HARBOUR VIEW BRISTOL

Proposed Rooftop Terrace

(Revision to planning permission ref: S62A/2024/0053)

Flood Risk Assessment

March 2025

Client:	Canada Life Asset Management
Agent / Architect:	SRA Architects Limited
Site:	Harbour View, Unit 7, Building 11, Harbourside, Bristol, BS1 5TY
Title:	**FLOOD RISK AND DRAINAGE ASSESSMENT**
Report ref.:	3373_02
Prepared by:	Paul Godbold BSc MSc FGS
Date:	27 February 2023
Version	*FINAL*

BOLD Environmental Ltd has prepared this document in accordance with the instructions of SRA Architects Limited, on behalf of their client, Canada Life Asset Management, for their sole and specific use. Any other persons who use any information contained herein do so at their own risk.

Suite 132, 3 Edgar Buildings, George Street, Bath, BA1 2FJ
Tel: 01225 666758
www.boldenvironmental.co.uk

BOLD Environmental Ltd

Contents

Appendices

Cover Photo: Image supplied by SRA Architects Limited.

[1] EA = Environment Agency
[2] SFRA = Strategic Flood Risk Assessment

1 Introduction

BOLD Environmental has been commissioned Canada Life Asset Management, to undertake a Flood Risk Assessment to accompany a development proposal at **'Harbour View, Unit 7, Building 11, Harbourside, Bristol, BS1 5TY (hereafter referred to as 'the site')**. At the time of preparing this Flood Risk Assessment (FRA) the proposal comprised a Rooftop Food and Drink Venue. Further comment regarding the proposed development is detailed within Section 2.

1.1 Site-Specific Flood Risk Assessment (FRA)

In accordance with the National Planning Policy Framework (NPPF) and Environment Agency Standing Advice, a Site Specific Flood Risk Assessment (FRA) should be both proportionate to the degree of flood risk and appropriate to the scale, nature and location of the proposed development or land use.

As the development is to provide a leisure facility, the Flood Risk Vulnerability Classification for the development has been determined as "Less Vulnerable" (as defined by the NPPF).

The Environment Agency flood risk setting for the site is determined as being wholly within Flood Zone 2.

Environment Agency Standing Advice is applicable; and requires that an FRA be conducted. Standing Advice requires that an FRA should include detail on surface water management; access and evacuation; and finished floor levels.

In recognition of the flood risk setting of the site, a **Level 2 Flood Risk Assessment (FRA): Scoping Study** has been conducted. The aim of the FRA is to provide an appraisal of the potential flood risk posed to the site; and equally the potential impact that the proposed development may have on flood risk to land or property external to the site. The Scoping Study will identify whether or not there are flooding or surface water management issues that require additional consideration and consequently completion of a more detailed FRA.

In completing the FRA, the following data sources were reviewed:

- Environment Agency (EA): Flood Risk Classification; Risk of Flooding from Rivers and the Sea (RoFRaS) database, and EA Standing Advice.
- Bristol City Council Level 1 Citywide Strategic Flood Risk Assessment (SFRA) (2020).
- Bristol City Council Surface Water Management Plan (SWMP) (2012).
- Bristol City Council Preliminary Flood Risk Assessment (PFRA) (2011).
- Bristol Local Flood Risk Management Strategy (LFRMS) (2018).
- An Environment Agency Product 4: Detailed FRA / FCA Map centred on Unit 7, Building 11, Harbourside, Bristol, BS1 5TY (ref: 289612-WX).
- Groundsure (2020) Flood Insight Report. Building 11, Harbourside, Bristol, BS1 5TY. Ref: CMAPS-CM-854569-31083-220120.
- British Geological Survey: on-line mapping and geological indicators of flooding.
- Site specific Topographical Elevations.
- Bristol City Council, Bristol Development Framework Core Strategy (Adopted June 2011). Flood Risk and Water Management Policy: BCS16.

The Level 2 FRA: Scoping Study did not include a specific Site Reconnaissance.

1.2 Site Setting

The site is defined as Unit 7 within Building 11 of the Harbourside Development, situated between Millennium Promenade and Canons Way, within the Canons Marsh area of central Bristol. The site is situated at the south-eastern corner of Building 11, at the junction of Canons Way and Explore Lane, and is part of an existing commercial / leisure building. The site may be located by National Grid Reference ST 58314 72440; and is situated approximately 160m north of Bristol Floating Harbour. The planning boundary of the site denotes a ground level footprint of approximating 95m^2 (0.0095 hectares); which comprised part of Unit 5 Rainbow Casino at the time of preparing this Flood Risk Assessment.

The site is surrounded by commercial, leisure, residential, and retail buildings in all directions.

The Site Location and Current Site Layout are provided within **Appendix A.**

1.3 Site Topography

Topographic elevations for the site are included on an 'As Built' drawing for the site dating from 2022 which is included within **Appendix B**. The survey indicates the floor level within the existing ground floor level to be 9.30mAOD.

1.4 Existing Site Drainage

A 'Below Ground Drainage' plan for Building 11 is presented within **Appendix B** and indicates separate surface water and foul drainage systems (Arup, 2004, Drawing 11-D-00-01 issue K).

Surface Water Drainage for the subject site is directed south-west to Canon's Way; and subsequently follows a south-easterly trajectory.

Foul Drainage for the subject site is indicated to exit Building 11 south-east to Canon's Way; with the drainage route subsequently following a south-easterly trajectory.

1.5 Surface Water Bodies / Features

The Bristol Floating Harbour watercourse is located approximately 160m south of the site. The watercourse connects to the River Avon approximately 1.5km west of the site.

The watercourse is classified by the Environment Agency as a Main River.

1.6 Geology and Ground Permeability

Published British Geological Survey (BGS) records indicate the site to be located on Bedrock of the Redcliffe Sandstone Member (comprising sandstone). The bedrock beneath the site is classified as a Secondary A Aquifer.

BGS records indicate that bedrock is overlain by Superficial Tidal Flat Deposits (comprising clay and silt) which has no aquifer designation.

No recent intrusive site investigation is known to have been conducted within the curtilage of the site. The site specific geology is therefore unconfirmed.

The closest published borehole to the subject site is located approximately 70m north-east, and is referenced Bristol Crown Courts, Canons Marsh (dated 1974) (ref: ST57SE142). The borehole confirms Made Ground to 1.70m below ground level (mbgl); over Tidal Flat Deposits to 13.80mbgl; over Sandstone to base.

A summary geological sequence from prior investigations in proximity to Building 11 of the Harbourside Development between 1983 and 2003 is detailed within the following report: Over Arup 'Bristol Harbourside, Building 11, Geocontamination Report' (April 2003). The report indicates Made Ground up to 3m below ground level (mbgl); overlying approximately 12m of Alluvium Deposits (comprising clay, clayey silt, and sand and gravel at depth; over Mudstone / Breccia); with sandstone recorded from approximately 29mbgl below ground level.

It is unknown as to whether Soil Infiltration (Soakaway) Tests have been conducted within the curtilage of the site. Ground permeability at the subject site is unknown.

The site is not located within an Environment Agency Source Protection Zone.

The management of Surface Water Discharge is referenced further in Section 2.

2 Development Proposal

At the time of preparing this Flood Risk Assessment (FRA), the proposed development comprised the following elements:

- Creation of a **Ground Level Foyer / Entrance** area of approximately 95m^2 (formerly part of Unit 5 Rainbow Casino) *incorporating an existing stairwell and customer lift and retaining the existing entrance from Explore Lane*.
- Creation of a **Rooftop Food and Drink Venue** at Level 3, including a mezzanine level incorporating an external roof terrace.

The proposal does not include changes to the built footprint of Building 11.

The following existing and proposed development plans are presented within **Appendix C**:

- 'Level 1 Existing' (Drawing No.: 3716-HAR-SRA-XX-XX-DR-A-01-100) dated 05/10/2022.
- 'Level 1 Proposed' (Drawing No.: 3716-HAR-SRA-XX-XX-DR-A-04-200-P01) dated 07/11/2022.
- 'Level 3 – Proposed' (Drawing No.: 3716-HAR-SRA-XX-XX-DR-A-04-204-P01) dated 07/11/2022.
- 'Level 3 Mezzanine Proposed' (Drawing No.: 3716-HAR-SRA-XX-XX-DR-A-04-205-P01) dated 07/11/2022.
- 'Section AA – Proposed' (Drawing No.: 3716-HAR-SRA-XX-XX-DR-A-06-215) dated 05/10/2022.

2.1 Vulnerability Classification of the Development

As the development is to provide a leisure facility, the Flood Risk Vulnerability Classification for the development has been determined as "Less Vulnerable" (as defined by the NPPF); which would be considered appropriate for Flood Zone 2 (subject to an FRA).

Environment Agency Standing Advice for a more vulnerable development requires that the FRA should include information regarding Finished Floor Levels; Surface Water Management; and Access and Evacuation. Proposed details are provided below; with additional information and recommendations within Section 4.2 Mitigation Measures.

2.2 Proposed Finished Floor Levels

The proposed development design drawings do not include a Finished Floor Level (FFL). It is however understood that the existing FFL of 9.30mAOD would be retained. Discussion regarding the FFL is detailed within Mitigation Measures (Section 4.2).

2.3 Proposed Site Drainage

It is assumed that the existing Foul and Surface Water drainage provision would be retained.

3 Flood Hazard and Probability

3.1 Flood Zone Classification

Flood Zone definitions are defined within the National Planning Policy Framework (NPPF) as follows, and relate to the potential risk from flooding by river or sea:

Flood Zone 1 - land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1% Annual Exceedance Probability; AEP).

Flood Zone 2 - land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1% – 0.1%AEP), or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5% – 0.1%AEP) in any year.

Flood Zone 3 - land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%AEP), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%AEP) in any year. Flood Zone 3 is further classified into Flood Zone 3a (high probability) and 3b (the functional floodplain, comprising land where water has to flow or be stored in times of flood).

Environment Agency flood zone mapping indicates that the site is entirely located within Flood Zone 2. The flood zone delineation indicates the level of flood risk assuming no flood defences. Flood Zone maps are provided within **Appendix D**[3]**.**

The Environment Agency Risk of Flooding from Rivers and the Sea (RoFRaS) database (Risk of Flooding from Rivers and Sea) generates an indication of river and coastal flood risk based on a 50m grid. The database considers the probability that any flood defences (if present) will overtop or breach, and the distance from the river or sea. **The RoFRaS Flood Rating for the site indicates the risk of flooding across the site to be 'Low' (less than 1 in 100 [1%] but greater than or equal to 1 in 1,000 [0.1%] in any given year).**

A RoFRaS map of the site and the surrounding area is provided within **Appendix D.**[4]

3.2 Flood Defences

Detail regarding flood defences was obtained via an Environment Agency (EA) 'Product 4: Detailed Flood Risk' document centred on the subject site (EA, 2022).

Flood defence assets comprising 'Natural High Ground' (walled channel) are indicated along the Bristol Floating Harbour waterfront approximately 160m south of the site. The crest levels are not provided for this section of defences; but the integrity of the defence is regarded as either Condition 2 or 3 'Good' or 'Fair' (on a scale of 1 to 5, where 1 is 'Very Good' and 5 'Very Poor'). Flood Defence detail is included within **Appendix E.**

No areas of Flood Storage are located within a 250m radius of the site.

[3] Open Government Licence
[4] Open Government Licence

3.3 Historic Flooding

The Environment Agency (EA) database of historic flooding events dating back to 1947 (Historic Flood Map) confirms that the whole site *has* been impacted by a Main River flood event (*no date provided*). A Historic Flood Map is presented within **Appendix F.**[5]

A further source (Groundsure, 2020) confirmed that the site was impacted by flooding in 1703 where the channel capacity was exceeded (no raised defences). A further flood event in 1896 is recorded as extending to within 20m south of the current site perimeter; the event was also detailed as a Main River flood event, where channel capacity was exceeded (no raised defences). A Historic Flood Map extract is presented within **Appendix F.**

The Bristol City Council Level 1 Citywide Strategic Flood Risk Assessment (SFRA) (2020) also depicts a historic flood event across the whole site (*specific details not provided*).

The only confirmed flood event impacting the site dates from 1703.

3.4 Hydraulic Modelling of Tidal and Fluvial Flood Levels

BOLD Environmental Limited (BOLD) requested modelled flood data from the EA through submission of an EA Product 4 data request. The EA duly provided data extracted from the Bristol Strategic Flood Risk Assessment (SFRA) 2019 v19 Model.

The EA Product 4 (2022) included maximum 2D flood depth and flood level data for a range of *combined* Tidal and Fluvial Annual Exceedance Probability (AEP) scenarios (return periods). The data provided was specifically related to the site boundary defined within the request submission; and was presented for both Defended and Undefended scenarios.

Flood depths and levels were provided for the present day (2020 epoch), and the 2080 and 2120 epochs for the following AEPs: 1:100 (1%), 1:200 (0.5%); and 1:1,000 (0.1%). Scenarios were also included for the same AEPs with the addition of a Climate Change Allowance (35% and 70%) for both the 2080 and 2120 epochs.

All modelled flood depths and levels for all AEP scenarios are provided within **Appendix G.**[6]

3.4.1 Modelled Present Day (2020) Tidal and Fluvial Flood Levels

Modelled Defended and Undefended flood level and flood depth data was provided for the following AEP scenarios: 1:100 (1%); 1:200 (0.5%); and 1:1,000 (0.1%). **Only the *Undefended* Combined Tidal and Fluvial scenario for the 0.1% AEP (1 in 1,000 year) AEP was indicated to impact the subject site. The associated Flood Elevation was determined as 9.60mAOD.**

The subject site ground elevation is 9.30mAOD, suggesting a potential flood depth of 0.3m.

3.4.2 Modelled Tidal and Fluvial Levels for the 2080 Epoch

Modelled Defended and Undefended flood level and flood depth data was provided for the following AEP scenarios: 1:100 (1%) and 1:200 (0.5%); and the same AEPs incorporating an allowance for climate change of 35% or 70%.

[5] Open Government Licence
[6] Open Government Licence

Modelled **Defended** Combined Tidal and Fluvial scenarios were shown to impact the subject site for the 1:100 (1%) and 1:200 (0.5%) + 70% climate change AEPs; with flood elevations of 9.40mAOD and 9.68mAOD respectively,

The subject site ground elevation is 9.30mAOD, suggesting a potential flood depth of 0.10m to 0.38m.

For the Modelled **Undefended** Combined Tidal and Fluvial scenarios, only the 1:200 (0.5%) + 70% climate change AEP was shown to impact the subject site, with a flood elevation of 9.85m (suggesting a potential flood depth of 0.55m).

3.4.3 Modelled Tidal and Fluvial Levels for the 2120 Epoch

Modelled Defended and Undefended flood level and flood depth data was provided for the following AEP scenarios: 1:100 (1%) and 1:200 (0.5%); and the same AEPs incorporating an allowance for climate change of 35% or 70%.

