



Seaway Parade, Baglan

Flood Consequences Assessment

April 2020

Tulip Engineering Consultancy Limited

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Client Name: CB3 Consult Ltd.
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1. Introduction

1.1 Terms of Reference

Tulip Engineering Consultancy was commissioned by CB3 Consult Ltd to prepare this Flood Consequences Assessment (FCA) to support a planning application for the development of Industrial Units on brownfield land at Seaway Parade, Baglan. Industrial development is classified as “less vulnerable” development in Technical Advice Note (TAN) 15 Development & Flood Risk (Welsh Assembly Government, 2004).

The proposed development site lies within Zones B and C1 of the Development Advice Map (DAM) published by Natural Resources Wales (NRW). Zone B is described as “areas known to have been flooded in the past evidence by sedimentary deposits”. Zone C1 is defined as areas at risk of flooding “with significant flood defence infrastructure” (Welsh Assembly Government, 2004).

The objective of this report is to undertake a study into the hydrological issues affecting the site, and establish whether and to what extent the consequences of flooding can be managed over the lifetime of the development, using the principles and tests set out in TAN 15.



2. Site Description

2.1 Location

The site is located at Baglan Energy Park, an industrial area of Baglan, Port Talbot. The site is bounded to the east by the A4241 Seaway Parade dual carriageway and to the north by Central Avenue, with good links to the nearby A48 and M4 corridor.

The National Grid Reference for the site is: SS 74440 92015.

A site location plan is shown in Figure 1.



Figure 1: Site Location

Ordnance Survey Data © Crown Copyright and Database Right 2020

An aerial view of the site is shown in Figure 2.



Figure 2: Aerial View showing Site Location

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2.2 Watercourses

The site lies between the River Neath and River Afan main rivers, close to the Baglan Brook. The River Neath flows into Swansea Bay at a distance of some 1.8km north-west of the development site.

The River Afan rises in the Brecon Beacons at Bwlch yr Afan some 500m above sea level and flows in a generally south-westerly direction to Swansea Bay. The river drains a total catchment of some 91km². The Afan flows approximately 2.8km south-east of the proposed development.

Baglan Brook is an ordinary watercourse which rises in the hills above Baglan and becomes culverted at St Illtyd's Drive as it enters the urban area. The brook passes through Seaway Parade pumping station (a Welsh Water asset) and flows in a flat 4.5m wide open channel at a level of approximately 3.0 – 3.5m AOD thereafter in a north-westerly direction parallel to the M4 motorway towards the Neath Estuary where it discharges to the Swansea Bay.

2.3 Topography

The Lidar ground level plan in Appendix A shows the site location in the relatively flat land expanse between the M4 corridor and the coast.

The development site sits in a low-lying strip between the Neath and Afan rivers, as shown by the Lowlying Ground plan in Appendix A which highlights land lower than 8m AOD.



A topographical survey of the development area and adjacent industrial units dated 2005 is also included in Appendix A. There have since been alterations to the Seaway Parade road bounding the site including the installation of a footbridge, but the site ground levels shown remain largely unchanged since this survey, ranging between approximately 6.0m AOD at the northern end to approximately 6.8m AOD at the southern end of the site.

2.4 Soils, Geology & Hydrogeology

Local soils are described as coastal flats, loamy and clayey in texture with naturally high groundwater according to the Cranfield University Soilscales Viewer.

The geology at the site is described as tidal flat deposits (clay, silt and sand) overlying mudstone, siltstone and sandstone bedrock, according to the BGS Geology of Britain Viewer.

The aquifer designation of the sedimentary bedrock is Secondary A (capable of supporting water supplies at a local rather than strategic scale). The site is not in a groundwater Source Protection Zone area.



3. Proposed Development

3.1 Layout

The proposed development consists of an industrial shed housing three HGV lorry bays and ground / first floor office space, with associated hardstanding for lorry parking/turning, car-parking and soft landscaping.

The plot will be accessed off the existing internal industrial estate road to the west of the plot.

The proposed architectural site layout and floor plans are included in Appendix B.

3.2 Levels

Proposed carpark and building floor levels are not yet finalised, although it is anticipated that proposed ground levels will be similar to existing levels.



4. Planning Policy and Flood Risk

4.1 Proposed Development and TAN 15

The development proposal is industrial development of a designated plot in the existing Baglan Energy Park industrial area. Industrial development is classified as 'less vulnerable' development in TAN 15.

The Development Advice Map (DAM) is a flood map published by NRW for land use planning purposes. It is used alongside Planning Policy Wales and Technical Advice Note (TAN) 15 to direct new development in respect to flood risk. Together, they form a precautionary framework to guide planning applications.

The map is based on Natural Resource Wales' extreme flood outlines (zone C) and the British Geological Survey drift data (zone B). Zone B data was originally published 2004 and updated in 2017. Zone C data is revised quarterly by ongoing hydraulic modelling and represents areas affected by flooding in events with up to a 1 in 1000 annual chance of occurring (0.1% Annual Event Probability), but no allowance for future climate change.

The Development Advice Map in the vicinity of the proposed development is included in Appendix C. The Map shows that the development site currently lies partly within the yellow zone B and partly in the green shaded zone C1 area, defined as "*areas of the floodplain with significant flood defence infrastructure*".

TAN15 provides for less vulnerable development in zone C1, subject to application of the justification test, including acceptability of consequences.

4.2 Justification Test

TAN15 Section 6 states that development will 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 Wales 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 found to be acceptable.

In this case this development is considered to meet the second and third criteria, whilst the fourth is supported by updated flood modelling undertaken specifically for this FCA, as described in Section 6.2 and Appendix E of this report.



5. Existing Flood Risk Review

5.1 Historical Flooding

The site has not experienced any flooding in the past according to NRW's map of historical flood outlines.

5.2 Fluvial / Tidal Flood Risk

The primary flooding mechanisms at this site location are fluvial, tidal, or a combination of both.

The NRW Zone 2 & 3 Map in Appendix C shows the majority of the site in zone 2 (up to 1 in 1000 annual chance of flooding) and the remaining southern (higher) part of the site outside of the floodplain. The zone 3 floodplain (up to 1 in 100 annual chance of flooding) is shown on the roundabout and adjacent roads north and east of the site but zone 3 does not encroach onto the site itself.

This map also indicates that the zone 3 area only is classed as 'area benefitting from flood defences', whereas the DAM map shows the whole floodplain (i.e. including zone 2) as green-coloured zone C1 (defended).

An additional 'Flood Zone Plan' is included in Appendix C, showing flood zones 2 & 3 overlaid on a map which also includes the site topographical survey, lidar ground elevation data and OS watercourses.

This is the flood risk as shown on the current flood maps which guide the planning process.

It is important to note that at this site location, the modelling which informs the current DAM Map and NRW Zone 2/3 Flood Map is based on modelling undertaken by Hyder Consulting in 2010. This pre-dates the flood modelling discussed in Section 6 of this report.

5.3 Surface Water Flood Risk

The surface water flood risk map included in Appendix C shows that the development site is at very low risk of surface water flooding. The surrounding roads are shown at low to medium risk of surface flooding by virtue of their topographic profile but this is infrastructure with a positive drainage system.

The proposed development land is elevated slightly from the surrounding roads and will be subject to sustainable drainage design/SAB approval. As such it is considered unlikely that the proposed development will be affected by surface water flooding or increase the risk of surface water flooding or the rate and volume of surface water runoff.

5.4 Reservoir Flood Risk

The development site is not at risk of flooding from reservoir failure according to NRW's flood risk mapping.

5.5 Groundwater Flood Risk

The development site is not in an area prone to groundwater flooding according to available BGS mapping, which is supported by NPT's Local Flood Risk Management Strategy which states that there are no specific areas of groundwater flooding recorded historically in the NPT area.



6. Hydraulic Modelling

6.1 2016 Port Talbot Model

This section of the report will reassess the flood risk indicated by the DAM map / NRW Flood Map and establish whether the consequences of the risk of flooding may be considered acceptable.

Following an enquiry to NRW as part of this FCA, NRW confirmed that there is a Port Talbot model which was created in 2016. NRW further confirmed that 'if this model/outputs are to be used for an FCA, the model, hydrology and tidal levels will need to be reviewed and brought up to current modelling standards. In addition, blockage scenarios will need to be considered for a FCA and the failure of Welsh Water pumps in the vicinity of the proposed site'.

The original 2010 Port Talbot flood model was updated in 2016 by JBA Consulting, incorporating updated hydrology, survey data and new 1D-2D watercourse elements including the Baglan Brook. This modelling was accepted by NRW in July 2017 although the DAM & NRW Flood Maps for planning were not updated.

The 2016 model output data was obtained for this FCA under NRW data request reference ATI-19002a. The extreme flood map outlines from this modelling data, for the key flood events to be considered in TAN15, are shown in the maps in Appendix D. These maps contain Natural Resources Wales information © Natural Resources Wales and database right. All rights reserved.

These maps show that the site remains unaffected by flooding in all events including the 0.5% and 0.1% AEP tidal events and the 1%CC and 0.1% AEP fluvial events.

In line with NRW's requirements for this site-specific FCA, this modelling was updated further and assessed for bridge blockage and pump failure scenarios as discussed in the following section.

