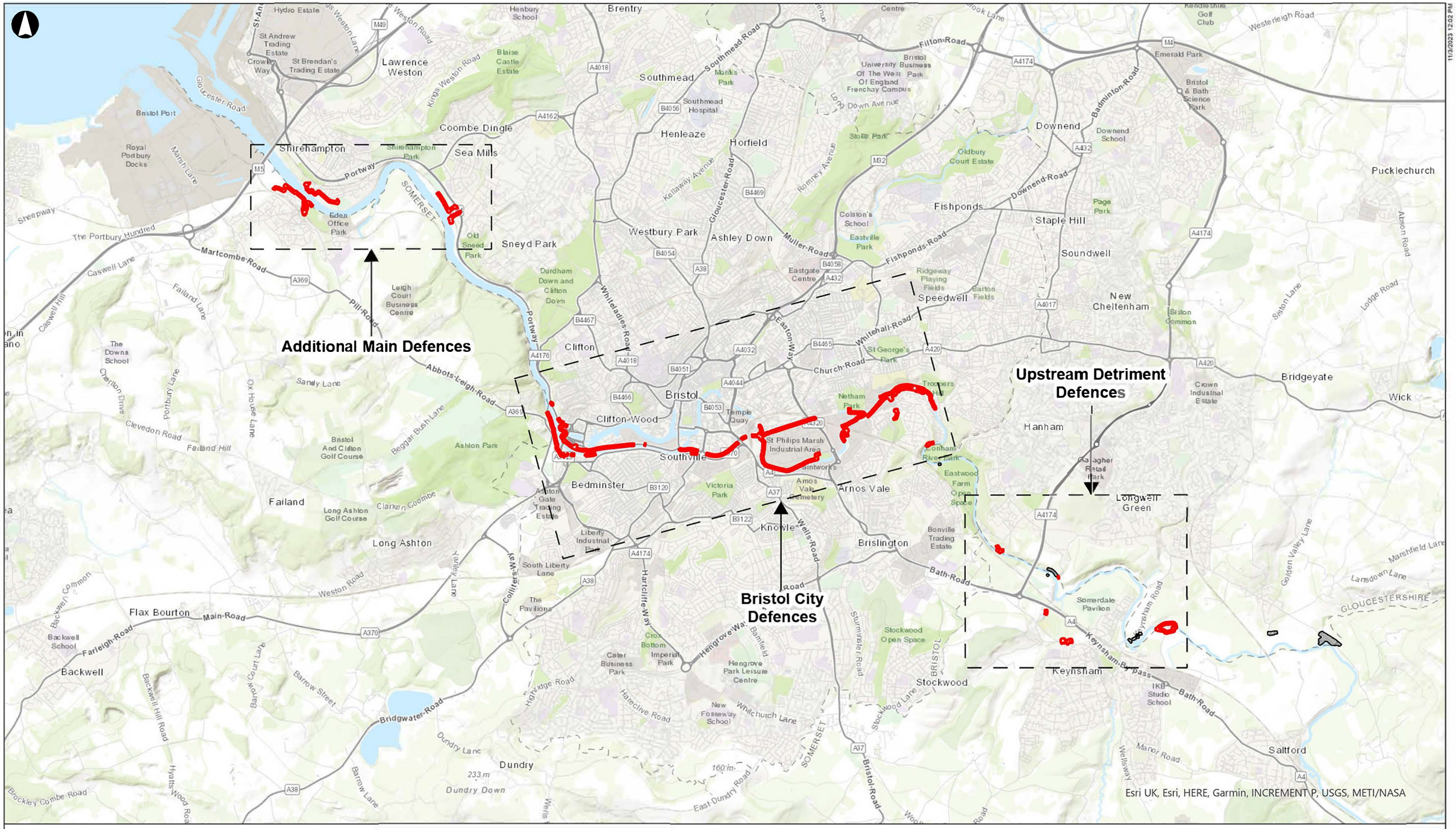

Redline Boundary

PFR Buildings

Kilometers
0 1 2

Coordinate System: British National Grid

--

Rev	Date	By	Chkd	Appd	Authd
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Client
Bristol City Council