Modelled **Defended** Combined Tidal and Fluvial scenarios were shown to impact the subject site for the 1:100 (1%) and 1:200 (0.5%) + 70% climate change AEPs; with flood elevations of 9.63mAOD and 10.40mAOD respectively,

The subject site ground elevation is 9.30mAOD, suggesting a potential flood depth of 0.33m to 1.10m.

For the Modelled **Undefended** Combined Tidal and Fluvial scenarios, the maximum modelled flood elevations (including climate change) ranged between 9.58mAOD and 10.34mAOD AEP.

The subject site ground elevation is 9.30mAOD, suggesting a potential flood depth of between 0.38m and 1.04m.

For building design, the benchmark AEP event for the determination of appropriate Finished Floor Elevations is the 1 in 200 (0.5%) tidal event.

A recommendation for an FFL based on hydraulic modelling of the Combined Tidal and Fluvial Flood Levels is discussed under Mitigation Measures (Section 4.2).

3.5 Surface Water (Pluvial) Flooding

Surface water (pluvial) flooding is rainfall generated overland flow prior to runoff entering a watercourse or sewer. Actual flooding may be a result of either overwhelming of sewerage and drainage systems during extreme events; or less extreme rainfall events over lower permeability ground. In such circumstances, overland flow and ponding may occur in topographic depressions.

The Environment Agency on-line Long Term Flood Risk mapping (https://flood-warning-information.service.gov.uk/long-term-flood-risk/) provides mapping of Surface Water Flood risk for 'High', 'Medium', and 'Low' risk scenarios. Map extracts of the 'High', 'Medium', and 'Low' risk scenarios are presented in **Appendix H.**

A 'High Risk' represents a chance of Surface Water Flooding of greater than 3.3% (1 in 30). The EA map extract for this scenario shows 'No Risk' across the footprint of the site.

For the 'Medium Risk' scenario, of between 1% (1 in 100) and 3.3% (1 in 30), 'No Risk' is indicated across the site.

For the 'Low' risk scenario between 0.1% (1 in 1,000) and 1% (1 in 100), 'No Risk' is indicated across the site.

The Bristol City Surface Water Management Plan (SWMP, 2012) identifies 13 areas at higher risk of surface water flooding. The subject site is not within any of these areas.

Neither the Bristol City SFRA (2009) nor the Central Area Flood Risk Assessment – Summary Report (2013) indicate records of surface water flooding in proximity to the subject site.

The Bristol City Council Level 1 Citywide Strategic Flood Risk Assessment (SFRA) (2020) does not indicate a risk of surface water flooding at the site or the immediate vicinity. Surface Water Flood Risk Mapping within the SFRA for the present day (1% and 0.1% return periods) does not indicate flood risk at the subject site. Mapping for the 2080 and 2115 epochs 1% (1 in 100 year) including climate change allowance *do not* indicate flood risk at the subject site. A SFRA Surface Water Flood Risk map extract for the 2115 epoch 1% (1 in 100 year) event is included within **Appendix H.**

In considering the combined risk of the *potential* impact from surface water flooding, and the absence of *actual* flooding, the overall flood risk is considered 'Negligible'.

3.6 Sewer Flooding

The Bristol City SWMP does not include details of sewer flood records from the Wessex Water DG5 Register.

Neither the Bristol City SFRA (2009) nor the Central Area Flood Risk Assessment – Summary Report (2013) indicate records of sewer related flooding in proximity to the subject site. The SFRA includes data referenced to the Wessex Water DG5 Register.

The Bristol City Council Level 1 Citywide Strategic Flood Risk Assessment (SFRA) (2020) does not present specific flood risk due to sewer flooding.

There is no reason to anticipate that sewer flooding incidents have impacted the subject property.

3.7 Groundwater Flooding

The British Geological Survey (BGS) Susceptibility to Groundwater Flooding hazard database identifies areas where geological conditions *could* facilitate flooding, and where groundwater may be present close to surface.

The database indicates that the whole site is classified as having **'No potential for groundwater flooding'**. A BGS Groundwater Flooding Map is provided in **Appendix I.**

It should be noted that the susceptibility to flooding database is intended for use primarily in regional or national planning; and should not be used in isolation for site specific planning decisions or without reference to historic flooding events. For this reason, reference has been made to the Bristol City SFRA, as detailed below.

The Bristol City SFRA (2009) states that the Environment Agency South West Region FRIS (Flood Reconnaissance Information System) database holds no records of groundwater flooding within the Bristol City area.

The Bristol City Council Level 1 Citywide SFRA (2020) states that "*according to the Bristol Local Flood Risk Management Strategy (LFRMS) and records with the Bristol City Council Lead Local Flood Authority (LLFA), there have been few instances of flooding from groundwater sources in Bristol*". The SFRA also indicates that groundwater flooding has been reported across the city, but that incidents have tended to be isolated basements rather than groundwater rising above ground to cause flooding.

As the proposed development does not include construction below ground level, the overall flood risk from groundwater flooding is considered 'Negligible'.

3.8 Flooding from Artificial Sources

The EA Long Term Risk of Flooding website (https://check-long-term-flood-risk.service.gov.uk/map?easting=533188&northing=244378&map=SurfaceWater) confirms that the site *is* at risk of Reservoir Flooding when there is also a risk of flooding from rivers.

It should be noted that reservoirs in the UK do have a very good safety record; and the EA, as regulatory authority for the Reservoirs Act 1975 England and Wales, has a duty to annually inspect all large reservoirs to ensure compliance. **The risk of flooding from reservoirs is considered minimal.**

3.9 Critical Drainage Areas

The Bristol City SFRA does not define Critical Drainage Areas (CDAs) at risk from surface water flooding. The Bristol City Surface Water Management Plan (SWMP, 2012) identifies 13 areas at higher risk of surface water flooding. The subject site is not within any of these areas.

3.10 Internal Drainage Board

The subject site is not within the administrative area of an Internal Drainage Board (IDB).

4 Summary

4.1 FRA Summary Points

- Environment Agency flood zone mapping indicates **'Harbour View, Unit 7, Building 11, Harbourside, Bristol, BS1 5TY** ('the site') to be located entirely within **Flood Zone 2.**

- In recognition of the flood risk setting for the site, a **Level 2 Flood Risk Assessment (FRA): Scoping Study** was conducted.

- The Bristol Floating Harbour watercourse is located approximately 160m south of the site. The watercourse is classified by the Environment Agency as a Main River.

- **The Environment Agency Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating for the whole site is 'Low' (less than 1 in 100 [1%] but greater than or equal to 1 in 1,000 [0.1%] in any given year).**

- The site does not benefit from directly from Flood Defences. Flood defence assets comprising 'Natural High Ground' (walled channel)' are indicated along the Bristol Floating Harbour waterfront approximately 160m south of the site. The integrity of the defence is regarded as Condition 2 'Good' or 3 'Fair'.

- There are no designated areas of Flood Storage in proximity to the site.

- The Topographic Elevation of the floor level within the existing building and the adjacent external ground approximates 9.30mAOD.

- Foul and Surface Water Drainage is directed to off-site Wessex Water infrastructure.

- Hydraulic Tidal and Fluvial Modelling: Modelled flood data was obtained from the EA through submission of an EA Product 4 data request. The EA duly provided data extracted from the Bristol Strategic Flood Risk Assessment (SFRA) 2019 v19 Model.

  - Flood depths and levels were provided for the present day (2020 epoch), and the 2080 and 2120 epochs for the 1:100 (1%), 1:200 (0.5%); and 1:1,000 (0.1%) AEPs. A Climate Change Allowance of 35% or 70% was added for the 2080 and 2120 epochs.

  - For the Present Day: **Only the *Undefended* Combined Tidal and Fluvial scenario for the 0.1% AEP (1 in 1,000 year) AEP was indicated to impact the subject site. The associated Flood Elevation of 9.60mAOD suggested a potential flood depth of 0.3m** (based on a site ground elevation of 9.30mAOD).

  - For the 2080 Epoch: Modelled **Defended** Combined Tidal and Fluvial scenarios were shown to impact the subject site for the 1:100 (1%) and 1:200 (0.5%) + 70% climate change AEPs; with flood elevations of 9.40mAOD and 9.68mAOD respectively; **suggesting a potential flood depth of 0.10m to 0.38m (rising to 0.55m for the Undefended scenario).**

  - For the 2120 Epoch: Modelled **Defended** Combined Tidal and Fluvial scenarios were shown to impact the subject site for the 1:100 (1%) and 1:200 (0.5%) + 70% climate change AEPs; with flood elevations of 9.63mAOD and 10.40mAOD respectively; **suggesting a potential flood depth of 0.33m to 1.10m (rising to between 0.38m and 1.04m for the Undefended scenarios).**

- Published records indicate the site has not been impacted by Historic Flood Events since a Main River flood event in 1703.

- The maximum potential risk from **Surface Water (Pluvial) Flooding across the whole site is considered to be 'Negligible'.** A 'Negligible' classification represents the maximum depth of flooding to be less than 0.1m in a 1 in 1,000 year rainfall event.

- The British Geological Survey (BGS) Susceptibility to Groundwater Flooding indicates **'No potential for groundwater flooding'** across the site. **As the proposed development does not include construction below ground level, the overall flood risk from groundwater flooding is considered 'Negligible'.**

- The Bristol City SFRA does not define Critical Drainage Areas (CDAs). The Bristol City Surface Water Management Plan (SWMP, 2012) identifies 13 areas at higher risk of surface water flooding. The subject site is not within any of these areas.

- The site is not within the administrative area of an Internal Drainage Board (IDB).

- The proposed leisure development is classified within the NPPF as a 'Less Vulnerable' development. Such developments are considered appropriate within Flood Zone 2 (subject to an FRA).

- The proposed development includes:

  - Creation of a **Ground Level Foyer / Entrance** area of approximately 95m^2 (formerly part of Unit 5 Rainbow Casino) *incorporating an existing stairwell and customer lift and retaining the existing entrance from Explore Lane*.

  - Creation of a **Rooftop Food and Drink Venue** at Level 3, including a mezzanine level incorporating an external roof terrace.

    The proposal does not include changes to the built footprint of the Building 11.

- A recommendation for a Finished Floor Level (FFL) for the building is discussed within Section 4.2 Mitigation Measures.

4.2 Mitigation Measures

In considering flood Mitigation Measures appropriate to the site and the proposed development; the following key flood risk factors have been taken into consideration:

- The Environment Agency Risk of Flooding from Rivers and the Sea (RoFRaS) database indicates a 'Low' potential risk of flooding.

- Combined Tidal and Fluvial Modelling from the Bristol Strategic Flood Risk Assessment (SFRA) 2019 v19 Model indicated the following potential impact *following an adjustment for the site specific topographic elevation:*

  - The **Defended** 1:200 (0.5%) + 70% climate change **AEP for the 2080 epoch could give rise to a flood elevation of 9.68mAOD, and a flood depth of 0.38m at the subject site (rising to 9.85mAOD or 0.55m for the Undefended scenario).**

  - The **Defended** 1:200 (0.5%) + 70% climate change **AEP for the 2120 epoch could give rise to a flood elevation of 10.40mAOD, and a flood depth of 1.10m at the subject site.**

  (Note: The 1:200 (0.5%) +CC AEP is selected as the relevant benchmark AEP event for the determination of appropriate Finished Floor Elevations for buildings potentially at risk from tidal flooding).

- The overall risk of Surface Water (Pluvial) Flooding is considered 'Negligible'.

- The overall risk of Groundwater Flooding is considered 'Negligible'.

4.2.1 Finished Floor Level (FFL)

In recommending a Finished Floor Level (FFL) appropriate to the flood risk setting for the site; consideration was given to the most significant source of potential flood risk; namely Tidal Flooding.

The maximum potential flood elevation of 10.40mAOD at the site relates to the 1:200 (0.5%) + 70% climate change AEP; which could give rise to a flood depth 1.10m (*based on the known on-site ground elevation of 9.30mAOD*).

As the on-site ground elevation of 9.30mAOD will be retained as the Finished Floor Level (FFL) for the development; achieving a minimum level of flood protection equivalent to 10.40mAOD will need to be achieved in line with EA Extra Flood Resistance and Resilience Measures; as follows:

For Water Depth above 600mm: The design of the building or development should allow water to pass through the property to avoid structural damage by:

1. Using materials with low permeability to at least 300mm;
2. Making it easy for water to drain away after flooding; and
3. Making sure there's access to all spaces to enable drying and cleaning.

It is noted that the proposed development is primarily for a Rooftop Food and Drink Venue with only a Foyer / Entrance at the Ground Level; and that no structural changes are proposed to the existing building at ground level. The existing structure would be compliant with the recommended Extra Flood Resistance and Resilience Measures listed as 1 to 3.

In view of the above, it is recommended that the proposed FFL of 9.30mAOD could be considered appropriate for this redevelopment.

4.2.2 Advisory Note

The use of 'Flood Barriers' could be considered for incorporation within the development design as an additional Flood Resistant / Resilient Design Strategy to raise the level of flood protection; as follows:

- The use of 'Flood Barriers' across the external doors to the building. *('Flood Barriers' are bespoke fitted barriers for each external door to the building; which, when required, would be manually placed in front of all entrance doors to prevent the ingress of floodwater. Flood barriers would need to extend above the maximum flood elevation of 10.40mAOD. Flood barriers would be permanently stored on-site*).

4.2.3 Surface Water Management

The proposed Surface Water Management design for the site should be detailed within a separate "Foul and Surface Water Drainage Statement".

4.2.4 Access and Evacuation

In the event of a flood evacuation, Flood Zone 1 (dry ground) could be reached as follows:

1. Exit the site onto Explore Lane and proceed left (north) for approximately 150m to the junction with Anchor Road;
2. Turn left (west) into Anchor Road and proceed for approximately 75m until reaching the junction with College Square (to the right);
3. Turn right into College Square and proceed north into Flood Zone 1.

The site is located within an area which can receive Environment Agency Flood Warnings and Alerts. Occupants of the site should be signed up to receive alerts and warnings. As such, sufficient warning should be possible so as to avoid evacuation through flood waters.

4.3 Concluding Comments

- The Environment Agency Risk of Flooding from Rivers and the Sea (RoFRaS) database indicates a 'Low' risk of flooding.
- The Bristol Floating Harbour watercourse is located 160m south of the site.
- Combined Tidal and Fluvial Hydraulic Modelling indicate that the site would be impacted during a 1:200 (0.5%) + 70% climate change AEP.
- The site does not benefit directly from flood defences.
- The site has not been impacted by historic flood events since 1703.
- The potential risk from Surface Water (Pluvial) Flooding is considered 'Negligible'.
- The Potential risk from Groundwater Flooding is considered 'Negligible'.
- Retention of the existing Finished Floor Level (FFL) of 9.30mAOD is feasible if the recommended Mitigation Measures are incorporated.
- In the event that the development proposal is changed, the FRA should be reviewed.

5 Closure

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the research carried out. The results of the research should be viewed in the context of the work that has been carried out and no liability can be accepted for matters outside the stated scope of the research. Any comments made on the basis of information obtained from third parties are given in good faith on the assumption that the information is accurate. No independent validation of third party information has been made by BOLD Environmental Ltd.

