Harlech Court, Bute Terrace, Cardiff

Flood Consequence Assessment

PREPARED BY:
Jubb Consulting Engineers Ltd.

FOR:
Draycott Group Ltd

DATE:
October 2024

REFERENCE:
24182-JUBB-XX-XX-RP-C-00004 – V02 - FCA

Contents

1 Project Information

1.1 Project Information

Client	Draycott Group Ltd

1.2 Project Details

Project Name	Harlech Court
Location	Harlech Court, Bute Terrace, Cardiff
Jubb Project Number	24182

1.3 Report Details

Version	02
Status	Planning Issue
Date	07/10/2024

1.4 Project Authorisation

ISSUE HISTORY:

AUTHORISATION:

Version	Date	Detail	Prepared By	Approved By
01	12/06/24	First Issue	MS	EH
02	07/10/24	Planning Issue	MS	EH

2 Introduction

2.1 Commission

2.1.1 This Flood Consequence Assessment has been commissioned on behalf of Draycott Group Ltd to support a planning application for the proposed development at Harlech Court, Bute Terrace, Cardiff.

2.1.2 This report is for the private and confidential use of Draycott Group Ltd. (to whom alone is owed a duty of care) and their professional advisors and consultants in connection with the current development proposals for the site.

2.1.3 This report may not be relied upon or reproduced by any third party for any use without the written agreement of Jubb Consulting Engineers Ltd.

2.2 Brief

2.2.1 This Flood Consequence Assessment is prepared in accordance with the requirements of the Technical Advice Note 15: Development and Flood Risk (TAN15) published by the Welsh Government.

This report addresses the requirements set out in TAN15 and other issues, which are deemed relevant to flood risk. These requirements include the following:

- Assessment of the magnitude and severity of flood risk to the site
- Assess suitability of the site and development through the use of the Justification Test, including acceptability of consequences (if required)
- Consider flood risk due to overtopping of existing flood defences
- Assess the impact of the proposed development on flood risk to adjacent developments
- Demonstrate the appropriate mitigation measure have been taken to prevent flooding
- Demonstrate the appropriate emergency situations have been considered e.g. evacuation routes

2.3 Consultation

2.3.1 Liaison with Natural Resources Wales (NRW) has been carried out to help inform this FCA and includes the acquisition of flood data from NRW. Flood data available for the site and its immediate surrounds only included adjacent design tidal levels.

3 Existing Site

3.1 Location

3.1.1 The proposed site is a brownfield site that consists of a purpose building office building and associated car parking, located south of Bute Terrace, Cardiff. The site is approximately 0.19 ha in area, with a National Grid Reference (NGR) of ST 18713 76079, or E318713 , N176079.

3.1.2 The site boundaries are formed by the Alto Lusso residential building to the south west, the Citrus hotel building to the north east, Bute Terrace to the west and the canal to the east.

3.1.3 A site location plan is included in Appendix A.

3.2 Current Land Use

3.2.1 The proposed site currently contains a purpose built office building and associated parking.

3.2.2 A bar is located in the basement area, with the area above currently used car parking for both the office building and adjacent hotel.

3.3 Site Topography

3.3.1 A topographical survey has been undertaken of the proposed site.

3.3.2 It should be noted that the majority of the site consists of industrial warehouses with ancillary car parking provided and is therefore predominantly hard surfaced.

3.3.3 The site is relatively flat with levels across the site varying from a high point of 8.50mAOD adjacent to Bute Terrace to a low of 7.70mAOD around the central area. The site currently sits on multiple levels with associated parking.

3.3.4 A copy of the topographical survey is included in Appendix B.

3.4 Site Geology

Geology

3.4.1 The British Geological Survey (BGS) maps indicate that the site is underlain with Mercia Mudstone Group (Mudstone).

3.4.2 Superficial deposits have been indicated beneath the site and are shown to comprise of glaciofluvial sheet deposits (sand and gravel).

Hydrogeology

3.4.3 The British Geological Survey (BGS) hydrogeology maps indicate that the site is underlain with Triassic Rocks (Undifferentiated), which are rocks which act as low productive aquifers.

3.4.4 The Environment Agency (EA) website-published indicative aquifer mapping identifies that the solid geology beneath the site is identified as a Secondary B aquifer.

3.4.5 Secondary B aquifers are assigned in cases where the geology exhibits predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of former non-aquifers.

3.4.6 The Natural Resources Wales (NRW) groundwater source protection zones map show that the proposed site is not located within a groundwater protection zone.

Hydrology

3.4.7 There are no watercourses located within the proposed site. A canal is present to the east of the site.

3.4.8 The nearest watercourse to the site is the River Taff, which is an NRW designated 'main river'. At its nearest point south west of the site the River Taff is approximately 700m away. The River Taff is tidally influenced adjacent to the site with water levels controlled by the Cardiff Bay Barrage downstream.

3.5 Existing Drainage

3.5.1 The existing public sewer network currently serving the greater Cardiff area is owned and maintained by Dwr Cymru Welsh Water (DCWW).

3.5.2 DCWW asset plans indicate that Bute Terrace is drained by a few different surface water Highways sewers, ranging in size from 600 diamater to 225 diamater. A 900x660 DCWW combined sewer drains is shown along Bute Terrace.

3.5.3 The site is currently served by private drainage networks that are assumed to discharge both foul and surface water runoff offsite into the DCWW network. The location and type (i.e. foul/surface/combined) of offsite connections will need to be confirmed via CCTV survey.

3.5.4 A copy of the Dwr Cymru Welsh Water asset plan is included in Appendix C.

4 Flood Risk to the Existing Site

This section explores the primary sources of flooding to the site.

4.1 Tidal & Fluvial Flooding

4.1.1 The proposed site is identified as lying within Flood Zone 3, with the land benefiting from flood defences in the NRW `published floodplain map (refer to Figure 1). This estimate of the extent of flooding is based on the absence or failure of all existing flood defences currently protecting the site.

