

Cultech Ltd Flood Consequence Assessment

Final Report

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Contract

This report describes work commissioned by Kevin Painter (kPa Consulting) on behalf of Cultech Limited, by an email dated 20 September 2018. Sara Lane-Dredge of JBA Consulting carried out this work.

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Purpose

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Carbon footprint

JBA is aiming to reduce its per capita carbon emissions.

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Abbreviations

AEP	Annual Exceedance Probability
CBC	County Borough Council
DAM	Development Advice Map
FCA	Flood Consequence Assessment
LDP	Local Development Plan
NRW	Natural Resources Wales
NPT	Neath Port Talbot
PPW	Planning Policy Wales
TAN	Technical Advice Note

1 Introduction

1.1 Terms of Reference

JBA Consulting were commissioned in September 2018 to prepare a Flood Consequence Assessment (FCA) to support the proposed building improvements at the Cultech Ltd site in Port Talbot.

1.2 FCA Requirements

This FCA follows Welsh Government guidance on development and flood risk set out in the Technical Advice Note 15: Development and Flood Risk (TAN-15). Where appropriate the following aspects of flood risk will be addressed in all planning applications over its expected lifetime in flood risk areas:

- The likely mechanisms of flooding
- The likely source of flooding
- The depths of flooding through the site
- The speed of inundation at the site
- The rate of rise of flood water through the site
- Velocities of floodwater across the site
- Overland flow routes
- The effect of access and egress and infrastructure, for example public sewer outfalls, combined sewer overflows, surface water sewers and effluent discharge pipes from waste water treatment works
- The impacts of the development in terms of flood risk on neighbouring properties and elsewhere on the flood plain

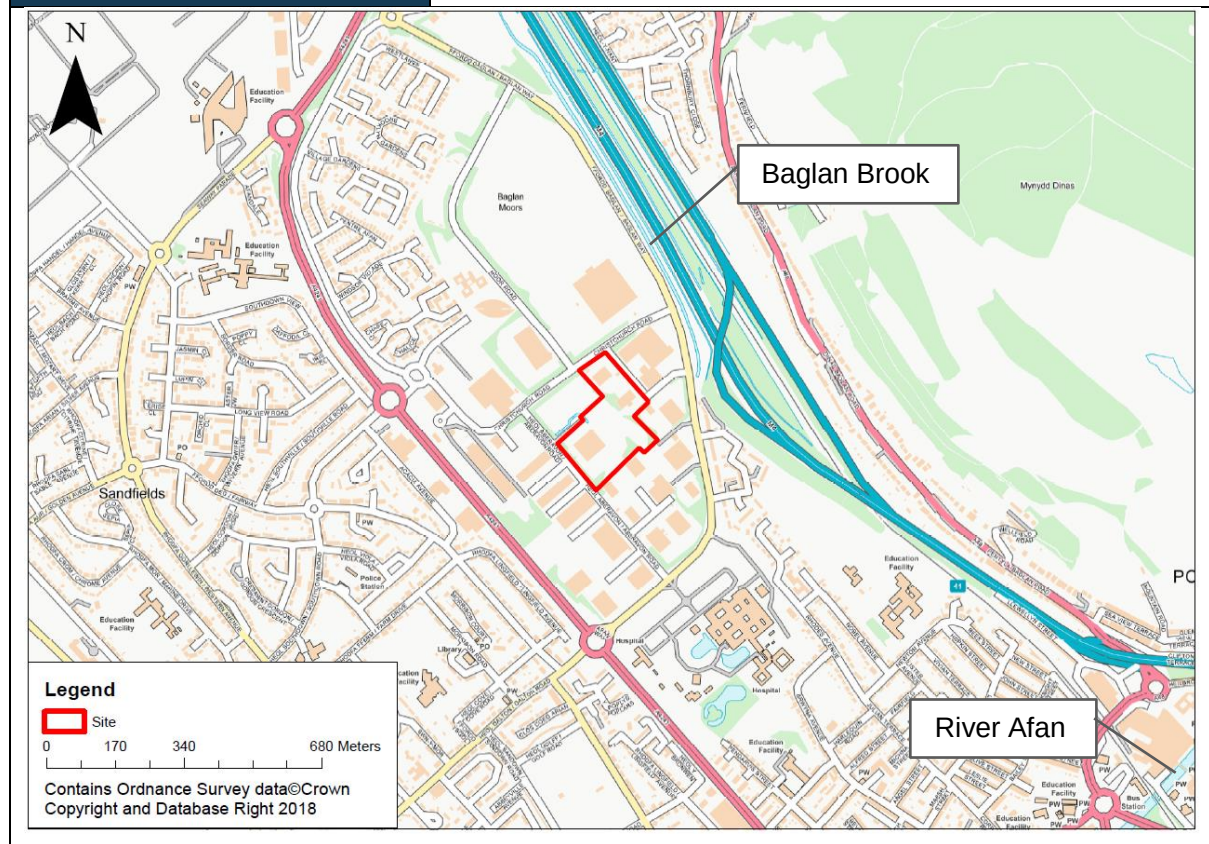
2 Site Description

2.1 Site location

Cultech Ltd. is an innovator and manufacturer within the nutritional supplement industry. Their site in Port Talbot requires expansion to provide more space for manufacturing, vehicle maintenance and staff welfare facilities. The River Afan flows through Port Talbot and enters Swansea Bay some 1.4km southeast of the site. The Baglan Brook flows in a north-westerly direction 130m to the northeast of the site. Details of the site location are included in Table 2-1.

Table 2-1. Site details and current and proposed development

Site name and address	Cultech Ltd, Unit 2-3, Christchurch Road, Baglan Industrial Park, Port Talbot, SA12 7BZ
Site area	4.14 hectare
Existing land use	Established industrial site
Purpose of development	Extensions to existing buildings for manufacturing, storage and staff welfare facilities. Construction of new unit for vehicle maintenance use.
OS NGR	SS 75040 90913
Local Planning Authorities	Neath Port Talbot County Borough Council
Lead Local Flood Authority	Neath Port Talbot County Borough Council



2.2 Site history and proposals

This FCA focuses on four extensions to the existing buildings at Cultech Ltd. and the construction of a new unit for vehicle maintenance. Part of the development described has already been constructed thus retrospective planning permission is to be sought. A further

three building extensions require planning permission for future construction. Figure 2-1. and Figure 2-2 present the aerial photography of the site from 2015 and 2018 demonstrating the site prior to the development in question and the site as it currently appears.

Table 2-2 and Figure 2-3 describes the development proposals considered within this FCA. The development consists of a further 6% of the total site area being developed.



Figure 2-1. 2015 aerial photography showing site outline in red (Google Earth)



Figure 2-2. 2018 aerial photography demonstrating development constructed to date (Google Earth)

Table 2-2. Existing and proposed developments

Development	Use	Area (m ²)	Finished floor level (mAOD)
Proposed extension 'A'	Reception area	89	6.49
Current extension 'B'	Manufacturing, storage, canteen	664	6.52
Current construction 'C'	Vehicle maintenance	536	5.86
Proposed extension 'D'	Manufacturing	298	5.91
Proposed extension 'E'	Manufacturing	758	5.85