The 'vicinity' of the site for the purposes of the report, is defined as locations situated within an approximate 250m radius of the site, although certain sources of contamination and/or sensitive targets further than 250m of site have also been included. Advice provided within this report is based on current guidelines available at the time of writing. This report is subject to amendment in light of additional information becoming available or statutory consultee review, including the Environment Agency and Local Council.

This report is written in the context of an agreed scope of work between BOLD Environmental Ltd and the Client and should only be used in this specific context. Re-interpretation of this report in whole or part may become necessary if additional information becomes available or practices or legislation changes.

BOLD Environmental Ltd does not provide legal advice; the advice of the Client's legal advisors may also be required. BOLD Environmental Ltd Terms and Conditions apply.

6 References

Arup (2012) Bristol City Council Surface Water Management Plan (SWMP) Phase 1 (August 2012).

Bristol City Council Level 1 Citywide Strategic Flood Risk Assessment (SFRA) (2020).

Bristol City Council, Bristol Development Framework Core Strategy (Adopted June 2011). Flood Risk and Water Management Policy: BCS16.

Bristol City Council (2018) Bristol Local Flood Risk Management Strategy (LFRMS) (February 2018).

Department for Communities and Local Government (2012) National Planning Policy Framework.

Department for Communities and Local Government (2012) Technical Guidance to the National Planning Policy Framework.

Environment Agency (2012): 'Standing Advice' for Flooding.

Environment Agency Product 4: Detailed FRA / FCA Map centred on Unit 7, Building 11, Harbourside, Bristol, BS1 5TY (ref: 289612-WX).

Groundsure (2020) Flood Insight Report. Building 11, Harbourside, Bristol, BS1 5TY. Ref: CMAPS-CM-854569-31083-220120.

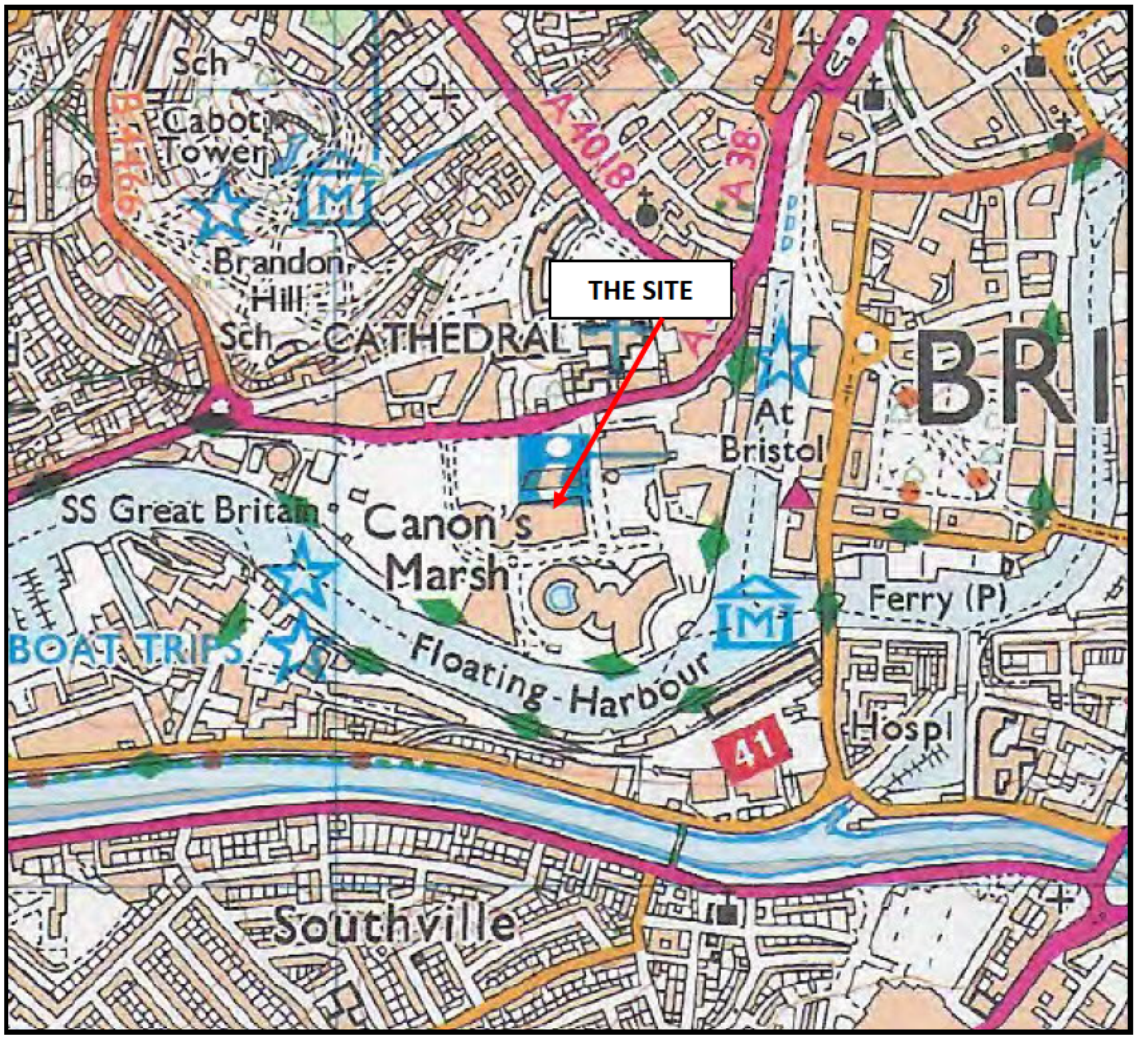
Halcrow Group Limited (2009) Bristol City Council Level 1 Strategic Flood Risk Assessment (SFRA) – Final report (March 2009).

Hyder Consulting (2013) Central Area Flood Risk Assessment, Summary Report (November 2013).

JBA Consulting (2012) Bristol Preliminary Flood Risk Assessment (PFRA), Bristol City Council (August 2012).

APPENDIX A Site Location Map and Current Site Layout

SITE LOCATION MAP: **HARBOUR VIEW, UNIT 7, BUILDING 11, HARBOURSIDE, BRISTOL, BS1 5TY**



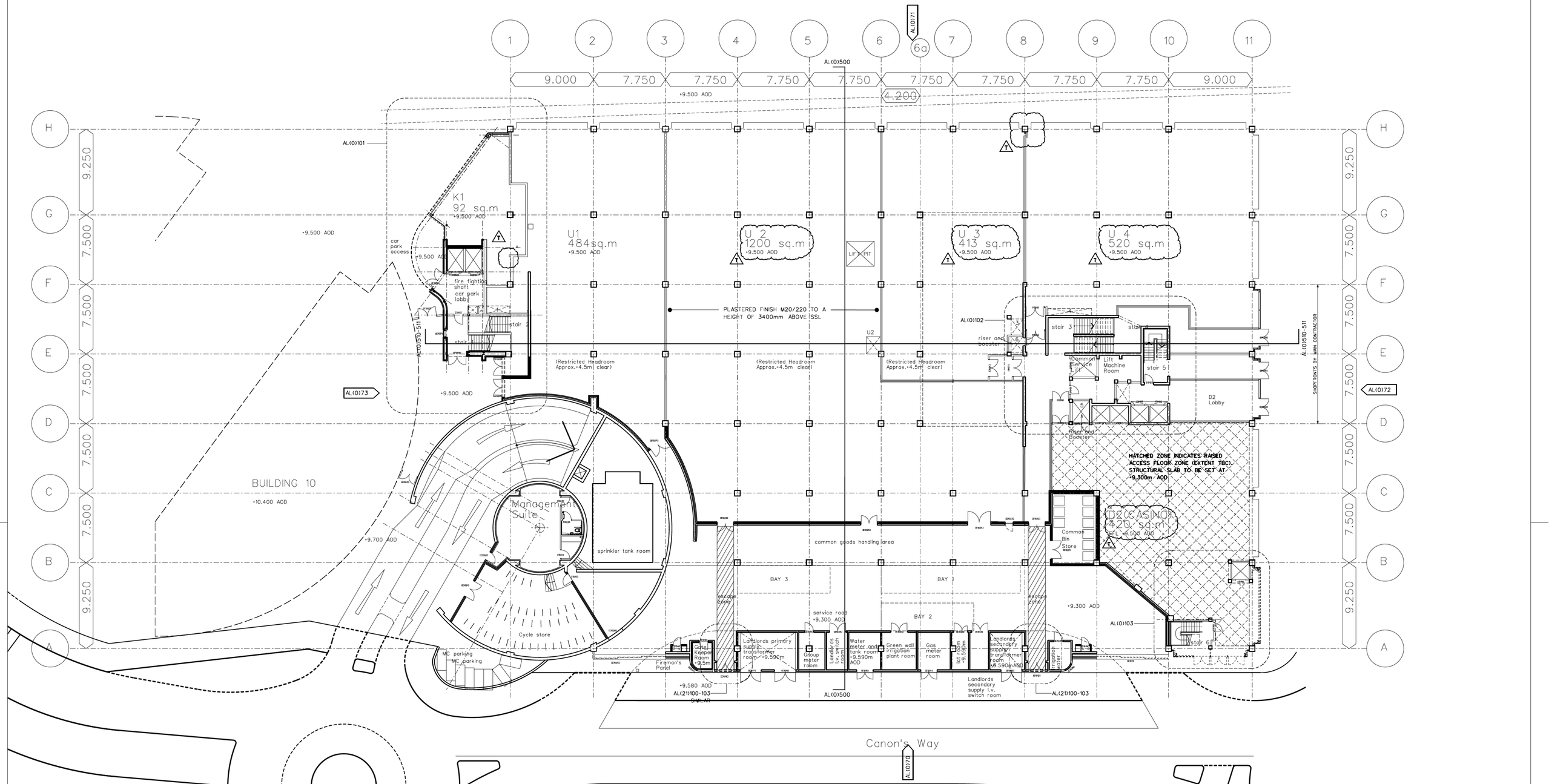
Key:

THE SITE = Harbour View, Unit 7, Building 11, Harbourside, Bristol, BS1 5TY

SITE LOCATION: AERIAL VIEW

Image supplied by SRA Architects Limited.

APPENDIX B Topographic Elevations



Do NOT scale this drawing
Do not derive dimensions from digital media

Rev	Date		Drawn	Checked
K	16.08.04	WEST, EAST AND SOUTH CORES AMENDED: 200mm RECESSED SLAB ZONE INDICATED: SHOPFRONTS BETWEEN GL F AND D BY MAIN CONTRACTOR NOTE ADDED: KITCHEN SINK SIZE AMENDED: 'DROP OFF ZONE' NOTE REMOVED: 7No RISER COLUMNS TO UNIT 2 REMOVED.	WKA	EBW
—	—		—	—
—	—		—	—
	20.08.04	ISSUED FOR CONTRACTORS PROPOSALS		
L	14.09.04	LOBBIES TO UNITS 3 4 AND 5 AMENDED	MTM	BS
M	20.09.04	MANAGEMENT SUITE NOTES OMITTED, STAIRCORE DRAWING REFS ADDED, FLOOR LEVELS ADDED TO SERVICE ISLAND, SHEAR WALL TO EAST STAIRCORE AMENDED, SPRINKLER TANK ROOM AMENDED AS PER ARUPs DWGS.	MTM	BS
—	—		—	—
	20.09.04	ISSUED FOR CONSTRUCTION		

Rev	Date		Drawn	Checked
N	16.02.05	WIND POSTS ADDED BETWEEN GRID LINES B AND C. WALL BUILD UP SHOWN ALONG PART OF GRID LINE 11. SERVICE ISLAND LAYOUT REVISED, DRY LINING ADDED TO MANAGEMENT SUITE, DOORS AND WALLSADJUSTED ACCORDINGLY.	JD	RMH
—	—		—	—
P	02.03.05	LAYOUT FOR ICT ROOM AND LANDLORD SECONDARY SUPPLY L.V. SWITCH ROOM UPDATED, WINDOW ADDED TO IRRIGATION WATER ROOM. DOORS TO GRID LINE 11, D-F INDICATED.	JD	RMH
—	—		—	—
Q	23.03.05	DOOR POSITION [E10331] ON SERVICE ISLAND AMENDED, DOORS [E1016], [E1017] AND [E1030] REVISED TO 2000mm WIDE	JD	RMH
—	—		—	—
R	27.04.05	VALVE ENCLOSURES ADDED TO SERVICE ISLAND	JD	RMH
S	06.05.05	WALL TO KIOSK REVISED, AS EAI 30, AREAS K1 AND U1 AMENDED ACCORDINGLY.	JD	RMH
T	03.02.06	WALL AT ON GL8 AMENDED AS TO SUIT DRAINAGE POSITIONS, NIB INCORPORATED TO KIOSK WALL, UNIT AREAS AMENDED.	MTM	RMH

Rev	Date		Drawn	Checked
	03.02.06	ISSUED FOR AS BUILT		
—	—		—	—
—	—		—	—
—	—		—	—
—	—		—	—
—	—		—	—
—	—		—	—
—	—		—	—
—	—		—	—

Drawing Status · AS BUILT

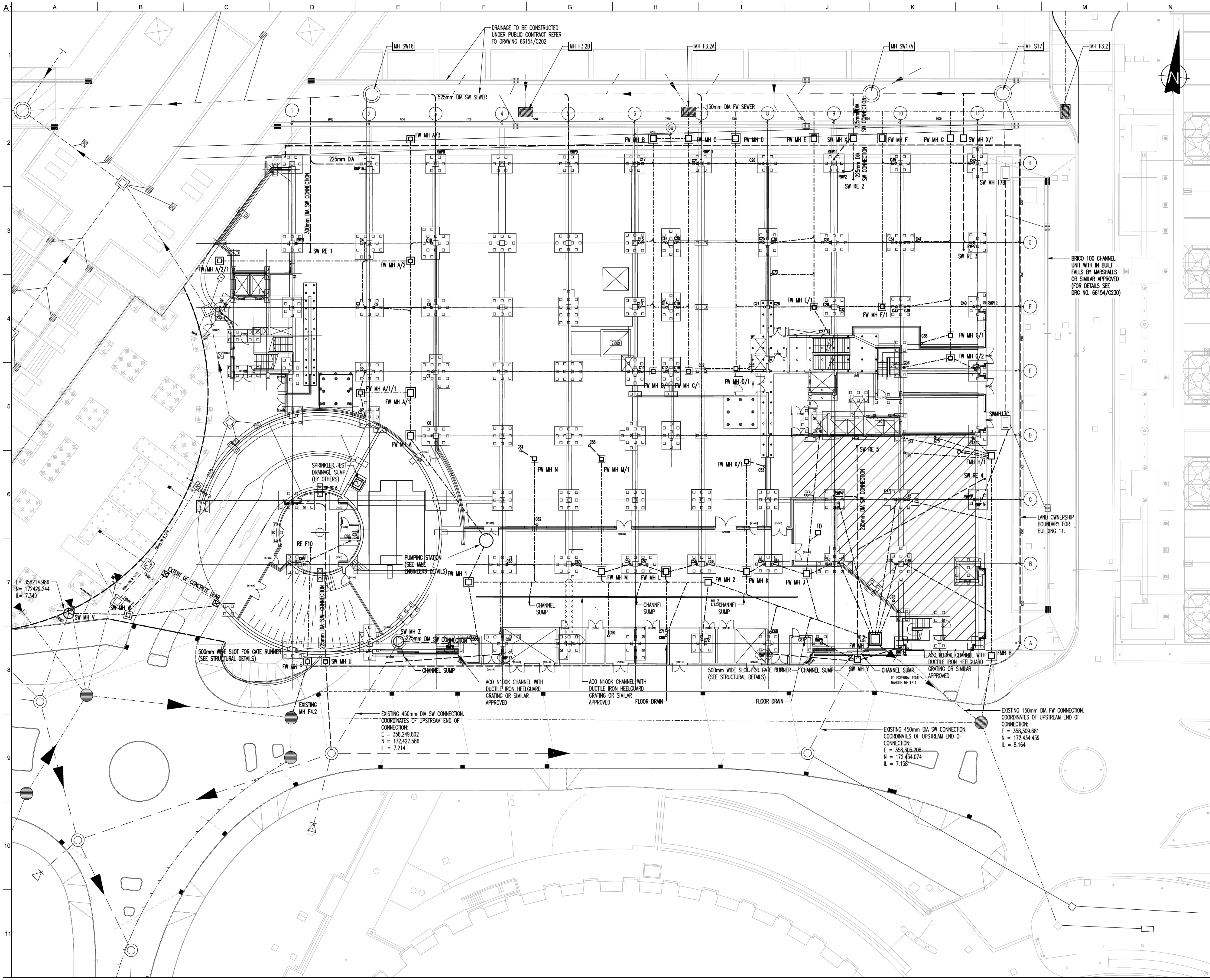
Job No. 1671 | **Drawing No.** · AL (0) 100 | **Rev** T