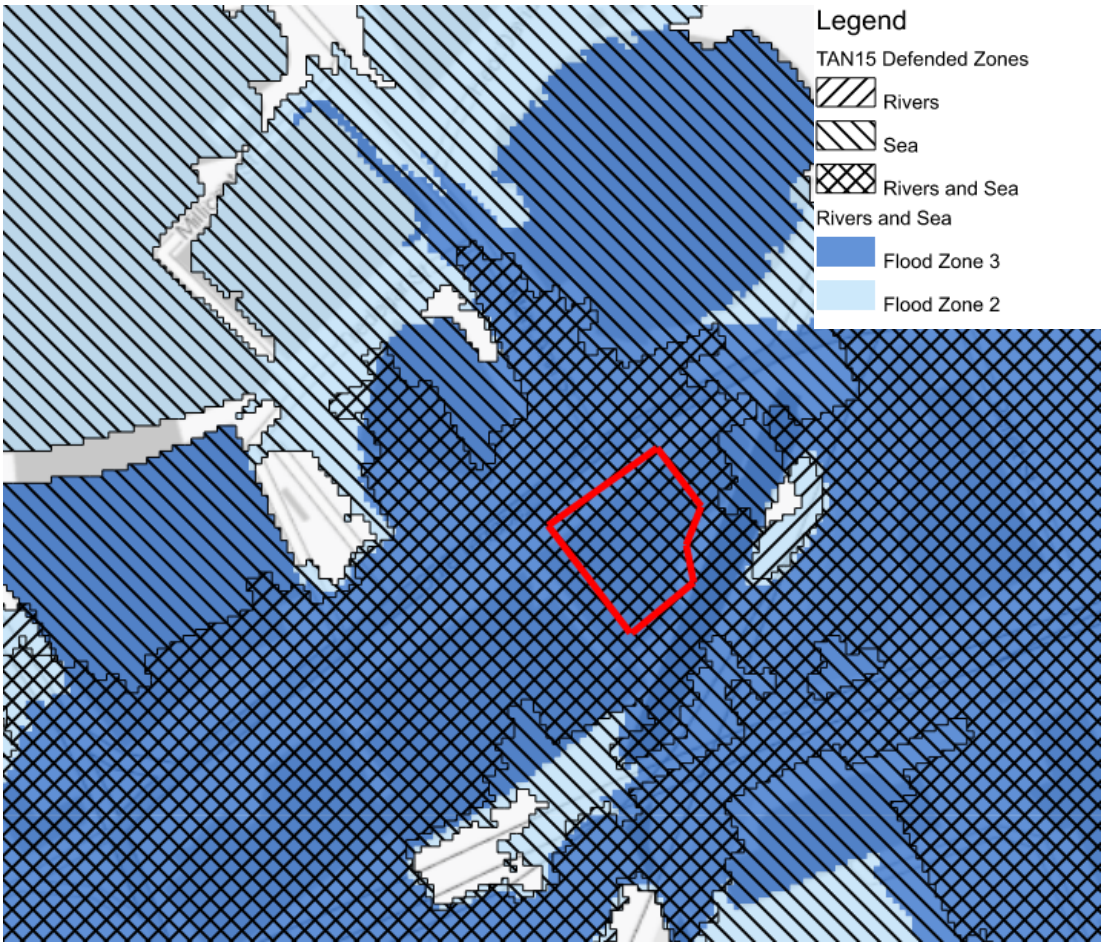

Figure 1 – Extract from NRW Fluvial/Tidal Flood Risk Map

4.1.2 Flood Zone 2 illustrates the expected extent of a 1 in 1000 year tidal or fluvial event and also contains areas recorded to have flooded in the past, while Flood Zone 3 illustrates the expected extent of a 1 in 100 year fluival event or a 1 in 200 year tidal event.

4.1.3 Due to the existing ground levels on the site, proximity to the sea and the relationship between fluvial and tidal flows within the region, tidal flooding can be seen to pose the main risk of flooding to the site.

4.1.4 The water levels within the nearest watercourse to the site the River Taff are controlled by the downstream Cardiff Bay Barrage. Sluice gates ensure that when sea levels drop below 4.5mAOD fluvial flows from the river are released directly into the sea. Due to the cyclical nature of tidal flooding and the presence of the Cardiff Bay lake inside the Barrage, which has a relatively large storage capacity, the probablity of fluival flooding effecting the site is extremely low as the lowest ground levels within the site is at 7.70mAOD.

4.1.5 NRW extreme sea levels for the higher central allowance (70th %tile) taken from the nearest data point to the site are shown below in Table 1;

Event	Climate Change Horizon			
	2017	2100	2120	2124
T1	6.98	7.83	7.99	8.02
T20	7.39	8.24	8.40	8.43
T100	7.67	8.52	8.68	8.71
T200	7.79	8.64	8.80	8.83
T1000	8.16	9.01	9.17	9.20
T10000	8.85	9.70	9.86	9.89

Table 1 – NRW Extreme Sea Levels Data Adjusted for Climate Change (70th percentile)

4.1.6 Table 1 shows that extreme sea levels are predicted to rise signifcantly due to climate change with the proposed 1 in 200 year tidal level predicted to be at 8.83mAOD in 2124, which is above the low point on the existing site. This data infers that it might be possible that tidal flooding may occur within the site, however, this does not take into account tidal defences and the influence of obstructions on flows between the sea and the site. The site is approximately 3.5km upstream of the Cardiff Bay Barrage.

4.1.7 The site is defended primarly as mentioned above by the Cardiff Bay Barrage and also by secondary lateral defences along Cardiff Bay and the River Taff. The Cardiff Bay Barrage is the main defence which defends the whole of Cardiff Bay from extreme tidal flows and has been designed accordingly with the NRW stating that it currently provides in excess of 1 in 1000 year standard of protection. The barrage is maintained on a frequent basis, thus the possibility of failure is considered to be very low. Due to the importance of this structure it is assummed that it will also be upgraded in time to account for climate change sea level rises.

4.1.8 Lateral defences within Cardiff Bay and the River Taff also provide a minimum level of protection at 8mAOD.

4.1.9 These defences provide significant protection to the dense urban environment within Cardiff and the site in question, thus the risk of tidal flooding affecting the existing site is considered to be low.

4.2 Overland / Surface Water Flooding

4.2.1 The NRW Surface Water Flood Risk Map (refer to Figure 2) doesn't show any of the existing site being at risk of surface water flooding. Areas adjacent to the site show a low risk of surface water flooding, including on the opposite side of Bute Terrace, and around the canal to the rear of the site.

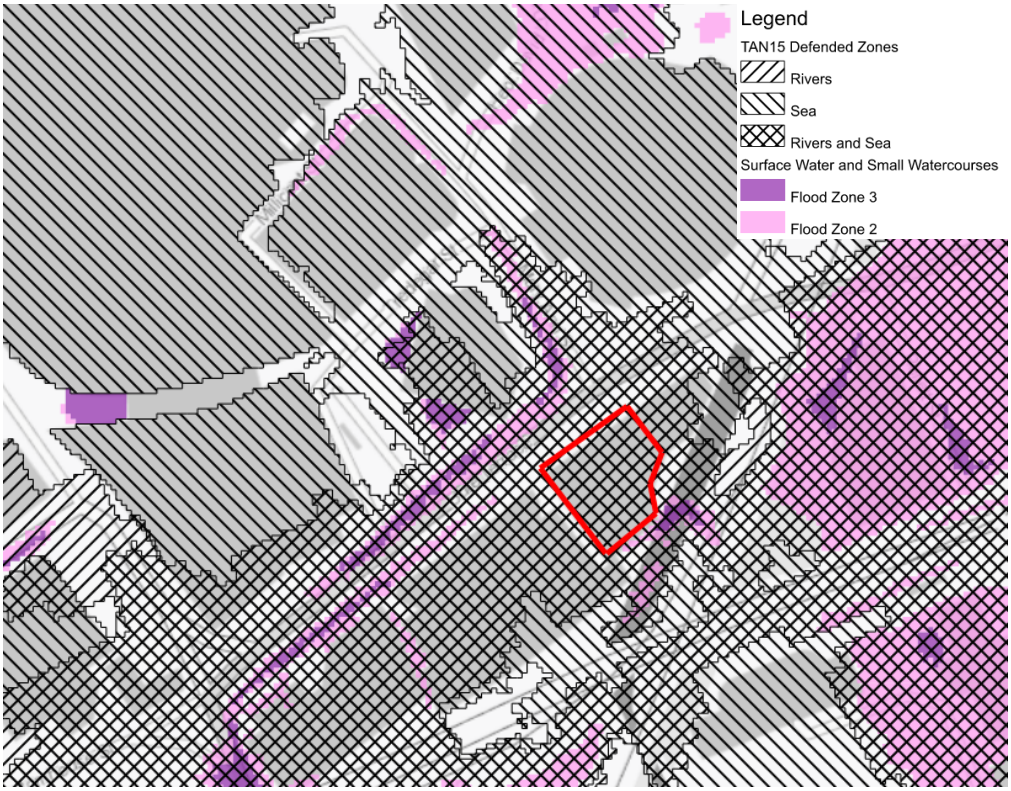

Figure 2 – Extract from NRW Surface Water Flood Risk Map

4.2.2 The surface water flooding shown on Bute Terrace to the north west will not affect the site due to Bute Terrace levels falling away to the west.