6.2 Updated Hydraulic Modelling for this FCA

The updated modelling undertaken by JBA Consulting for this FCA encompasses updated tide curves and Seaway Parade pumping station modelling as recommended NRW.

The High Street Bridge on the River Afan was modelled with a 25% blockage scenario, reflecting that requested by NRW for previous studies.

A failure of the DCWW Seaway Parade pumping station on the Baglan Brook was also modelled. 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 by reducing the maximum capacity of the station by 2 cumecs. In addition the back-up pump was not activated in the pump failure scenario, in order to provide a conservative estimate of the potential impact.

A Technical Note from JBA Consulting summarising the updated modelling exercise, is included in Appendix E of this report.

Results from this updated modelling show that the proposed development still remains flood-free in all TAN15-critical events, that is the 0.5% and 0.1% AEP tidal events for future year 2117, and the 1%CC and 0.1% AEP fluvial events including both the High St bridge blockage and pump station failure scenarios.



TAN15 guidelines require a flood-free development level for fluvial flood risk of 1% (1 in 100 annual chance) probability over the lifetime of the development. The updated modelling results displayed in Appendix E demonstrate that the proposed development would be compliant with the flood-free development level criteria (A1.14) of TAN15. Consequently it is clear that no ground level alterations would be required in order to meet this criteria.

Emergency access/egress to/from the site needs to be considered in light of the TAN15 recommendations. The maps in Appendix E demonstrate that the Seaway Parade and Central Avenue link roads are unaffected by flooding, allowing unimpeded access for emergency vehicles. As such the development meets the criteria in section A1.15 of TAN15.

The 'no flooding elsewhere' criterion of TAN15 is considered irrelevant in this context since it has been demonstrated that the site would not flood during either the 1%CC or 0.1% AEP events.



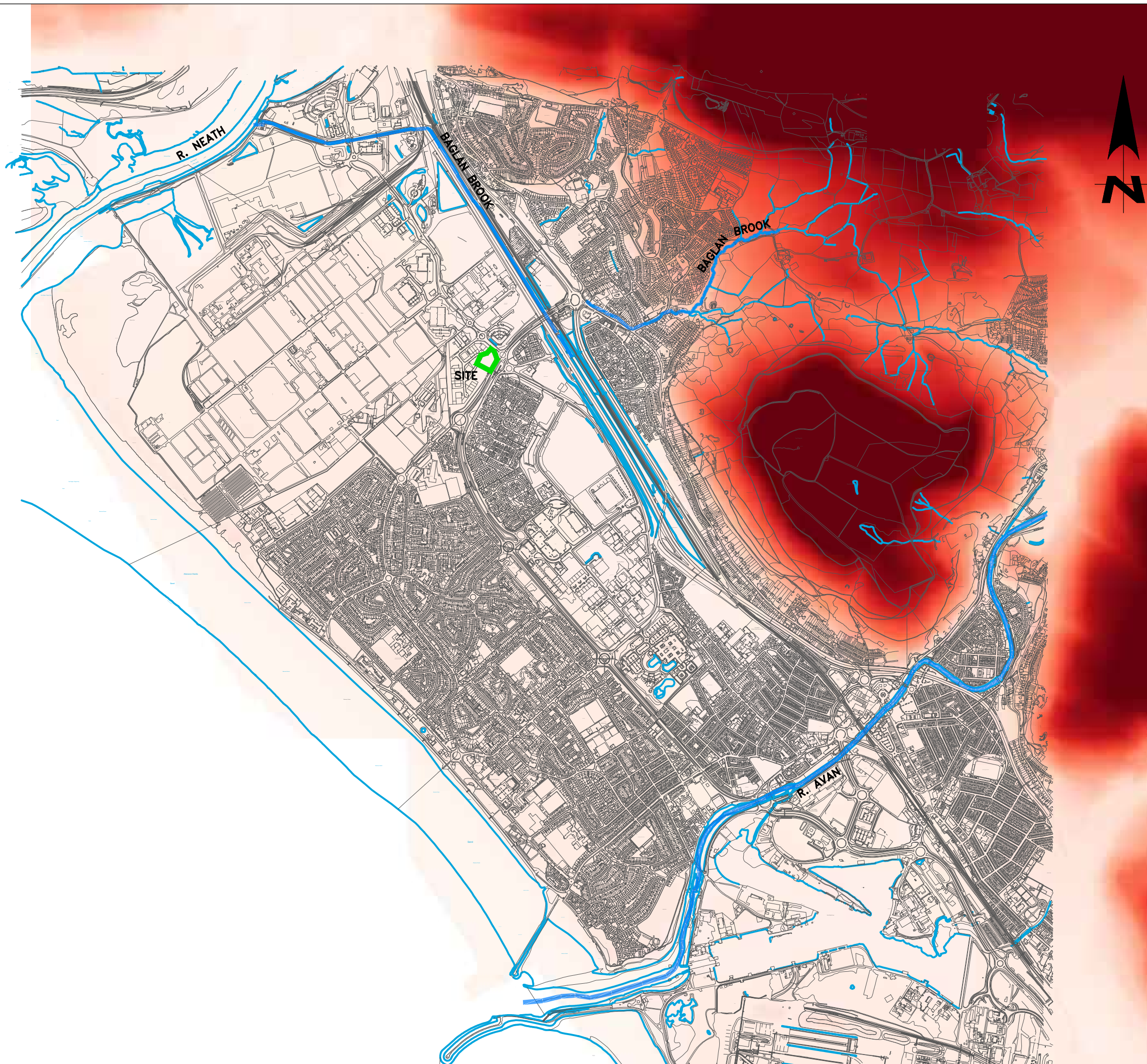
7. Conclusions & Recommendations

- This planning application is for industrial development (classed as less vulnerable in TAN15) on a plot at Baglan Energy Park in Port Talbot.
- The requirement for this FCA is due to the proposed development site location in the flood plain (zone C1 of the current Welsh Government Development Advice Map).
- However, updated flood modelling undertaken specifically for this FCA for this development, has demonstrated that the proposed development site is outside the flood plain, that is, flood-free during both the 1%CC and 0.1% AEP events, including a High Street bridge blockage scenario on the River Afan and a Seaway Parade Pumping Station failure scenario as advised by NRW.
- The most up to date analysis of flood risk to the site is therefore shown to be less than the risk suggested by the current DAM Map, and the key TAN15 acceptability tests in relation to flood-free floor level, no flooding elsewhere and access/egress are all met by default.
- The proposed development is considered to meet the justification test criteria set out in TAN15 and is compliant with all key aspects in relation to the acceptability of consequences of flooding. As such it is considered that this land is suitable for industrial development in relation to planning policy and flood risk.

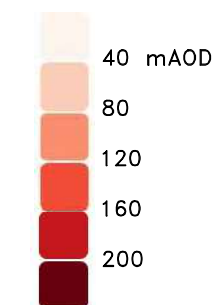


APPENDICES

A. LIDAR Plan, Lowlying Ground Plan, Topographical Survey



Lidar Ground Elevation



OS-MAPPED WATERCOURSE

REV DATE



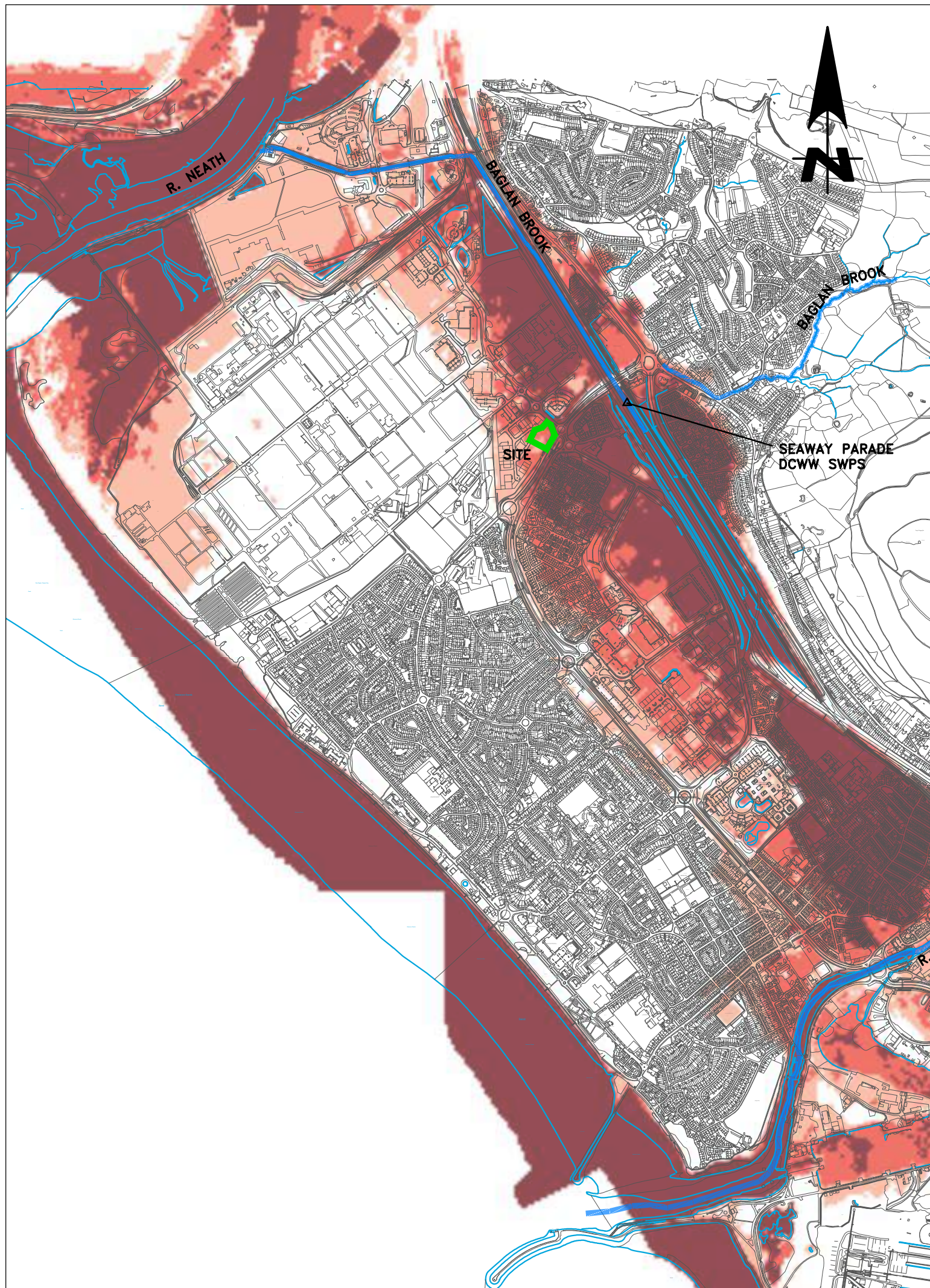
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CLIENT: CB3 CONSULT LTD