Job Title · BRISTOL HARBOURSIDE - BLDG. 11

Drawing Title LEVEL 1 PLAN

Date	Scale	Drawn	Checked
30-10-02	1:200	EC	BS

FaulknerBrowns Architects
Dobson House
Northumbrian Way
Killingworth
Newcastle upon Tyne
NE12 6QW.
Telephone 0191 268 3007
Fax 0191 268 5227



Notes:

1. For notes see Drg No. 11-D-00-02

Issue	Date	By	Chkd	Appd
K	03/10/05	RLC	RLC	MAH
	Drainage channel to ramp entrance removed. 2No gullies Added at extent of concrete slab			
J	11/05/05	JAH	KRB	MAH
	Connection C70 deleted, RWP17 and RWP18 numbered.			
H	29/04/05	EKW	KRB	MAH
	RWP's added at GL A/8 & A/4 (Kier email dated 24/04/05)			
G	18/03/05	RLC	KRB	MAH
	FWMH 2 & 3 Relocated, linear drain added to service road, connection C90 added. C66, C68, C71 & C80 relocated.			
F	17/01/05	RLC	KRB	MAH
	Floor gulley removed at grid line A/6 (Kier) FW MH1, gulley at grid line A/3 & gulley at grid line A/8 relocated (to avoid escape route ramp – Kier, 17/01/05)			
E	13/01/05	JAH	KRB	MAH
	Location of MH S17, SWMH 17B, and 17C revised, RWP at G.L. 2 /H revised to RWP 15, RWP at G.L. 1/C revised to RWP 16. SWRE6 – SWMH 'U' confirmed as 225mm DIA. RWP 11 connected to SWMH X (Kier). Linear drains and slot for door runners added (Kier), C81 added to new green veil room, gulley relocated, connection from FW MH J relocated, (Andrew Haines, Grant Associates).			
D	01/12/04	ADM	KRB	MAH
	C66 and C67 Revised to floor drain (Instruction from Employer's Agent 31/11/04) SW MH 17–17B–17C and slot drain added (fax Grant Associates /Arup, 27/10/04) SW MH Y relocated (fax from H.L.P. dated 25/11/04), connection C80 added (email Arup /Kier dated 26/11/04) RWP 8–14 added (fax from H.L.P. dated 25/11/04), FW MH 3 relocated (to accomodate groove in slab) Pile caps updated.			
C	26/11/04	JAH	KRB	CO
	RE F 10, connections C64 and C65 revised and FW MH P added (request from Kier), RWP 8, SWRE 6 and SW MH U added (e-mail dated 24/11/04 from Nic Smith), Linear drain SW MH W and SW MH V added (design development), RWP 7 added (e-mail dated 24/11/04 from Nic Smith), Connection C79 added (Gala layout), Note re. Drainage in abeyance adj. to B10 (as built details of C.I.W added), SW MH Z relocated (as built location of connection), FW MH K1 revised to silt trap (M and S specification).			
B	29/10/04	EKW	KRB	MAH
	Pile layout updated. FW MH's A/1/1, A/1 L & J and SW MH Z relocated, 4 no gullies added in service road.			
A	06/10/04	ADM	JJM	CO
	Revised to suit Kier comments			
-	03/09/04	EKW	KRB	CO

ARUP

63 St Thomas Street
Bristol BS1 6JZ
Tel +44(0)117 976 5432 Fax +44(0)117 976 5433
www.arup.com

Client
Crest Nicholson/Kier Build

Job Title
Bristol Harbourside
Building 11

Drawing Title
Below Ground Drainage

Scale at A1 1:200
Plot ID PlotID
Drawing Status
Construction

Job No	Drawing No	Issue
69214	11-D-00-01	K

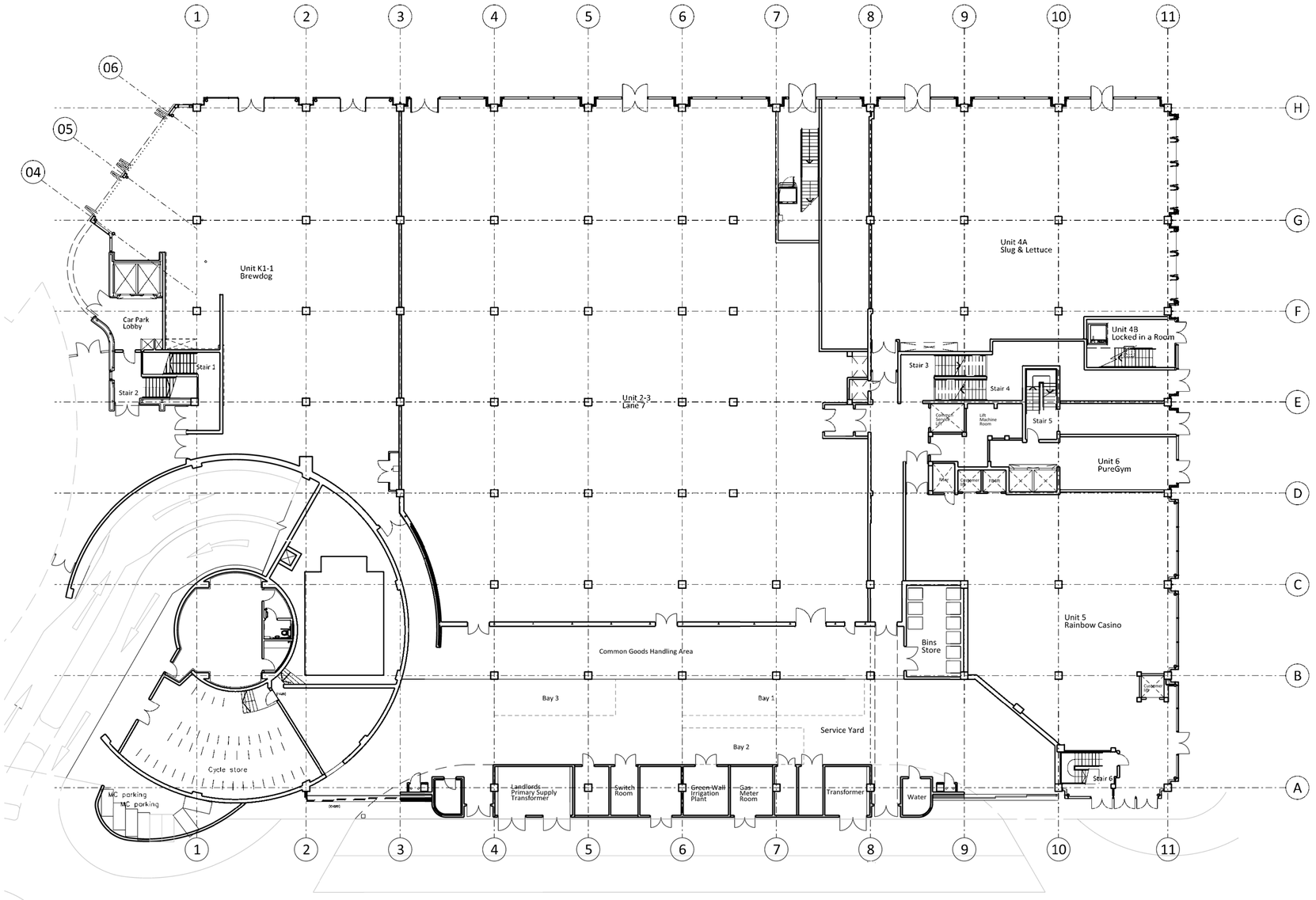
J:\69xxx\69214-00\4.30_Dgs\USTN\Drawings\11-D-00-01.dgn

APPENDIX C Development Plans

Notes:

Drawings are not based on surveyed information.

All structural works to be advised by structural engineer.



0 1 2 3 4 5 10 20m

Unit 7 Harbourside Bristol

Drawing title
Level 1
Existing

Amendments

Drawing No.
3716-HAR-SRA-XX-XX-DR-A-01-100
Project No. Location Originator Volume Level File Type Disc System Number

Revision

Drawn by	Checked by	Approved by	A1 Scale	Date	Reason for Issue
GD	MR		1:200	05/10/2022	Preliminary

SRA | ARCHITECTS

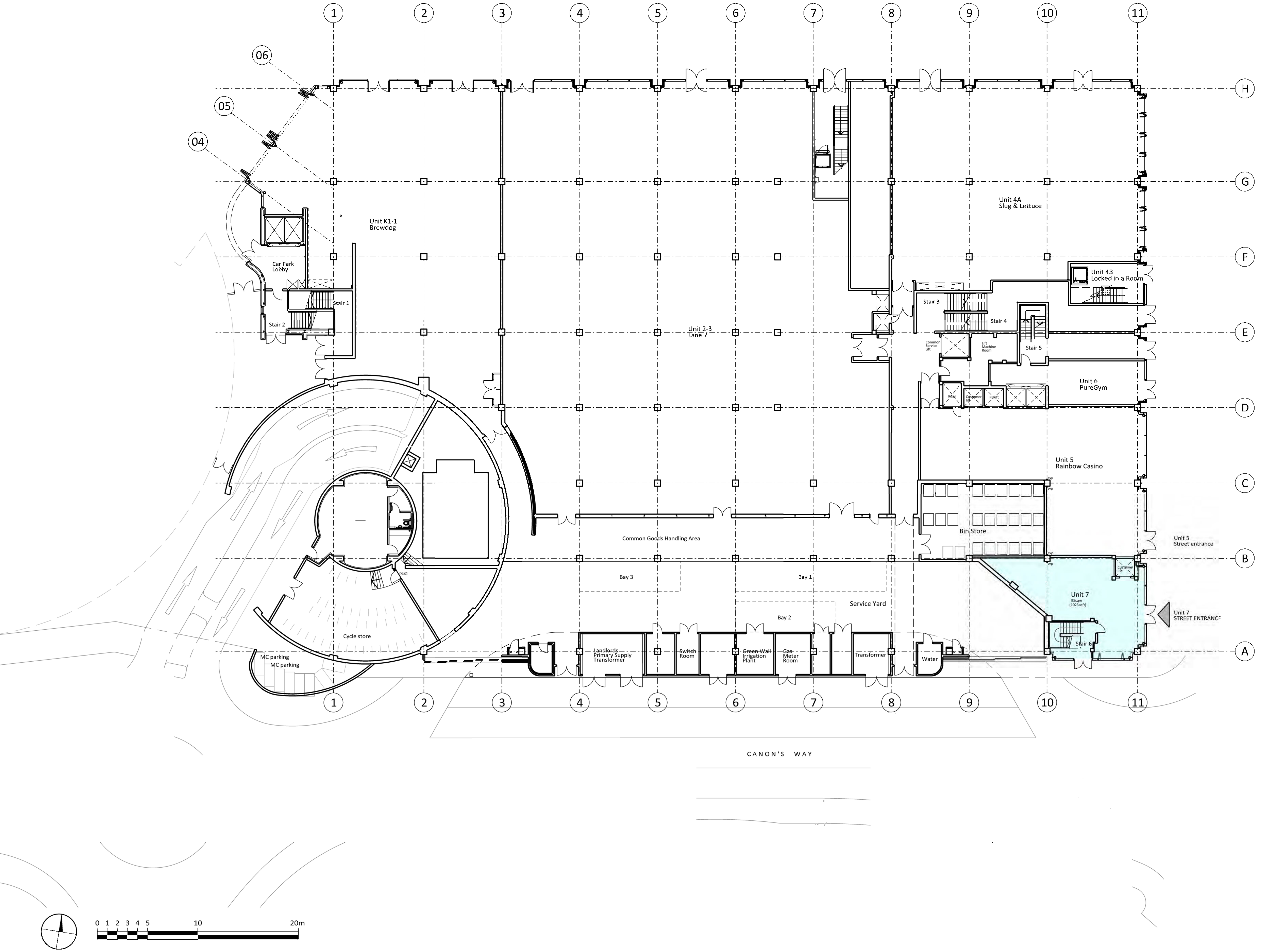
Station House, Ashley Avenue Bath BA1 1DS | 01225 827444 | www.sra-architects.co.uk

Notes:

Notes:

Drawings are not based on surveyed information.

All structural works to be advised by structural engineer.



Unit 7 Harbourside Bristol

Drawing title
Level 1
Proposed

Amendments
Existing SVP locations added.

