

FLOOD CONSULT



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Railway Tavern - Tonna
Flood Risk Assessment

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Preface

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Executive Summary

The Railway Tavern in Tonna has been surveyed and assessed for flood risk. Initial analysis of the Natural Resources Wales flood map shows the site to lie within flood zone 3 with greater than 1% (1 in 100) chance of flooding from the nearby River Neath.

Detailed modelling of the River Neath has been provided by NRW which shows that the site location is susceptible to flooding from the 20% (1 in 5) flood scenario and hence at high risk of fluvial flooding. Taking into account the property structure, brick/stone, the maximum flood protection height based on current guidance would be 0.6m without further structural assessment which was on the lowest floor level surveyed, 8.36mAOD, would produce a maximum flood protection level of 8.96mAOD. The level of 8.96mAOD is between the 1% (1 in 100) and 0.5% (1 in 200) modelled flood levels within the site boundary and therefore this level is considered to provide a reasonable standard of protection.

The property has suffered internal flooding during October 1998 and October 2018. The most recent flood event in October 2018 resulted in relatively minor flood depths above the property floor of approximately 0.1m, equating to a level of 8.46mAOD. This level is between the 10% (1 in 10) and 5% (1 in 20) modelled flood levels and hence is considered to be a high chance flood event.

The risk from pluvial (surface water) has been deemed high on the NRW flood maps which is considered to be accurate at the topography on the access road, Dulais Fach Road, to the south east is the lowest topography locally and lower than the surrounding ground on all perimeters. Therefore, during periods of prolonged heavy or extreme bursts of rainfall, accumulation on the access road is considered to be very likely. Although there is a risk of surface water flooding, the risk associated with the River Neath outweighs the predicted flood risk from surface water significantly.

Following the site survey, the only formal flood alleviation measures observed were two flood doors installed on the doorway entrances on the north eastern perimeter as well as internal flood barriers between the main building and extension to the south west.

Taking this into account, recommendations have been made within this report with a view to reducing the potential impacts of flooding.

Flood Risk Report

1.0 Introduction

Following instruction given to FCI, a flood resilience survey has been carried out at the Railway Tavern in Tonna in order to investigate if any flood risk exists at the property. A site visit was carried out on the 30th January 2024. This report will discuss any flood risk that has been identified and give recommendations to mitigate if required.

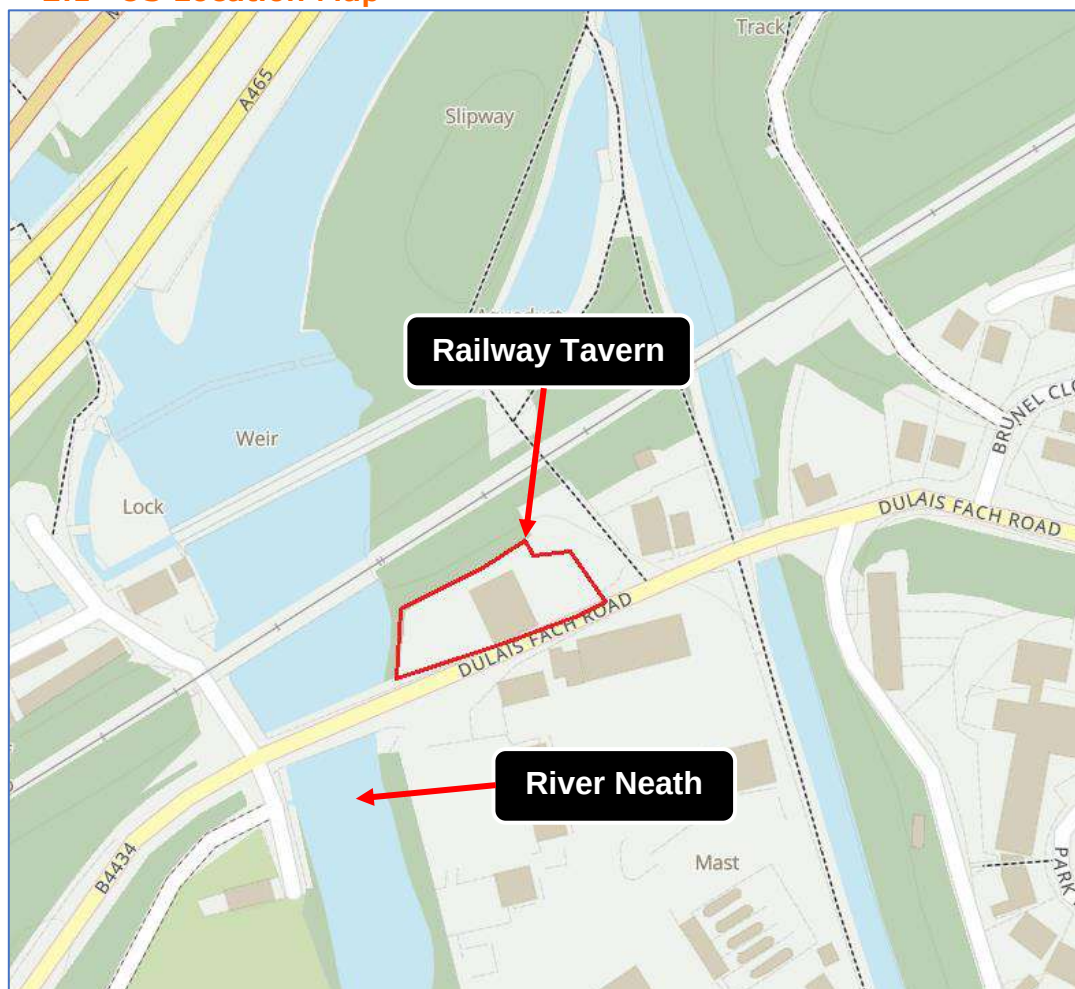
2.0 Background Information

The Railway Tavern is located at grid reference SS 77359 99255 to the north of Tonna, Neath Port Talbot with access into the grounds gained from Dulais Fach Road.