PROJECT: SEAWAY PARADE
BAGLAN FCA

DRG TITLE: LIDAR PLAN

DATE: 20.04.2020	STATUS: PLANNING	SCALE: 1:20,000
DRG No. J006/001	REV. -	SIZE: A3



REV DATE



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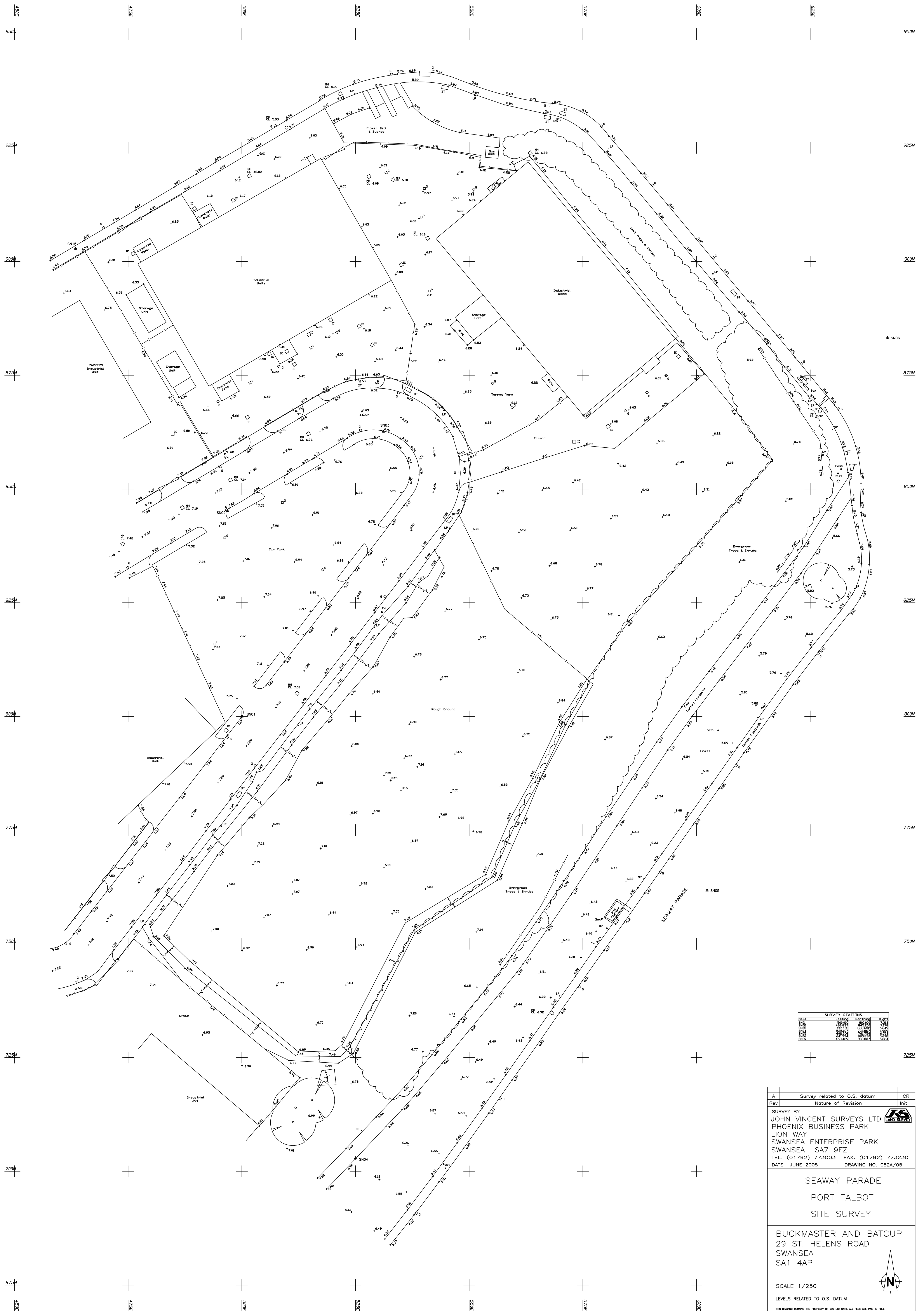
CLIENT: CB3 CONSULT LTD

PROJECT: SEAWAY PARADE
BAGLAN FCA

DRG TITLE: LOWLYING GROUND

DATE: 20.04.2020 STATUS: PLANNING SCALE: 1:20,000

DRG No. J006/002 REV. - SIZE: A3



SURVEY STATIONS			
Name	Easting	Northing	Height
SN01	500.050	800.000	7.313
SN02	496.839	867.290	7.178
SN03	531.103	867.625	6.649
SN04	525.007	702.867	6.969
SN05	602.306	761.754	6.053
SN06	641.994	883.230	5.672
SN15	463.439	902.837	6.324

A	Survey related to O.S. datum	CR
Rev	Nature of Revision	Init

SURVEY BY JOHN VINCENT SURVEYS LTD PHOENIX BUSINESS PARK LION WAY SWANSEA ENTERPRISE PARK SWANSEA SA7 9FZ TEL. (01792) 773003 FAX. (01792) 773230 DATE JUNE 2005 DRAWING NO. 052A/05		
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SEAWAY PARADE