4.2.3 The surface water flooding shown to the south east of the site is related to the existing canal. The surface water does not have a pathway to the site due to the canal walls being a higher level, 7.92m AOD

4.2.4 There are no historic records of overland and surface water flooding affecting the proposed site. Based on this and the factors described above, the proposed site is not considered to be at risk from overland and surface water flooding.

4.3 Flooding from Sewers

4.3.1 There is minimal risk of flooding due to the existing onsite private sewers as they would have been designed to account for relatively large rainfall events/peak foul loadings.

4.3.2 If a downstream blockage of gullies occurs within Bute Terrace, there is risk of backing up flows inundating the site. There are no records of historical flooding caused by the local sewer infrastructure, within the site, which indicates the low point on Bute Terrace is lower than the site levels. Consequently, it is not considered that flooding from sewers poses a significant risk of flooding to the proposed development.

4.4 Flooding from Groundwater

4.4.1 The underlying geology beneath the proposed site has been identified as Triassic rocks, which has low productive aquifer properties.

4.4.2 It is difficult to undertake a quantified assessment of the risk of groundwater flooding on the proposed site. This is due to a lack of groundwater levels records, the variability in geological conditions and the lack of predictive tools that can be used to make assessments of groundwater flow and risk of groundwater flooding following rainfall events.

4.4.3 No detailed on-site geotechnical investigation works has been undertaken on the proposed site. It is therefore difficult to estimate the potential impact of groundwater levels on the proposed site.

4.4.4 However, there are no historic records of groundwater flooding events on the site and therefore it is considered that flooding from groundwater does not pose a significant risk to the site.

4.5 Flooding from Artificial Sources

4.5.1 The NRW Reservoir Flood Risk map (refer to Figure 3) illustrates that part of the site, along with most of Cardiff Bay is at risk of reservoir flooding. The maps estimate flood depths between 0.3-2m within the site.

Figure 3 – Extract from NRW Reservoir Flood Risk Map

4.5.2 This risk is due to the Beacons, Cantref and Pontsticill reservoirs that are located approximately 40 miles north of Cardiff city centre. The extent of this flooding is based on the assumption of complete failure of these reservoirs and is extremely unlikely to occur, therefore flooding due to reservoirs is considered low for the site.

5 Proposed Development

5.1 Development Description

5.1.1 The current proposals for the site include the demolition of the existing office building, car parking and basement bar, and the construction of a residential development.

5.1.2 The proposed development comprises of 350 build to rent apartments, bike stores, and associated car parking at ground floor level, along with 137m² commercial space. No residential development is proposed at ground floor level.

5.1.3 Vehicular access to the site will be provided via Bute Terrrace through a new junction immediately north west of the site.

5.1.4 A plan of the proposed site plan is included in Appendix D.

5.2 Development Suitability

5.2.1 TAN15 aims to direct developments to suitable areas with a lower probability of flooding. Development suitability is also considered with a greater emphasis placed on locating more vulnerable infrastructure within Development Advice Map Zone A.

5.2.2 The proposed development is a residential led scheme and is therefore classified as 'highly vulnerable' under Figure 2 of TAN15.

5.2.3 The proposed site is identified as primarily lying within Zone C1 according to the NRW published Development Advice Map (refer to Figure 4) with the remainder of the site considered to be within Zone B.

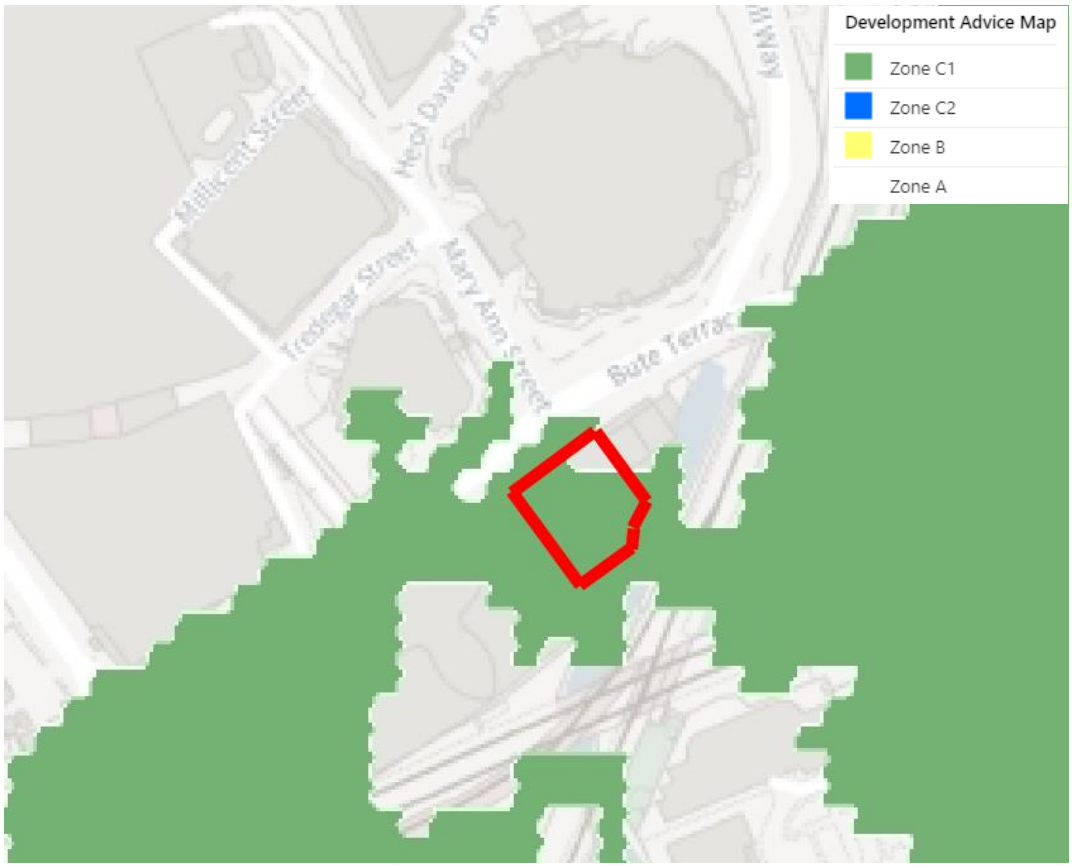

Figure 4 – Extract from NRW TAN15 Development Advice Map

5.2.4 Zone C1 is described as areas of the floodplain which are developed and served by significant infrastructure, including flood defences.

5.2.5 Per TAN15 guidance all proposed use types within Zone C1 are required to undergo a justification test that includes an acceptability of consequences assessment to determine the suitability of the development.

5.3 Justification Test

5.3.1 TAN15 advises that all new developments should only be permitted within Zones C1 and C2 if determined by planning authority to be justified in that location. Development, including transport infrastructure, should only be considered 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 (PPW) and meets the definition of previously developed land (PPW fig 2.1); and,
4) The potential consequences of a flooding event for the particular type of development have been considered and found to be acceptable.