Project Name
Bristol Avon Flood Strategy

Drawing Title
2.1 Site Location

Scale at A3
1:60,000

Role
Environment

Suitability
For Information

Project Number
28598200

Rev
P01

Drawing Name
285983-ARP-XX-DR-ENV-001

B:\285000\285982-00_BristolAvonFlood\Workspaces\GBR_28598200_BAFS_EIAFigures\P02_Workspace\Figure 2.1 Site Location.aprx

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Shirehampton

Pill

Sea Mills

Esri UK, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA

Proposed Defence Alignment

PFR Buildings

Kilometers
0 0.5 1

Coordinate System: British National Grid

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Project Name
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Drawing Title
2.2 Downstream Defences

Scale at A3
1:25,000

Role
Environment

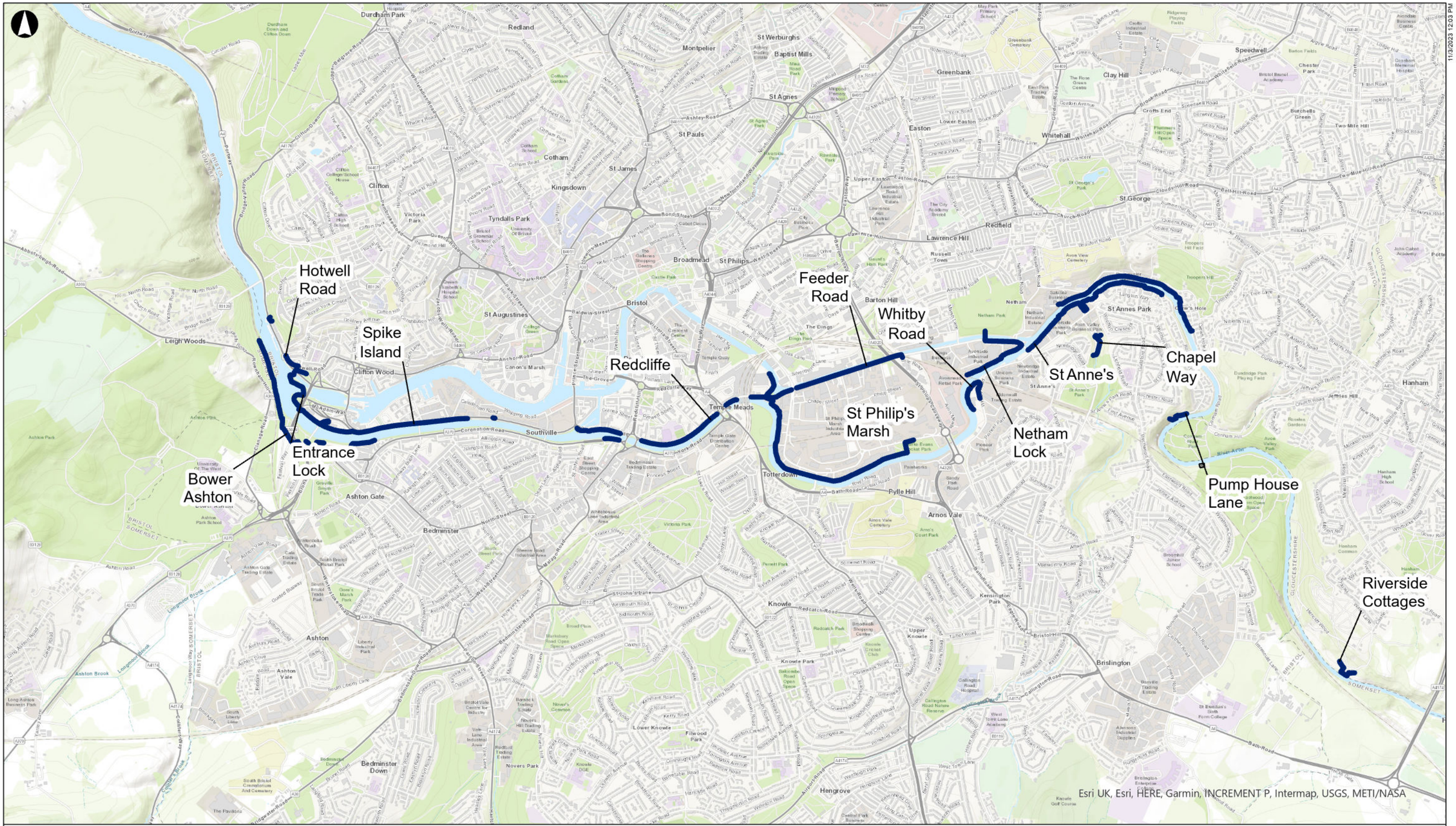
Suitability
For Information

Project Number
28598200

Rev
P01

Drawing Name
285983-ARP-XX-DR-ENV-002

B:\285000\285982-00_BristolAvonFlood\Workspaces\GBR_28598200_BAFS_EIAFigures\P02_Workspace\Figure 2.3 Additional Main Defence.aprx



Proposed Defence Alignment

PFR Buildings

Kilometers 0 0.5 1

Coordinate System: British National Grid

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Project Name: **Bristol Avon Flood Strategy**