PORT TALBOT

SITE SURVEY

BUCKMASTER AND BATCUP

29 ST. HELENS ROAD

SWANSEA

SA1 4AP

SCALE 1/250

LEVELS RELATED TO O.S. DATUM



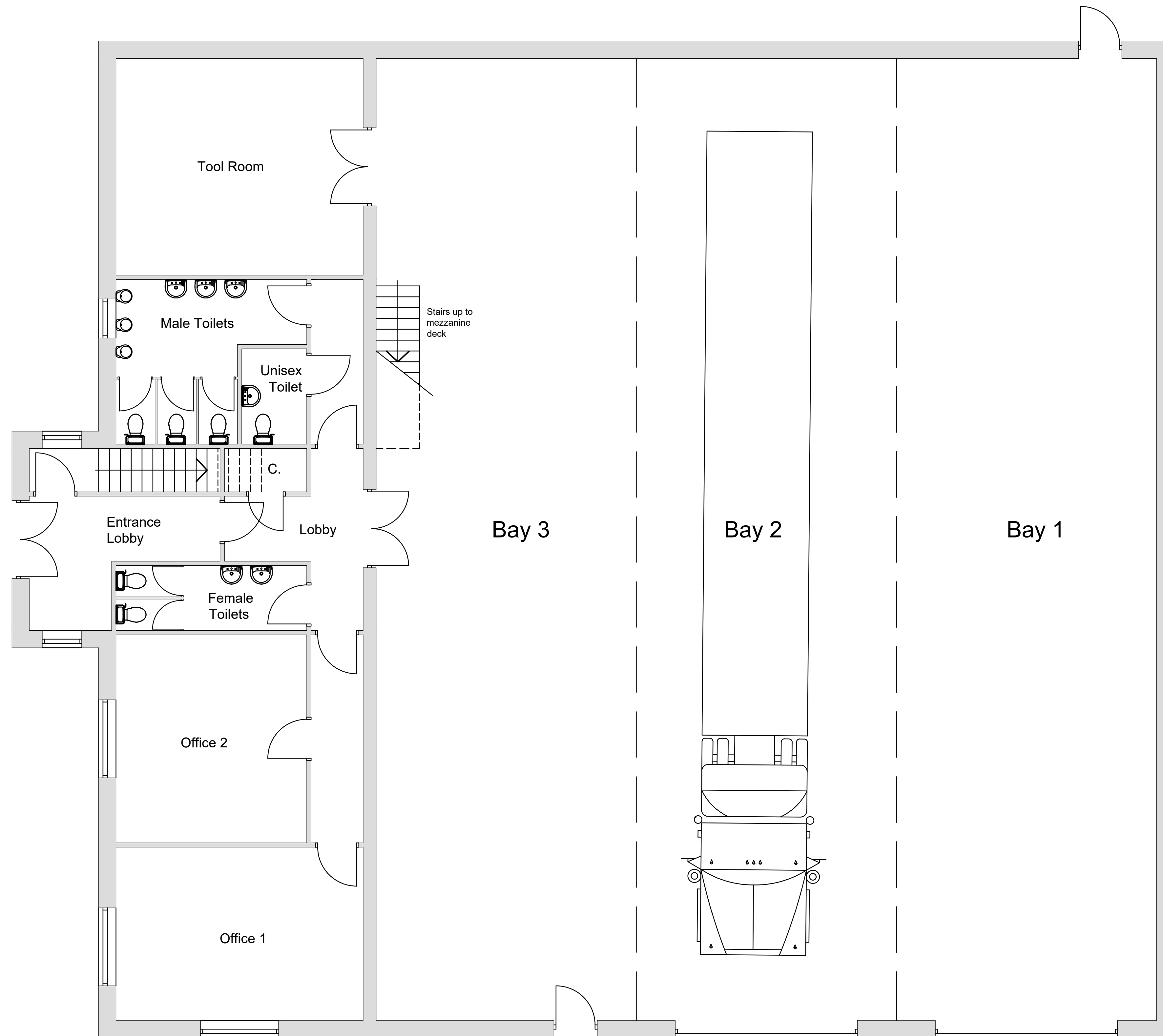
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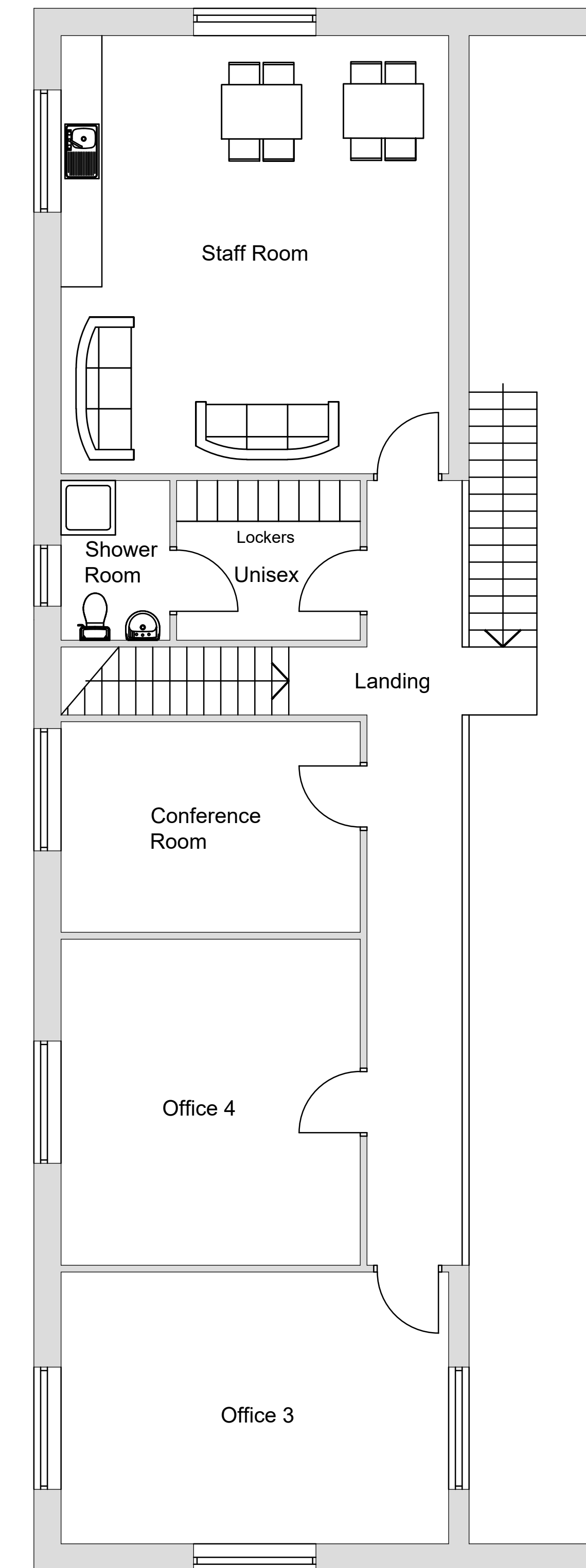