5.3.2 The site has been allocated for future mixed-use development under the Cardiff Local Development Plan 2006-2026. The site sits within Strategic Site A within the schematic framework for Cardiff Central Enterprise Zone and Regional Transport Hub

5.3.3 The Cardiff Central Enterprise Zone encompasses 78.8ha of existing brownfield sites that are proposed to be upgraded/improved to meet future demand for employment/housing in the critical strategic region and promotes a sustainable regeneration of the area.

5.3.4 This strategic allocation thus addresses points 1, 2 and 3 above. To address point 4, the minimum finished floor level (FFL) for the residential part of the development will be provided at or above the 1 in 200-year tidal event level for the proposed life of the building (i.e. 100 years), whilst the 'low vulnerability' ground commercial will be positioned close to existing external levels. Due to the level of existing and future flood risk to the site, the potential consequences of flooding to the site are considered to be low and the justification test is therefore assumed to be passed. The potential consequences of flooding are explored in more detail below in Section 5.4.

5.4 Acceptability of Consequences Assessment

Acceptability Criteria

5.4.1 TAN15 provides an indicative guidance as to what the frequency threshold could be for different types of development described in terms of annual probability of occurrence:

5.4.2 The site currently is shown by NRW data to be fully inundated during the 1 in 200-year tidal event, assuming tidal defences were not available for the site and the surrounding area.

Type of Development	Threshold Frequency	
	Fluvial	Tidal
Residential	1 in 100 year	1 in 200 year
Commercial	1 in 100 year	1 in 200 year

Table 2 – Indicative Guidance of TAN15 Section A1.14 (Target for no flooding)

5.4.3 In the absence of further fluvial/tidal modelling data for the area, the threshold frequency level for the site has been conservatively based on assuming that the site is undefended from tidal flood levels and all other obstructions in the path between the sea and the site are ignored.

5.4.4 It is therefore proposed that finished floor levels (FFL) for the 'highly vulnerable' residential units be set at a minimum level of 8.91mAOD, which is equivalent to the adjacent year 2120 1 in 200-year tidal event level to the site. Due to the existing external levels within the site and the high level of protection afforded by the tidal defences it is not considered practicable/reasonable to provide an extra freeboard on this level.

5.4.5 It is proposed that 'Low vulnerable' commercial units be provided below this threshold level at a FFL similar to existing external levels which will generally be 8.0-8.3mAOD. These levels will be confirmed prior to planning permission.

5.4.6 As identified in Section 4.1, the existing site is at low risk of flooding from all sources, with the high level of protection provided by tidal defences ensuring the site is at low risk of the main risk of tidal flooding for the proposed lifetime (i.e. 100 years) of the development. Due to the impractically of raising all external levels within the site, the consequent difficulty of providing access directly from Bute Terrace and the high level of tidal defence provided for the site, it is considered reasonable that FFL's for the commercial units are set at existing ground levels.

5.4.7 The future 1 in 1000-year tidal event, assuming the absence/failure of tidal defences, may inundate the site above the 600mm max depth of flooding provided by A1.15 in the TAN15. The alteration of the ground/road levels outside of the development footprint is beyond the control of the developer and hence this guidance cannot be reasonably achieved within the site.

Development Flood Risk

5.4.8 As highlighted in Section 4.1 there is a residual risk of future tidal flooding to the site due to a climate change induced rise in sea level. This risk assumes the failure of tidal defences downstream of the site that includes the Cardiff Bay Barrage and lateral barriers adjacent to Cardiff Bay and the River Taff. Due to the significance of these defences (i.e. low probability of failure) and the proposed development's design (i.e. only 'low vulnerable' commercial located below TAN15 threshold frequency level) the risk of tidal flooding is therefore considered very low for the site.

5.4.9 The development will not increase the probability for flooding within the site or the surrounding area. A new surface water network will be constructed onsite that will follow local and national guidance and ensure no offsite flooding for all return periods up to the 1 in 100-year return period including an allowance for climate change.

Flood Mitigation Measures

5.4.10 Flood resilient construction techniques will be provided within the commercial development up to the future 1 in 200-year tidal event level. Such techniques may include concrete flooring, raised sockets etc.

5.4.11 Due to the nature of tidal flooding (i.e. cyclical) fully surrounding the site, and the distance between the site and a safe evacuation area/the higher ground associated within central Cardiff it is not considered safe or appropriate that evacuation of the site occurs during a flood event.

5.4.12 The proposed residential FFL's for the site ensure that all residential units can be considered 'safe havens'. A communal community space will be required above the TAN15 threshold frequency to ensure a 'safe haven' for commercial workers. In failure/overtopping of adjacent tidal defences residents are to remain in their units until the risk of flooding has passed, which will be determined by NRW guidance.

5.4.13 All residents/businesses will be signed up to the NRW 'Floodline Warnings Direct' scheme so they receive advance warnings of potential flooding and will be made to complete an NRW personal flood plan.

5.4.14 With the time afforded by advance warning, evacuation of property to safe egress and the removal of valuables from buildings can be implemented. A means of safe access and egress from the site is likely to be afforded at all times prior to even partial flooding of the site and/or surrounding areas. It is crucial that all occupants of the site be aware of this inherent risk, and the planned egress route.

6 Drainage Strategy

6.1 Foul Drainage

6.1.1 New foul drainage infrastructure will be implemented to accommodate foul flows from the proposed development, utilising the existing connection from site where possible.

6.1.2 The new network will be designed to convey foul flows to a connection point into the adjacent Dwr Cymru Welsh Water (DCWW) sewer network. Liaison with DCWW will be required to ascertain a suitable connection point into their existing network and to confirm if the local network has sufficient capacity to accommodate the development.

6.2 Surface Water Drainage

6.2.1 A new surface water drainage network will be implemented onsite that will be designed to meet the Sustainable Drainage Approval Body (SAB) requirements.

6.2.2 The proposed surface water drainage is to be designed in line with the SuDS hierarchy. Disposing of surface water via infiltration is to be prioritised, and if deemed unfeasible, as there are no watercourses adjacent to the site the network is to be connected to a sewerage system. Due to the nature of the stratum within the site it is not expected that infiltration will be feasible, however this will need to be confirmed. The water levels within the adjacent watercourse/canal are considered too high for a surface water connection. A proposed connection to a sewerage system must be limited where possible. This can be achieved via flow control devices and attenuation features.

6.2.3 Should the proposed surface water drainage need to relay on a connection to a sewerage network, the proposed connection(s) and discharge rate(s) must be agreed with DCWW and the SAB.

6.2.4 SuDS features will ensure that water quality, amenity and biodiversity conditions are appropriately provided within the site.

7 Key Conclusions, Considerations and Recommendations

The proposals for the regeneration of the newly named Harlech Court includes the demolition of the existing office buildings and the erection of a tower block that will house 450 residential apartments, approximately 137m^2 of ground floor commercial and ancillary features. The site is predominantly within Zone C1 as defined in TAN15. Under TAN 15 the development is classified as a 'highly vulnerable' and is therefore required to undergo a justification test, which includes an acceptability of consequences assessment.