The nearest watercourse to the site is the River Neath which borders the site to the west which can be seen on the following OS and aerial image.

The site is a former public house which is currently being refurbished with car parking area to the east and garden area to the west.

2.1 OS Location Map



(OS Copyright)

2.2 Aerial Image



(Bing Copyright)

3.0 Survey Level Information

In order to better understand the topography of the site in relation to any flood risk that may potentially exist, a level survey was carried out across the property boundary. All levels were taken off a predetermined benchmark obtained from GPS surveying equipment in metres above ordnance datum (mAOD). This report will use this information, as well as the following modelled flood level information to form its findings. All surveyed levels can be seen in APPENDIX F.

4.0 Flood Risk Assessment

4.1 Fluvial Flooding

4.1.1 Flood Zone

Based on the Natural Resources Wales (NRW) flood map for planning, the site is shown to lie within flood zone 3 which equates to greater than 1% (1 in 100) chance of flooding in any given year from the nearby River Neath. The NRW flood map for planning can be seen in APPENDIX A.

4.1.2 Modelled Flood Levels

Following the searches conducted, the most up to date fluvial modelling information for the site was obtained from Natural Resources Wales. The River Neath borders the site to the west for which detailed flood levels have been obtained. Modelled flood levels are available within the site boundary which will be shown below along with the maximum predicted flood level.

Site Boundary



River Neath	
Return Period	Modelled Level (mAOD)
50% (1 in 2)	-
20% (1 in 5)	8.03
10% (1 in 10)	8.29
5% (1 in 20)	8.51
2% (1 in 50)	8.73
1.3% (1 in 75)	8.82
1% (1 in 100)	8.88
1%+CC (1 in 100 + CC)	9.20
0.5% (1 in 200)	9.16
0.1% (1 in 1000)	9.92

The above table shows that the site location is susceptible to flooding during the 20% (1 in 5) flood event and therefore the risk of flooding is considered to be high.

The site topography is generally between 7.90mAOD and 8.10mAOD with the lowest ground level surveyed to be 7.67mAOD on Dulais Fach Road to the south east. Taking the lowest ground level of 7.67mAOD, maximum flood depths would range between 0.36m and 2.25m from the 20% (1 in 5) chance up to the 0.1% (1 in 1000) chance based on the levels shown in the above table.

Predicted flood depths from all applicable flood levels shown above will be displayed in the below table at five points spread throughout the site boundary. The point location are shown below:



Return Period	Flood Depth (m)				
	Point 1	Point 2	Point 3	Point 4	Point 5
50% (1 in 2)	0.00	0.00	0.00	0.00	0.00
20% (1 in 5)	0.14	0.05	0.02	0.00	0.36
10% (1 in 10)	0.40	0.31	0.28	0.21	0.62
5% (1 in 20)	0.62	0.53	0.50	0.43	0.84
2% (1 in 50)	0.84	0.75	0.72	0.65	1.06
1.3% (1 in 75)	0.93	0.84	0.81	0.74	1.15
1% (1 in 100)	0.99	0.9	0.87	0.80	1.21
1%+CC (1 in 100 + CC)	1.31	1.22	1.19	1.12	1.53
0.5% (1 in 200)	1.27	1.18	1.15	1.08	1.49
0.1% (1 in 1000)	2.03	1.94	1.91	1.84	2.25

*0.00 indicates that the point is not affected by flooding

4.1.3 Fluvial Flood Defences

There are no formal flood defences in the locality on the River Neath which benefit the property.

4.2 Coastal/Tidal Flooding

The River Neath is tidally influenced at the site location, however, modelling provided by NRW shows that flooding purely from tidal sources does not overtop the river channel at the site location even during the 0.1% (1 in 1000) chance with additions for sea level rise up to the year 2116 (88 years from now) where a maximum in-channel level of 7.77mAOD is predicted.

The level of 7.77mAOD is greater than the lowest surveyed level of 7.67mAOD on Dulais Fach Road, however, all other site ground levels are greater than the predicted flood level.

Taking the above into account the risk of coastal/tidal flooding is considered to be very low.

4.3 Surface Water Flooding

Based on the NRW indicative flood map for surface water, the property is deemed at high risk of flooding from this source equating to greater than 3.3% (1 in 30) probability. The NRW surface water flood map can be seen in APPENDIX B.

The NRW surface water flood maps are considered to be accurate as the topography on Dulais Fach Road to the south east is the lowest lying locally and hence accumulation of surface water during periods of prolonged heavy or extreme bursts of rainfall is expected.

Although there is a risk of surface water to the property, the risk of flooding from this source is greatly outweighed by the fluvial flood risk from the River Neath and therefore no further investigation into the surface water flood risk has been conducted.

5.0 Site Flood Depths

The site location recognised as being at greatest risk of fluvial flooding from the nearby River Neath from the 20% (1 in 5) scenario and greater in magnitude.

Taking into account the property structure, brick/stone, property level protection is considered feasible up to 0.6m above floor level. The lowest property floor level surveyed was 8.36mAOD which would deem the greatest level of defence for property level protection of 8.96mAOD (8.36mAOD + 0.6m).

When compared to the predicted flood levels within the site boundary, the maximum defence level of 8.96mAOD is between the 1% (1 in 100) and 0.5% (1 in 200) chance and hence is considered a reasonable level of protection.

The below section will detail the likely impacts of flooding to all areas of the site based on the derived flood resilience level of 8.96mAOD. All surveyed levels can be seen in APPENDIX D.

5.1 Property

The finished floor level of the property was surveyed to be 8.36mAOD at the lowest point which when compared to the design resilience level of 8.96mAOD results in an internal flood depth of 0.60m.

The property is currently unfurnished and planning to be refurbished with the ground floor comprising of reception/hallway, lounge, bar area, kitchen, toilets and storage rooms of which the main damage loss would be from fixtures, fittings and flooring with possible loss of kitchen appliances, furniture and electronic items (TV, router, plug sockets etc.).

5.2 External

Flood depths external to the property are expected to amass up to 1.29m on Dulais Fach Road based on the lowest level surveyed of 7.67mAOD.

The car park area to the north east of the building has surveyed levels of between 7.89mAOD and 8.40mAOD. Based on the design resilience level of 8.96mAOD, flood depths of between 0.56m and 1.07m can be expected in the car park.

The garden area to the south west of the building has surveyed levels of between 7.88mAOD and 8.08mAOD. Based on the design resilience level of 8.96mAOD, flood depths of between 0.88m and 1.08m can be expected in the garden.

5.3 Site Access and Egress

The main site access road is topographically lower than the property with the lowest surveyed level of 7.67mAOD likely to result in a flood depth of 1.29m based on the design resilience level.

The topography of the access road, Dulais Fach Road, rises to both the south west and north east of the property and therefore access locally will likely be maintained, however, access into the property would only likely be achievable by boat.

6.0 Flood History

Through the background research conducted the locality of Tonna has been subject to flooding historically from the River Neath in 1979, 1998 and 2018. Based on the NRW recorded flood event map, the property boundary was affected during 1998 flood event, however, further details regarding this flood event are unable to be confirmed.

The most recent flood event at the property occurred in October 2018 during Storm Callum where the River Neath overtopped leading to extensive flooding locally. Internally flooding to the property was minimal in depth, approximately 0.1m above floor level equating to 8.46mAOD.

The flood level taken from the property during October 2018 of 8.46mAOD is between the predicted 10% (1 in 10) and 5% (1 in 20) flood levels and hence the October 2018 flood event is considered to have a high chance of occurrence.

As well as fluvial flooding from the River Neath, surface water accumulation on Dulais Fach Road to the south east of the site is also relatively common although significantly less severe than the fluvial flood risk.

7.0 Existing Flood Alleviation Measures

The property owner informed FCI that the previous owner had installed flood doors to the property access from the car park area on the north eastern perimeter as well as installed a raised concrete floor within the lounge area.

The flood doors would be effectively at reducing flood water ingress into the property, however, other routes of water ingress such as drainage, cable/pipe penetrations as well as the property walls and floor have not been considered and therefore during a repeat flood event, internal flooding would still occur.

8.0 Recommendations

The property owner is looking to implement flood protection measures in order to reduce or potentially mitigate significant disruption in the event of future flooding. The below section will therefore detail potential flood defence options which could be implemented at the site location based on the derived flood resilience level of 8.96mAOD which is greater than the October 2018 flood level and considered the most feasible level to defend the property due to the construction.

8.1 Entrance Point Protection

The main route of flood water ingress into the property is through doorway entrances on the north eastern and north western perimeters, these can be seen below:

Single Door – North Eastern Perimeter



Door Dimensions (mm)	1170 wide x 2570 high (full reveal)	Threshold Level (mAOD)	8.39
Opening	Outward	Flood Level (mAOD)	8.96
Reveal Construction	Stone	Flood Depth Above Threshold (m)	0.57

Single Door – North Eastern Perimeter



Door Dimensions (mm)	1040 wide x 2330 high	Threshold Level (mAOD)	8.36
Opening	Outward	Flood Level (mAOD)	8.96
Reveal Construction	Stone	Flood Depth Above Threshold (m)	0.60

Single Door – North Western Perimeter



Door Dimensions (mm)	865 wide x 2120 high	Threshold Level (mAOD)	8.38
Opening	Outward	Flood Level (mAOD)	8.96
Reveal Construction	Stone	Flood Depth Above Threshold (m)	0.58

8.2 Internal Doors

There are two internal doors into the main building which would require flood protection which are shown below:

Internal Doorway (Bar)



Door Dimensions (mm)	895 wide	Threshold Level (mAOD)	8.39
Opening	N/A	Flood Level (mAOD)	8.96
Reveal Construction	Stone	Flood Depth Above Threshold (m)	0.57

Internal Doorway (Toilet)



Door Dimensions (mm)	770 wide	Threshold Level (mAOD)	8.39
Opening	N/A	Flood Level (mAOD)	8.96
Reveal Construction	Stone	Flood Depth Above Threshold (m)	0.57

FCI would recommend that the doorway entrances into the property are defended against flood water ingress by means of installing demountable flood barriers. Flood doors are not recommended at this point as the upstand at the bottom of the door would create a trip hazard.

8.3 Penetration Sealing

Penetrations through the building floor and walls were observed during the site survey, all identified penetrations can be seen below:

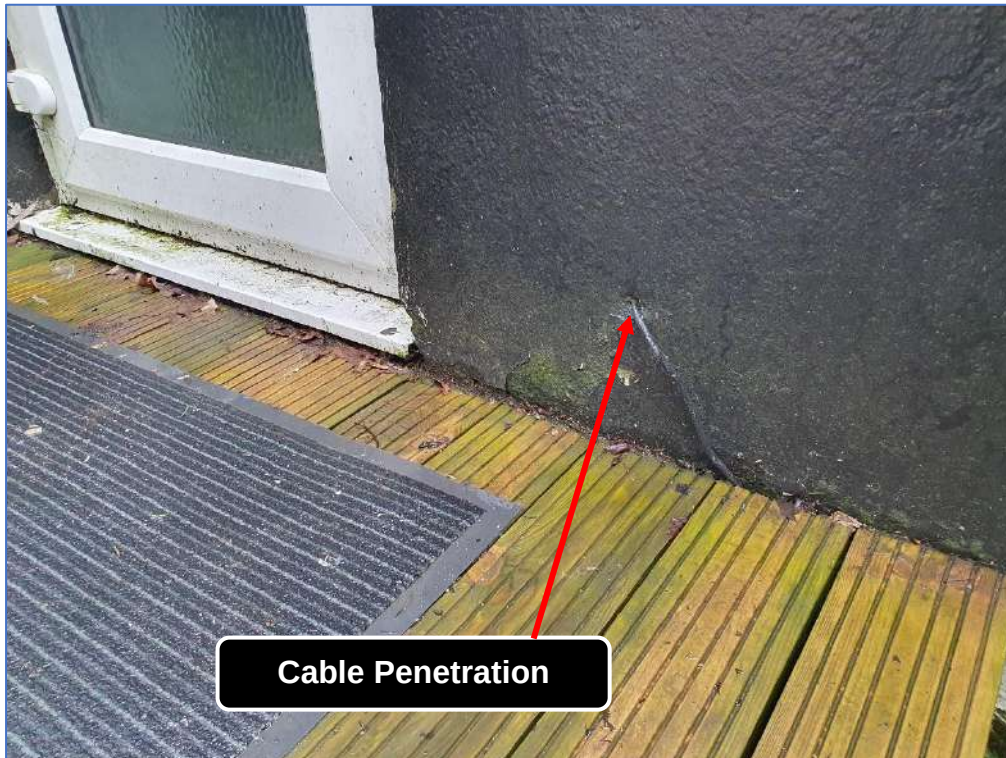
Pipe Penetration – North Western Perimeter



Pipe Penetration – South Western Perimeter



Cable Penetration – South Western Perimeter



Pipe Penetration – South Western Perimeter



FCI would recommend that the pipe and cable penetrations through the building walls are sealed against flood water ingress using an approve water-resistant sealant.

Any pipe penetrations below the predicted flood level are also recommended to be fitted with non-return valves to prevent back surge of water during a flood event.

8.4 Property Drainage

The property drainage is thought to exit on the south western perimeter of the site within a manhole cover which was unable to be lifted during the site visit. This can be seen below:



As the above manhole was unable to be lifted, FCI would advise that a CCTV drainage survey is carried out to confirm the drainage outlets from the property.

The foul drainage outlet will be below the predicted level of flooding and hence surcharging of the drainage system is highly likely during a flood event. FCI would therefore recommend that non-return valves are fitted to the pipes exiting the property to prevent surcharge of the foul drainage system during a flood event.

8.5 Sump & Pump System

FCI would advise that a permanent sump and pump system is installed within the property to eject seepage through the building as well as installed flood protection.

FCI would also advise that the property owner purchase puddle pumps which can be deployed around the property to eject very shallow seepage before it reaches any sump and pump.

8.6 Utilities

The property owner is planning to raise the existing electrical sockets as part of flood resilience works and FCI would advise that these are located as high as practically possible but a minimum of 0.6m above floor level.

The existing utilities including the electrical supply and distribution boards are located at high level on the ground floor and hence should remain resilient to flood damage.

The main incoming electrical supply is located in the extension on the south western perimeter of the main building. The extensions is likely to be either partially or completely demolished and therefore FCI would advise that either the incoming supply is relocated to the main building or the supply remains in its current location and is contained within a new structure (i.e. brick enclosure).

8.7 Further Comments

The use of resilient materials could have been utilised on the ground floor of properties following the recent flooding which would look to prevent stripping out and replacement of flooring, walls and furniture. These measures could have included hard flooring (tiled, vinyl), use of lime-based plaster board for walling and plastic/metal furnished items (chairs, tables, counters etc.) which would remain resilient to flood damage and hence would only require to be cleaned following a flood event.

Given that the predicted flood depths above the property floor level are relatively high based on the design resilience level, the client may want to consider applying a tanking membrane to the external property walls to further reduce any percolation of flood water through the structure. Tanking membranes can be applied in varying methods from torch applied, roll on or sprayed on and can be covered with any RAL/BS colour, acrylic render or brick slips to protect and conceal the membrane.

Further information on any of the recommendations made above can be attained by contacting flood consult international.

9.0 Conclusion

The Railway Tavern located in Tonna has been deemed at greatest risk of fluvial flooding from the nearby River Neath with high risk from surface water flooding and negligible risk from coastal/tidal flooding.

Detailed modelling provided by NRW has indicated that the site location is susceptible to flooding from the 20% (1 in 5) fluvial flood event and hence at high risk. The lowest property floor level surveyed was 8.36mAOD with current guidance stating that property level protection up to 0.6m above floor level is feasible without further structural assessment, a level of 8.96mAOD. The level of 9.8.96mAOD is between the 1% (1 in 100) and 0.5% (1 in 200) modelled fluvial flood levels and therefore is considered a reasonable standard of protection for the property.

The proposed protection level of 8.96mAOD is greater than the level of flooding of the most recent significant flood event at the property in October 2018 also.

Taking this into account, recommendations have been made within this report with a view to reducing the potential impacts of flooding.

10.0 Glossary

Word	Definition
1D	Estimation of peak flow and elevation in the river channel only
2D	Estimation of flow routes and elevations across the floodplain
CC	Climate Change
Fluvial	Rivers
mAOD	Meters Above Ordnance Datum - a vertical datum used by ordnance survey as the basis for deriving altitudes on maps.
Pluvial	Rainfall or surface water
Property Level Protection	Utilising the existing structure of an asset to implement flood protection measures.
Return Period	Estimated likelihood of an event
Topography	The arrangement of the natural and artificial physical features of an area

APPENDIX A
NRW Flood Map

Flood Map for Planning - Basic
NRW FMP

Legend

TAN15 Defended Zones



Rivers



Sea



Rivers and Sea

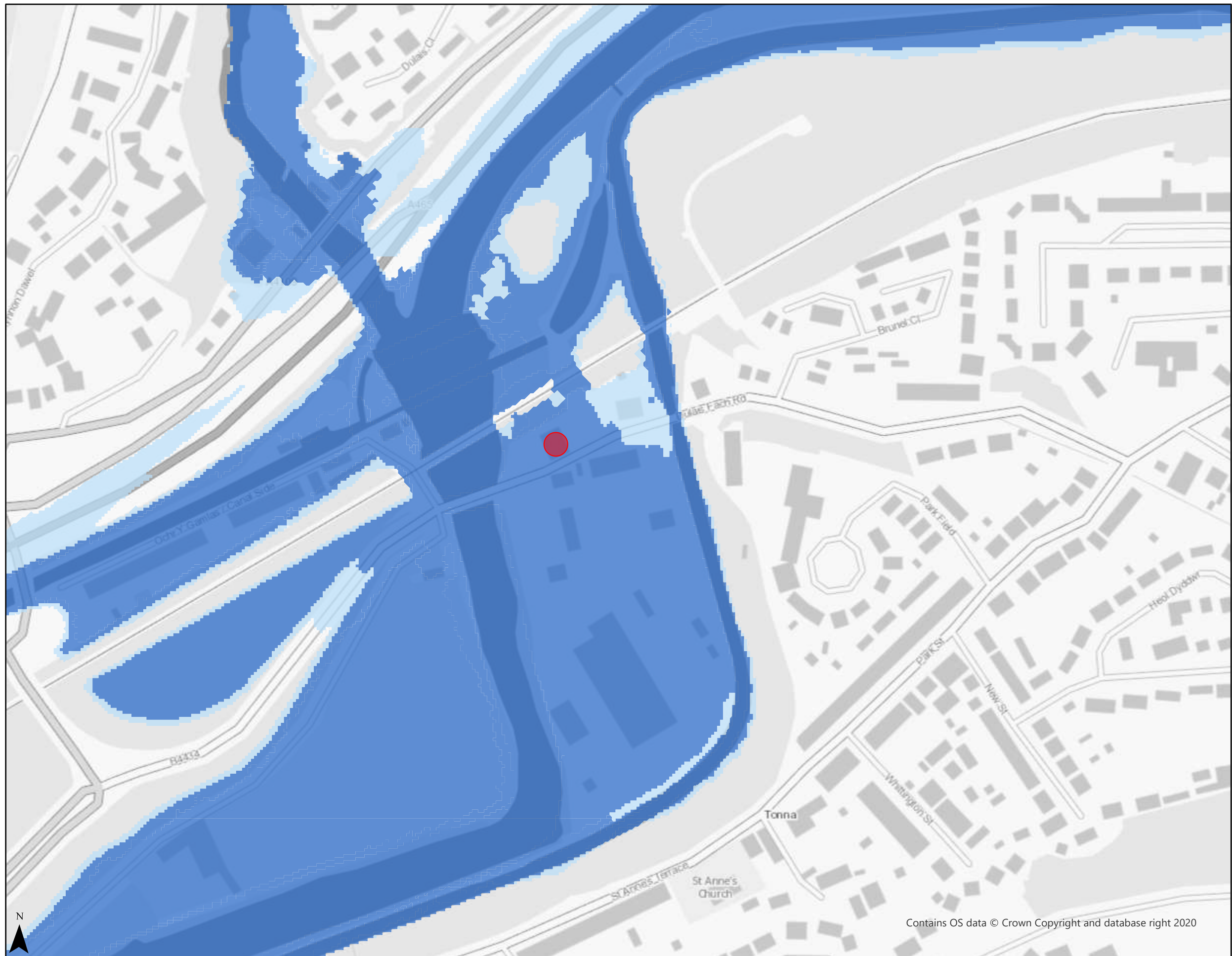
Rivers and Sea



Flood Zone 3



Flood Zone 2



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Date: 02/02/2024



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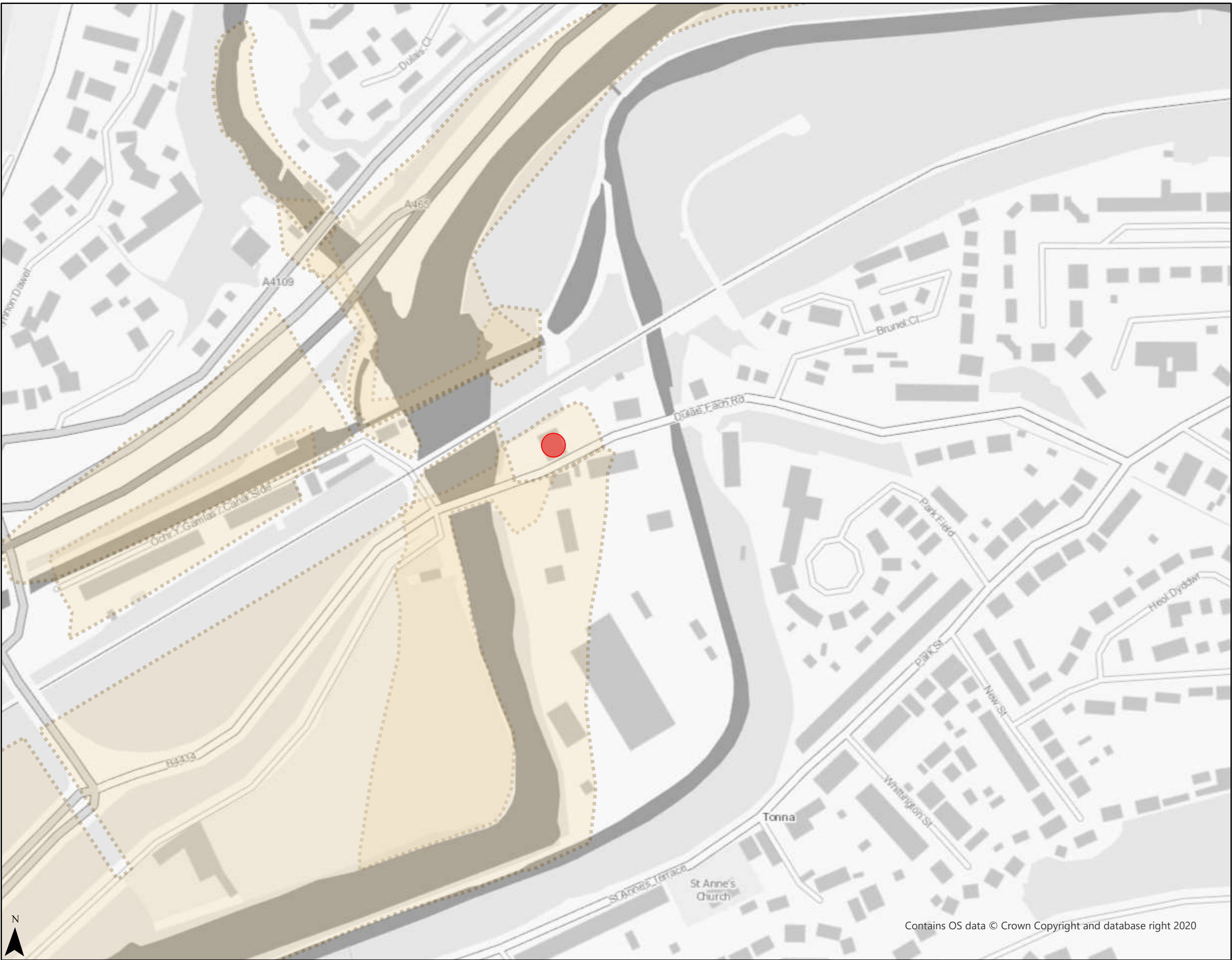
APPENDIX B
River Neath Modelled Flood Levels

	Railway Tavern
Return Period	Modelled Level (mAOD)
50% (1 in 2)	-
20% (1 in 5)	8.03
10% (1 in 10)	8.29
5% (1 in 20)	8.51
2% (1 in 50)	8.73
1.3% (1 in 75)	8.82
1% (1 in 100)	8.88
1%+CC (1 in 100 + CC)	9.20
0.5% (1 in 200)	9.16
0.1% (1 in 1000)	9.92

APPENDIX C
NRW Flood History Map

Flood Map for Planning - Basic
NRW FH

Legend
Recorded Flood Extents



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0.1 0.05 0 0.1
km
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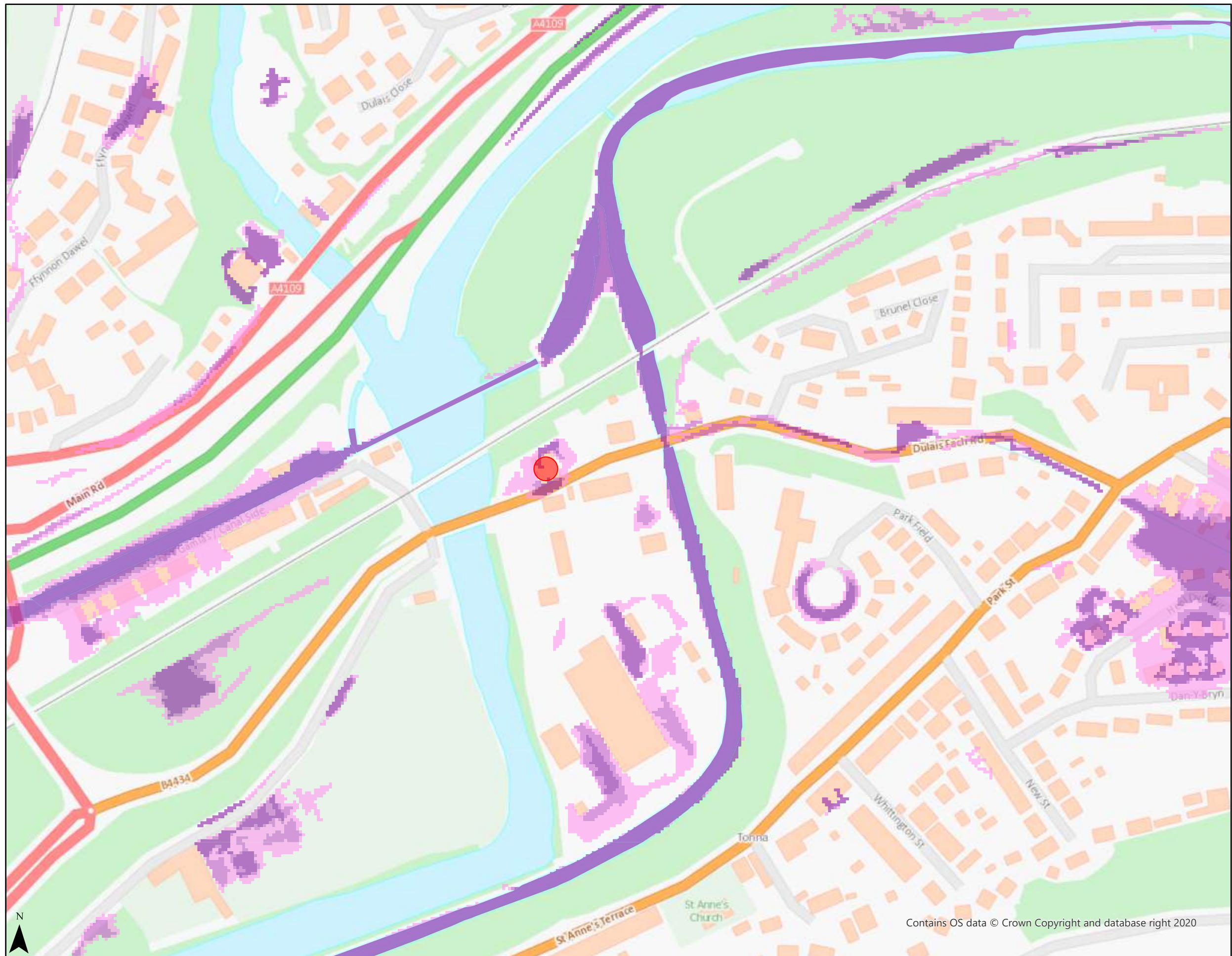
APPENDIX D
NRW Surface Water Flood Map

Flood Risk Maps
NRW SW

Legend

Flood Risk from Surface Water & Small Watercourses

- High
- Medium
- Low



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0.1 0.05 0 0.1
km
British National Grid

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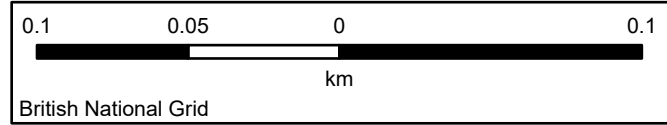
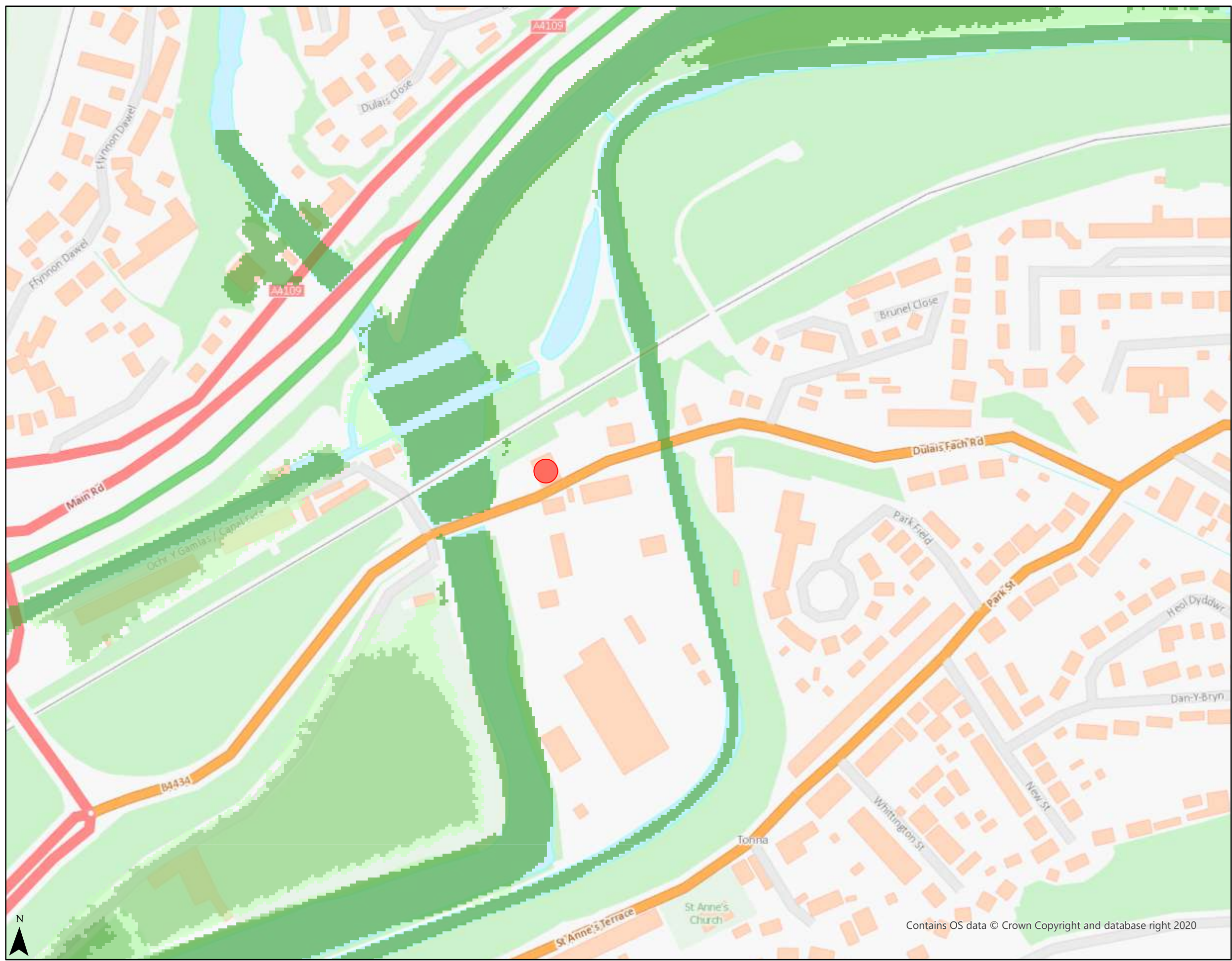
APPENDIX E
NRW Coastal/Tidal Flood Map