Drawing Title: **2.3 Bristol City Centre Defences**

Scale at A3: **1:25,000**

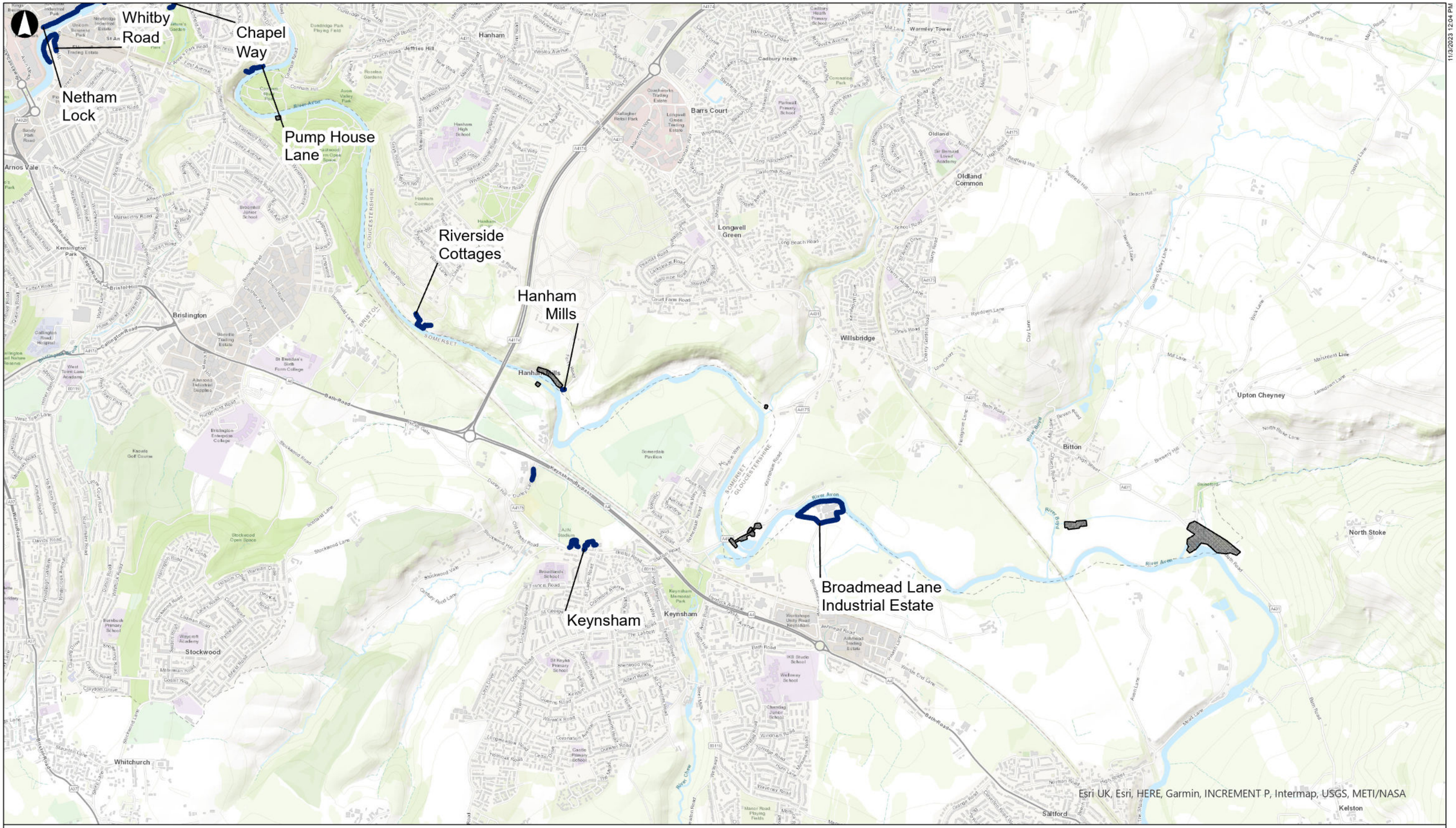
Role: **Environment**

Suitability: **For Information**

Project Number: **28598200** Rev: **P01**

Drawing Name: **285983-ARP-XX-DR-ENV-003**

B:\285000\285982-00_BristolAvonFlood\Workspaces\GBR_28598200_BAFS_EIAFigures\P02_Workspace\Figure 2.2 Main Defences.aprx



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Proposed Defence Alignment

PFR Buildings

Kilometers
0 0.5 1

Coordinate System: British National Grid

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Project Name
Bristol Avon Flood Strategy

Drawing Title
2.4 Upstream Detriment Defences

Scale at A3
1:25,000

Role
Environment

Suitability
For Information

Project Number
28598200

Rev
P01

Drawing Name
285983-ARP-XX-DR-ENV-004

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11/3/2023 12:09 PM

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Redline Boundary
100m Buffer
250m Buffer
PFR Buildings
Listed Buildings (by grade)
I
II
II*
Scheduled Momuments
Conservation Areas
Registered Parks and Gardens