A technical assessment of the consequences of flooding of the site has been carried out in accordance with the requirements of TAN15. In respect of the criteria outlined in this document the findings are as follows:

- The development site is allocated for mixed-use development within the Cardiff Local Development Plan and therefore satisfies the justification test outlined in Section 6 of TAN15.
- The main source of flood risk to the site is tidal, though this risk can be considered very low due to significant flood alleviation infrastructure provided downstream that includes the Cardiff Bay Barrage.
- Proposed minimum residential FFL's of 8.91mAOD to be set, which is equivalent to the future 1 in 200-year adjacent tidal level and meets TAN15 threshold tolerance for a residential scheme.
- Commercial unit FFL's to be set at equivalent existing ground levels, which is deemed acceptable due to the high level of tidal defences provided and subsequent low risk of flooding to the site for the lifetime of the development.
- Units and community space above TAN15 threshold frequency to act as 'safe havens' during flooding event, with evacuation of the site not advised.
- All residents/businesses are to be signed up to the NRW 'Floodline Warnings Direct' scheme.
- Surface water drainage to be suitably designed in line with local and national requirements.

Therefore, based on the findings of the FCA, it is considered that the principal objectives of TAN15 have been satisfied and that the development proposals are acceptable in terms of flood risk.

Appendix A: Proposed Site Layout

DOCK FEEDER

SITE BOUNDARY

Existing Bank

Soft landscaping/raingarden

Soft landscaping/raingarden

Plant 2 (78 sqm)

2m high gate

Plant 1
(11.8m x 8.76m)

Gravel

2m high gate

Service Yard
(permeable paving)

Line of building above

Escape Corridor

F.E.

Cycle Store (352 spaces)
(two tier bike racks)

Riser above

1.2m wide path (permeable)

Soft landscaping/raingarden

3.0m wide delivery access

Office

Parcels

Dis. WC

1.35m wide corridor

Post

Reception

L.F. Lift

Lift

Lift

7m wide corridor

Waiting

Entrance Foyer

Stair

Riser above

Vertical Fins

Entrance

F.E.

Escape Corridor

Vehicular entrance gates

Commercial Waste

Line of hotel above

Existing column

'Hypothetical' car park layout following demolition of podium
(14 spaces)

Existing column

Soft landscaping/raingarden

'Public Square' Paving slabs

Commercial + Visitor Cycle Parking *(8 spaces)*

Refuse
(27.0m x 3.56m)

2m high security gate

Secure doors

void above

Substation

Commercial Unit - A1/A3
(137 sqm / 1,474 sqft)

Commercial entrance

'Arcade'

Commercial entrance

1.8m

1.0m

3.5m

Line of building above

Trees in 1m tree grilles along Bute Terrace

3m wide x 10m high canopy above

CITRUS HOTEL

Existing column

Raised planters and benches

Raised planters and benches

SITE BOUNDARY

Edge of council ownership

Existing crossover retained for entrance to hotel

New crossover

Existing Footpath

Loading/Unloading Bay

Altolusso car park with podium above

Existing gate and fence

ALTOLUSSO

Existing crossover for entrance to Altolusso car park

IN

Existing Box Junction

OUT

BUTE TERRACE

N

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Project Name :	Harlech Court, Bute Terrace, Cardiff
Project Ref :	SP565
Drawing Title :	Proposed Site Plan
Drawing Number :	SP565 - P01
Scale :	1:250 @ A3
Revision:	PAC
Drawn by:	rb
Date:	Aug' 2024

Appendix B: Topographical Survey

Coordinate System

This survey has been oriented to the Ordnance Survey (OS) National Grid and Datum using GPS observations and the OS Active Network.

A true OS coordinate was established near to the centre of the site. This survey has been correlated to this point. Further OS coordinates were established to create a true OS bearing for angle orientation.

No scale factor has been applied to this survey. The coordinates shown are arbitrary and not true OS coordinates which do have a scale factor applied.

Notes

1. Dimensions should not be scaled. All dimensions should be verified on site prior to construction.
2. All dimension and levels are in metres unless otherwise stated.
3. Some detail may have been obscured by parked vehicles, stored materials, overgrown vegetation, and leaf litter.
4. All data shall remain Copyright of Gwalia Surveyors unless formally agreed otherwise.
5. This surveyed boundary features may not be legal boundaries.
6. Gwalia Surveyors cannot accept any responsibility for any damage to computer systems from viruses which may be contained in the data/files supplied.

Key to Abbreviations

Inspection Covers & Chambers

AV	Air Valve
BH	Borehole
BT	British Telecom Cover
CDP	Cable Draw Pit
CW	Combined Water
Dr.Ch.	Drainage Channel
Elec.	Electric Inspection Cover
ER	Earth Rod
FH	Fire Hydrant
FW	Foul Water
G	Gully
GC	Gas Cock
GV	Gas Valve
IC	Inspection Cover
KO	Kerb Outlet
MH	Manhole
RE	Rodding Eye
SC	Stop Cock
SV	Stop Valve
SW	Storm Water
TV	Cable Television Cover
UL	Uplighter
UTL	Unable to Lift
WM	Water Meter
WO	Washout

Ground Surface Types

Asp.	Asphalt
B/P	Block Paviors
Conc.	Concrete
Pav.	Concrete Paving
Tac.	Tactile Paving

Measurement Descriptions

CL	Cover Level
d	Depth (m)
dia.	Diameter (mm)
FFL	Finished Floor Level
h	Feature Height (m)
IL	Invert Level
SL	Sump Level
Soff.	Soffit Level
WL	Water Level

Walls & Fence Types

Bl.	Block Wall
Br.	Brick Wall
B/W	Barbed Wire Fence
C/B	Close Boarded Fence
C/I	Corrugated Iron Fence
C/L	Chain Link Fence
C/P	Concrete Post
Gab.	Gabion Wall
H/R	Hand Rail
I/R	Iron Railings
Pal.	Pallisade Fence
P/R	Post & Rail Fence
P/W	Post & Wire Fence
Ret.	Retaining Wal
St.	Stone Wall

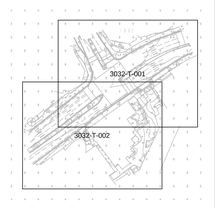
Street Furniture

B	Bollard
BB	Belisha Beacon
DP	Down Pipe
EP	Electricity Pole
FB	Flower Bed
JB	Junction Box
LP	Lamp Post
MP	Marker Post
P	Post
PB	Post Box
RS	Road Sign
RWP	Rain Water Pipe
SP	Sign Post
Stay	Stay Wire
SVP	Soil Vent Pipe
TCB	Telephone Call Box
TL	Traffic Light
TP	Telegraph Pole
VP	Vent Pipe

Linetypes & Symbols

- Banks
- Buildings
- Building Overhead
- Change of Surface
- Fences
- Kerbs
- Overhead Cables
- Ridges & Eaves
- Steps
- Walls
- Vegetation
- Tree Canopy
- Combined Water
- Foul Water
- Storm Water
- Banking
- Flow Direction
- Gate
- Survey Station
- Tree