Flood Risk Maps
NRW SW

Legend

Flood Risk from the Sea

- High
- Medium
- Low



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APPENDIX F
Site Photos

Photo 1 – North eastern perimeter of the property



Photo 2 – North western perimeter of the property



Photo 3 – South western perimeter of the property



Photo 4 – South eastern perimeter of the property



Photo 5 – Bar area within the property



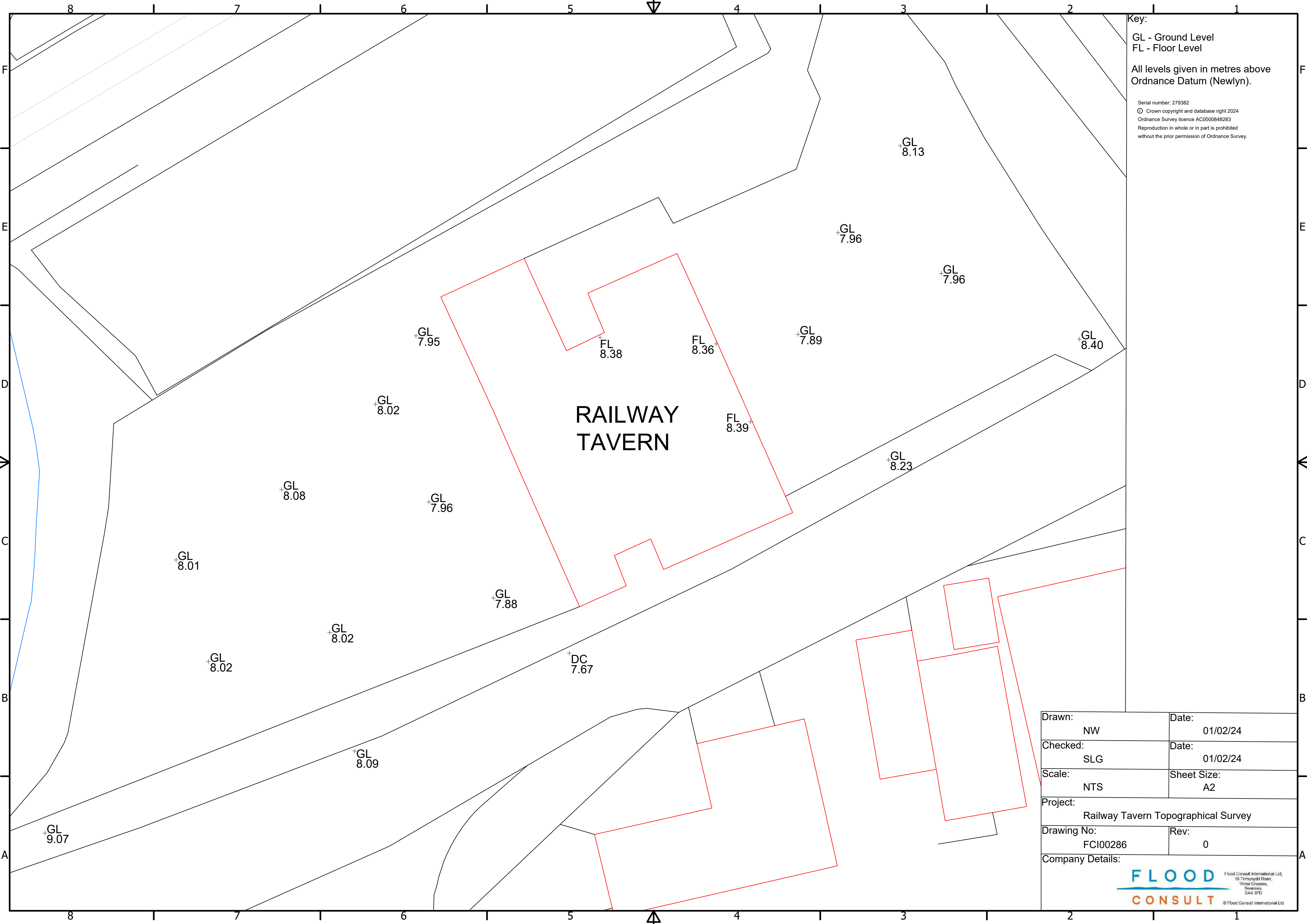
Photo 6 – Toilet on the ground floor



Photo 7 – Garden area to the south west of the property



APPENDIX G
Site Topographic Survey



Key:
GL - Ground Level
FL - Floor Level

All levels given in metres above
Ordnance Datum (Newlyn).

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