Drawing No.
3716-HAR-SRA-XX-XX-DR-A-04-200
Project No. Location Originator Volume Level File Type Disc System Number

Revision
P01

Drawn by	Checked by	Approved by	A1 Scale	Date	Reason for Issue
GD	MR		1:200	07/11/2022	Preliminary

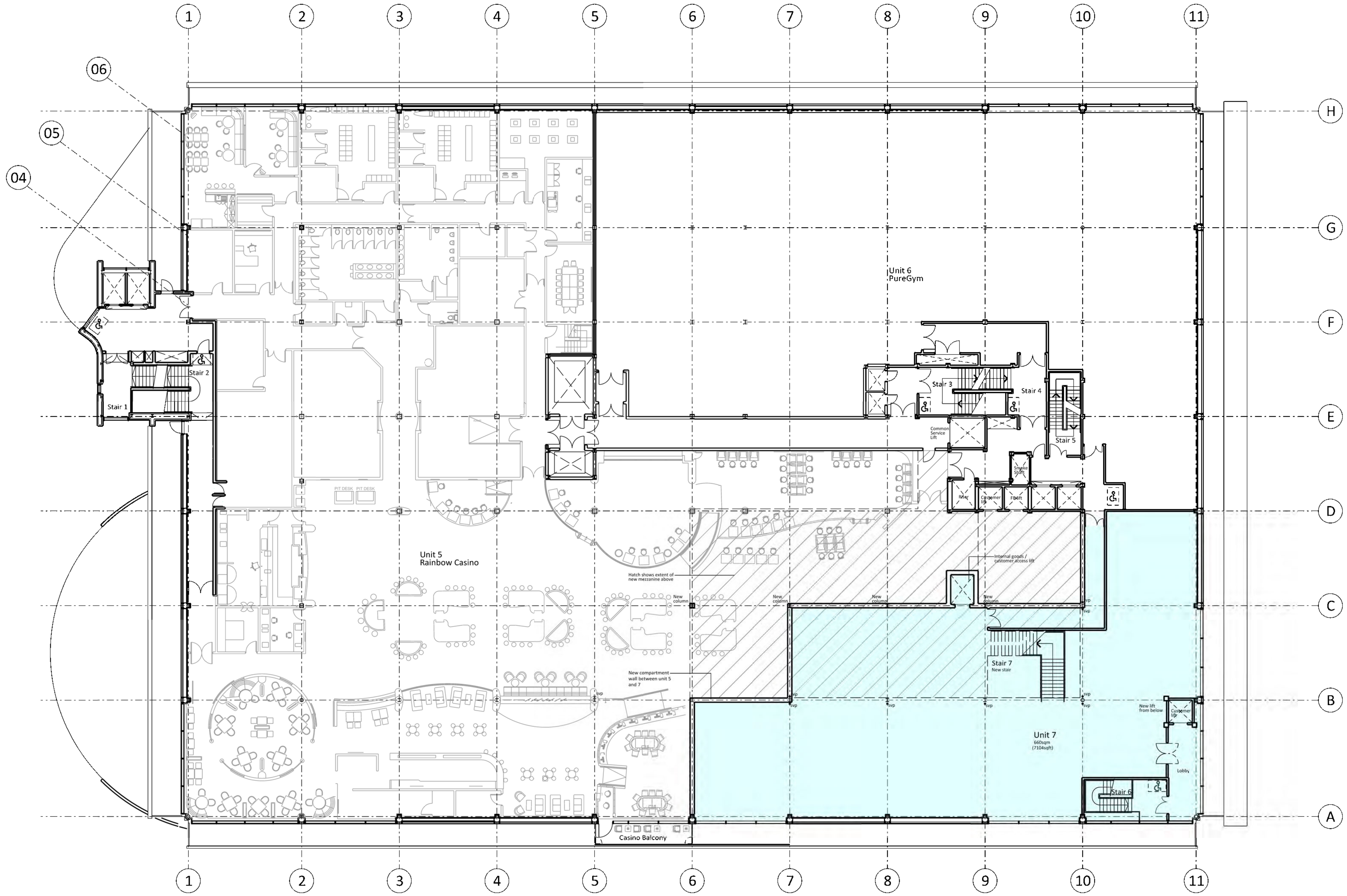
SRA | ARCHITECTS

Station House, Ashley Avenue Bath BA1 3DS | 01225 827444 | www.sra-architects.co.uk

Notes:

Drawings are not based on surveyed information.

All structural works to be advised by structural engineer.



Unit 7 Harbourside Bristol

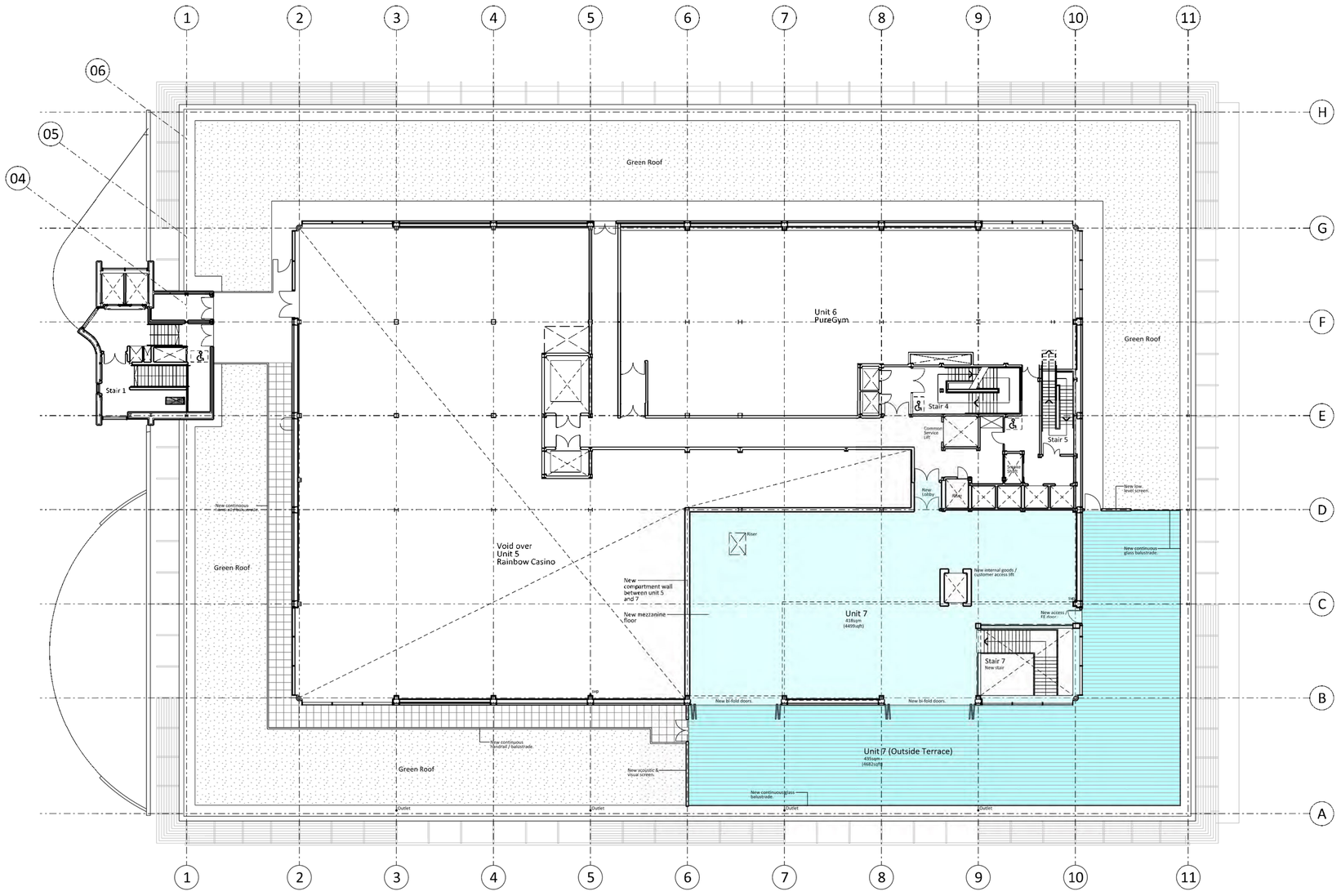
Drawing title	Amendments
Level 3 Proposed	Existing SVP locations added.

Drawing No.	Revision
3716-HAR-SRA-XX-XX-DR-A-04-204	P01

Drawn by	Checked by	Approved by	A1 Scale	Date	Reason for Issue
GD	MR		1:200	07/11/2022	Preliminary

SRA | ARCHITECTS

Notes:
Drawings are not based on surveyed information.
All structural works to be advised by structural engineer.



Unit 7 Harbourside Bristol

Drawing title
Level 3 Mezzanine Proposed

Amendments
Existing SVP locations added.

Drawing No.
3716-HAR-SRA-XX-XX-DR-A-04-205
Project No. Location Originator Volume Level File Type Disc System Number

Revision
P01

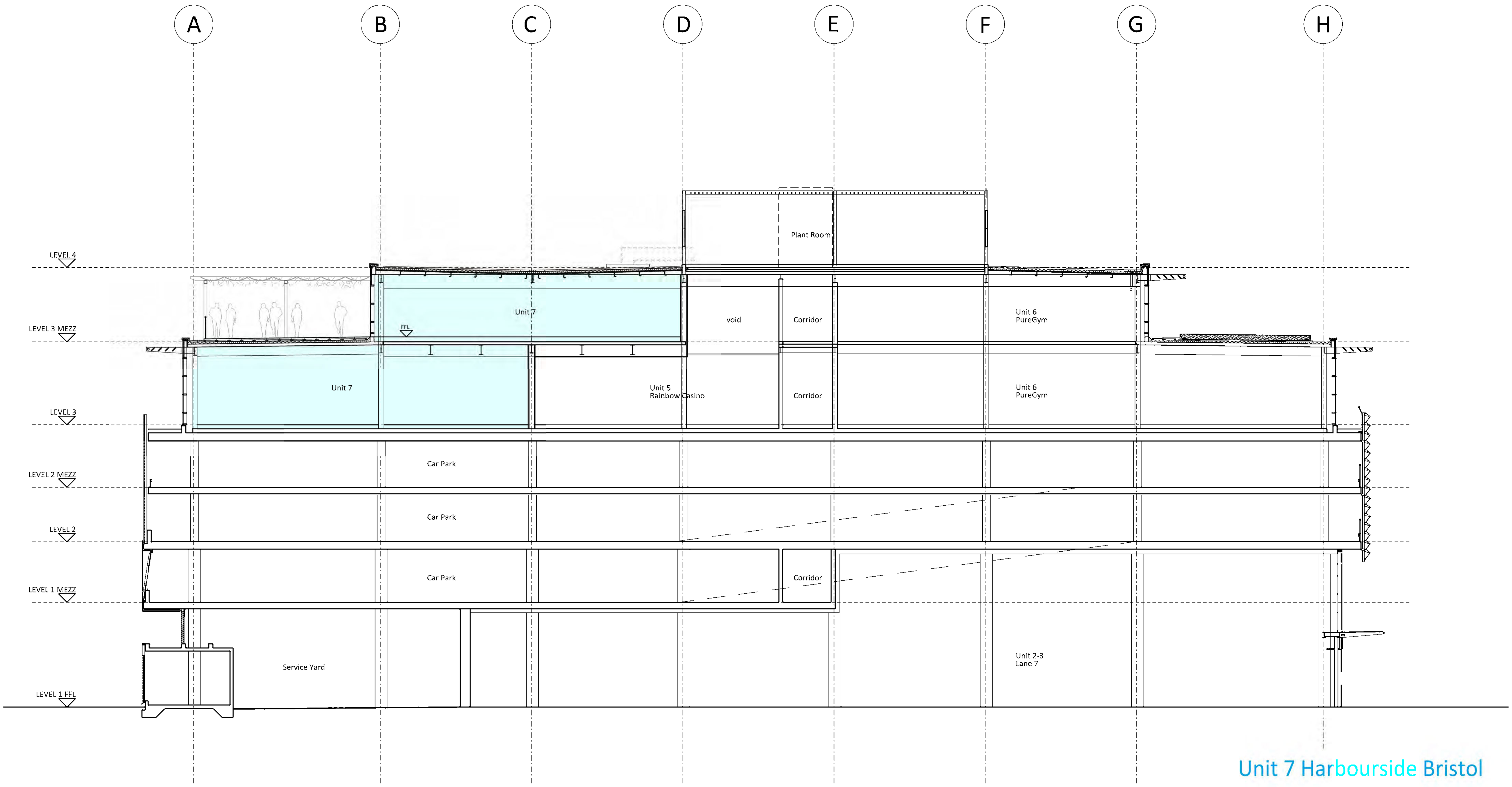
Drawn by	Checked by	Approved by	A1 Scale	Date	Reason for Issue
GD	MR		1:200	07/11/2022	Preliminary

SRA | ARCHITECTS
Station House, Ashley Avenue Bath BA1 1EN | 01225 827444 | www.sra-architects.co.uk

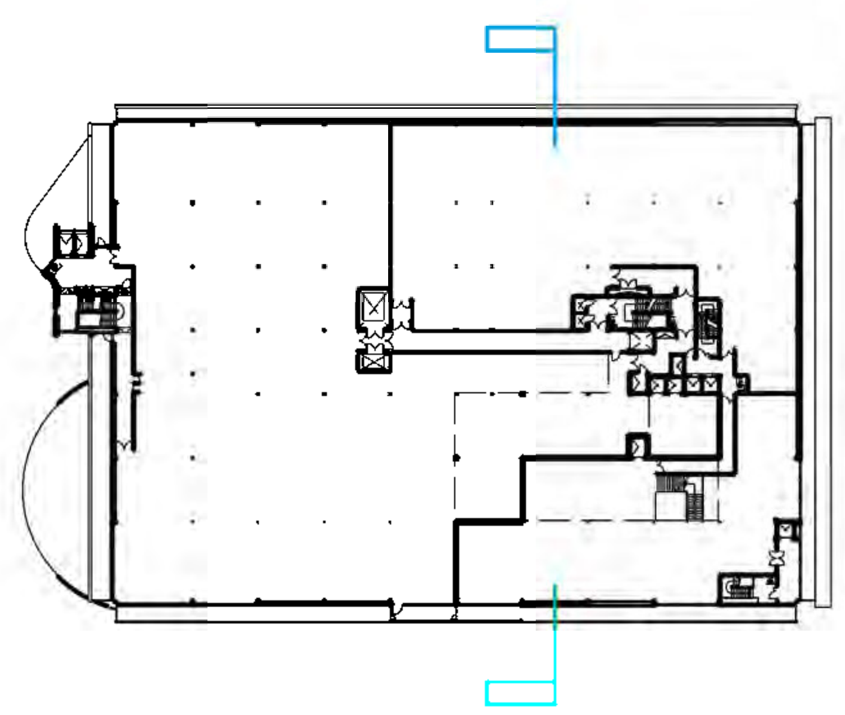
Notes:

Drawings are not based on surveyed information.

All structural works to be advised by structural engineer.



0 1 2 3 4 5 10 20m



Unit 7 Harbourside Bristol

Drawing title
Section AA Proposed

Amendments

Drawing No.
3716-HAR-SRA-XX-XX-DR-A-06-215
Project No. Location Originator Volume Level File Type Disc System Number

Revision

Drawn by	Checked by	Approved by	A1 Scale	Date	Reason for Issue
GD	MR		1:200	05/10/2022	Preliminary

SRA | ARCHITECTS

Station House, Ashley Avenue Bath BA1 3DS | 01225 827444 | www.sra-architects.co.uk

Notes

SRA ARCHITECTS Ltd accepts no liability for use of this drawing by any other party other than the party for whom it was prepared or for purposes other than those for which it was prepared.