Sheet Layout

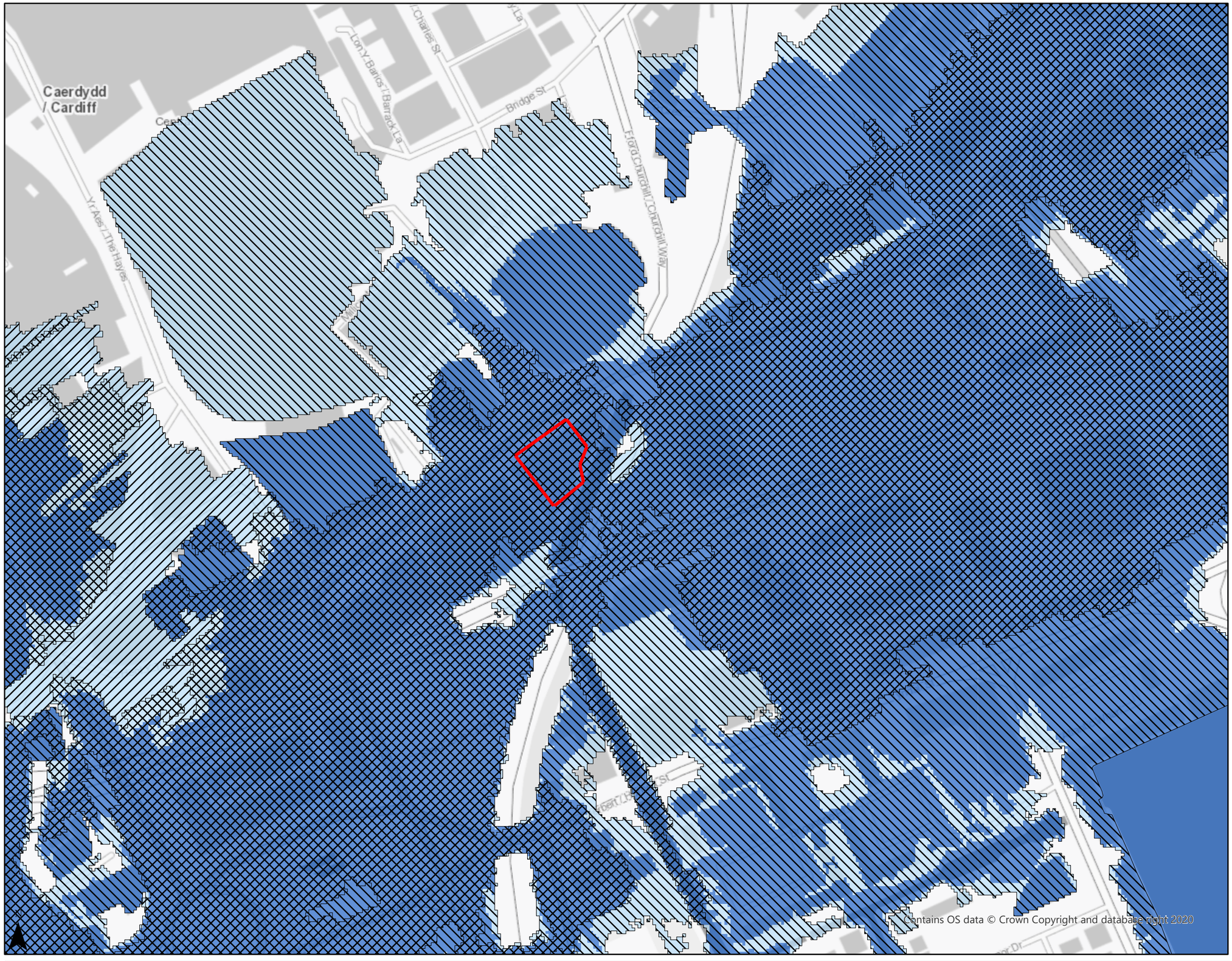


Rev.	Date	Drawn	Details

Gwalia
SURVEYORS
Unit 1, Link Trade Park,
Penarth Road, Cardiff, CF11 8TQ.
Cardiff: 029 2111 1700 · London: 020 3011 1099
W: gwaliasurveyors.co.uk
LAND | UTILITIES | BUILDING | BOUNDARY | BIM

Title:	Topographical Survey
Project:	Harlech Court
Client:	Harlech Court Ltd
Drawn: JT	Checked: DR
Date: 15.01.2021	Scale: N.T.S.
Drawing Number: 3032-T-Overview	Rev.

Appendix C: Natural Resources Wales Development Advice Maps



Cyfoeth Naturiol Cymru
Natural Resources Wales

Flood Map for Planning - Basic

Flood Zone Rivers and Sea

Legend

TAN15 Defended Zones

- Rivers
- Sea
- Rivers and Sea

Rivers and Sea

- Flood Zone 3
- Flood Zone 2

Scale at A3: 1:2,500

Date: 09/09/2024

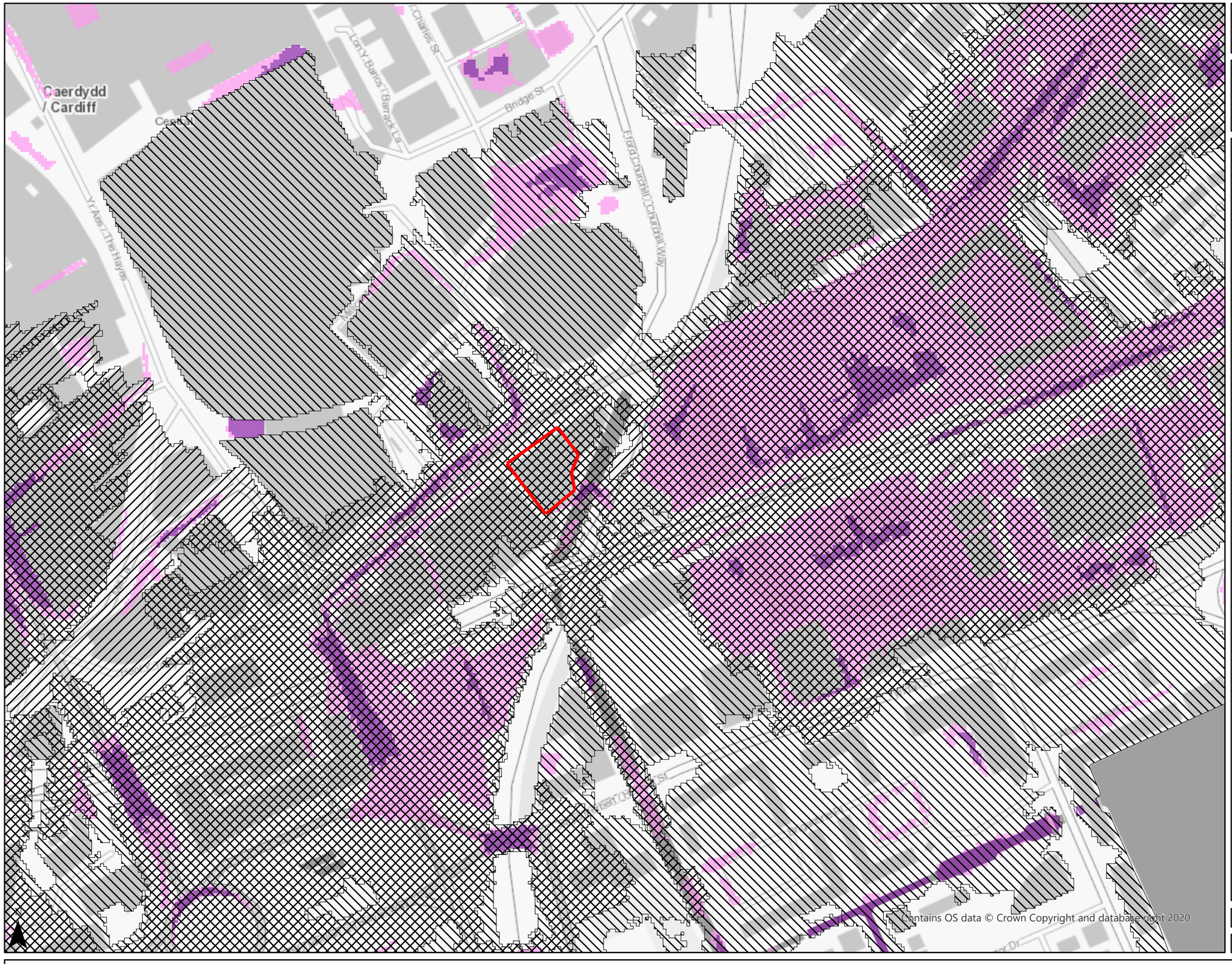
0.1 0.05 0 0.1

km

British National Grid

Disclaimer

https://naturalresources.wales/flooding/disclaimer-for-our-flood-and-coastal-erosion-risk-maps/?lang=en