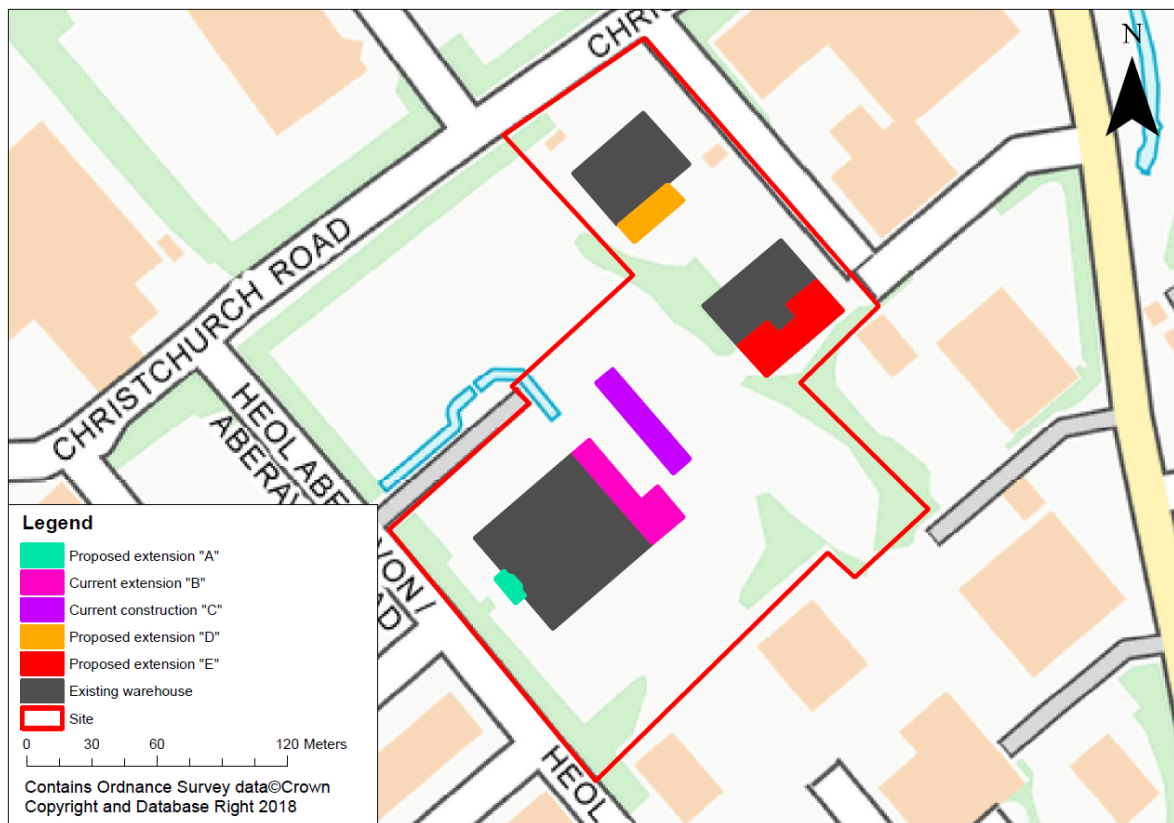


Figure 2-3. Development considered within this FCA

2.3 Site Topography

A topographical survey of the site is included in Appendix A. The surveyed extent is shown in Figure 2-4. The survey shows that levels range from a minimum of 5.34m AOD in the northern part of the site rising to 6.4m AOD the south-western part of the site as shown in the LiDAR image in Figure 2-5. Localised banks and areas of higher ground can be found in the eastern and southern part of the site.



Figure 2-4. Topographical survey extent



Figure 2-5. LiDAR site topography

2.4 Site Soils and Geology

The Cranfield University Soilscape viewer¹ describes the soils on site as loamy and clayey with naturally high groundwater associated with coastal flats.

The British Geological Survey's Geology of Britain viewer² identified the local geological as being underlain by South Wales Middle Coal Measures Formation which comprise of Mudstone, Siltstone and Sandstone. These sedimentary rocks are permeable and allows for the storage and movement of groundwater.

A large part of the site will remain permeable or grass following the proposed development, allowing for natural infiltration on site.

2.5 Review of existing flood risk data

The latest available information of flood risk at the site, published by Natural Resources Wales (NRW) is summarised in Table 2-3.

Table 2-3. Summary of flood risk

Source of Flooding	Onsite Presence	Description
Fluvial	✓ (section 2.7)	The site is partially in Flood Zone 2 and partially in Flood Zone 3 but benefits from the presence of flood defences.
Tidal	✗	The site is not at risk of tidal flooding
Surface Water	✓ (section 2.9)	A small area in the north of the site is at a high risk of surface water flooding but the remainder of the site is considered at a very low risk.
Reservoirs	✗	The site is not at risk of flooding as a result of reservoir failure
Groundwater	✗	The site is not considered to be at risk from groundwater flooding.
Sewers	✗	There is no evidence to suggest that the site is at risk of flooding from sewers

2.6 Existing Flood Zoning

The site is mainly located within Flood Zone 2 describing areas at risk of flooding during fluvial events less frequent than the 1% AEP but more frequent than the 0.1% AEP. The north-eastern part of the site is located within Flood Zone 3 describing areas at risk of flooding in events more frequent than the 1% AEP. The flood zone mapping does not consider the impacts of flood defences on actual flood risk but Figure 2-6 does show that the site does benefit from the presence of defences.

¹ Cranfield University Soilscape Viewer <http://www.landis.org.uk/soilscales>

² BGS Geology of Britain Viewer <http://www.bgs.ac.uk/discoveringGeology/geologyOfBritain/viewer.html>

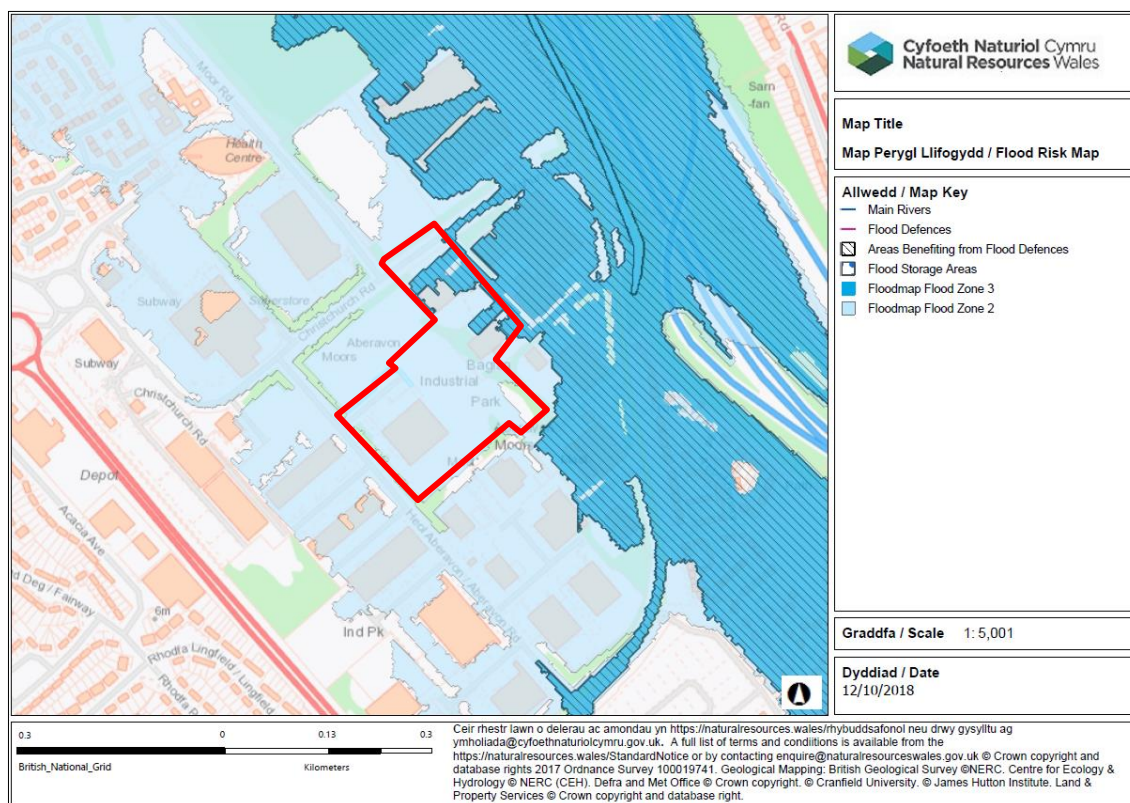


Figure 2-6. NRW Flood Zone map

2.7 Historical Flooding

The NRW Historic Flood Map does not show any historic flood events on site.