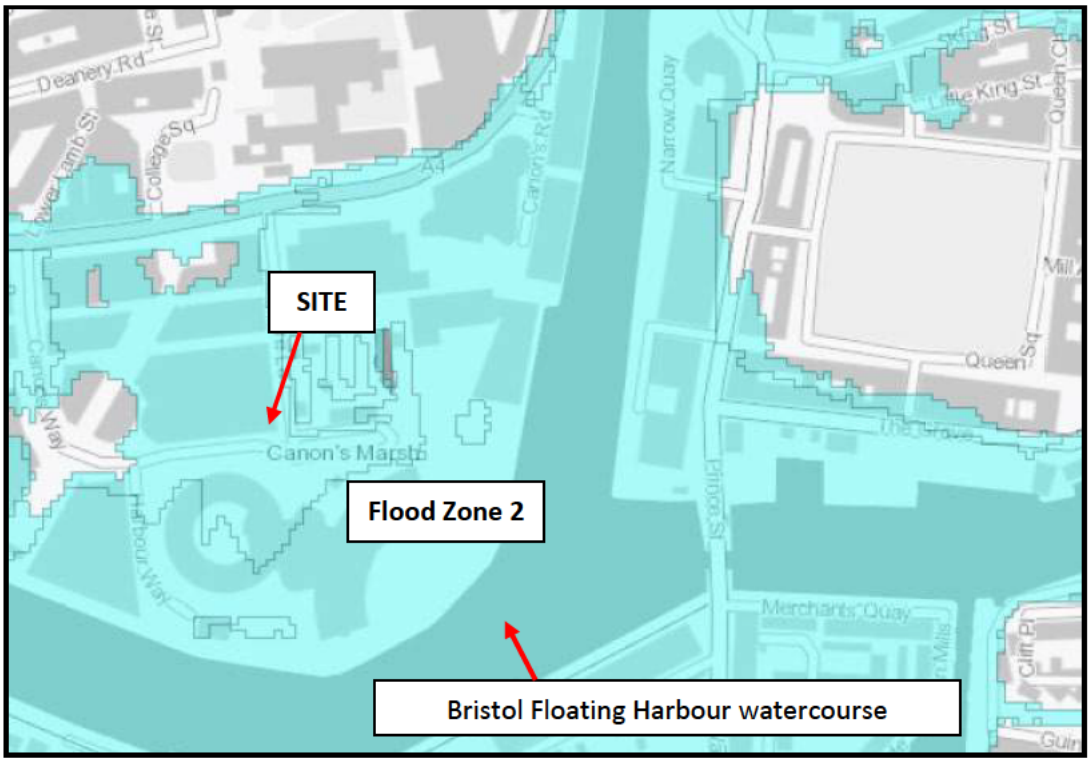
When the above drawing is issued in DWG form ... solely responsible. It is based on background informat... arising out of changes to such background information wh...

Responsibility is not accepted for errors made by others ...

APPENDIX D Flood Zone Map (EA map extracts)

FLOOD ZONE MAPPING

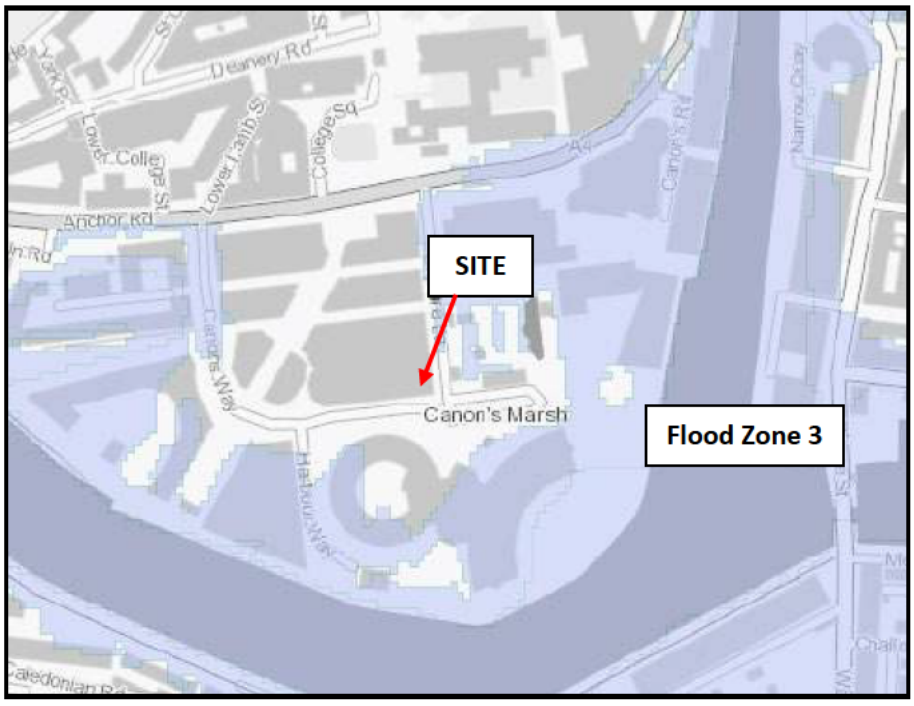
Environment Agency flood zone mapping indicates the site is wholly within Flood Zone 2.



Key: **THE SITE = Harbour View, Unit 7, Building 11, Harbourside, Bristol, BS1 5TY**

= Flood Zone 2

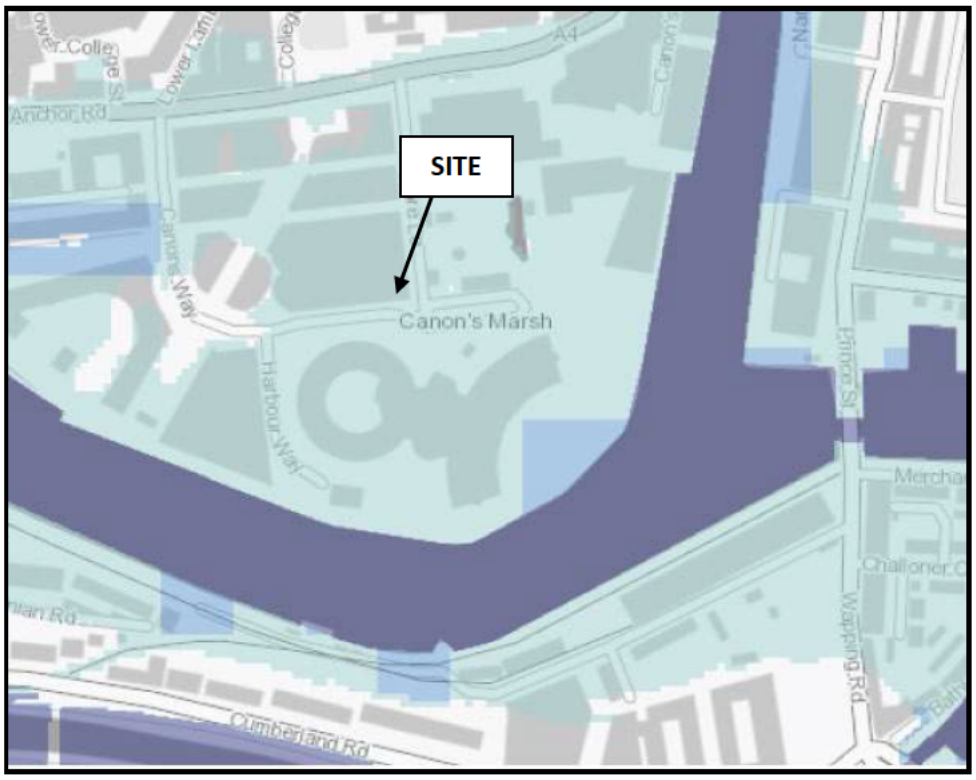
Source: Flood Zone 2 (Open Government Licence)



RoFRaS MAPPING

The Environment Agency / Natural Resources Wales 'Risk of Flooding from Rivers and the Sea (RoFRaS) database' (Risk of Flooding from Rivers and Sea)[1] generates an indication of river and coastal flood risk based on a 50m grid. The database considers the probability that any flood defences (if present) will overtop or breach, and the distance from the river or sea.

The RoFRaS Flood Rating indicates the *maximum* risk to be 'Low' (less than 1 in 100 [1%] but greater than or equal to 1 in 1,000 [0.1%] in any given year).

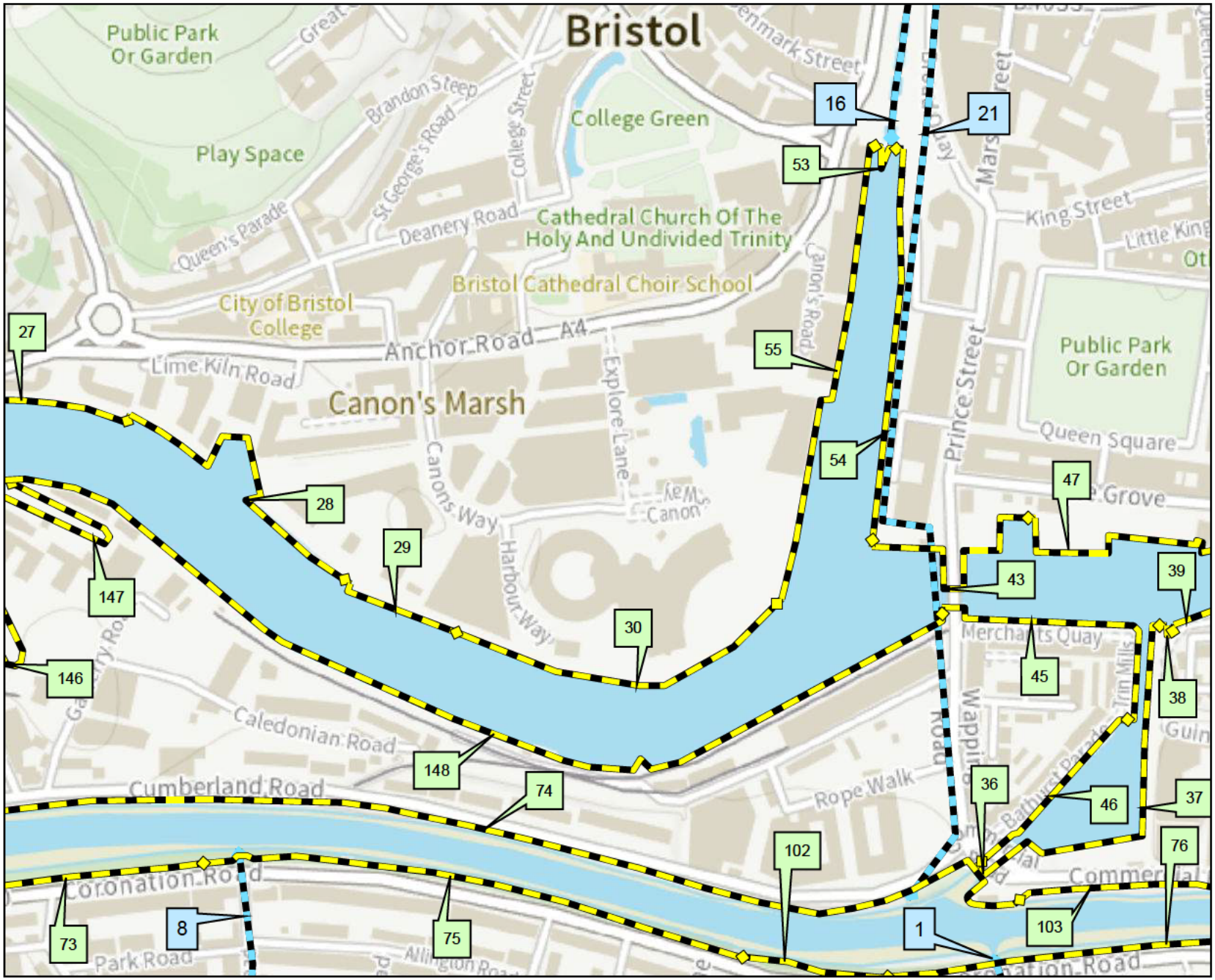


Key: **THE SITE = Harbour View, Unit 7, Building 11, Harbourside, Bristol, BS1 5TY**

[1] Open Government Licence

APPENDIX E Flood Defences (EA Product 4)

Current Flood Defences centered on NGR ST 58314 72440, created 30/11/2022 Ref: 289612-WX



Environment Agency

Scale: 1:5,000

N W E S

Legend

Defences

- Barrier Beach
- Beach
- Bridge Abutment
- Cliff
- Demountable Defence
- Dunes
- Embankment
- Engineered High Ground
- Flood Gate
- Natural High Ground
- Promenade
- Quay
- Spillway
- Wall

Culverts

- Simple Culvert
- Complex Culvert

This data has been extracted from the Asset Information Management System (AIMS OM) which was created to draw various data sources into one database and has been populated with information of varying quality.

Contact Us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506 (Mon-Fri 8-6). Email: enquiries@environment-agency.gov.uk

Product 4 - AIMS Information **289612-WX** **Date:** **30/11/2022**

Map Ref	Asset ID	Asset Type	Right or left bank	Asset Description	Approx length (m)	Actual fluvial downstream crest level (mAOD)	Actual fluvial downstream crest level accuracy	Actual fluvial upstream crest level (mAOD)	Actual fluvial upstream crest level accuracy	Actual fluvial coastal crest level (mAOD)	Actual fluvial coastal crest level accuracy	NGR	Most recent inspection	Overall condition
27	134808	Natural High Ground	Right	Walled channel	169.18	DNR	DNR	DNR	DNR	DNR	DNR	ST57817251	24/08/2022	3 - Fair
28	134969	Natural High Ground	Right	Walled channel/bund	325.69	DNR	DNR	DNR	DNR	DNR	DNR	ST57977248	24/08/2022	2 - Good
29	134970	Natural High Ground	Right	Walled channel	118.45	DNR	DNR	DNR	DNR	DNR	DNR	ST58087235	24/08/2022	2 - Good
30	134971	Natural High Ground	Right	Walled channel	322.20	DNR	DNR	DNR	DNR	DNR	DNR	ST58357226	24/08/2022	3 - Fair
36	154293	Natural High Ground	Left	Weir/Lock entrance	10.67	DNR	DNR	DNR	DNR	DNR	DNR	ST58657209	24/08/2022	3 - Fair
37	154294	Natural High Ground	Left	Harbour wall	360.92	DNR	DNR	DNR	DNR	DNR	DNR	ST58757212	24/08/2022	3 - Fair
38	154295	Natural High Ground	Left	Slipway and walls	22.42	DNR	DNR	DNR	DNR	DNR	DNR	ST58827231	24/08/2022	3 - Fair
39	154296	Natural High Ground	Left	Harbour wall	235.39	DNR	DNR	DNR	DNR	DNR	DNR	ST58967239	24/08/2022	3 - Fair
43	154447	Natural High Ground	Right	Harbour wall	247.25	DNR	DNR	DNR	DNR	DNR	DNR	ST58637235	24/08/2022	3 - Fair
45	155710	Natural High Ground	Left	Harbour wall	281.32	DNR	DNR	DNR	DNR	DNR	DNR	ST58717232	24/08/2022	2 - Good
46	155711	Natural High Ground	Left	Harbour wall	186.65	DNR	DNR	DNR	DNR	DNR	DNR	ST58687213	24/08/2022	3 - Fair
47	155726	Natural High Ground	Right	Harbour Wall and Carpark	626.54	DNR	DNR	DNR	DNR	DNR	DNR	ST58877238	24/08/2022	3 - Fair
53	155912	Natural High Ground	Left	Stepped Embankment with Wooden Quay	51.65	DNR	DNR	DNR	DNR	DNR	DNR	ST58567273	24/08/2022	2 - Good
54	155913	Natural High Ground	Left	Masonry Harbour Wall with Cobbled Hardstanding above	360.08	DNR	DNR	DNR	DNR	DNR	DNR	ST58577266	24/08/2022	3 - Fair
55	155914	Natural High Ground	Right	Harbour Wall	434.25	DNR	DNR	DNR	DNR	DNR	DNR	ST58527256	24/08/2022	3 - Fair
73	2060	Natural High Ground	Left	MASONRY WALL	385.65	8.03	4 - +/- 0.75m or more vertical accuracy	8.27	4 - +/- 0.75m or more vertical accuracy	DNR	DNR	ST57827209	06/10/2022	3 - Fair
74	2061	Natural High Ground	Right	MASONRY WALL	1092.50	8.62	4 - +/- 0.75m or more vertical accuracy	8.42	4 - +/- 0.75m or more vertical accuracy	DNR	DNR	ST58537206	06/10/2022	3 - Fair
75	2062	Natural High Ground	Left	REGRADED ROCK BANK	500.68	14.09	4 - +/- 0.75m or more vertical accuracy	15.01	4 - +/- 0.75m or more vertical accuracy	DNR	DNR	ST58037211	06/10/2022	3 - Fair
76	2063	Natural High Ground	Left	MASONRY WALL	500.10	13.53	4 - +/- 0.75m or more vertical accuracy	11.16	4 - +/- 0.75m or more vertical accuracy	DNR	DNR	ST58867203	06/10/2022	3 - Fair
102	40600	Natural High Ground	Left	MASONRY WALL	134.67	15.01	4 - +/- 0.75m or more vertical accuracy	13.53	4 - +/- 0.75m or more vertical accuracy	DNR	DNR	ST58497201	06/10/2022	3 - Fair
103	40626	Natural High Ground	Right	REGRADED BANK	203.66	8.42	4 - +/- 0.75m or more vertical accuracy	9.92	4 - +/- 0.75m or more vertical accuracy	DNR	DNR	ST58777208	06/10/2022	3 - Fair
146	73714	Natural High Ground	Left	Drydock	350.53	DNR	DNR	DNR	DNR	DNR	DNR	ST57777228	23/08/2022	3 - Fair
147	73910	Natural High Ground	Left	Walled channel and Drydock	271.53	DNR	DNR	DNR	DNR	DNR	DNR	ST57867239	23/08/2022	3 - Fair
148	73911	Natural High Ground	Left	Walled channel	969.83	DNR	DNR	DNR	DNR	DNR	DNR	ST58277219	23/08/2022	3 - Fair

Map Ref	Asset ID	Asset Type	Right or left bank	Asset Description	Approx length (m)	Actual fluvial downstream crest level (mAOD)	Actual fluvial downstream crest level accuracy	Actual fluvial upstream crest level (mAOD)	Actual fluvial upstream crest level accuracy	Actual fluvial coastal crest level (mAOD)	Actual fluvial coastal crest level accuracy	NGR	Most recent inspection	Overall condition
1	130707	Simple Culvert	DNR	Culverted Channel	528.05	DNR	DNR	DNR	DNR	DNR	DNR	ST58777186	24/05/2022	3 - Fair

Map Ref	Asset ID	Asset Type	Right or left bank	Asset Description	Approx length (m)	Actual fluvial downstream crest level (mAOD)	Actual fluvial downstream crest level accuracy	Actual fluvial upstream crest level (mAOD)	Actual fluvial upstream crest level accuracy	Actual fluvial coastal crest level (mAOD)	Actual fluvial coastal crest level accuracy	NGR	Most recent inspection	Overall condition
8	153734	Simple Culvert	DNR	Culvert	1247.66	DNR	DNR	DNR	DNR	DNR	DNR	ST58237159	17/02/2021	3 - Fair
16	39915	Simple Culvert	DNR	DNR	1053.08	DNR	DNR	DNR	DNR	DNR	DNR	ST58697313	23/06/2022	2 - Good
21	455098	Simple Culvert	DNR	Culverted Channel	1112.72	DNR	DNR	DNR	DNR	DNR	DNR	ST58607277	28/09/2021	3 - Fair

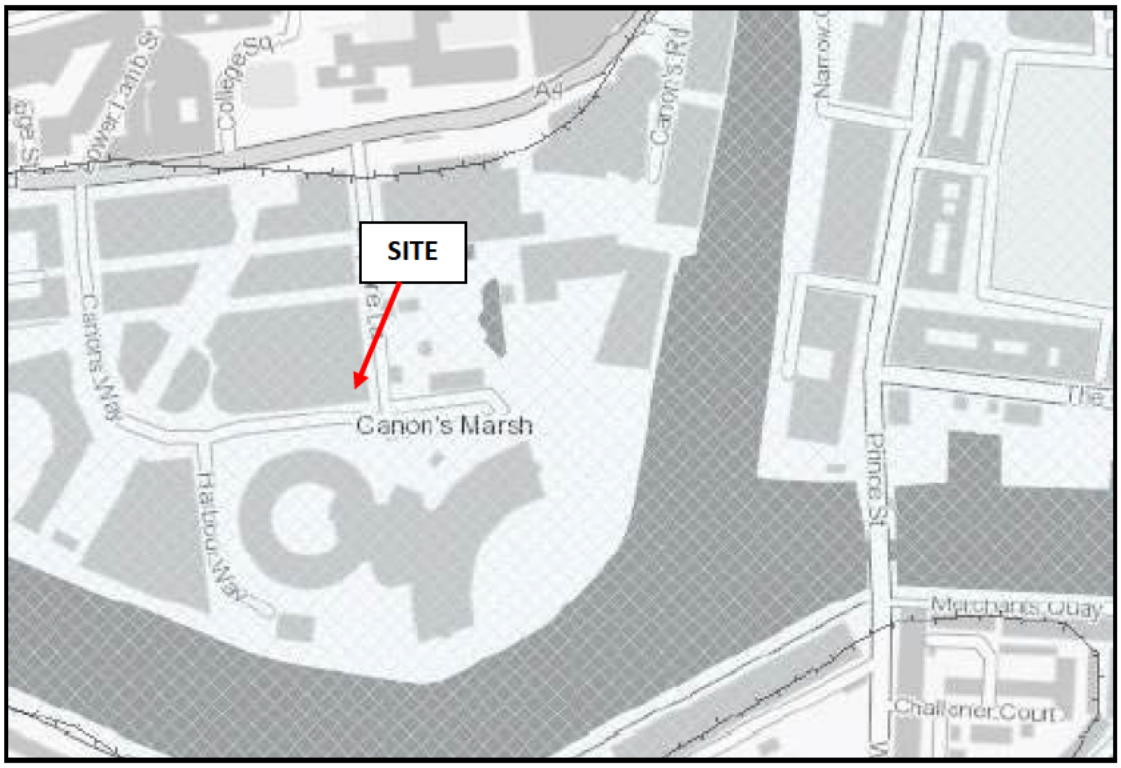
Notes

* Overall Condition has been taken from the most recent inspection
* Inspections are of a purely visual nature and do not necessarily reflect the true condition of the asset
* Condition: 1 = very good, Condtion 2 = good, Condition 3 = fair, Condition 4 = poor, Condition 5 = very poor
* Crest level accuracy: 1 = ± 0.01 to 0.05m, 2 = ± 0.05 to 0.15m, 3 = ± 0.15 to 0.75m, 4 = ± 0.75 or greater
* DNR = data not recorded

APPENDIX F Historic Flooding (EA map extract)

HISTORIC FLOODING

The Environment Agency (EA) database of historic flooding events dating back to 1947 (Historic Flood Map) confirms that the whole site *has* been impacted by a Main River flood event (*no date provided*). A map extract is presented below:



Key: **THE SITE = Harbour View, Unit 7, Building 11, Harbourside, Bristol, BS1 5TY**

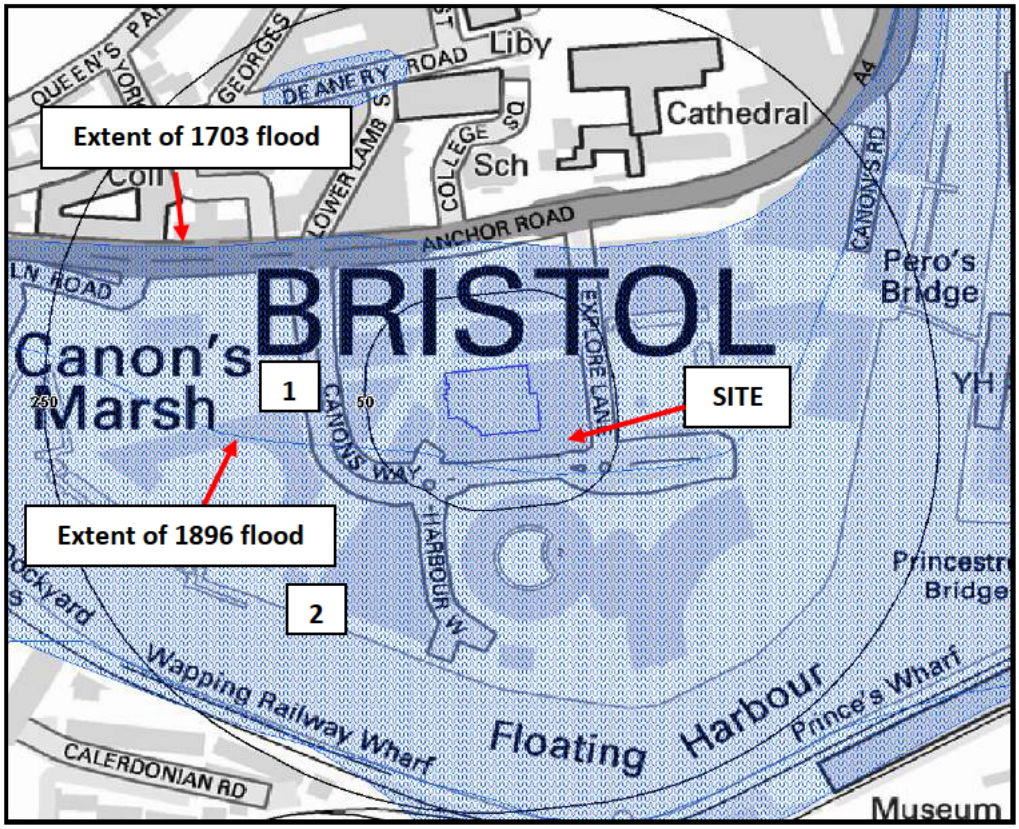
Historic_Flood_Map

Source: Historic Flood Map

Open Government Licence

HISTORIC FLOODING

Groundsure (2020) confirmed that the site was impacted by flooding in 1703 where the channel capacity was exceeded (no raised defences). A further flood event in 1896 is recorded as extending to within 20m south of the current site perimeter; the event was also detailed as a Main River flood event, where channel capacity was exceeded (no raised defences). A Groundsure map extract is presented below (sourced from the EA):



Key: **THE SITE = Harbour View, Unit 7, Building 11, Harbourside, Bristol, BS1 5TY**

Historic Flood Events

ID	Distance	Direction	Event Name	Date of Flood	Flood Source	Flood Cause	Type of Flood
1	0.0	On Site	Ea112_Bristol - November 1703	Start Date: 13-11-1703 End Date: 14-11-1703	Main river	Channel capacity exceeded (no raised defences)	Fluvial Tidal
2	20.0	S	Ea112_Bristol_Bedminster_St Philips_1896	Start Date: 07-10-1896 End Date: 07-10-1896	Main river	Channel capacity exceeded (no raised defences)	Fluvial Tidal

Source: Extracted from Groundsure (2020) Flood Insight Report. Original source Environment Agency / Natural Resources Wales. Open Government Licence

APPENDIX G Hydraulic Modelling of Tidal and Fluvial Flood Levels (EA Product 4)

HYDRAULIC MODELLING OF TIDAL AND FLUVIAL FLOOD LEVELS

Below is an extract from the Environment Agency Product 4: Detailed FRA / FCA Map centred on Unit 7, Building 11, Harbourside, Bristol, BS1 5TY (ref: 289612-WX).

Modelled Flood levels
Please see the table below for maximum 2D depth and level information for your site for a range of return periods. Please note that the maximum flood depths include all low points within your site of interest, which include watercourses, and low ground spots.

This information is taken from the Bristol SFRA 2019 model v19. We have completed a review of this model data and advise that the data is suitable for the purpose of your Flood Risk Assessment. The Bristol SFRA model contains combined scenarios for tidal and fluvial flooding.

E.g BristolSFRA_Defended_2020_0100_T0001_F0100. Is a combined Tidal 1 year event and a fluvial 100 year event. Please see the Appropriate usage and limitations section of this document for additional guidance or request the Product 5 model report for additional model information.

Defended

BristolSFRA_Defended_2020_0100_T0001_F0100_depth	0.00m
BristolSFRA_Defended_2020_0100_T0001_F0100_level	0.00mAOD
BristolSFRA_Defended_2020_0200_T0200_F0002_depth	0.00m
BristolSFRA_Defended_2020_0200_T0200_F0002_level	0.00mAOD
BristolSFRA_Defended_2020_1000_T0012_F1000_depth	0.00m
BristolSFRA_Defended_2020_1000_T0012_F1000_level	0.00mAOD
BristolSFRA_Defended_2020_1000_T1000_F0012_depth	0.00m
BristolSFRA_Defended_2020_1000_T1000_F0012_level	0.00mAOD
BristolSFRA_Defended_2080_0100_T0001_F0100cc70_depth	0.01 m
BristolSFRA_Defended_2080_0100_T0001_F0100cc70_level	9.40mAOD
BristolSFRA_Defended_2080_0200_T0200_F0002cc70_depth	0.31m
BristolSFRA_Defended_2080_0200_T0200_F0002cc70_level	9.68mAOD
BristolSFRA_Defended_2120_0100_T0001_F0100cc70_depth	0.26m
BristolSFRA_Defended_2120_0100_T0001_F0100cc70_level	9.63 mAOD
BristolSFRA_Defended_2120_0200_T0200_F0002cc70_depth	1.02m
BristolSFRA_Defended_2120_0200_T0200_F0002cc70_level	10.40mAOD

Undefended

BristolSFRA_UnDefended_2020_0100_T0001_F0100_level	0.00mAOD
BristolSFRA_UnDefended_2020_0200_T0200_F0002_level	0.00mAOD
BristolSFRA_UnDefended_2020_1000_T0012_F1000_level	0.00mAOD
BristolSFRA_UnDefended_2020_1000_T1000_F0012_level	9.60mAOD
BristolSFRA_UnDefended_2080_0100_T0001_F0100cc35_level	0.00mAOD
BristolSFRA_UnDefended_2080_0100_T0001_F0100cc70_level	0.00mAOD
BristolSFRA_UnDefended_2080_0200_T0200_F0002cc70_level	9.85mAOD
BristolSFRA_UnDefended_2120_0100_T0001_F0100cc35_level	9.58mAOD
BristolSFRA_UnDefended_2120_0100_T0001_F0100cc70_level	9.63mAOD
BristolSFRA_UnDefended_2120_0200_T0200_F0002cc70_level	10.34mAOD

NB 0.00 (m or mAOD) indicates the data does not reach the site
Levels and depths have been extracted based upon the site boundary plan provided.

APPENDIX H Surface Water (Pluvial) Flooding (EA and SFRA map extracts)

EA SURFACE WATER FLOOD RISK

HIGH RISK SCENARIO

The following map extract is taken from the Environment Agency (EA) on-line Long Term Flood Risk mapping (https://flood-warning-information.service.gov.uk/long-term-flood-risk/). The map extract depicts the 'High' risk flood scenario; where a 'High' risk is greater than 1 in 30 [3.3%] in any given year.

THE SITE = Harbour View, Unit 7, Building 11, Harbourside, Bristol, BS1 5TY

High Risk Flood Scenario Potential Flood Depth

= Over 900mm

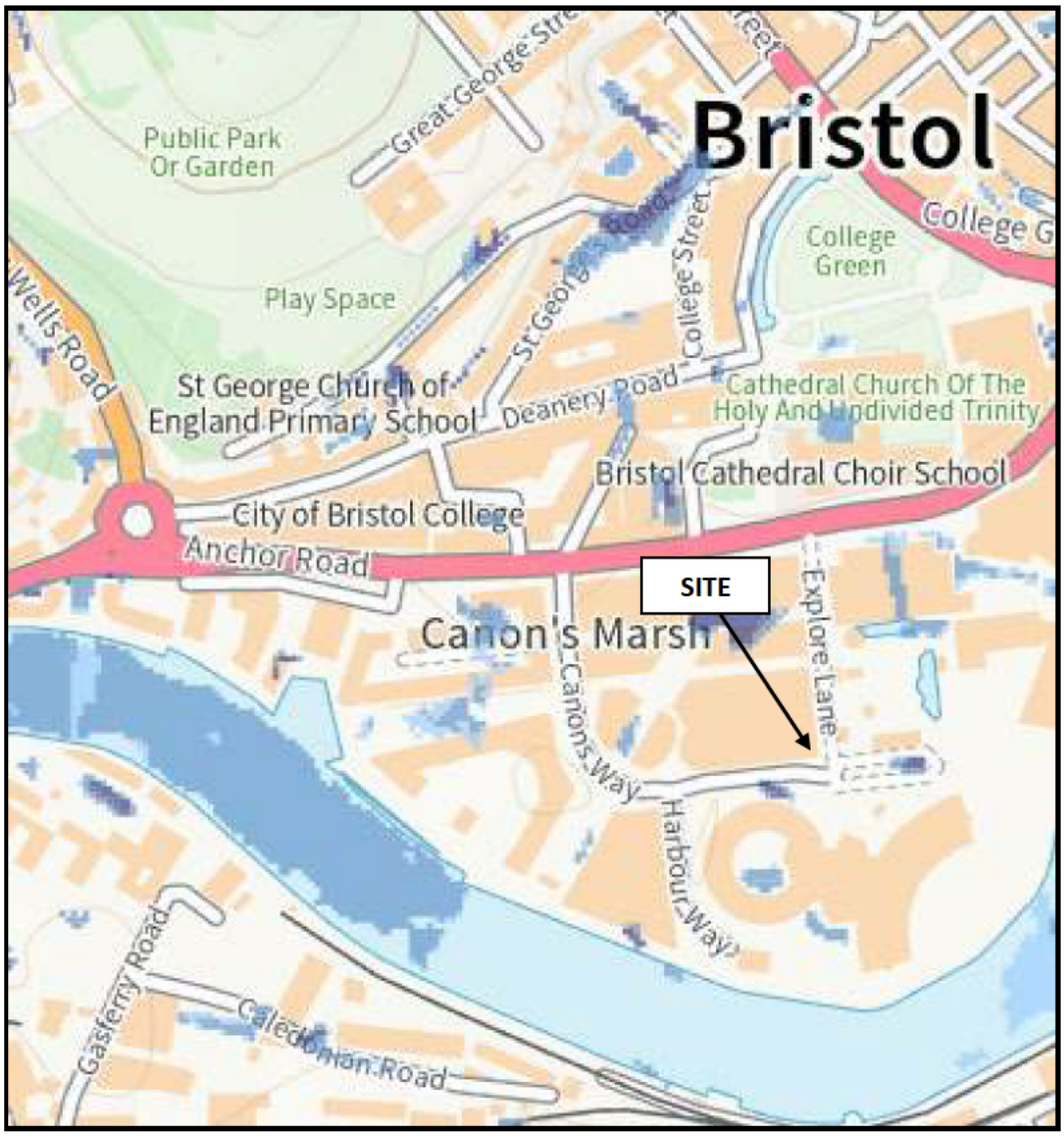
= Between 300mm and 900mm

= Below 300mm

EA SURFACE WATER FLOOD RISK

MEDIUM RISK SCENARIO

The following map extract is taken from the Environment Agency (EA) on-line Long Term Flood Risk mapping (https://flood-warning-information.service.gov.uk/long-term-flood-risk/). The map extract depicts the 'Medium' risk flood scenario; where a 'Medium' risk is between 1 in 100 [1%] and 1 in 30 [3.3%] in any given year.



THE SITE = Harbour View, Unit 7, Building 11, Harbourside, Bristol, BS1 5TY

Medium Risk Flood Scenario Potential Flood Depth

= Over 900mm

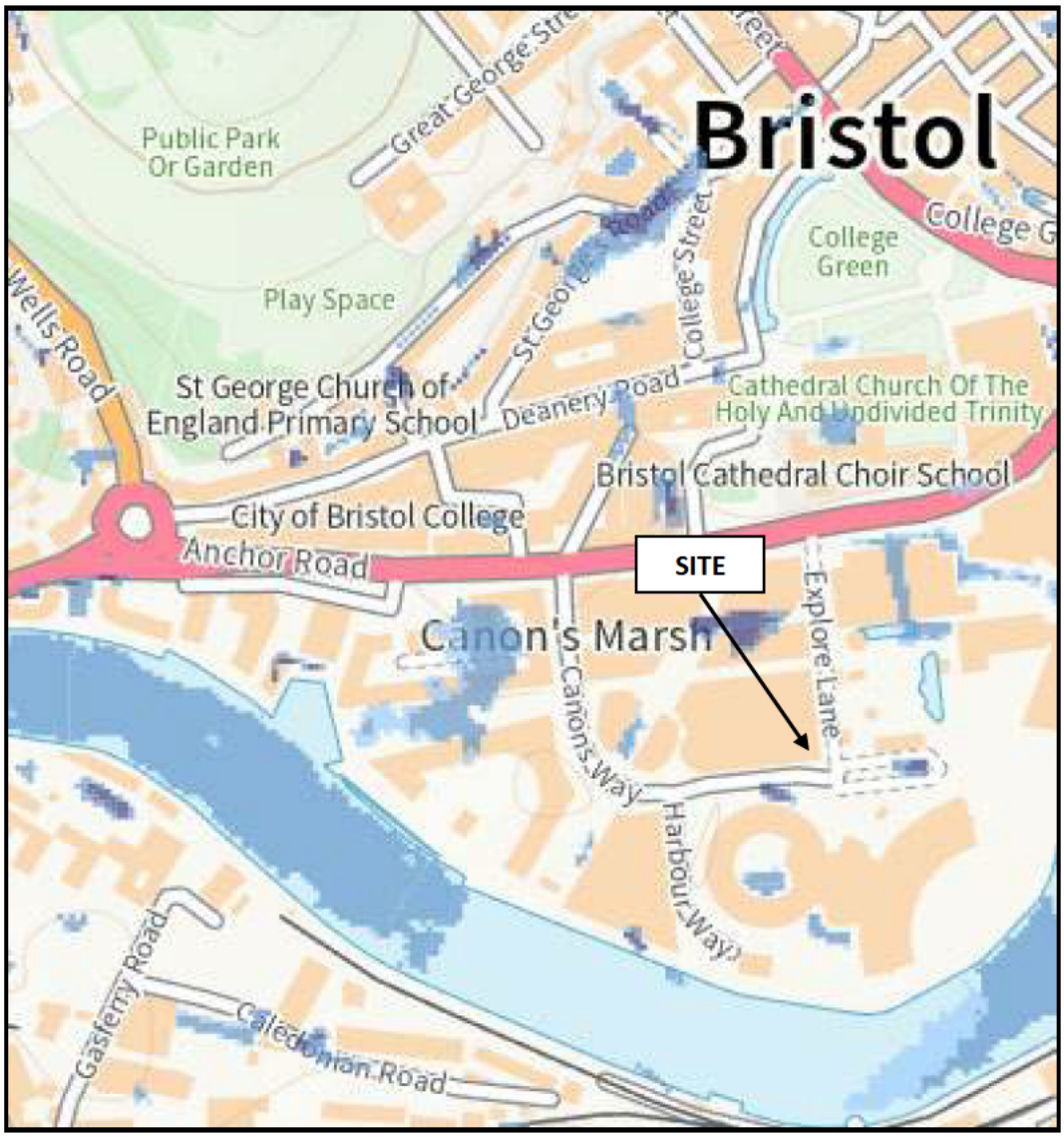
= Between 300mm and 900mm

= Below 300mm

EA SURFACE WATER FLOOD RISK

LOW RISK SCENARIO

The following map extract is taken from the Environment Agency (EA) on-line Long Term Flood Risk mapping (https://flood-warning-information.service.gov.uk/long-term-flood-risk/). The map extract depicts the 'Low' risk flood scenario; where a 'Low' risk is between 1 in 1,000 [0.1%] and 1 in 100 [1%] in any given year.



THE SITE = Harbour View, Unit 7, Building 11, Harbourside, Bristol, BS1 5TY

Low Risk Flood Scenario	Potential Flood Depth
	= Over 900mm
	= Between 300mm and 900mm
	= Below 300mm

SURFACE WATER FLOOD RISK

Surface Water Flood Risk Mapping within the Bristol City SFRA (2020) for the present day (1% and 0.1% return periods) does not indicate flood risk at the subject site.

Mapping for the 2080 and 2115 epochs 1% (1 in 100 year) events including climate change allowance *do not* indicate flood risk at the subject site.

A SFRA Surface Water Flood Risk map extract for the 2115 epoch 1% (1 in 100 year) event is presented below:

THE SITE = Harbour View, Unit 7, Building 11, Harbourside, Bristol, BS1 5TY

2115 100 year Return Period
(inclusive of climate change)

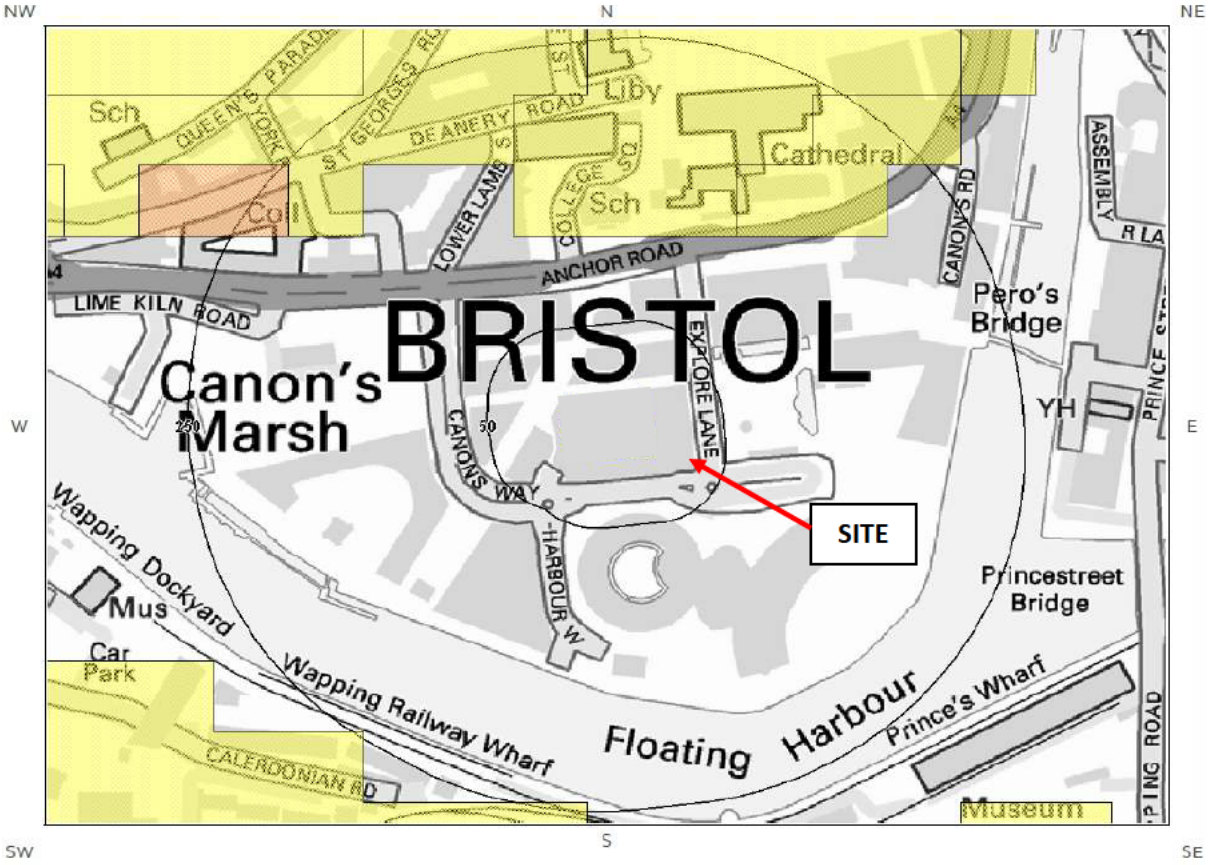
Source: The Bristol City Council Level 1 Citywide Strategic Flood Risk Assessment (SFRA) (2020)

APPENDIX I Groundwater Flooding

GROUNDWATER FLOODING

The British Geological Survey (BGS) Susceptibility to Groundwater Flooding hazard database identifies areas where geological conditions *could* facilitate flooding, and where groundwater may be present close to surface.

The database indicates that the whole site is classified as having **'No potential for groundwater flooding'**. A BGS Groundwater Flooding Map extract is presented below:



Key: **THE SITE = Harbour View, Unit 7, Building 11, Harbourside, Bristol, BS1 5TY**

Source: Extracted from Groundsure (2020) Flood Insight Report. Original source British Geological Survey.