Cyfoeth Naturiol Cymru
Natural Resources Wales

Flood Map for Planning - Basic

Flood Zone Surface Water

Legend

TAN15 Defended Zones

- Rivers
- Sea
- Rivers and Sea

Surface Water and Small Watercourses

- Flood Zone 3
- Flood Zone 2

Scale at A3: 1:2,500

Date: 09/09/2024

0.1 0.05 0 0.1

km

British National Grid

Disclaimer

https://naturalresources.wales/flooding/disclaimer-for-our-flood-and-coastal-erosion-risk-maps/?lang=en

Cyfoeth Naturiol Cymru
Natural Resources Wales

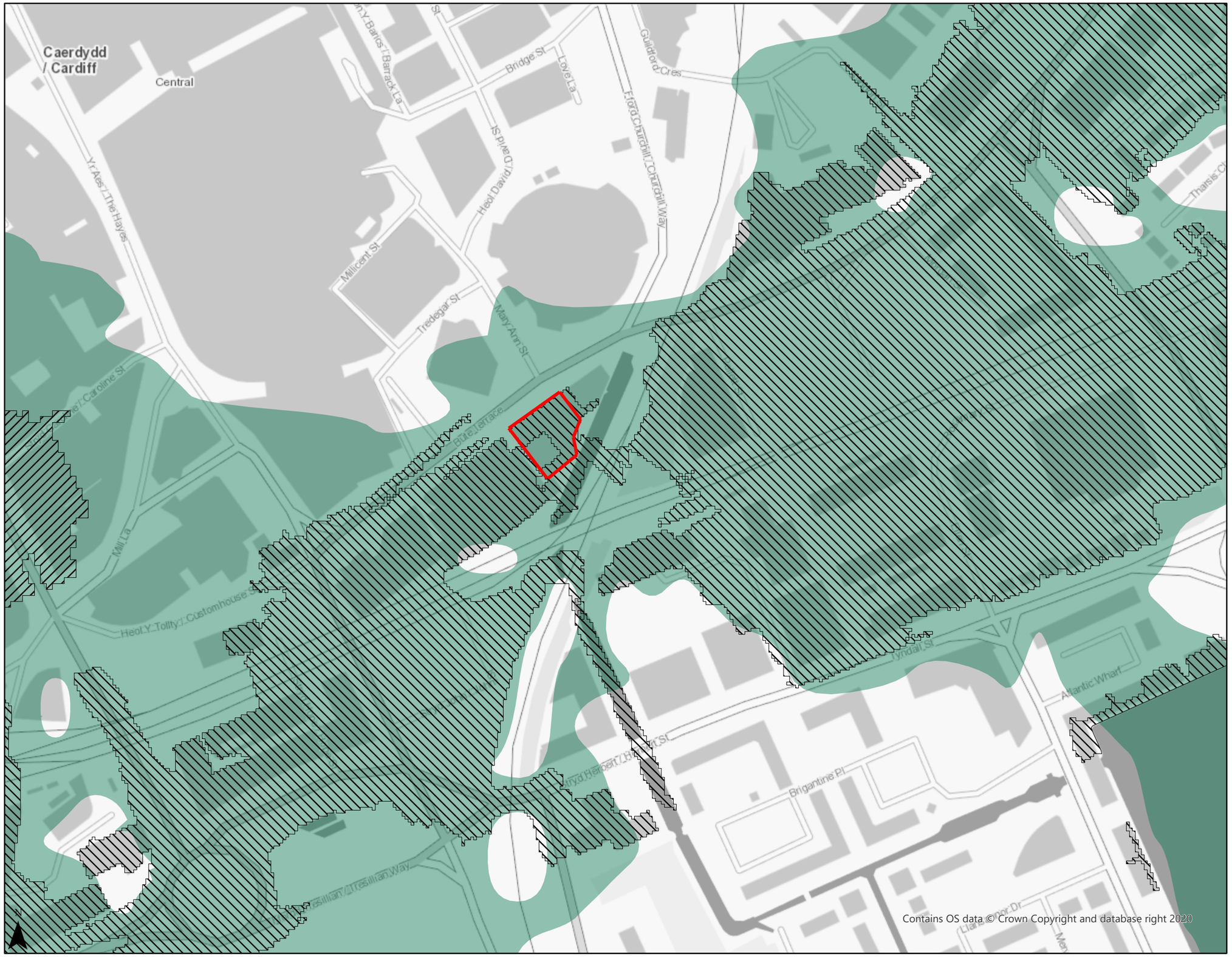
Flood Risk Maps

Flood risk from resevoirs

Legend

Areas Benefitting from Flood Defences

- Rivers
- Sea
- Rivers and Sea
- Flood Risk from Reservoirs
- Main Rivers



Scale at A3: 1:2,500

Date: 09/09/2024

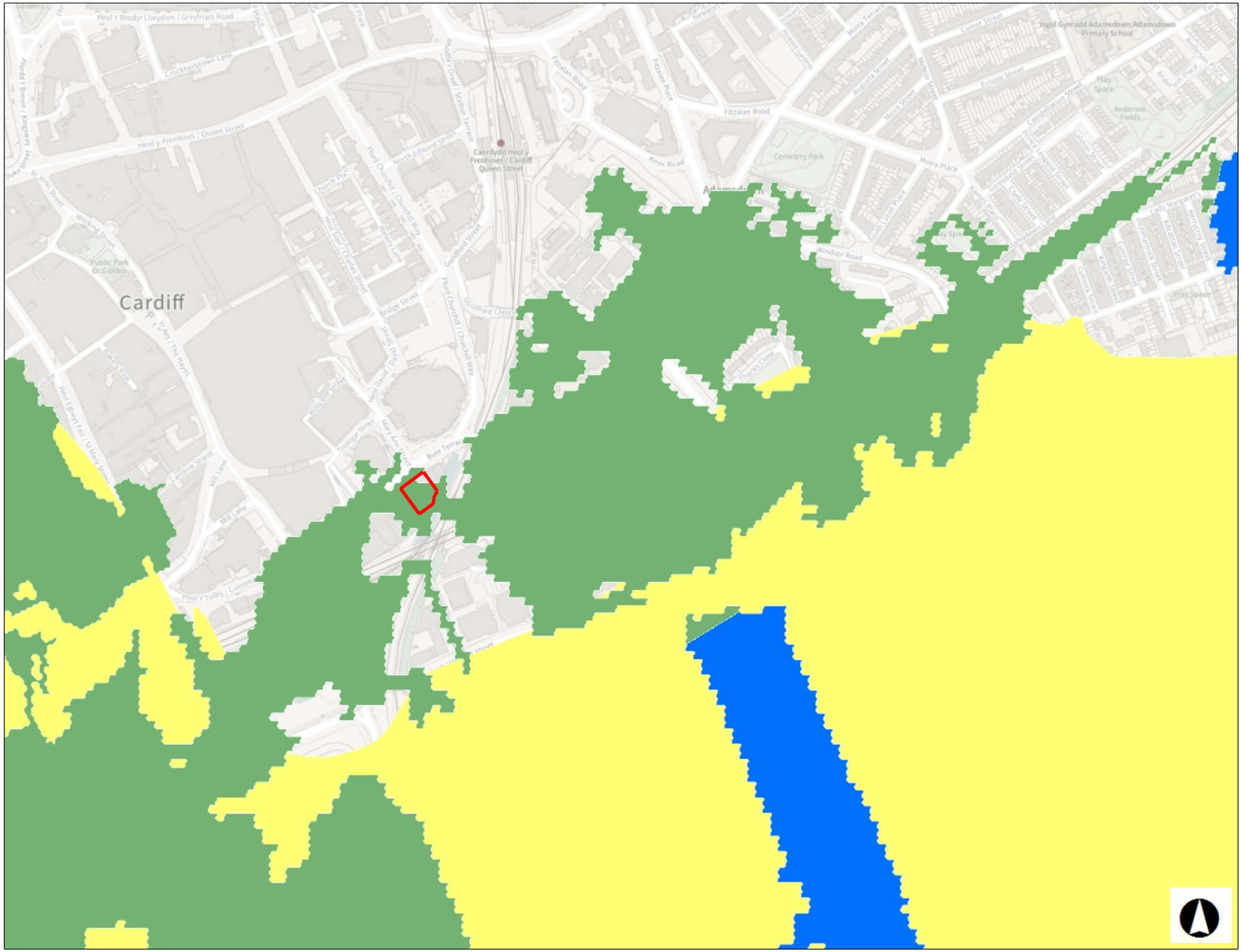
0.1 0.05 0 0.1

km

British National Grid

Disclaimer

https://naturalresources.wales/flooding/disclaimer-for-our-flood-and-coastal-erosion-risk-maps/?lang=en



Cyfoeth Naturiol Cymru