B. Architectural Site Plan, Floor Plans





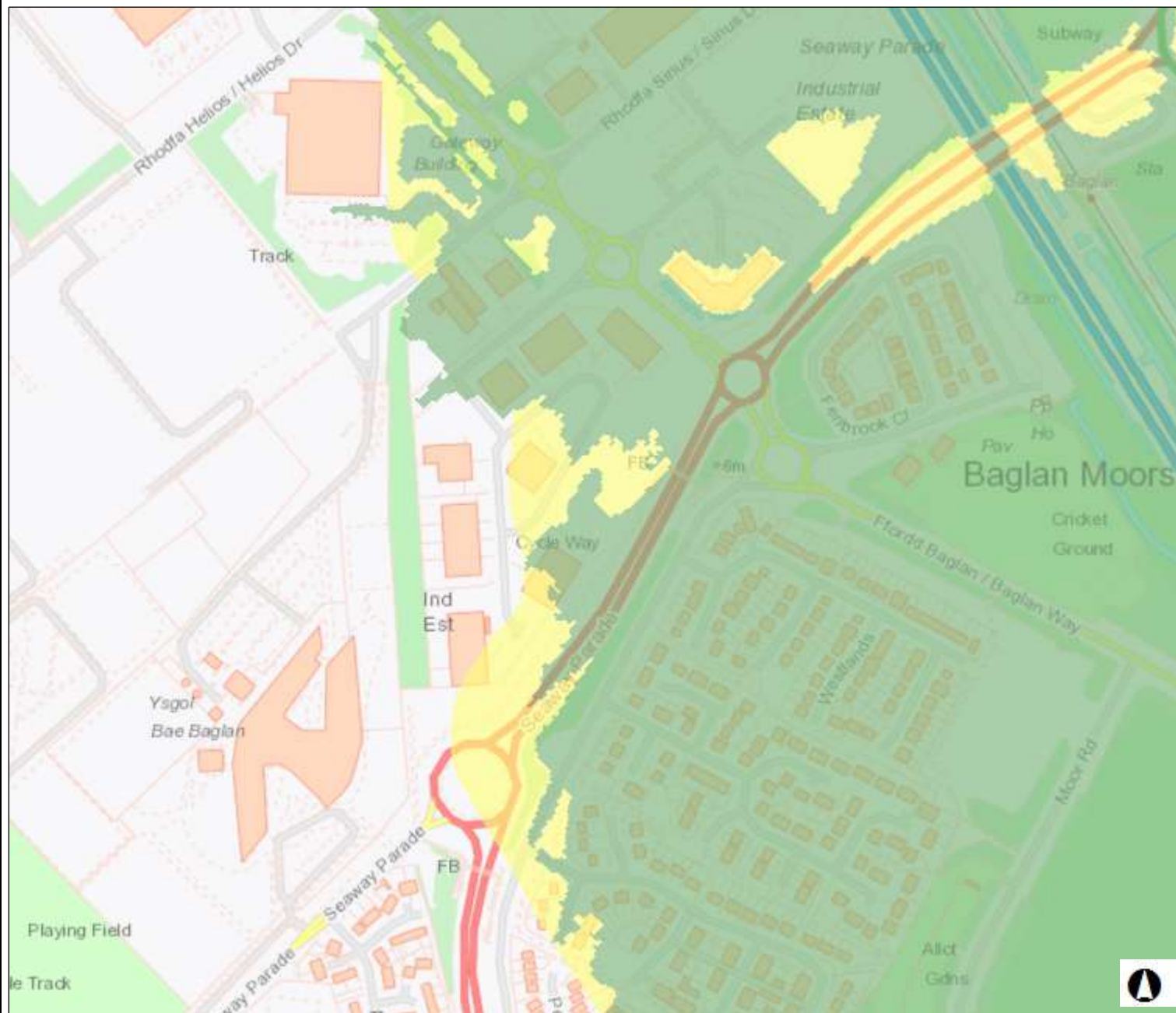
Proposed Ground Floor Plan



Proposed First Floor Plan



C. Flood Maps for Planning



Map Title

Map Perygl Llifogydd / Flood Risk Map

Allwedd / Map Key

-  Zone C1
-  Zone C2
-  Zone B
-  Zone A

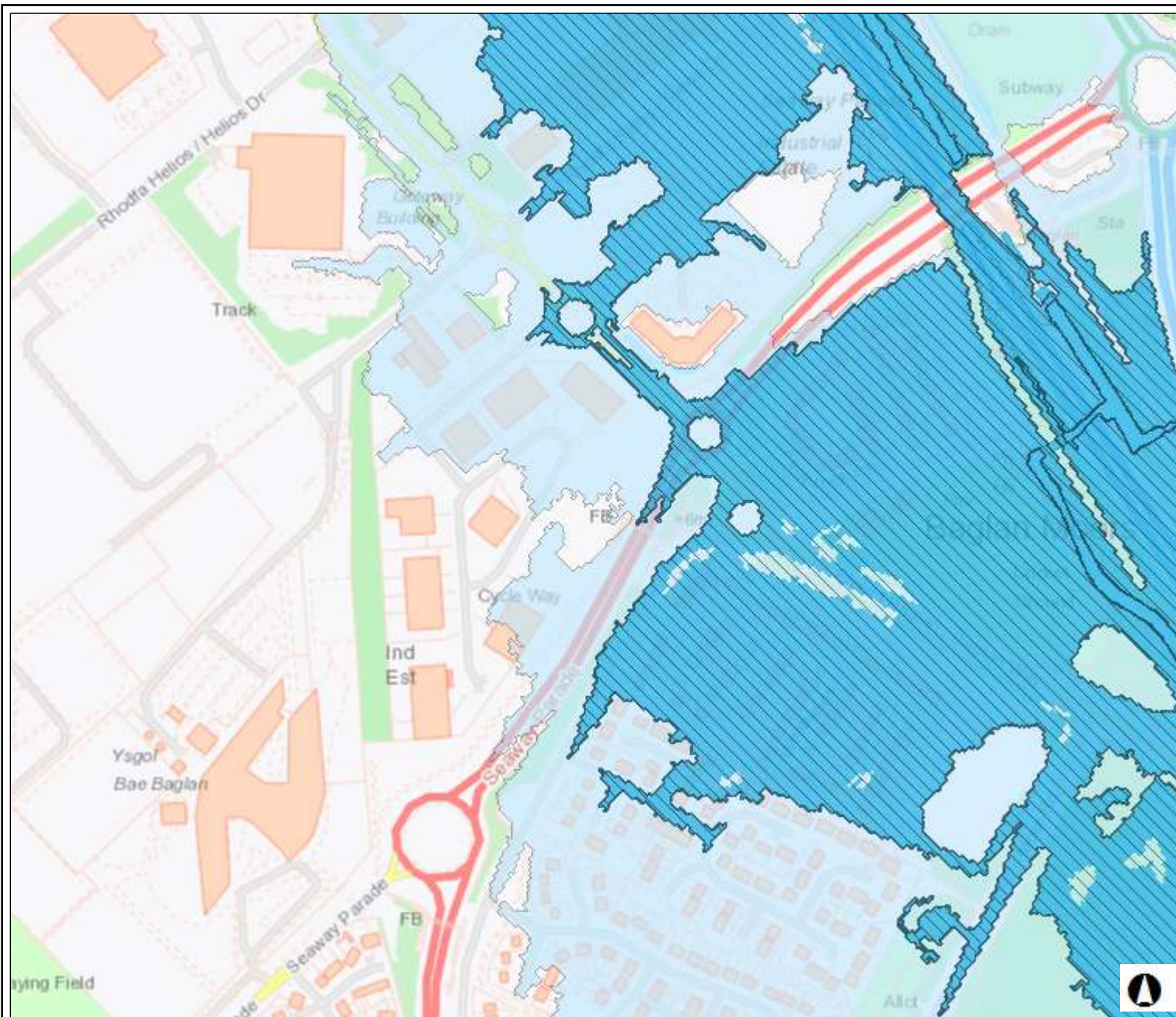
Graddfa / Scale 1: 4,999

Dyddiad / Date
17/04/2020

0.3 0 0.13 0.3

British_National_Grid Kilometers

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Map Title

Map Perygl Llifogydd / Flood Risk Map

Allwedd / Map Key

-  Main Rivers
-  Flood Defences
-  Areas Benefiting from Flood Defences
-  Flood Storage Areas
-  Floodmap Flood Zone 3
-  Floodmap Flood Zone 2

Graddfa / Scale 1: 5,001

Dyddiad / Date
15/02/2020



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- 40 mAOD
80
120
160
200
- OS-MAPPED WATERCOURSE
- FLOOD ZONE 3:
UP TO 1% AEP (100yr)
- FLOOD ZONE 2:
UP TO 0.1% AEP (1000yr)
- AREA BENEFITTING FROM
FLOOD DEFENCES



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BAGLAN FCA

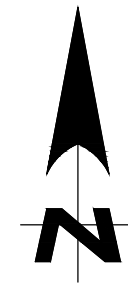
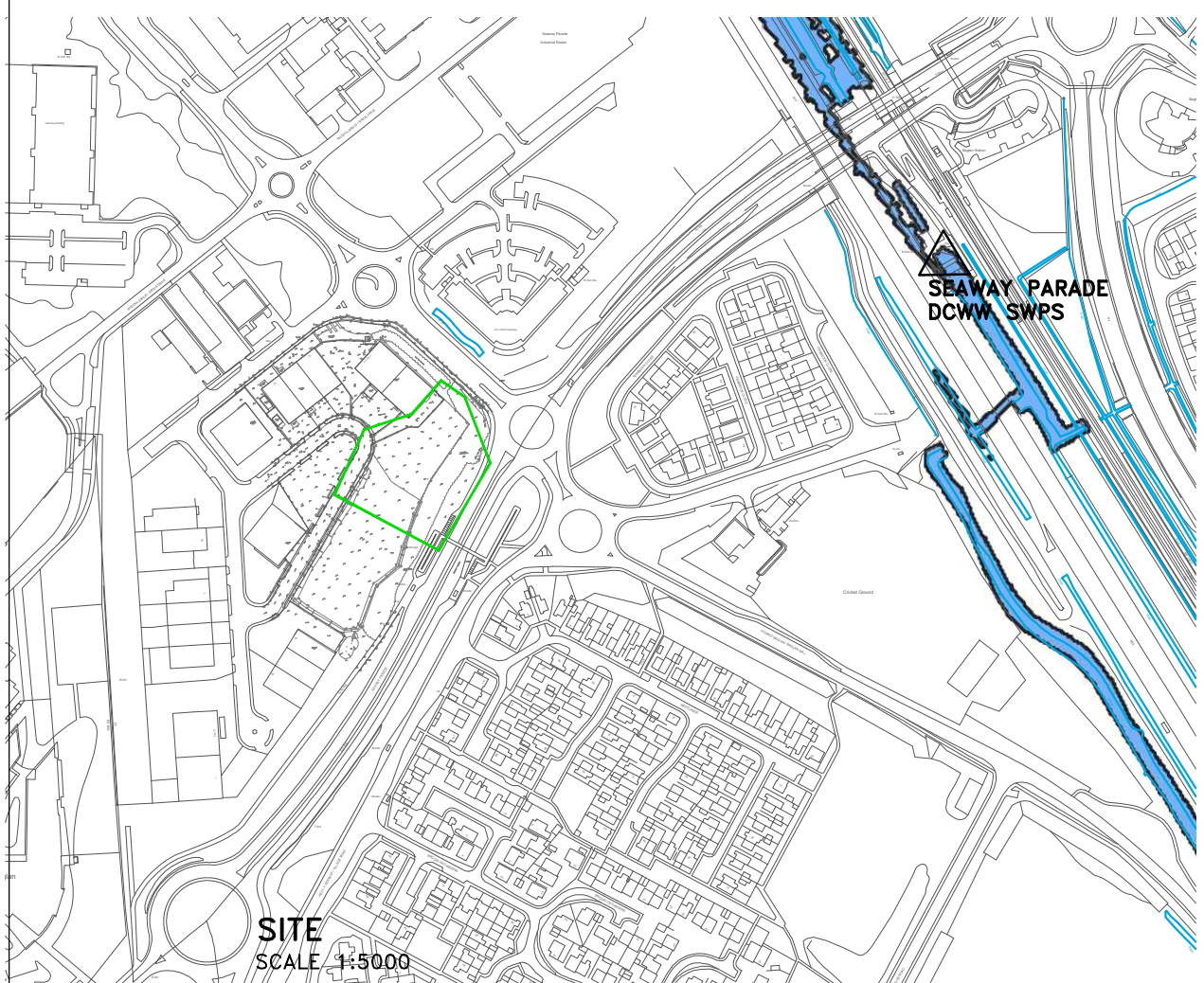
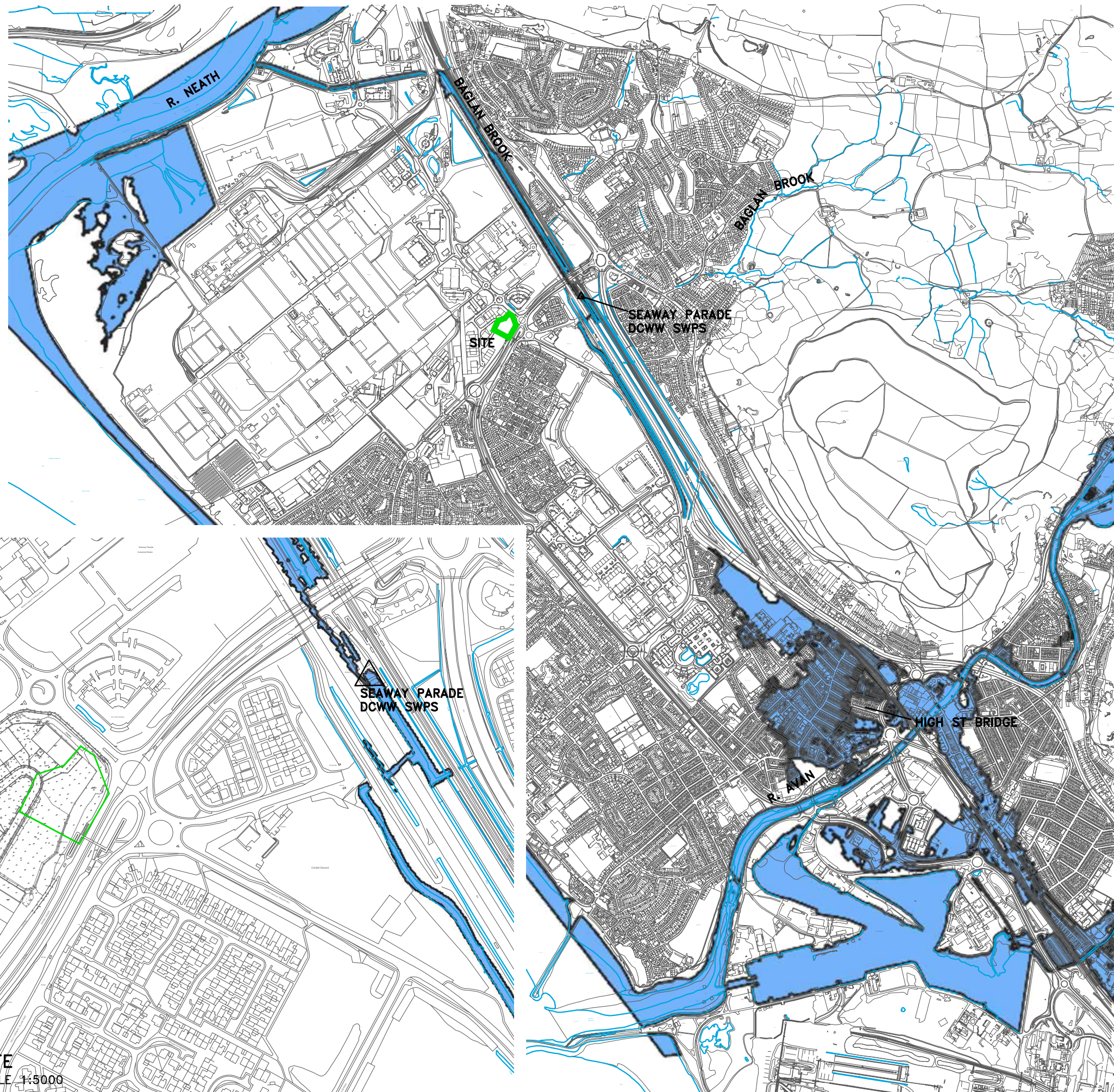
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ZONES 2&3

DATE: 20.04.2020 STATUS: PLANNING SCALE: 1:20,000

DRG No. J006/003 REV. - SIZE: A3

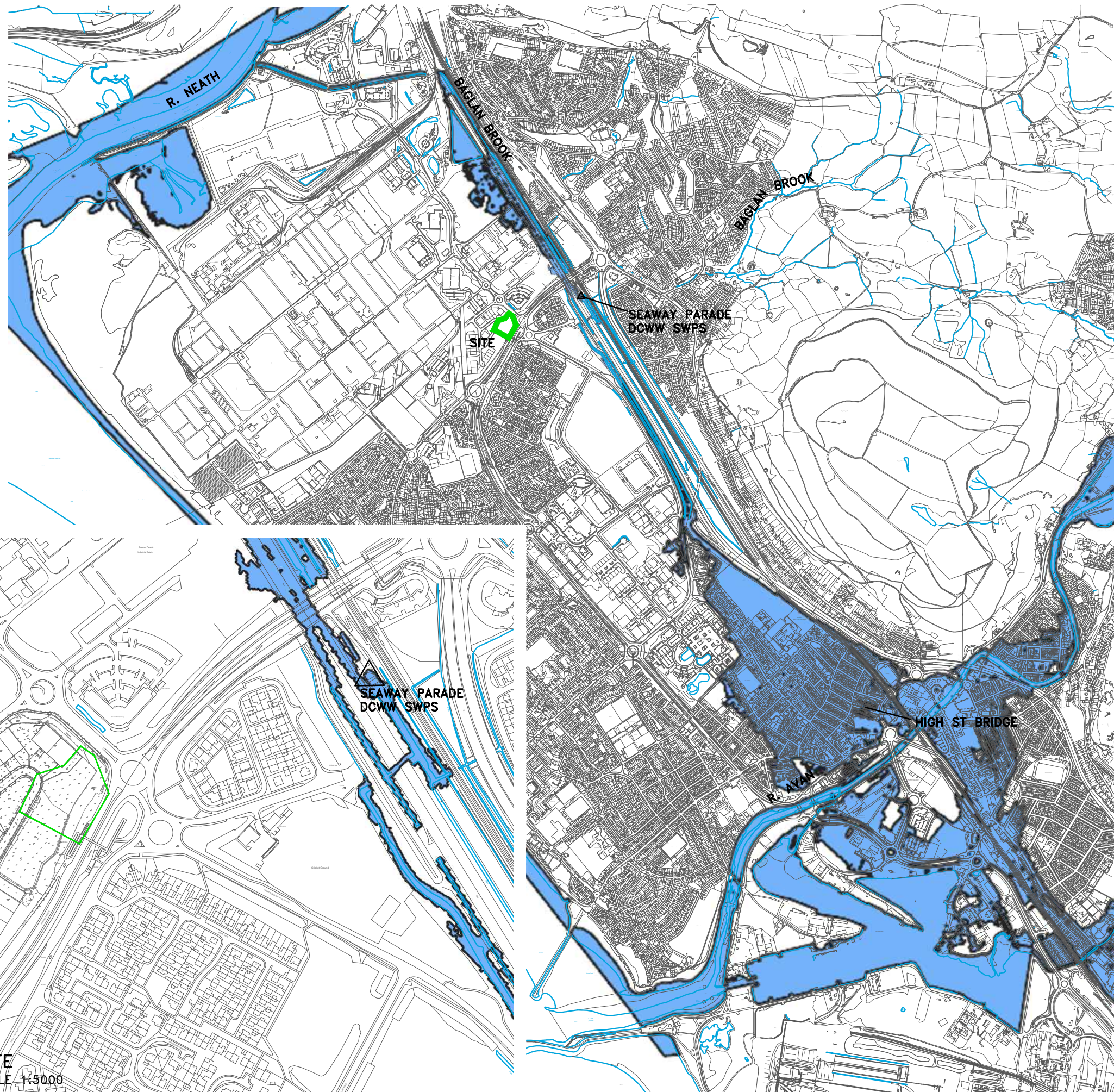


D. Flood Maps: Port Talbot 2016 Model



- OS-MAPPED WATERCOURSE
- EXTREME FLOOD OUTLINE:
UP TO 1% AEP (100yr)
FLUVIAL EVENT INCLUDING
30% CLIMATE CHANGE
ALLOWANCE
- NOTE: NO BRIDGE BLOCKAGE
OR PUMP STATION FAILURE
SCENARIOS MODELLED

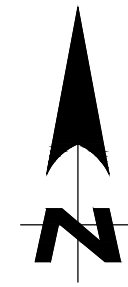
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CLIENT:	CB3 CONSULT LTD	
PROJECT:	SEAWAY PARADE BAGLAN FCA	
DRG TITLE:	FLOOD EXTENT PLAN: 2017 MODEL FLUVIAL 1%CC EVENT	
DATE: 20.04.2020	STATUS: PLANNING	SCALE: 1:20,000
DRG No. J006/004	REV. -	SIZE: A3



OS-MAPPED
WATERCOURSE

EXTREME FLOOD OUTLINE:
UP TO 0.1% AEP (1000yr)
FLUVIAL EVENT

NOTE: NO BRIDGE BLOCKAGE
OR PUMP STATION FAILURE
SCENARIOS MODELLED



REV DATE



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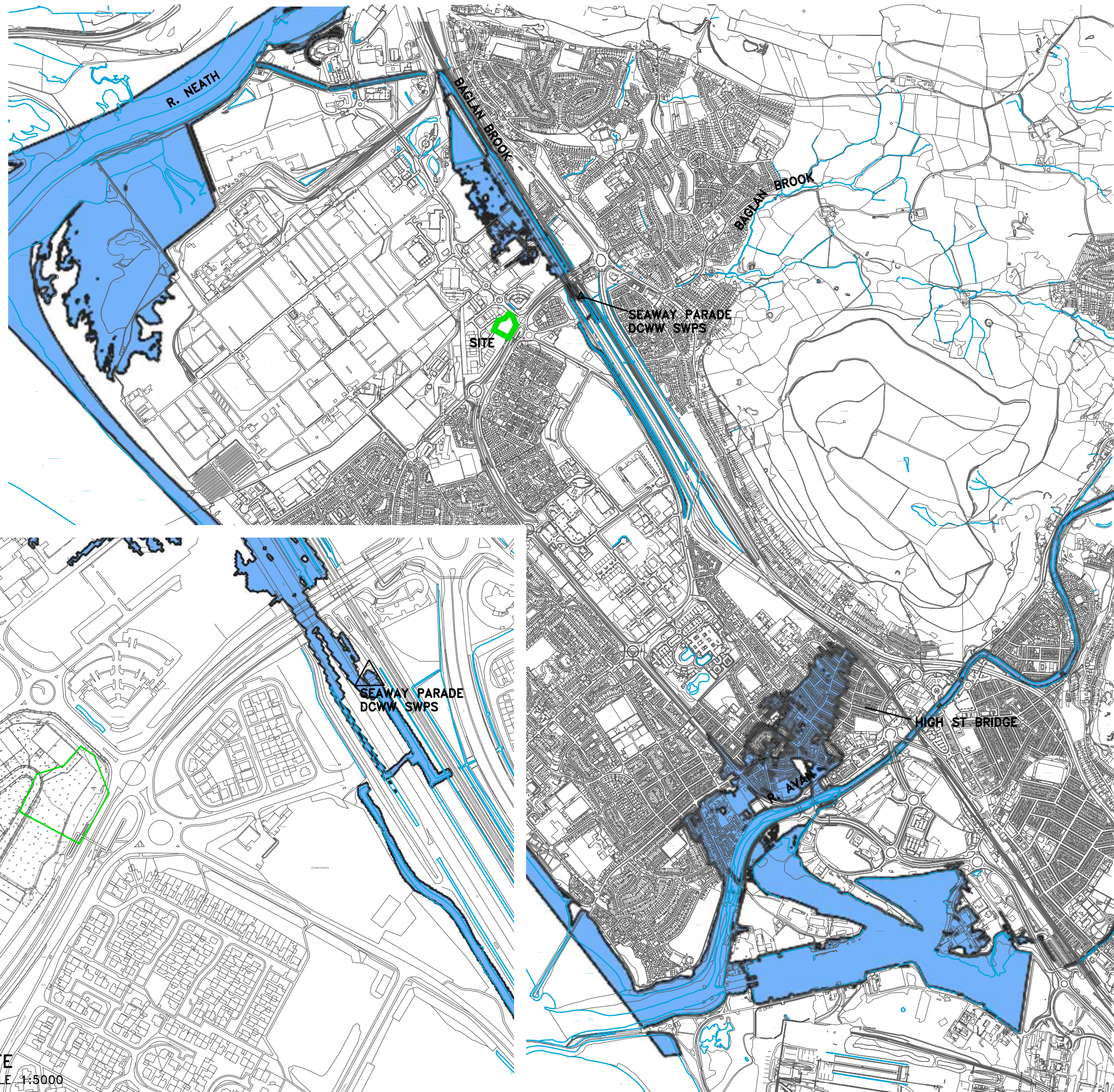
CLIENT: CB3 CONSULT LTD

PROJECT: SEAWAY PARADE
BAGLAN FCA

DRG TITLE: FLOOD EXTENT PLAN:
2017 MODEL
FLUVIAL 0.1% EVENT

DATE: 20.04.2020 STATUS: PLANNING SCALE: 1:20,000

DRG No. J006/005 REV. - SIZE: A3



OS-MAPPED
WATERCOURSE

EXTREME FLOOD OUTLINE:
UP TO 0.5% AEP (200yr)
TIDAL EVENT WITH CLIMATE
CHANGE ALLOWANCE:
FUTURE YEAR = 2116

NOTE: NO BRIDGE BLOCKAGE
OR PUMP STATION FAILURE
SCENARIOS MODELLED

REV DATE



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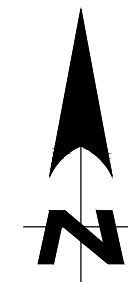
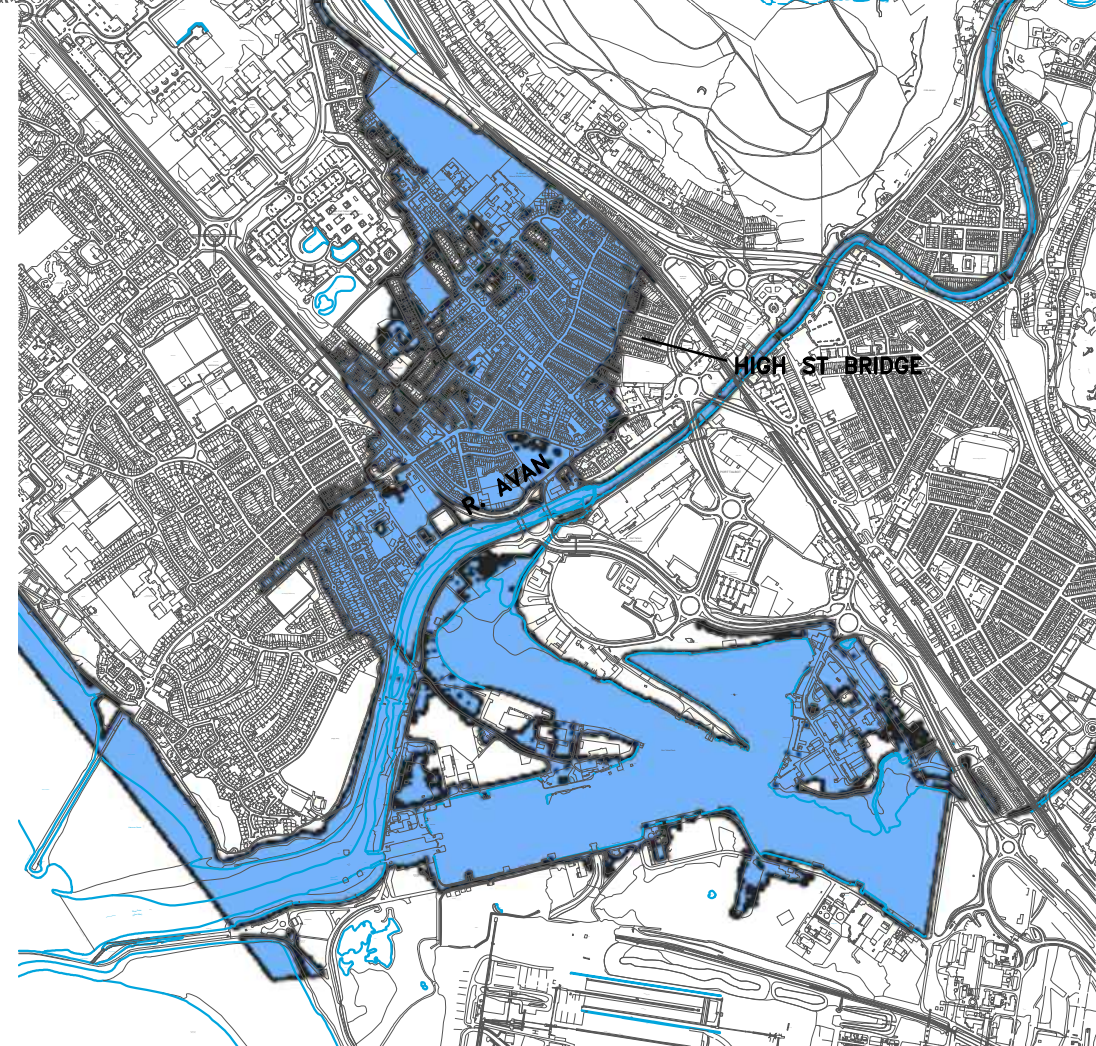
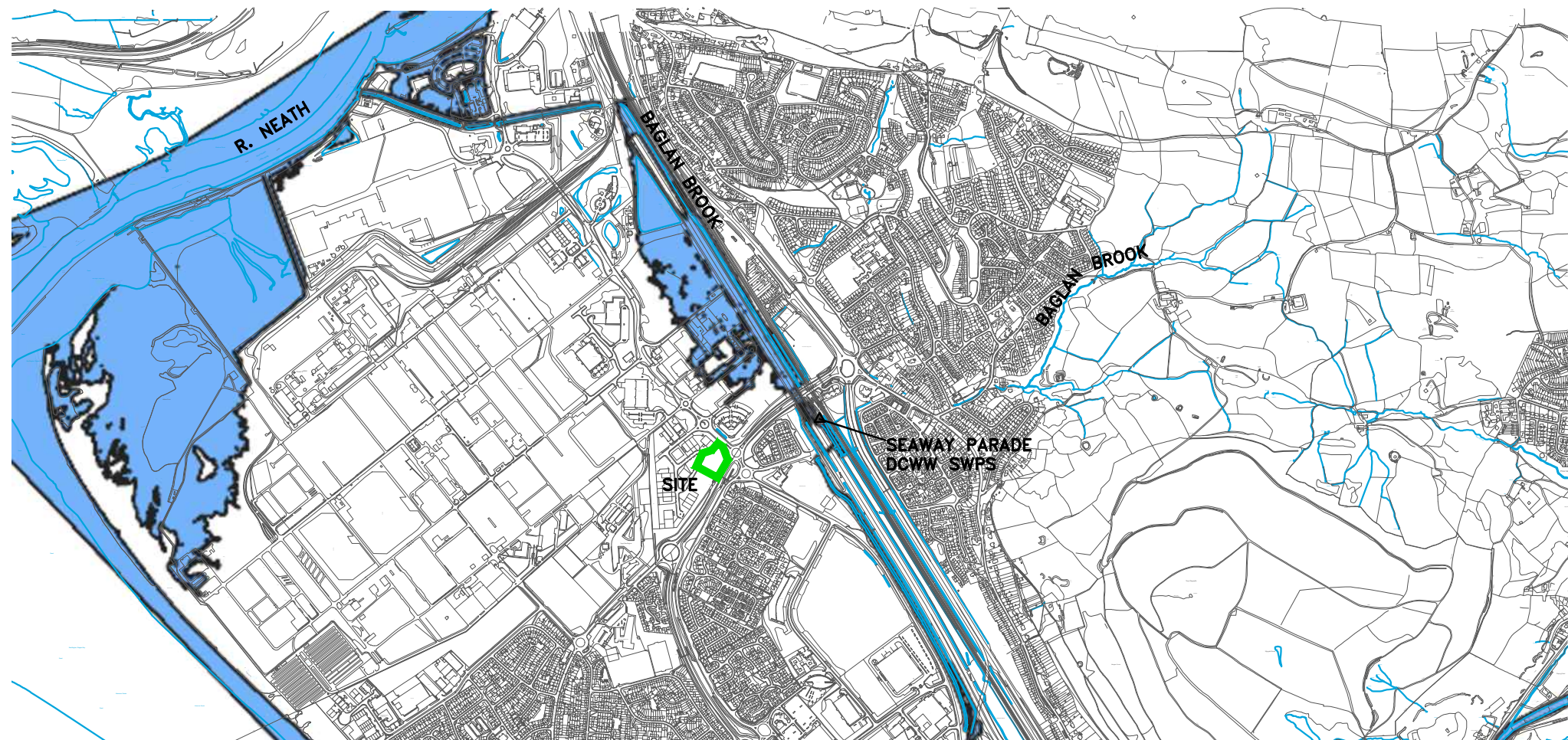
PROJECT: SEAWAY PARADE
BAGLAN FCA

DRG TITLE: FLOOD EXTENT PLAN:
2017 MODEL
TIDAL 0.5%CC EVENT

DATE: 20.04.2020 STATUS: PLANNING SCALE: 1:20,000

DRG No. J006/006 REV. - SIZE: A3

SITE
SCALE 1:5000



OS-MAPPED
WATERCOURSE

EXTREME FLOOD OUTLINE:
UP TO 0.1% AEP (1000yr)
TIDAL EVENT WITH CLIMATE
CHANGE ALLOWANCE:
FUTURE YEAR = 2116

NOTE: NO BRIDGE BLOCKAGE
OR PUMP STATION FAILURE
SCENARIOS MODELLED

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DRG TITLE: FLOOD EXTENT PLAN:
2017 MODEL
TIDAL 0.1%CC EVENT

DATE: 20.04.2020 STATUS: PLANNING SCALE: 1:20,000

DRG No. J006/007 REV. - SIZE: A3



E. Updated Hydraulic Modelling: Technical Note

NOTE TO FILE

JBA Project Code	2020s0478
Contract	Seaway Parade Flood Consequence Assessment
Client	Portacover (Machinery Movements) Ltd
Day	April 2020
Author	Clare Burnell
Reviewer	George Baker
Subject	Seaway Parade - Model updates

1 Introduction

1.1 Terms of Reference

JBA Consulting were commissioned by Portacover (Machinery Movements) Ltd to prepare a model update report and flood risk mapping to support a Flood Consequence Assessment (FCA) for a proposed new industrial unit at Seaway Parade, Baglan.

1.2 Site Description

The proposed site is located on Seaway Parade in Baglan, Port Talbot, South Wales, as shown in Figure 1-1. The Baglan Brook flows 0.4km east of the site and the River Neath flows 1.8km north of the proposed development site.

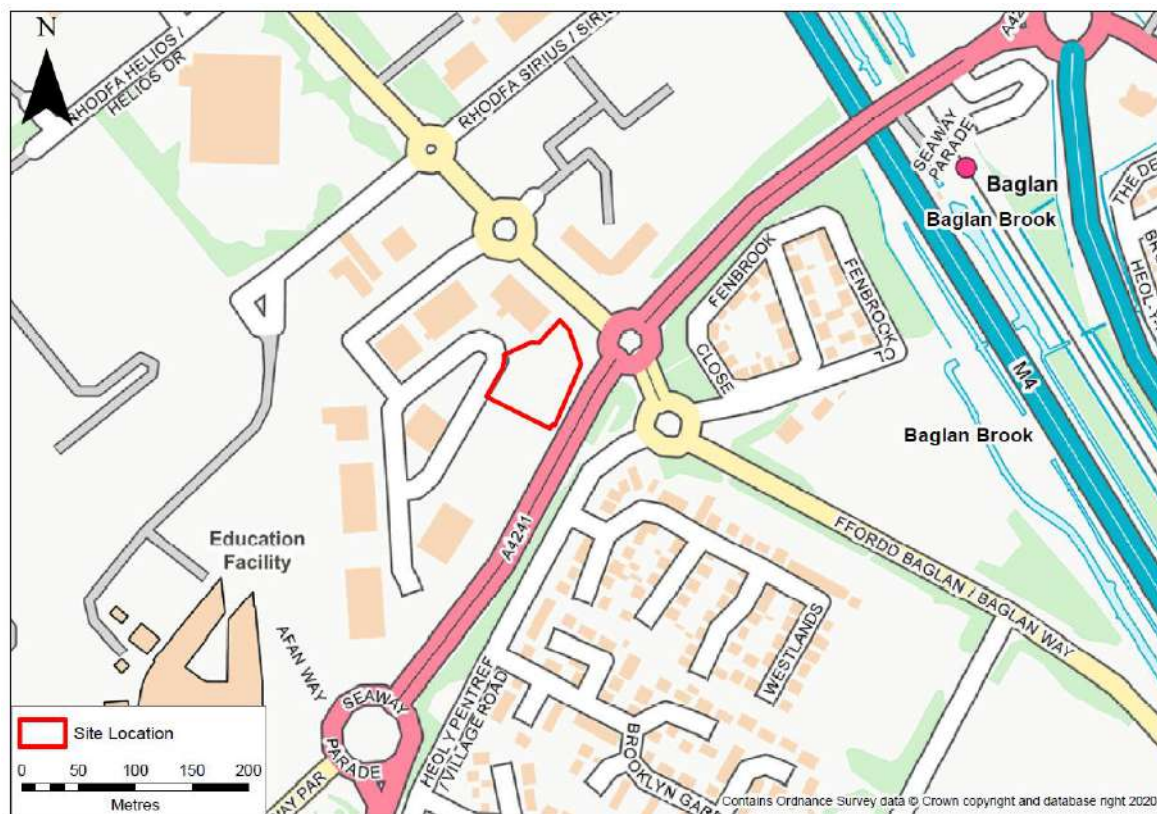


Figure 1-1 Site Location

NOTE TO FILE

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Day	April 2020
Author	Clare Burnell
Reviewer	George Baker
Subject	Seaway Parade - Model updates



2 The Model

The Port Talbot flood model was originally developed by Hyder Consulting in 2010. This model has been updated by JBA Consulting to a unified detailed flood model of Port Talbot. The updates included new hydrology, construction of a new 1D-2D model element for Baglan Brook and Ffrwd Wyllt and incorporated new survey data of the Baglan Brook.

The updated Port Talbot flood model was thoroughly reviewed and accepted by Natural Resources Wales (NRW) in July 2017. JBA have made further updates to the model since it was accepted by NRW. The updates include:

- 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 were generated for 2117 as the previous model assessed climate change at 2116
- Updated initial conditions of the model to account for the above changes
- Updated climate change allowances to 30% in line with the latest guidance¹

The model currently represents the best available data for assessing tidal flood risk at the Seaway Parade site.

2.1 Residual Flood Risk

NRW has indicated that two asset failure scenarios should be considered; the blockage of High Street Bridge and failure of Baglan Brook pumping station.

2.2 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 this is the percentage blockage used to inform the residual risk at the Seaway Parade site.

2.3 Baglan Brook Pump Failure

The failure of the Welsh Water Seaway Parade pumping station on the Baglan Brook downstream of the site has also been considered. 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 was not activated in the pump failure scenario, as to provide a conservative estimate of the potential impact. The model assumes the failure of Storm Pump 3 by reducing the maximum capacity of the station by 2 cumecs.

¹ Welsh Government. Flood Consequence Assessment: Climate Change Allowances (2016) <https://gov.wales/sites/default/files/publications/2018-11/flood-consequence-assessments.pdf>

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2.4 Flood Risk Maps

The following scenarios have been modelled and are presented within Appendix A:

- Fluvial 1% AEP plus climate change
- Fluvial 0.1% AEP
- Tidal 0.5% AEP plus climate change
- Tidal 0.1% AEP plus climate change
- 25% Blockage of High Street Bridge 1% AEP plus climate change
- 25% Blockage of High Street Bridge 0.1% AEP
- Pump Station failure 1% AEP plus climate change
- Pump Station failure 0.1% AEP

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Appendix: Flood Maps