2.8 Surface Water Flood Risk

The NRW map showing the risk of flooding from surface water (Figure 2-7) shows that the flood risk on site (outlined in red) ranges from very low to high. Most of the site is considered to have a very low risk of flooding (i.e. less than 0.1% AEP) but there are patches near the warehouses (notably the southernmost warehouse) and the centre of the site which have a low risk of flooding (0.1% to 1.0% AEP). A very small patch near the centre of the site is at risk of medium (1 – 3.3%) to high (>3.3% AEP) risk of flooding, with the highest risk being near the easternmost corner. The current and proposed development on site will be located in areas with a very low to medium surface water flood risk.

The site has two entrances; one to the northeast which leads to Christchurch Road, and the other to the southwest which leads to Heal Aberavon / Aberavon Road. Both these roads have a low risk of surface water flooding with patches of medium risk near both site entrances, and a patch of high risk near the northernmost entrance.

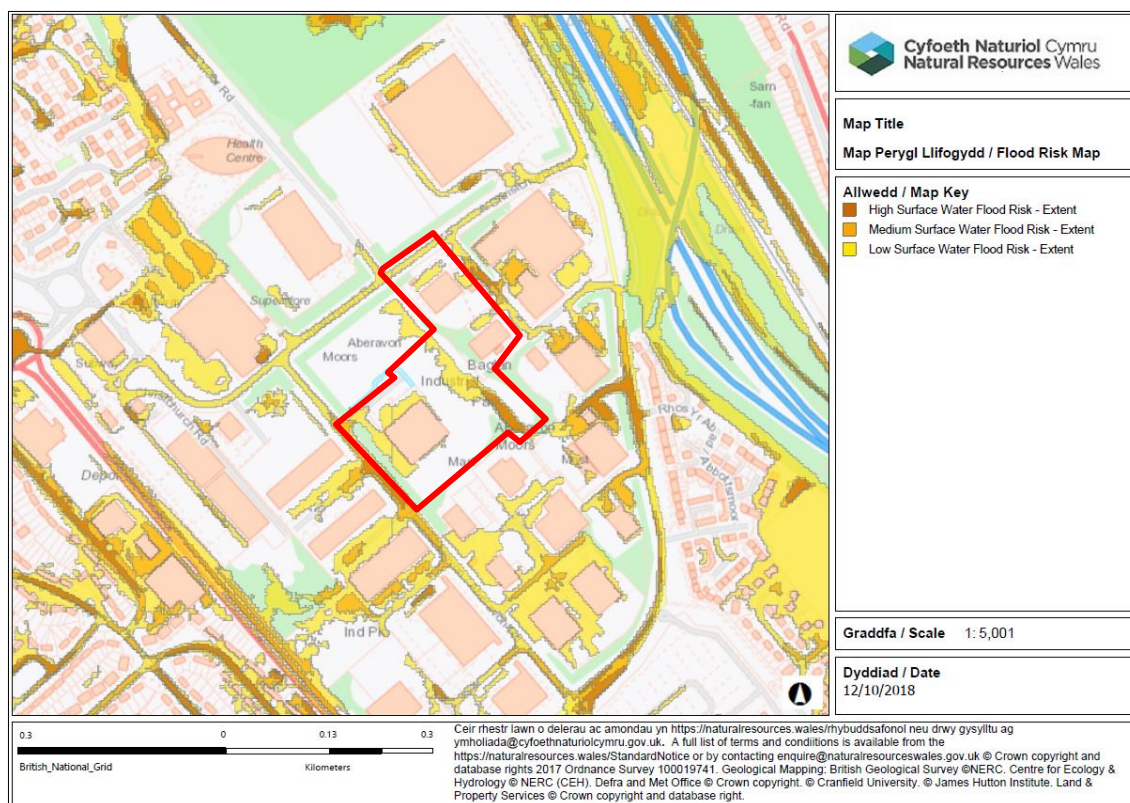


Figure 2-7. NRW surface water flood risk map

2.9 Groundwater Flood Risk

The Neath Port Talbot County Borough Council's Local Flood Risk Management Strategy³ states that the history of flooding in the County indicates groundwater to be a source, however there are no specific areas of groundwater flooding recorded in the Neath Port Talbot area. Whilst rising groundwater is not considered to have the potential as a major source of flooding according to the Strategy, it recognises the possibility of groundwater flooding occurring in the future and uses the NRW national dataset 'Areas Susceptible to Groundwater Flooding' to form the basis of the assessment of future flood risk from groundwater. This identifies areas along the coast to be at greatest risk of flooding from groundwater sources.

³ https://www.npt.gov.uk/media/4930/lfrms_npt_local_flood_risk_management_strategy.pdf

3 Planning Policy and Flood Risk

3.1 Planning Context

Technical Advice Note – 15. Development and Flood Risk (TAN-15) was introduced in 2004 by the Welsh Assembly Government. It is technical guidance related to development planning and flood risk using a sequential characterisation of risk based on the NRW's Development and Flood Risk Advice Map (DAM). Its initial requirement is to identify the DAM zone and vulnerability classification relevant to the proposed development determining the requirement for further assessment.

3.2 DAM Zone and Vulnerability Classification

The Cultech Ltd. site falls mainly Zone C1 of NRW's DAM as seen in Figure 3-1. There are small areas of Zone B within the site. Zone C1 denotes "areas of the floodplain which are developed and served by significant infrastructure including flood defences". Zone B denotes "areas known to have been flooded in the past, evidenced by sedimentary deposits".

The proposals are industrial in nature and therefore is categorised as "less vulnerable development" by TAN-15.

In Zone C1 less vulnerable development can take place subject to application of Justification Test, including the acceptability of flood consequences".

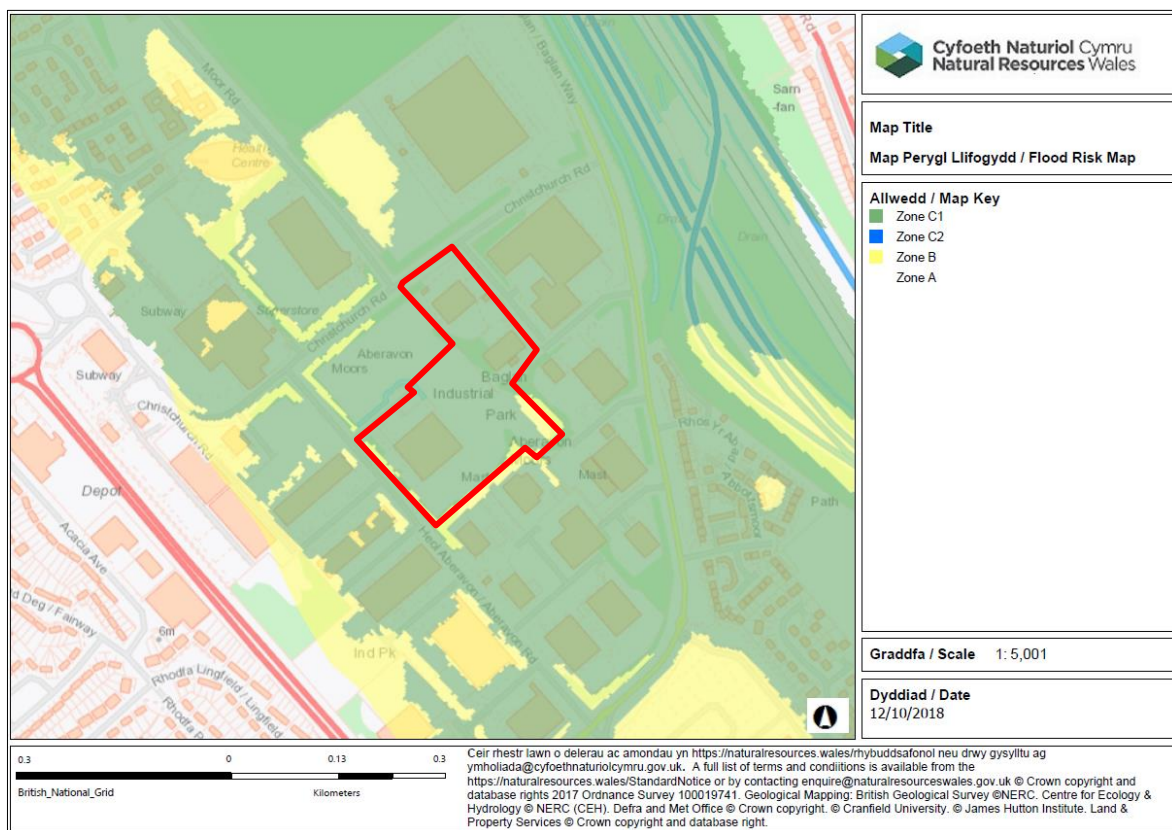


Figure 3-1. NRW's Development Advice Maps

3.3 Policy and Guidance Review

Local Development Plan

The Neath Port Talbot County Borough Council Local Development Plan⁴ (LDP) is a land use document which sets out development candidate site between 20011 – 2026. The site is located within an area defined as an “Existing employment area (EC2)” which are areas “safeguarded to reflect the important function they have”. The development of EC2 areas for general industry is encouraged within the LDP and reflects Policy SP11 (Employment Growth) aspirations.

Neath Port Talbot County Borough Council have published The Waterfront Regeneration Strategy⁵ which describes the Council’s strategy for the physical and economic regeneration of the Waterfront area of the County Borough. It includes six strategic goals, with the aim of the third to “develop existing and establish new employment sites within the area of Port Talbot that meets the needs of modern business, strengthens the local economy and ensures the provision of employment opportunities”.

Local Flood Risk Management Strategy

Neath Port Talbot County Borough Council’s Local Flood Risk Management Strategy⁶ sets out how the Council, in its capacity as the Lead Local Flood Authority, will manage the risk of flooding sources other than tidal or Main River sources.

The Strategy refers to the Shoreline Management Plan (SMP) which describes the strategic approach for the long-term management of the coastline. The policy for the Neath Port Talbot is to hold the line of the shoreline through the maintenance and upgrading of existing defences.

3.4 Justification Test

As discussed in Section 3.2 less vulnerable development is appropriate in DAM Zone C1 subject to application of Justification Test, including the acceptability of consequences. The proposed development can be justified if it can be demonstrated that;

1. 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

2. 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

3. It concurs with the aims of Planning Policy Wales⁷ (PPW) and meets the definition of previously developed land;

and

4. The potential consequences of a flooding event for the particular type of development have been considered, and in terms of the criteria contained in TAN-15 sections 5 and 7 and appendix 1 found to be acceptable.

⁴ Local Development Plan (2011-2026), Neath Port Talbot County Borough Council, 2016.
https://www.npt.gov.uk/PDF/ldp_written_statement_jan16.pdf

⁵ Waterfront Regeneration Strategy, Neath Port Talbot County Borough Council, 2011. http://www.npt-business.co.uk/media/4340/waterfront_strategy_document.pdf

⁶ Local Flood Risk Management Strategy, Neath Port Talbot County Borough Council, 2013.
https://www.npt.gov.uk/media/4930/lfrms_npt_local_flood_risk_management_strategy.pdf

⁷ Planning Policy Wales (Edition 9), Welsh Government, 2016.
<https://www.npt.gov.uk/media/5399/floodriskmanagementplan15.pdf>

The Cultech Ltd. site is within an established industrial estate and an area designated within the LPD for employment. The development will help meet key employment objectives supported by the local authority and will contribute to the regeneration of the waterfront area. The site concurs with the definition of previously developed land. Therefore, the proposed development passes requirements 1, 2 and 3 of the Justification Test.

The acceptability of flood consequences as a result of the proposed development will be assessed within Section 4.

4 Detailed Assessment of Tidal and Fluvial Risk

4.1 TAN-15 requirements

TAN-15 paragraph A1.14 states that industrial development “should be designed to be flood free during the 1% fluvial flood and the 0.5% tidal flood for the design life of the development.”

Paragraph A1.15 states that a “maximum depth of 1000mm should not be exceeded within the proposed development for an 0.1% AEP”.

4.2 Hydraulic modelling

In September 2016 JBA Consulting was commissioned by Neath Port Talbot County Borough Council Borough Council (NPTCBC) to undertake a comprehensive flood modelling exercise for all of Port Talbot. The 2010 model developed by Hyder Consulting, was updated to develop unified detailed flood model of Port Talbot. The 2016 updates included new hydrology, construction of a new 1D-2D model element for Baglan Brook and Ffrwd Wylt, and incorporation of new survey data. Full details on these model updates are available from NPTCBC.

The updated Port Talbot flood model was thoroughly review and accepted by NRW in July 2017. JBA have made further updated to the model by JBA since it was accepted by NRW; these are:

- Updated the TUFLOW version to 2016-03-AE;
- Amended the network layer to account for altered operation of the Seaway Parade pumping station, as recommended by NRW;
- New tide curves have been generated for 2117 as the previous model assessed climate change at 2116;
- Subsequently, updated initial conditions of the model to account for the above changes; and
- Updated, climate change allowances to 30% in line with the latest guidance (⁸

This model represents the best available data for assessing flood risk at the Cultech Ltd. site.

4.2.1 Tidal flood risk

The updated hydraulic modelling shows that the site is completely free of flooding during the 0.5% AEP plus climate change and the 0.1% AEP plus climate change tidal event, as shown in Figure 4-1 and Figure 4-2.

⁸ Policy Clarification Letter CL-03-16 - Climate change allowances for planning purposes, 2016)
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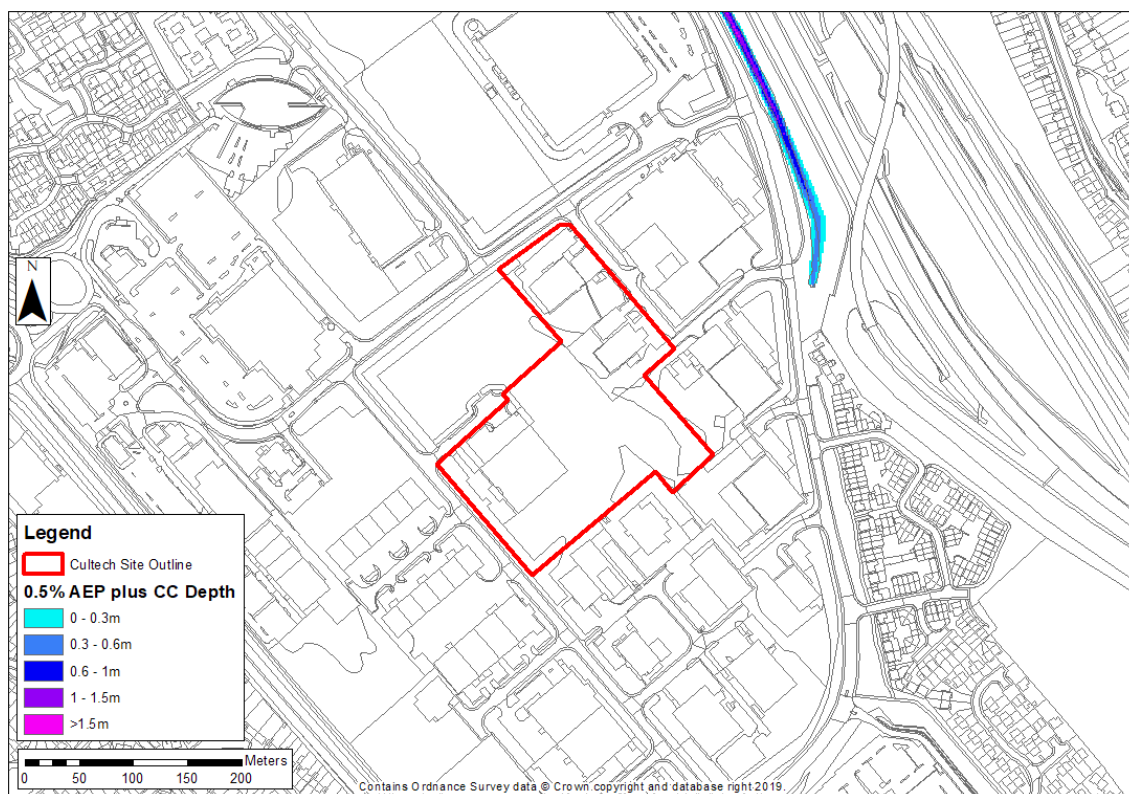