Natural Resources Wales

Map Perygl Llifogydd / Flood Risk Map -

Allwedd / Map Key

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

Graddfa / Scale at A3 1: 5,001

Dyddiad / Date
09/09/2024

0.3 0 0.13 0.3

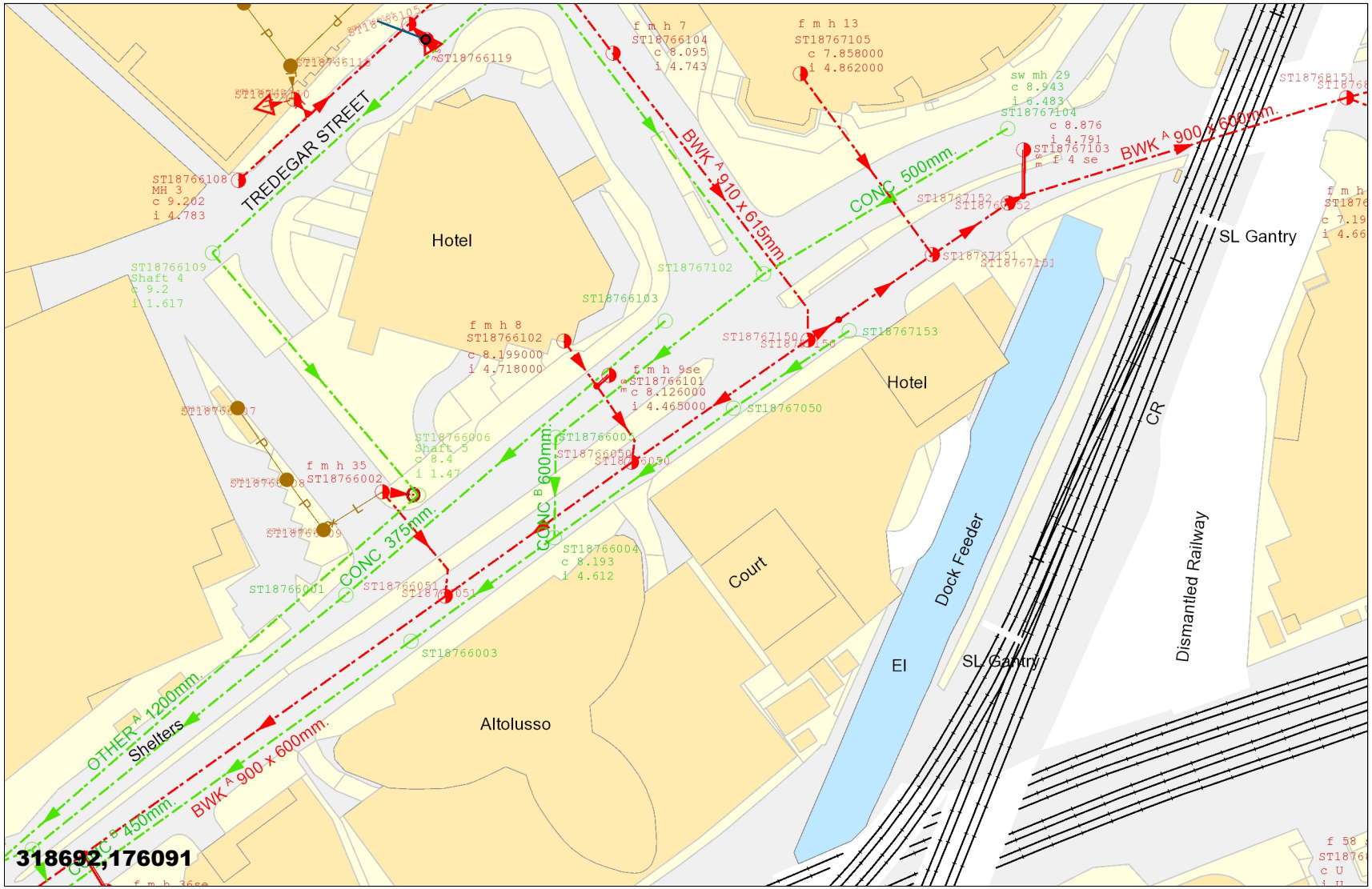
British_National_Grid Kilometers

Appendix D: Dwr Cymru Welsh Water Asset Map

Dŵr Cymru
Welsh Water

26/03/2024

Scale: 1: 1104



LEGEND

Clean Water

- Sluice Val
- Air Val, SINGLE
- Tap
- Pressure Reducing Valve
- Meter
- BULK Meter
- FH
- Cap
- Existing Main
- NON COMPANY

Sewerage External

- Foul
- Surface Water
- Combined
- Rising Main
- Private
- Treatment Works
- Pumping Station
- Special Purpose
- Unknown End
- Change, Combined Overflow
- Outfall, FOUL
- Lamp Hole, Foul
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

EXACT LOCATION OF ALL APPARATUS TO BE DETERMINED ON SITE

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be Asbestos Cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation