas marked as the proposed footprint.



Figure 1: Site Location (Source: OpenStreetMaps © Contains public sector information licensed under the Open Government License v3.0)

- 1.4. Natural Resource Wales (NRW) Light Detecting and Ranging (LiDAR) data (1m resolution) was used to review the existing ground levels at the site. Within the site boundary ground levels are

shown to vary between 37.89 meters Above Ordnance Datum (m AOD) and 39.91m AOD (Figure 2). Within the proposed footprint boundary the ground levels vary between 37.95m AOD and 38.50m AOD.

- 1.5. A topographical survey has been provided by the client which confirms that at the threshold level at the ground floor is 38.19m AOD. The survey also gives the cill level at the ground floor which is 39.07m AOD, and the cill levels at the first floor which are 41.86m AOD and 41.92m AOD. The full topographical survey can be found in Appendix A of this report.
- 1.6. The site plans provided (Appendix B), show that the existing FFLs range between 38.16m AOD and 38.31m AOD at the ground floor.

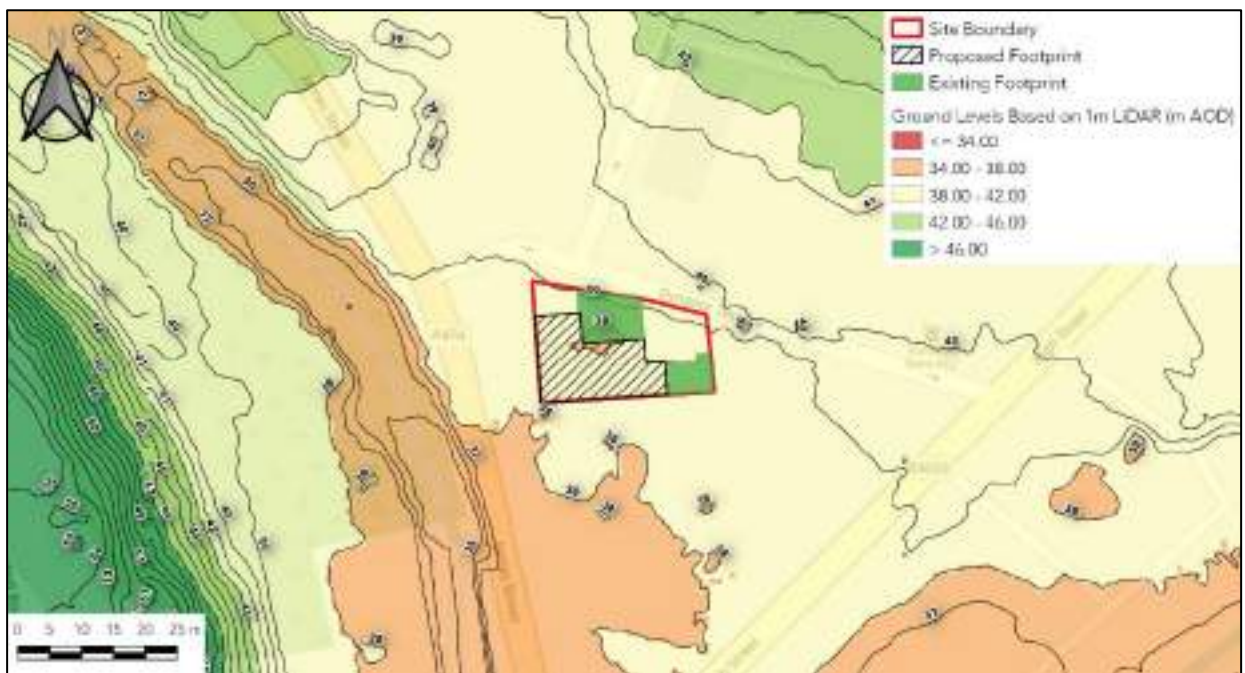


Figure 2: Site Topography

- 1.7. Neath Port Talbot Council is the Local Planning Authority (LPA) for the site, and also the designated Lead Local Flood Authority (LLFA). The site sits within NRW's South West Wales region.

2. Planning Policy and Guidance

- 2.1. Technical Advice Note 15 (TAN15), in conjunction with Planning Policy Wales (PPW) and any local planning documentation forms the basis for assessment of flood risk in Wales and its risk mitigation and development control. For an application to be acceptable, it must pass both a Flood Risk justification test and the assessment/acceptability of flooding consequences tests.

Flood Risk Justification Test

- 2.2. The Flood Risk justification test is undertaken against both the development advice maps (DAM) and the Land Use Vulnerability Classification, provided within TAN15.
- 2.3. The DAM contains 3 zones – A, B and C subdivided into C1 and C2, summarised in Table 1.

Table 1: Development Advice Map Zone Classifications

Description of Zone	Flood Zone	Use within the precautionary framework
Considered to be at little or no risk of fluvial or tidal/coastal flooding.	A	Used to indicate that justification test is not applicable and no need to consider flood risk further.
Areas known to have been flooded in the past evidenced by sedimentary deposits.	B	Used as part of a precautionary approach to indicate where site levels should be checked against the extreme (0.1%) flood level. If site levels are greater than the flood levels used to define adjacent extreme flood outline there is no need to consider flood risk further
Based on Environment Agency extreme flood outline, equal to or greater than 0.1% (river, tidal or coastal)	C	Used to indicate that flooding issues should be considered as an integral part of decision making by the application of the justification test including assessment of consequences.
Areas of the floodplain which are developed and served by significant infrastructure, including flood defences.	C1	Used to indicate that development can take place subject to application of justification test, including acceptability of consequences.

Areas of the floodplain without significant flood defence infrastructure.	C2	Used to indicate that only less vulnerable development should be considered subject to application of justification test, including acceptability of consequences. Emergency services and highly vulnerable development should not be considered.
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- 2.4. Interrogation of the NRW Development Advice Map shows that the proposed site is within Flood Zone C2, described above as areas of the floodplain without significant flood defence infrastructure.
- 2.5. The land use vulnerability classifications are presented in Table 2.

Table 2: TAN15 Vulnerability Classifications

Development Category	Type
Emergency services	hospitals, ambulance stations, fire stations, police stations, coastguard stations, command centres, emergency depots and buildings used to provide emergency shelter in time of flood
Highly vulnerable development	all residential premises (including hotels and caravan parks), public buildings (e.g. schools, libraries, leisure centres), especially vulnerable industrial development (e.g. power stations, chemical plants, incinerators), and waste disposal sites
Less vulnerable development	General industrial, employment, commercial and retail development, transport and utilities infrastructure, car parks, mineral extraction sites and associated processing facilities, excluding waste disposal sites

- 2.6. As the proposed development is for residential dwellings, this would also be classified as highly vulnerable. Residential dwellings (being highly vulnerable) would not normally be deemed justified in Zone C2. However, the existing public house is classed as 'Highly Vulnerable' due to the fact that it is considered a public building. As such, there would be no change in vulnerability classification.

2.7. Paragraph 6.2 of TAN15 states:

New development should be directed away from zone C and towards suitable land in zone A, otherwise to zone B, where river or coastal flooding will be less of an issue. In zone C the tests outlined in sections 6 and 7 will be applied, recognising, however, that highly vulnerable development and Emergency Services in zone C2 should not be permitted. All other new development should only be permitted within zones C1 and C2 if determined by the planning authority to be justified in that location. Development, including transport infrastructure, will only be justified if it can be demonstrated that: -

- i. Its location in zone C is necessary to assist, or be part of, a local authority regeneration initiative or a local authority strategy required to sustain an existing settlement; or,*
- ii. Its location in zone C is necessary to contribute to key employment objectives supported by the local authority, and other key partners, to sustain an existing settlement or region;*

and,

- iii. It concurs with the aims of PPW and meets the definition of previously developed land (PPW fig 2.1); and,*
- iv. The potential consequences of a flooding event for the development have been considered, and in terms of the criteria contained in sections 5 and 7 and appendix 1 found to be acceptable.*

2.8. With regards to Paragraph 6.2 section I and ii of the TAN15, the proposal is for the change of use of the existing public house building to 6 flats. The Neath Port Talbot Local Plan (2016) includes the following policies relating to the provision of new housing within the Borough by 2026.

Policy SP 7 Housing Requirement

In order to deliver the 7,800 new dwellings required to meet the economic-led growth strategy, provision will be made for the development of 8,760 additional dwellings between 2011-2026 including a 12.31% flexibility allowance.

- 2.9. Therefore, the proposed development is contributing towards the needs of a Local Authority strategy to sustain an existing settlement (Port Talbot). Creation of the 6 flats would be meeting the needs of Policy SP 7 mentioned above by helping to contribute to the requirements of the target for new dwellings.
- 2.10. With regards to Paragraph 6.2 section iii of the TAN15, the proposed development is for a change of use and by definition, previously developed.
- 2.11. With regards to Paragraph 6.2 section iv, section 4 of this report will assess the flood risk to the proposed site from various flood sources. The analysis of this risk will meet the needs of the criteria contained in section 5 and 7 and appendix 1 of the TAN 15 document. TAN15 requires that a site should only be considered for development if the following conditions can be satisfied.

Assessment/Acceptability of Flooding Consequences Test

- 2.12. If a development is to be located within Zone C1 or Zone C2 and, having passed the initial Flood Risk Justification Test, then an assessment of flooding consequences will be required. This assessment will assess all potential flood mechanisms which could impact the development and establish if the consequences of flooding can be managed appropriately for the type of development being proposed.
- 2.13. Appendix 1 of the TAN 15 provides the criteria which should be met by the Acceptability Test;

Acceptability Criteria:

- Flood defences must be shown by the developer to be structurally adequate particularly under extreme overtopping conditions (i.e. that flood with a 1 in 1000 chance of occurring in any year).*
- The cost of future maintenance for all new/approved flood mitigation measures, including defences must be accepted by the developer and agreed with the Environment Agency (now Natural Resources Wales).*
- The developer must ensure that future occupiers of the development are aware of the flooding risks and consequences.*
- Effective flood warnings are provided at the site*

- *Escape/evacuation routes are shown by the developer to be operational under all conditions*
- *Flood emergency plans and procedures produced by the developer must be in place*
- *The development is designed by the developer to allow the occupier the facility for rapid movement of goods/possessions to areas away from floodwaters.*
- *Development is designed to minimise structural damage during a flooding event and is flood proofed to enable it to be returned to its prime use quickly in the aftermath of the flood.*
- *No flooding elsewhere*

- 2.14. Sections 4 and 5 of this report will address each of the points above in order to show that the proposed development is able to pass the Acceptability Test.
- 2.15. Any points where action is required by the developer should be completed by the site developer separately and may not be explicitly mentioned within this report.

Surface Water Run-Off from New Development

- 2.16. TAN15 states that flooding from all new development, in all zones, should not increase the risk of flooding elsewhere, via the creation of additional run-off when compared with the undeveloped situation.
- 2.17. The Welsh Sustainable Drainage (SuDS) Statutory Guidance (2019) requires that Sustainable Drainage Systems (SuDS) should be included in all new development proposals, irrespective of which zone they are to be located. Developments with an overall construction area of 100m² or more, or more than 1 dwelling, will require SuDS.
- 2.18. A surface water drainage strategy is therefore recommended prior to the detailed design stage.

Neath Port Talbot County Borough Council Local Development Plan (2011-2026)

- 2.19. The Neath Port Talbot County Borough Council Local Development Plan (LDP) (2016) is the development plan for the local area and is the basis for land use planning within the

Council's administrative area. The LDP includes Policy SP1 which refers to the management of flood risk within the Borough:

Policy SP 1

Climate Change

The causes and consequences of climate change will be addressed by implementing the following measures.

In relation to the causes of climate change:

1.1 The efficiency and sustainability of the County Borough's settlements will be enhanced through developing more cohesive and efficient settlements and settlement patterns, and consequently more sustainable travel patterns;

1.2 Greenhouse gas emissions from transport will be minimised through encouraging freight / commercial transport by alternatives to road (e.g. rail or sea);

1.3 Dependence on the private car and the need to travel in general will be reduced through promoting alternative means of transport and more efficient use of existing facilities, co-location and joint use of facilities;

1.4 Provision will be made for the County Borough's appropriate contribution to renewable and low carbon energy generation.

In relation to the consequences of climate change:

2.1 Likely increased flood risk will be taken into account and addressed by ensuring that there is greater resilience by avoiding development on land that is at risk from flooding in the first instance in accordance with the sequential approach set out in national guidance or in locations that could increase the risk of flooding elsewhere;

2.2 The fragmentation of habitats will be minimised and opportunities made for habitat and species change and migration where possible.

2.20. However, only point 2.1 in Policy SP 1 directly refers to the management of flood risk.

3. Consultation and Review

Sources of Information

Consultation

- 3.1. The site is within the remit of Neath Port Talbot Council as Lead Local Flood Authority (LLFA). NRW have been consulted and have provided flood depth and extent data for various return periods. This data has been provided as Product 6 outputs from the Pontardawe model (2015). This information will be used to determine the flood risk to the proposed site.

Documents

- 3.2. Local Governments and LLFA's provide documents which contain data and policies on flood risk and new development in their areas. These documents are introduced and briefly summarised below. For the purposes of this FCA, these documents have been reviewed for relevant information and any relevant data is discussed within the appropriate sub heading of this report.
- 3.3. The following sources of information have been reviewed for this assessment:
- The Interactive Flood Risk Mapping available on the Natural Resources Wales (NRW) website¹.
 - Planning Policy Wales Technical Advice Note 15 (TAN 15): Development and Flood Risk (June 2004)²
 - British Geological Survey – Geoindex Onshore (British Geological Survey, 2022).
 - Local Plan, Neath Port Talbot County Borough Council (2016)³
 - Neath Port Talbot Council Preliminary Flood Risk Assessment (PFRA), Neath Port Talbot Council (2011)⁴

¹ https://maps.cyfoethnaturiolcymru.gov.uk/Html5Viewer/Index.html?configBase=https://maps.cyfoethnaturiolcymru.gov.uk/Geocortex/Essentials/REST/sites/Flood_Risk/viewers/Flood_Risk/virtualdirectory/Resources/Config/Default&layerTheme=0

² <https://gov.wales/sites/default/files/publications/2018-09/tan15-development-flood-risk.pdf>

³ https://www.npt.gov.uk/media/7321/ldp_written_statement_jan16.pdf?v=20170727124344

⁴ https://www.npt.gov.uk/media/4629/pfra_report_2011.pdf?v=20171123145433

- Neath Port Talbot Council Stage 1 & 2 Strategic Flood Consequences Assessment (SFCA), Neath Port Talbot Council (2014)⁵
- Neath Port Talbot County Borough Council Flood Risk Management Plan (FRMP), (2015)⁶
- Neath Port Talbot County Borough Council Local Flood Risk Management Strategy (LFRMS), (2013)⁷

Preliminary Flood Risk Assessment (PFRA)

- 3.4. The PFRA, published in 2011, is a high-level appraisal of flood risk across LLFANeath Port Talbot Council. The flood risk from all sources, including fluvial, surface water, groundwater and surcharged sewers is evaluated. It is the basis upon which the Local Flood Risk Management Strategy (described below) is produced.
- 3.5. The PFRA summarises historical flood incidents in Neath Port Talbot Council. The site is not recorded as having been affected by any flood event.

Strategic Flood Consequences Assessment (SFCA)

- 3.6. The SFCA, published in 2014, provides the evidence base for the Local Planning Authority Neath Port Talbot Council Local Plan and guidance for consideration when determining planning applications.
- 3.7. The SFCA seeks to place new development into areas of lower flood risk, taking into account current flood risk, future flood risk, and the effect a proposed development would have on the risk of flooding.
- 3.8. The SFCA online mapping provided by Neath Port Talbot Council has been used throughout production of this report as a source of information, particularly pertaining to historic flood incidents.

⁵ https://www.npt.gov.uk/media/5137/ldp_submission_eb01.pdf

⁶ <https://www.npt.gov.uk/media/5399/floodriskmanagementplan15.pdf?v=20170627002320>

⁷ https://www.npt.gov.uk/media/4930/lfrms_npt_local_flood_risk_management_strategy.pdf?v=20170627002244

Local Flood Risk Management Strategy

- 3.9. The Local Flood Risk Management Strategy (LFRMS), published in 2013, sets out roles and responsibilities for flood risk management, assesses the risk of flooding in the area, where funding can be found to manage flood risk, what our policies are as a Lead Local Flood Authority and what our objectives and actions are to manage flood risk.
- 3.10. The Neath Port Talbot Council LFRMS, as mentioned above, assesses the risk of flooding in the county and will be used within this report to identify whether the proposed site is at risk.

Flood Risk Management Plan

- 3.11. This Flood Risk Management Plan (FRMP) is the further extension of the work previously undertaken by the authority in the production of its Preliminary Flood Risk Assessment and Local Flood Risk Management Strategy.
- 3.12. The FRMP gives a greater focus on the areas at risk of flooding and identifies measures to reduce that risk, and in so doing demonstrates the authority's commitment to long term sustainability and ensuring that Neath Port Talbot remains an attractive place to live, work and visit

4. Sources of Flood Risk

Fluvial Flood Risk

- 4.1. Flooding from watercourses arises when flows exceed the capacity of the channel, or where a restrictive structure is encountered, resulting in water overtopping the banks into the floodplain.

Main Rivers and Ordinary Watercourses

- 4.2. The nearest NRW Main River is the Upper Clydach River, located approximately 20m west of the proposed development. The Upper Clydach flows from north to south past the site and is culverted from approximately 25m southwest of the site till it reaches the south side of the A474 road.
- 4.3. The River Tawe is also within the vicinity of the site, located approximately 530m southeast of the proposed development.
- 4.4. The Swansea canal also lies within the vicinity of the site approximately 80m southeast of the site.
- 4.5. There are no other ordinary watercourses within the vicinity of the site.

NRW Development Advice Map

- 4.6. The NRW Development Advice Map (Figure 3) shows that the proposed site lies within the NRW Zone C2. This denotes areas of the floodplain without significant flood defence infrastructure.

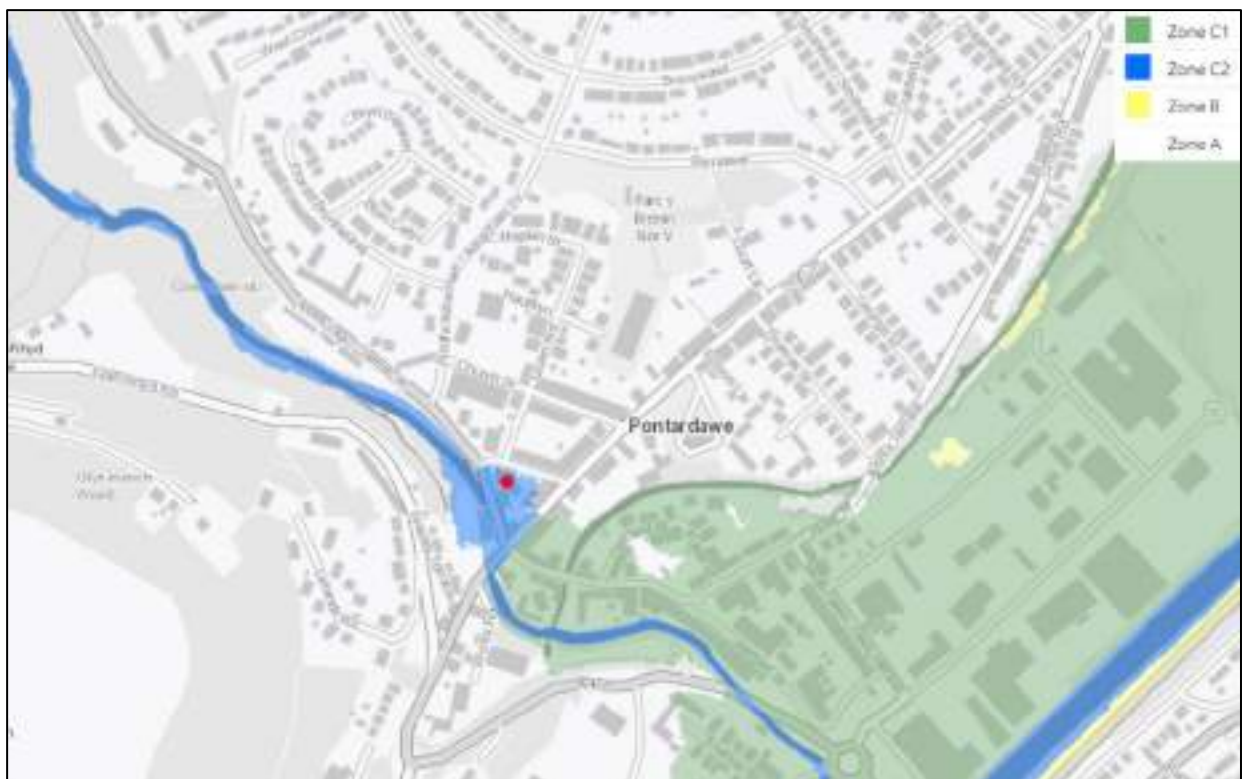


Figure 3: NRW Development Advice Map (Contains OS data © Crown Copyright and database right 2020 | Airbus Defence & Space)

NRW National Flood Risk and Hazard Map

- 4.7. The NRW National Flood Risk Assessment Wales Flood Risk from Rivers dataset indicates that the site is at a low risk (between 0.1% Annual Exceedance Probability (AEP) and 1.0% AEP) of flooding from rivers (fluvial sources) as shown in Figure 4.



Figure 4: NRW Flood Risk Assessment Wales Flood Risk from Rivers (Contains OS data © Crown Copyright and database right 2020)

- 4.8. The NRW National Flood Hazard and Risk Maps were further assessed to determine likely flood depths for the modelled high risk (3.3% AEP), medium risk (1% AEP) and low risk (0.1% AEP) events. These depths are presented in Figure 5, Figure 6, and Figure 7 respectively.
- 4.9. Figure 5 shows that in the modelled 3.3% AEP flood event the site should remain unaffected by fluvial flooding.
- 4.10. Figure 6 shows that in the modelled 1.0% AEP event the site should also remain unaffected by fluvial flooding.
- 4.11. In the 0.1% AEP low risk event, shown in Figure 7, the site could experience flood depths between 0.30m and 0.90m.



Figure 5: NRW National Flood Risk and Hazard Map – Depth – High Risk (3.3% AEP) (Contains OS data © Crown Copyright and database right 2020)



Figure 6: NRW National Flood Risk and Hazard Map – Depth – Medium Risk (1% AEP) (Contains OS data © Crown Copyright and database right 2020)



Figure 7: NRW National Flood Risk and Hazard Map – Depth – Low Risk (0.1% AEP) (Contains OS data © Crown Copyright and database right 2020)

Fluvial Climate Change

- 4.12. The 2018 NRW guidance for climate change states that developments in the Western Wales catchment for the 2080s epoch should consider a 30% allowance (central) to assess the potential impact of climate change as part of an FCA. It does further state that in addition to the central allowance of 30%, an assessment of risk should be made using the upper end estimate – which for the Western Wales catchment is 75%. Although, the guidance states:

It is recommended that the central estimate, or change factor, for the 2080s for the relevant river basin district should be used to assess the potential impact of climate change as part of a flood consequence assessment...

...The information derived from this assessment [using the upper end estimate] should be used to inform mitigation measures that help to ensure the long term resilience of the development. (Note: The upper end estimate may not be applicable to every site but will need to be considered depending upon the scale and nature of the site in question).

- 4.13. At the time of writing this report, detailed flood model data has been provided by NRW. The climate change (CC) allowance provided in the Product 6 model outputs was +20% in the 1.0% AEP event. No outputs were provided for the central allowance of 30%. Based on the

information provided, interpolation of the +30% CC event is not possible, therefore as a proxy, the 0.5% AEP event has been analysed to determine the flood risk for the central allowance climate change allowance event (as the flood extent for this event is greater than the 1%AEP +20%CC extent).

- 4.14. Flood extents or depths have not been provided for the upper end estimate allowance of 75% and due to the limited information provided by NRW, interpolation of the +75% CC allowance scenario is not currently possible given the information provided. However, analysis of the 0.1% AEP event has been used as a proxy for the 1.0% +75% CC event.

Portardawe Model (2015) – Defended Scenario

- 4.15. The NRW have provided results of the Pontardawe Model (2015). The Product 5 information provided alongside the Product 6 model outputs describes the scenarios which were modelled;

List of Design Runs

The main purpose of the design runs was to produce flood extent, depth, velocity and hazard maps for the following scenarios and fluvial events:

Defended

- Present Day: (50% {QMED}, 20%, 10%, 5%, 2%, 1.33%, 1%, 0.5%, 0.2% and 0.1% AEP)
- Future: (1% AEP with 20% flow increase {climate change}).

Undefended

- Present Day: (1% & 0.1% AEP)
- Future: (1% AEP with 20% flow increase {climate change}).

- 4.16. In the modelled defended 1.0% AEP event (Figure 8), the extent of the flooding remains within the channel of the Upper Clydach River. The model results from this event also show the location of the culvert southwest of the proposed site. This is indicated by the fact that the flood extent is shown to be cut off abruptly as the river enters the culvert. The proposed site is not affected in the modelled defended 1.0% AEP event.
- 4.17. Figure 9 shows the flood extent for the 1.0% AEP +20%CC event. In this event the site remains unaffected by fluvial flooding. However, the flood extent in this modelled event is not just contained to the river channel. It is shown to back up around the culvert entrance and floods both on the sides of the riverbanks to the north of the culvert and around the sides of the culvert.

- 4.18. As a proxy for the +30%CC central allowance recommended by the NRW 2018 guidance for the site, the 0.5% AEP event (Figure 10) has been analysed. In this modelled event the flood depths at the proposed site range up to 0.38m based on the depth grid provided by NRW. The flood level in this event is 38.36m AOD. When comparing this to the minimum topographical level at the proposed dwelling footprint (37.95m AOD), the depths at this location could reach 0.41m.
- 4.19. In the defended modelled 0.1% AEP event (Figure 11) the site is affected by fluvial flooding. The flood depths in this event at the proposed development ranges up to 0.79m based on the depth grid provided by NRW. The flood level in this event is 38.79m AOD. This event has been considered a proxy for the 1.0% AEP +75% CC upper end climate change allowance. Moreover, when comparing this to the minimum topographical level at the proposed dwelling footprint (37.95m AOD), the depths at this location could reach 0.84m.



Figure 8: Pontardawe (2015) Model Defended 1.0% AEP Flood Depths and Extent

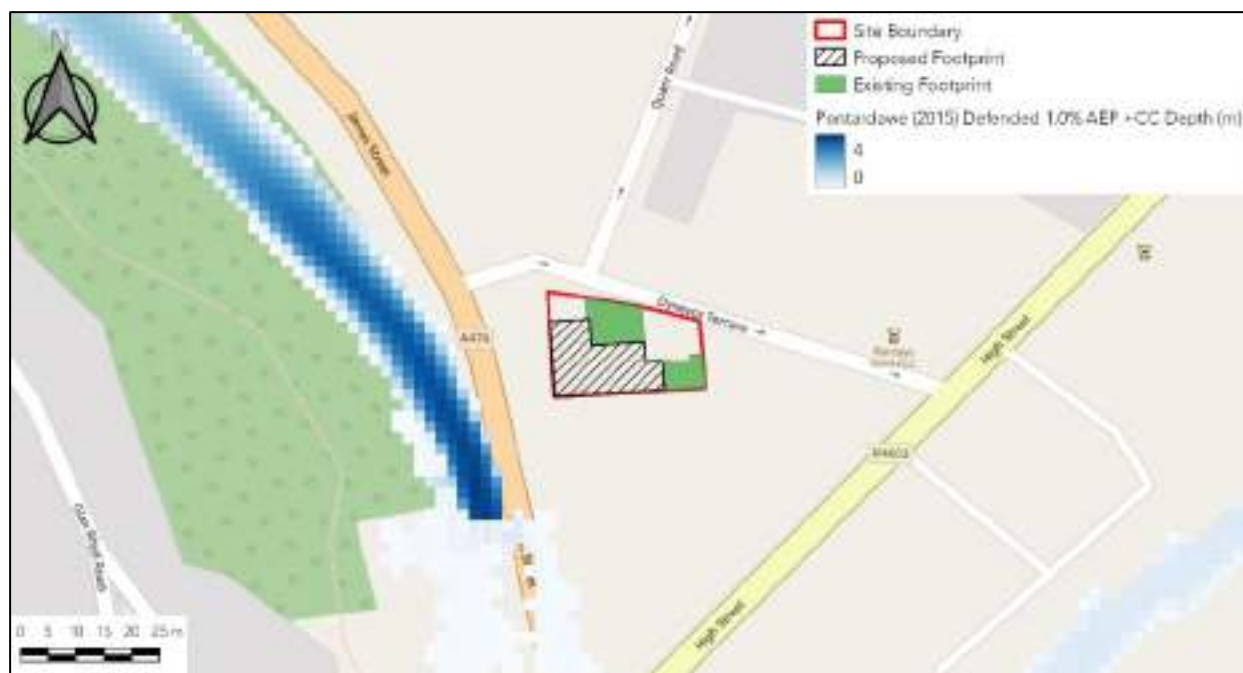


Figure 9: Pontardawe (2015) Model Defended 1.0% AEP +20%CC Flood Depths and Extent



Figure 10: Pontardawe (2015) Model Defended 0.5% AEP Flood Depths and Extent (1.0% AEP +30% CC Proxy)



Figure 11: Pontardawe (2015) Model Defended 0.1% AEP Flood Depths and Extent (1.0% AEP +75% CC Proxy)

- 4.20. In summary, in the modelled defended present-day scenario, the site is considered to be at a low risk of fluvial flooding. The modelled defended residual risk, which includes the central and upper end climate change allowances, is considered high. Mitigation measures to manage this risk are recommended in Section 5 of this report.

Portardawe Model (2015) – Undefended Scenario

- 4.21. In addition to the defended scenarios analysed above, NRW also provided outputs in the Product 6 data for the undefended scenario of the 2015 Pontardawe model.
- 4.22. However, as shown in Figure 12, the site is not served by any current flood defences. As such, the extent of each of the modelled defended and undefended flood events were the same in each case for the proposed development.



Figure 12: NRW Flood Defence Locations

Historical Flooding

- 4.23. The NRW Recorded Flood Extents dataset shows that the site is located outside of the recorded outline for any historic fluvial flood extent. This is shown in Figure 13. The closest recorded historic event is located approximately 200m southeast recorded in October 1998 and was associated with fluvial flooding of the River Tawe.



Figure 13: NRW Recorded Flood Extents

Summary

- 4.24. Based on the information above in the defended present day scenario, the site is considered to be at a low risk of fluvial flooding. The residual risk, which includes the central and upper end climate change allowances, is considered high. Mitigation measures to manage this risk are recommended in Section 5 of this report.

Tidal Flood Risk

- 4.25. The NRW Flood Risk Assessment Mapping also shows details relating to the Flood Risk from the Sea to the proposed development.
- 4.26. Figure 14 shows that the proposed development lies outside the extent of the low, medium, and high risk areas associated with tidal sources. The nearest area which could be affected by tidal flooding is towards Neath, approximately 7.2km southeast of the site.
- 4.27. As such, the site is considered to be at a very low risk of tidal flooding.

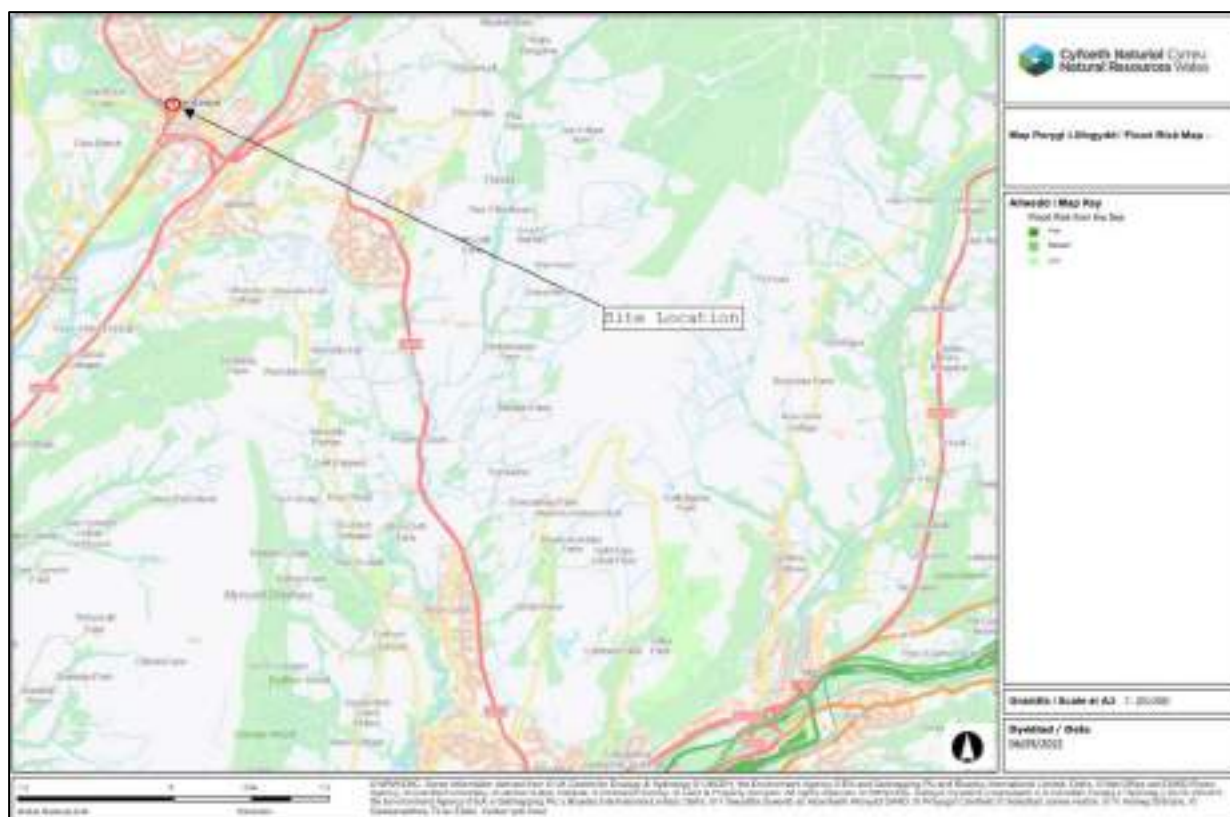


Figure 14: NRW Flood Risk Assessment Wales map (Contains OS data © Crown Copyright and database right 2020 | Airbus Defence & Space)

Canals

- 4.28. The Canal and River Trust (CRT) generally maintains canal levels using reservoirs, feeders and boreholes and manages water levels by transferring it within the canal system.
- 4.29. Water in a canal is typically maintained at predetermined levels by control weirs. When rainfall or other water enters the canal, the water level rises and flows out over the weir. If the level continues rising it will reach the level of the storm weirs. The control weirs and storm weirs are normally designed to take the water that legally enters the canal under normal conditions. However, it is possible for unexpected water to enter the canal or for the weirs to become obstructed. In such instances the increased water levels could result in water overtopping the towpath and flowing onto the surrounding land.
- 4.30. Flooding can also occur where a canal is impounded above surrounding ground levels and the retaining structure fails.

- 4.31. Water levels within the canal to the southwest of the site will be maintained and controlled as described above. In addition to the management measures described, Figure 15 shows the existing ground levels between the proposed site and the Swansea Canal based on existing LiDAR data. The site lies at a location approximately 2m higher than the canal level.
- 4.32. As such, considering both the management of the UK canal network by the CRT and the raised elevation of the proposed site above the canal water level, the site is considered to be at a low risk of canal flooding.

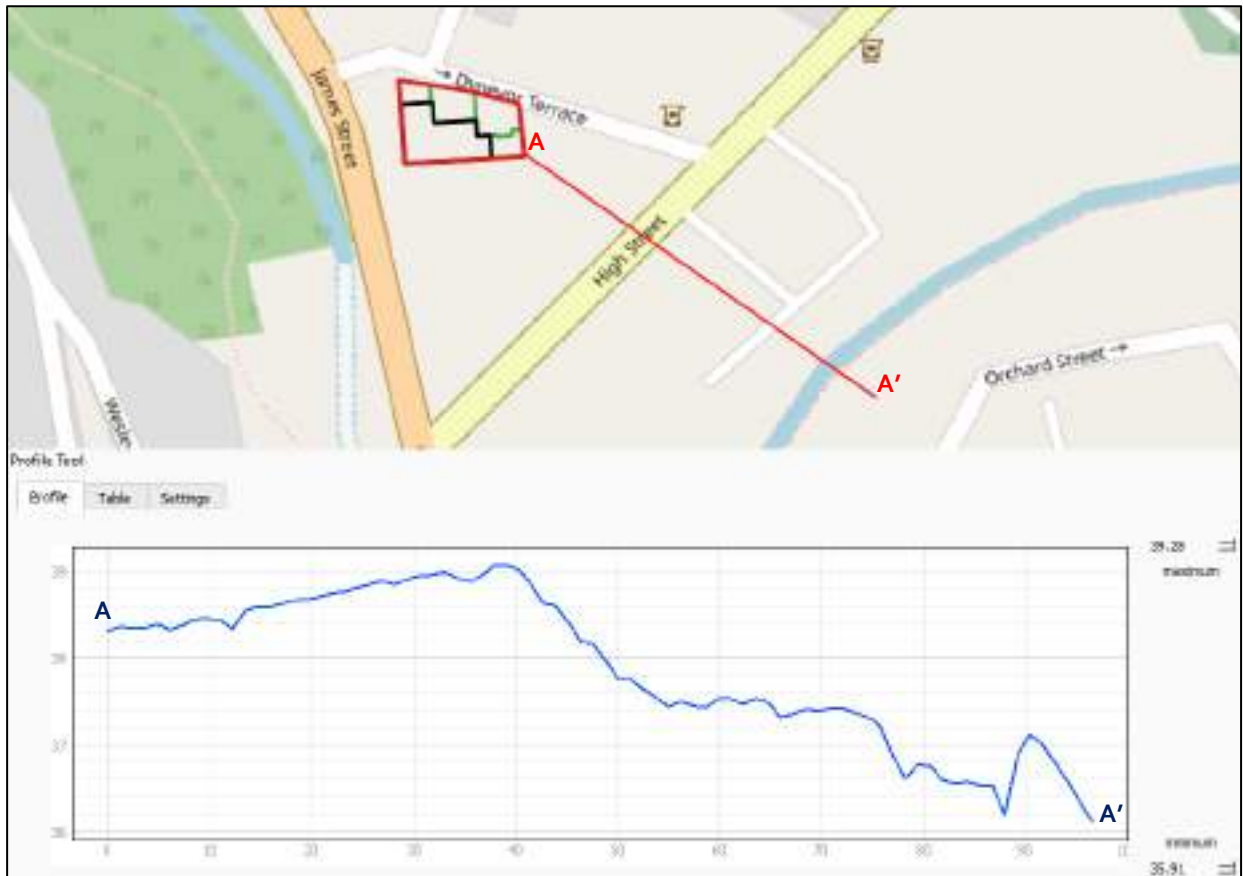


Figure 15: Cross Section of Existing Ground Levels between the Proposed Development and the Swansea Canal (Northeast to Southwest)

Pluvial Flood Risk

- 4.33. Pluvial flooding can occur during prolonged or intense storm events when the infiltration potential of soils, or the capacity of drainage infrastructure is overwhelmed leading to the accumulation of surface water and the generation of overland flow routes.

- 4.34. Examination of NRW Flood Risk Assessment Wales map (Figure 16) Flood Risk from Surface Water and Small Watercourses shows that the site lies outside the extent of the each of the modelled low risk (0.1% AEP), medium risk (1% AEP), and high risk (3.3% AEP) events. Additionally, both James Street to the east of the site and Dynevor Terrace to the north of the site do not experience flooding in any of the modelled events included in the NRW mapping.



Figure 16: NRW Flood Risk Assessment Wales map (Contains OS data © Crown Copyright and database right 2020 | Airbus Defence & Space)

- 4.35. Based on the information above, the site is considered to be at a low risk of pluvial flooding.

Reservoirs

- 4.36. Flooding can occur from large waterbodies or reservoirs if they are impounded above the surrounding ground levels or are used to retain water in times of flood. Although unlikely, reservoirs and large waterbodies could overtop or breach leading to rapid inundation of the downstream floodplain.
- 4.37. The NRW Wales Flood Risk Assessment map shows the site is not located within a reservoir flood risk extent. Therefore, the risk of flooding from reservoirs is considered to be low.

Groundwater

- 4.38. Groundwater flooding occurs in areas where underlying geology is permeable and water can rise within the strata sufficiently to breach the surface.
- 4.39. The British Geological Survey's (BGS) mapping shows superficial deposits of Alluvium – Sand and Gravel underlying the site. The bedrock underlying the site is Rhondda Member Formation – Sandstone.
- 4.40. Historic BGS borehole (ref: SS78NE243) located approximately 225m south of the site did not identify water being struck within the 5m deep borehole.
- 4.41. The LFRMS (2013) presents the NRW's Areas Susceptible to Groundwater Flooding mapping (Figure 17). This mapping consists of 1km grid squares and shows what proportion of each is considered susceptible to groundwater flooding. The site is within a 1km cell of which less than 25% is considered susceptible to groundwater flooding.

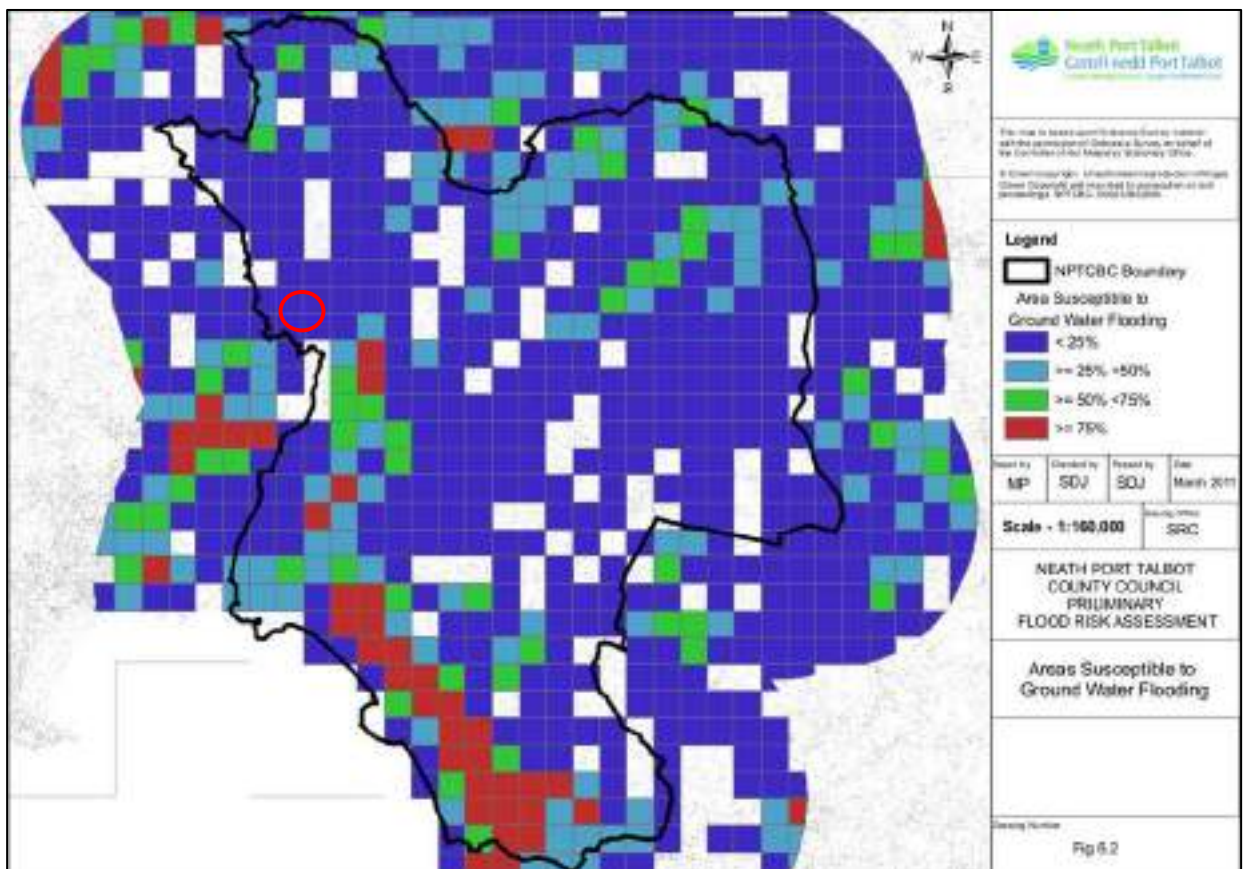


Figure 17: LFRMS (2013) Groundwater Flood Susceptibility Mapping

- 4.42. Based on the information above, the risk of groundwater flooding is considered low.

Sewer Flooding

- 4.43. Sewers can be a cause of flooding where the drainage network has become overwhelmed, either by blockage or due to local development beyond the designed capabilities of the drainage system.
- 4.44. Neither the SFCA (2014) or PFRA (2011) contain publicly available specific mapping to illustrate the number of historical sewer flooding incidents in the borough. However, the SFCA does mention the risk of sewer flooding within its report;

Records are also available from the Drainage and Streetcare Services department of the Council of drainage incidents, including general flooding incidents, call outs in relation to heavy rain incidents, sewer flooding and culvert blocking and significant historic flood outlines. Most of the information records spot addresses only, but 13 historic floods were considered significant enough to be plotted in more detail, although the outlines recorded may not be entirely accurate

- 4.45. Based on the information above the site is considered to be at a low risk of sewer flooding. This is considering that there are only 13 recorded sewer flood incidents within the entire borough.

5. Flood Risk Mitigation

Fluvial and Canals

- 5.1. The Flood Risk Assessment Wales Map and the National Flood Hazard and Risk Map shows the site to be at a low risk of flooding from fluvial sources. Overall, considering the historical flood extent, flood depth, and flood extent from all datasets (including the NRW Port Talbot Model (2016)), the site is considered to be at a low risk of flooding from fluvial sources in the present day scenario.
- 5.2. However, the residual risk which includes the central and upper end climate change allowances to the modelled 1.0% AEP event, is considered to be high.
- 5.3. The mitigation measures included below are recommendations and should be reviewed prior to construction in line with the architectural and structural proposals and wider site constraints.

Finished Floor Levels

- 5.4. TAN15 (Paragraph 6.2 section iv) describes the “threshold frequency” for which beyond this the development would be expected to flood. For residential development, the suggested threshold frequency is 1% AEP for fluvial flood events. Therefore, the proposed 6 flats should be designed such that flood water does not enter the structure for up to the 1.0% AEP (defended) + climate change flood level.
- 5.5. Therefore, the FFLs will be raised above the 1.0% AEP (defended) +30% climate change allowance flood level as shown in the development proposals in Appendix B. This level is given as 38.36m AOD for the 0.5% AEP event, used as a proxy for the 1.0% AEP +30% CC allowance event. The existing FFLs range between 38.16m AOD and 38.31m AOD at the ground floor. Therefore, the proposed FFLs are a maximum of 0.2m above the existing levels.

Safe Access and Egress

- 5.6. An analysis of the detailed modelling provided in the Pontardawe (2015) model shows that safe access/egress is not expected to be possible at the site for 1.0% AEP +30%CC fluvial flood event at either ground floor entrances to flats 1, 2, and 3. It is recommended that the entrances to the ground floor flats be moved to an area not affected by the 1.0% AEP +30%CC fluvial flood extent. The recommended areas where entrances should be located are the southeast corner

and northwest corner of the proposed development footprint. These areas are not affected in the modelled 1.0% AEP +30%CC fluvial flood event.

- 5.7. Flats 4, 5, and 6 are located on the first floor of the proposed development and as such lie above the 1 in 100+30%CC fluvial flood level. Flats 4, 5, and 6 are self-contained flats and it is understood that residents should remain inside till such a time that the flood event is concluded.
- 5.8. Evacuation should be sought prior to the onset of flooding. Subscription to the local flood warning system should provide adequate notice prior to the onset of a flood event. Details on the NRW Flood Warning Service can be found in subsequent sections of this report.

Flood Resistance and Resilience

- 5.9. TAN15 also states for developments to be considered acceptable the below criteria must be met:

• Development is designed to minimise structural damage during a flooding event and is flood proofed to enable it to be returned to its prime use quickly in the aftermath of the flood.

- 5.10. Given that the development may be subject to flooding following fluvial flood events greater than the 1.0% AEP, flood resilience measures are recommended to facilitate quick recovery following a flood event. The following measures are recommended where applicable and possible over and above the flood protection systems:

- Solid (i.e. concrete floors) with waterproof screed.
- Raised wiring and power outlets at lower ground and ground level.
- Air brick covers to be installed.
- Damp Proof Membranes (d.p.m.) should be included in any design to minimise the passage of water through ground floors.
- Non-return valves on any new sewer connection to prevent back flow.
- All new plumbing insulation to be of closed cell design.
- Site owners and residents required to sign up to the NRW flood warning service.

Pluvial

- 5.11. The site is considered to be at a low risk of pluvial flooding. As such, no specific mitigation is recommended.

Reservoirs, Groundwater and Sewers

- 5.12. The flood risk from other sources is considered to be low, therefore no further specific mitigation is recommended.

Increase to Flood Risk Elsewhere

- 5.13. The existing site is public house. The proposed development is for change of use of the existing public house to 6 flats.
- 5.14. Furthermore, the proposed development does not include any external increase in footprint. In fact, there is a reduction of the footprint.
- 5.15. As such, the proposed development in isolation should have no impact on flood risk elsewhere.

NRW Flood Warning Service

- 5.16. As a further precaution and risk reduction, the tenant of the dwelling should sign up the 'Alloy Industrial Estate, health centre and Tawe Terrace, and property adjacent to the Upper Clydach including Herbert Street' NRW flood warning service. This service allows tenants to register an address, which is at risk of flooding, along with contact details so that in the event of a flood being forecast, the tenant will be sent an alert directly to their chosen method of contact.
- 5.17. Flood warnings/alerts can be enforced at any time of the day or night. Signing up for this service provides occupants some notice before a flood event. The amount of time afforded before a flood occurs depends on the site-specific location (e.g. proximity to the source of flooding, topography of the surrounding area) and the flood mechanism (e.g. bank over topping versus a breach event). Flood alerts and warnings provide tenants with time to take necessary action, e.g. communication of the risk of flooding to occupants/employees etc, evacuation of occupants offsite or to a safe level, removal of valuable items out of reach of flooding and the mounting of site specific flood defences.

6. Conclusions

- 6.1. This FCA has been undertaken with reference to the requirements of TAN15 with respect to the development at 6 James Street, Pontardawe, Swansea, SA8 4LR. It has been written to support a full planning application and has been prepared with due consideration to the nature of the proposed development to provide the appropriate level of detail.
- 6.2. The FCA supports the full planning application and demonstrates that there is an acceptable level of flood risk to the site if the mitigation strategies recommended are implemented in the scheme. The development does not increase flood risk off site or to the wider area.

Source of Flooding	Flood Risk Summary
Fluvial (and Canals)	The Flood Risk Assessment Wales Map and the National Flood Hazard and Risk Map shows the site to be at a low risk of flooding from fluvial sources. Overall, considering the historical flood extent, flood depth, and flood extent from all datasets (including the NRW Port Talbot Model (2016)), the site is considered to be at a low risk of flooding from fluvial sources in the present-day scenario. However, the residual risk which includes the central and upper end climate change allowances to the modelled 1.0% AEP event, is considered to be high. Based on the Pontardawe (2015) model results, safe access/egress should be located outside of the 1.0% AEP +30%CC event (0.5% AEP year event used as a proxy) at either the southeast or northwest corners of the proposed development footprint. FFLs are to be raised to the level of the 1.0% AEP +30%CC allowance flood level (0.5% AEP event used as a proxy) of 38.36m AOD. The owners and managers of the commercial premises should sign up to the NRW flood warning service.
Pluvial	The site is considered to be at a low risk of pluvial flooding. As such, no specific mitigation is recommended.
Reservoirs Groundwater Sewers	The risk from reservoir, groundwater, and sewer sources is considered low.

6.3. The following conclusions can be drawn from this level 1 FCA:

- This FCA has identified no prohibitive constraints in developing the proposed site for the proposed usage.
- The site is considered to be at a low risk of fluvial flooding in the present day event. The residual risk, including CC allowances is considered high.
- The site is considered to be at a low risk of pluvial flooding.
- The change in risk from all other sources is considered low.
- FFLs are to be raised to the level of the 1.0% AEP +30%CC allowance flood level (1 in 200 year event used as a proxy) of 38.36m AOD. The existing FFLs range between 38.16m AOD and 38.31m AOD at the ground floor. Therefore, the proposed FFLs are a maximum of 0.2m above the existing levels.
- Flood resilience measures are recommended to facilitate quick recovery following a flood event.
- The owners and tenants of the commercial premises should sign up to the NRW flood warning service.

6.4. This Flood Consequence Assessment should be submitted as part of the planning application to satisfy the requirements under TAN15.