Figure 4-1. Maximum flood depths for the 0.5% AEP+CC tidal event at the site

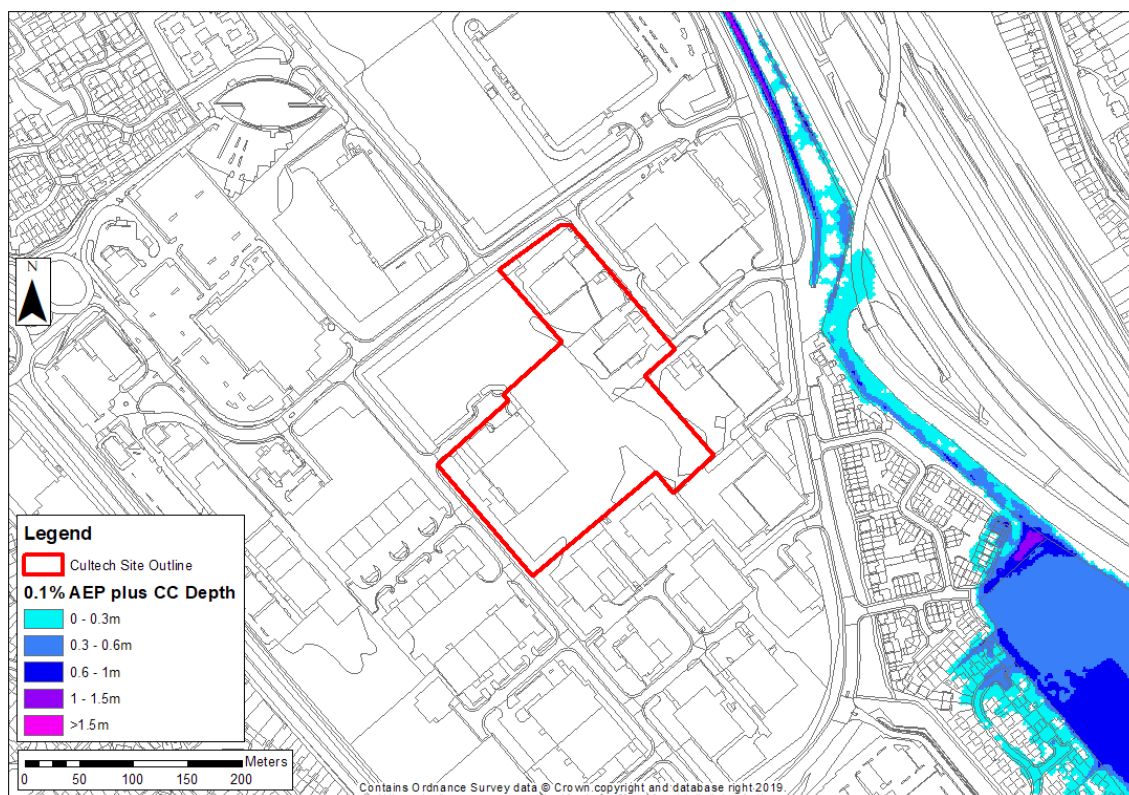


Figure 4-2. Maximum flood depths for the 0.1% AEP+CC tidal event at the site

4.2.2 Fluvial flood risk

The fluvial flood risk during the 1% AEP plus climate change and the 0.1% AEP events are shown in Figure 4-3 and Figure 4-4. These represent the risk in a defended scenario. During both events, the site is predicted to remain flood free.

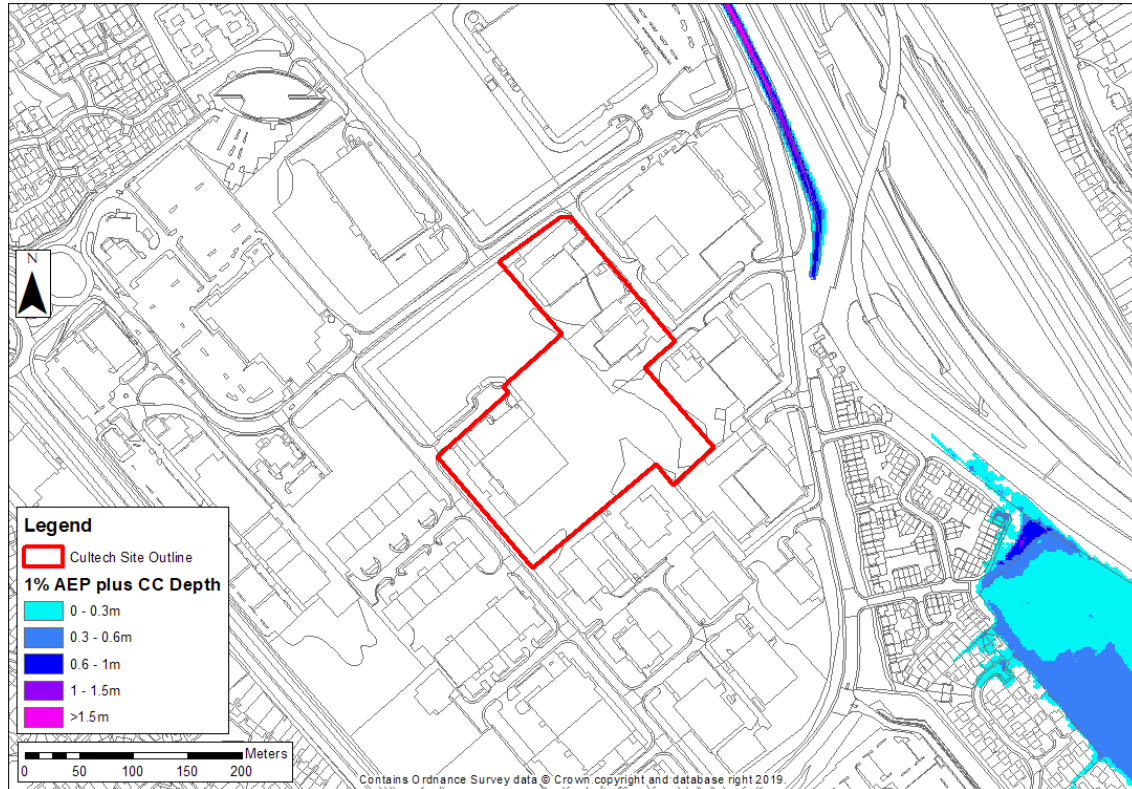


Figure 4-3. Maximum flood depths for the 1% AEP+CC fluvial event at the site

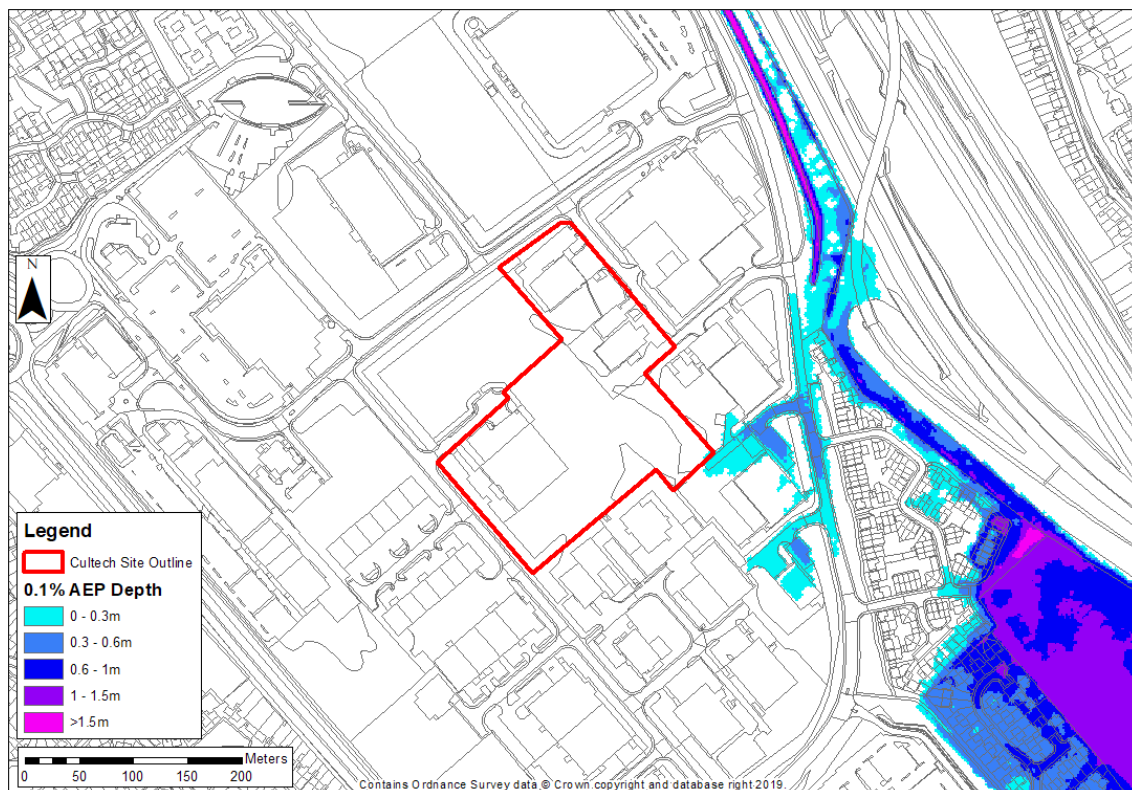


Figure 4-4. Maximum flood depths for the 0.1% AEP fluvial event at the site

4.3 Residual flood risk

The NRW Flood Map suggests that the site may be at risk of fluvial flooding as a result of asset failure. Therefore, it is necessary to consider the residual risks associated with the potential failure of assets that are critical to the management of flood risk. Such assets include not only formal flood defences, but also assets such as bridges, tidal outfalls and pumping stations.

In consultation with NRW for a previous study, it was agreed that two such asset failure scenarios should be considered; the blockage of High Street Bridge and failure of Baglan Brook pumping station as seen in Figure 4-5. Breach analysis of the formal defences along the River Afan was not requested from NRW.

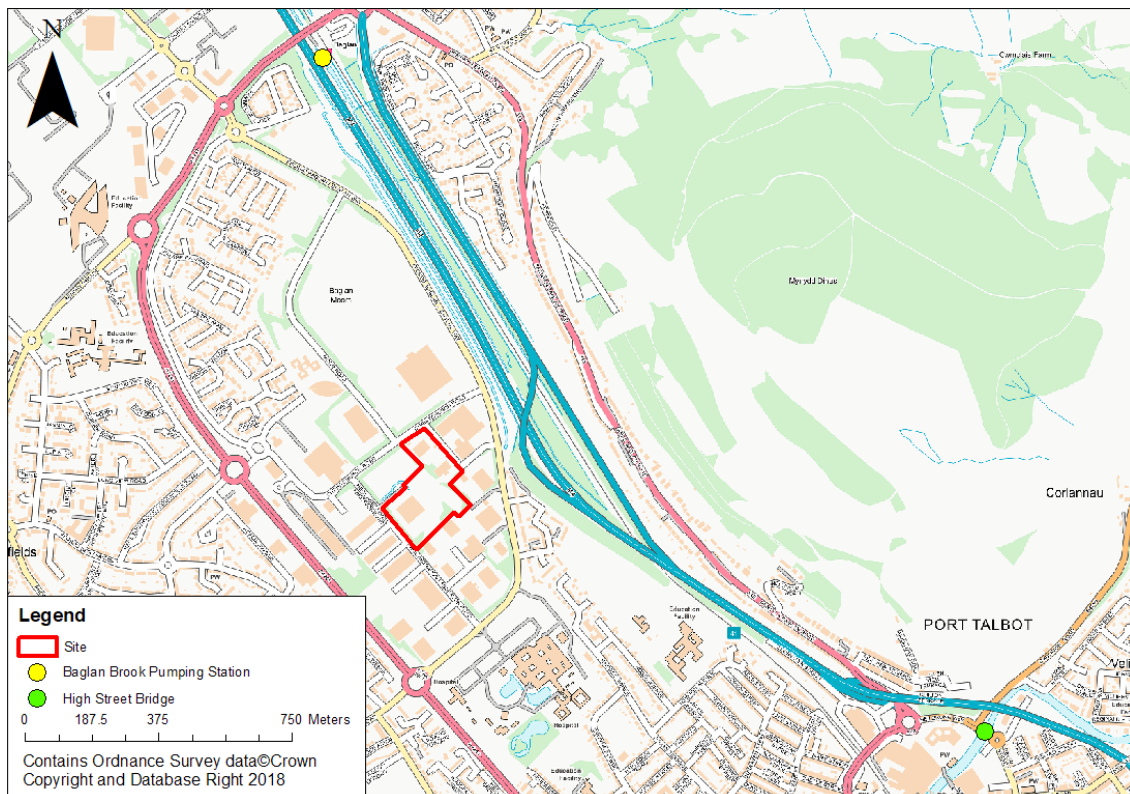


Figure 4-5. Location of High Street Bridge and Baglan Brook Pumping Station

4.3.1 High Street bridge blockage

High Street Bridge on the River Afan is the most significant hydraulic constriction on the River Afan, and the bridge most vulnerable to blockage during a flood event. The bridge comprises of three masonry arches and is located adjacent to the Aberafan Shopping Centre and Tesco on the western and eastern banks respectively. NRW had requested that a blockage of 25% be tested against this bridge for previous studies, and so that has been used to inform the residual risk at the Cultech Ltd. site.

During this scenario, the site remains flood free during the both the 1% AEP plus climate change and 0.1% AEP events as shown in Figure 4-6 and Figure 4-7 respectively.

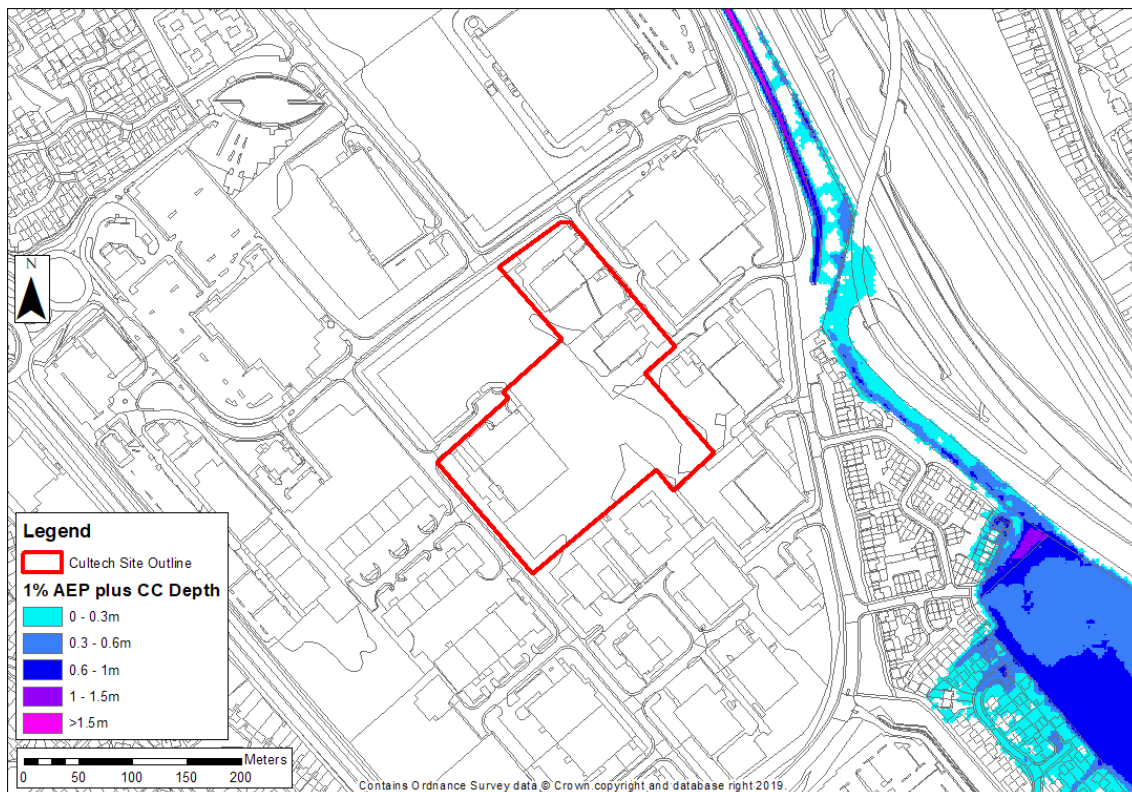


Figure 4-6. Maximum flood depths for the 1% AEP+CC fluvial event at the site, with blockage to the High Street bridge

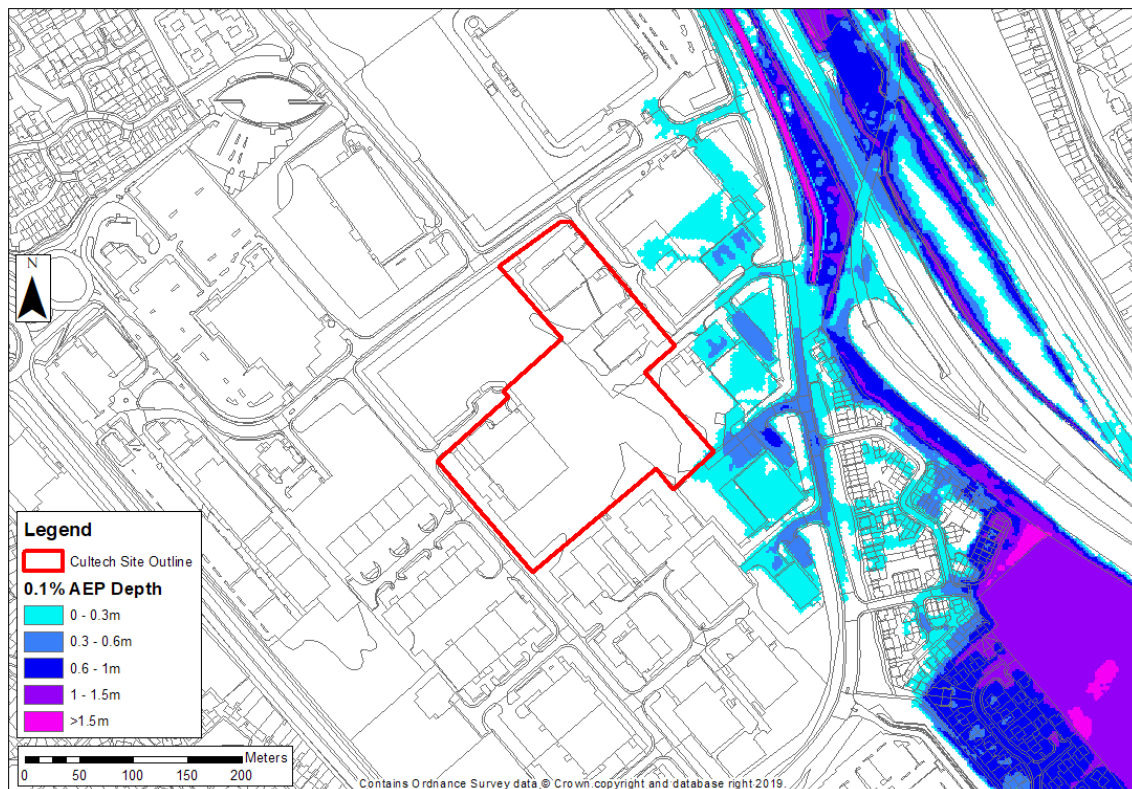


Figure 4-7. Maximum flood depths for the 0.1% AEP fluvial event at the site, with blockage to the High Street bridge

4.3.2 Baglan Brook pump failure

A further assessment of residual flood risk was carried out to determine the impacts of a failure of the Welsh Water Seaway Parade pumping station on the Baglan Brook downstream of the site. This pumping station is essential for the drainage of the brook under all conditions. The station consists of a dry weather pump, three storm pumps and a back-up storm pump. The failure of Storm Pump 3 was assessed, as this pump commences operation with an upstream water level of between 0.8m and 1.10m. Typically, the failure of a storm pump will result in the operation of the back-up storm pump. However, the back-up pump has not been activated in this scenario, as to provide a conservative estimate of the potential impact of a pump failure.

This assumed the failure of Storm Pump 3 and the backup pump was modelled by reducing the maximum capacity of the station by 2 cumecs. As shown in Figure 4-8 and Figure 4-9, the Cultech Ltd. site remains flood-free during this event.

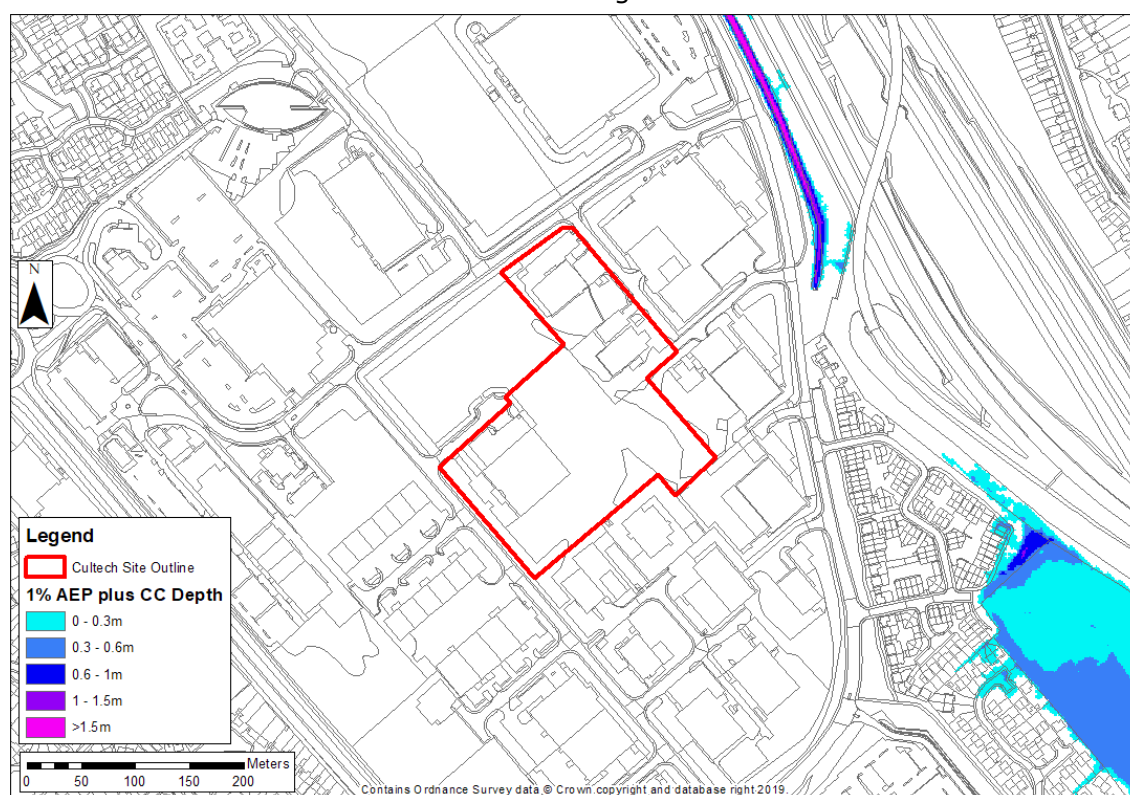


Figure 4-8. Maximum flood depths for the 1% AEP+CC fluvial event at the site, with the failure of a Baglan Brook storm pump

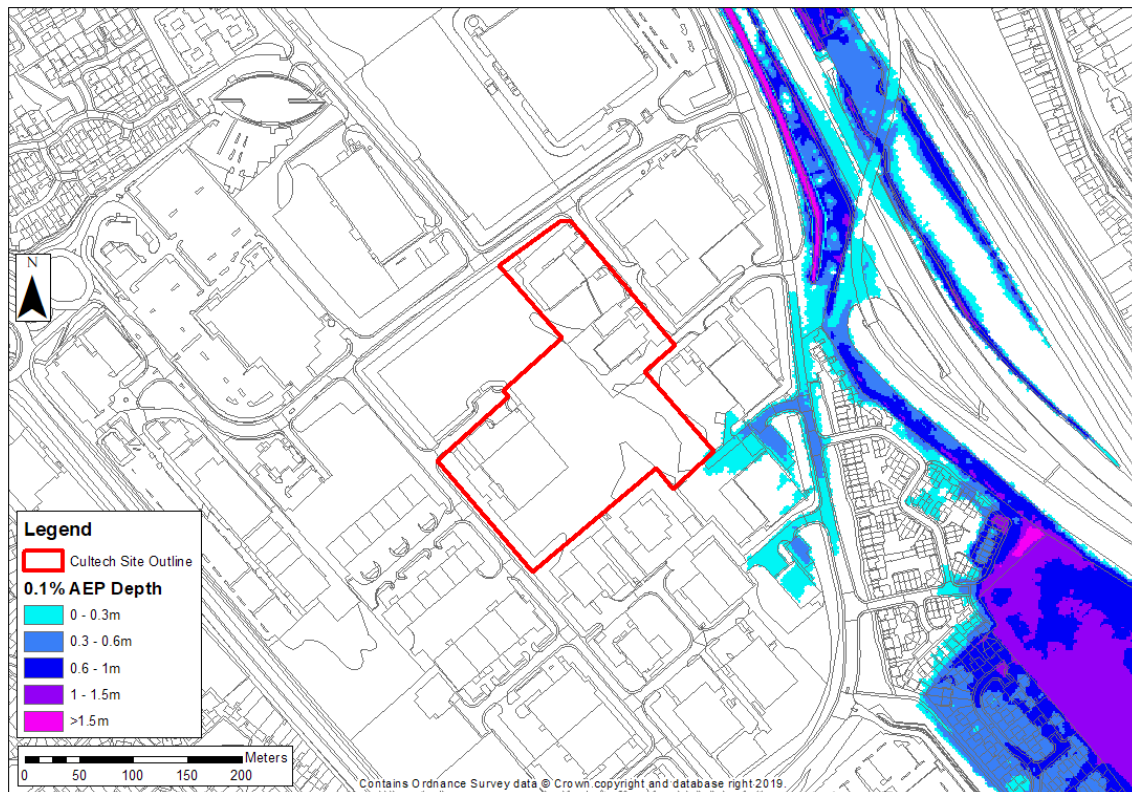


Figure 4-9. Maximum flood depths for the 0.1% AEP fluvial event at the site, with the failure of a Baglan Brook storm pump

4.4 Flood risk assessment summary

The site is not at risk in either the 0.1% AEP (2117) tidal or 0.1% AEP fluvial flood event. The residual risk assessment demonstrates that there is no further risk to the site as a result of a failure at the Seaway Parade pumping station or a blockage at the High Street Bridge on the River Afan. The access to the development site remains operational in all events and therefore the proposed development meets the Acceptability Criteria set out within TAN-15.

5 Conclusions and Recommendations

- JBA Consulting were commissioned by Cultech Ltd in August 2018 to prepare a Flood Consequence Assessment (FCA) to support a planning application at Cultech Ltd in Port Talbot for five minor developments.
- This FCA focuses on four extensions to the existing buildings at Cultech Ltd. and the construction of a new unit for vehicle maintenance. Part of the development described has already been constructed thus retrospective planning permission is to be sought. A further three building extensions require planning permission for future construction.
- The Cultech Ltd. site falls mainly Zone C1 of NRW's DAM. There are small areas of Zone B within the site. Zone C1 denotes "areas of the floodplain which are developed and served by significant infrastructure including flood defences". Zone B denotes "areas known to have been flooded in the past, evidenced by sedimentary deposits".
- The proposals are industrial in nature and therefore is categorised as "less vulnerable development" by TAN-15.
- There are no historic flood events recorded on site.
- The site is at very little to no risk of flooding from reservoir failure and groundwater sources.
- The site is generally subject to very low to low risk of surface water flooding. However, localised pockets of greater risk are present in depressions within the site.
- A detailed 1D-2D ESTRY-TUFLOW hydraulic model has been used to assess the flood risk from the various nearby watercourses (namely the Baglan Brook and the River Afan) and the Severn Estuary at the site.
- The site is not at risk of tidal flooding in either the 0.5% AEP plus climate change or the 0.1% AEP plus climate change events.
- The site is not at risk of fluvial flooding in the 1% AEP plus climate change or the 0.1% AEP event.
- The residual risk of a blockage to the High Street bridge along the River Afan in Port Talbot town centre has been assessed by applying a 25% blockage. The site remains flood free during the 1% AEP plus climate change and the 0.1% AEP fluvial event.
- The residual risk of a storm pump failure at the Seaway Parade Pumping Station along the Baglan Brook has been assessed. The site remains flood free during the 1% AEP plus climate change fluvial event and during the 0.1% AEP fluvial event.
- Flood mitigation measures are not required as the site is at little or no risk of flood from all sources.
- The site complies with the Justification Test as set out in TAN-15, including the Acceptability Criteria.
- We conclude that on the grounds of flood risk, the site is in compliance with Planning Policy Wales and TAN-15, meeting all the requirements set out therein.

Appendices

A Site topographical survey

Offices at

Coleshill
Doncaster
Dublin
Edinburgh
Exeter
Glasgow
Haywards Heath
Isle of Man
Limerick
Newcastle upon Tyne
Newport
Peterborough
Saltaire
Skipton
Tadcaster
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