Kilometers
0
1
2

Coordinate System: British National Grid

--

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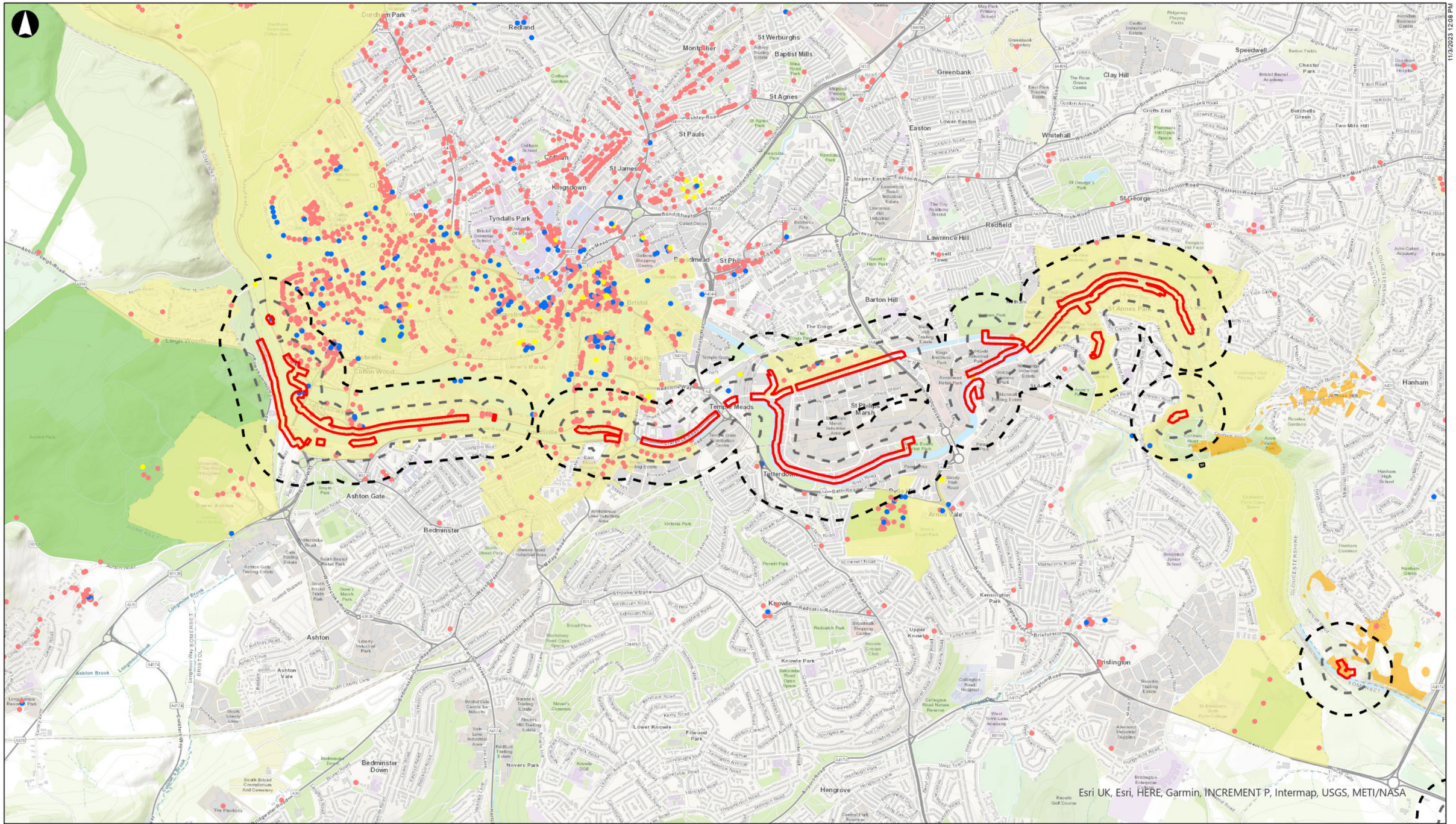
Project Name
Bristol Avon Flood Strategy

Drawing Title
Figure 6.1 - Heritage Assets (Page 1 of 3)

Scale at A3
1:25,000
Role
Environment
Suitability
For Information
Project Number
28598200
Rev
P01
Drawing Name
285983-ARP-XX-DR-ENV-005

B:\285000\285982-00_BristolAvonFlood\Workspaces\GBR_28598200_BAFS_EIAFigures\P02_Workspace\Figure 2.5 Heritage Assets.aprx



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Redline Boundary
100m Buffer
250m Buffer
PFR Buildings
Listed Buildings (by grade)
I
II
II*
Scheduled Momuments
Conservation Areas
Registered Parks and Gardens

Kilometers
0 1 2

Coordinate System: British National Grid

--

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Rev	Date	By	Chkd	Appd	Authd

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Project Name
Bristol Avon Flood Strategy

Drawing Title
Figure 6.1 - Heritage Assets (Page 2 of 3)

Scale at A3
1:25,000
Role
Environment
Suitability
For Information
Project Number
28598200
Rev
P01
Drawing Name
285983-ARP-XX-DR-ENV-006

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Redline Boundary
100m Buffer
250m Buffer
PFR Buildings
Listed Buildings (by grade)
I
II
II*
Scheduled Momuments
Conservation Areas
Registered Parks and Gardens

Kilometers
0 1 2

Coordinate System: British National Grid

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Rev	Date	By	Chkd	Appd	Authd

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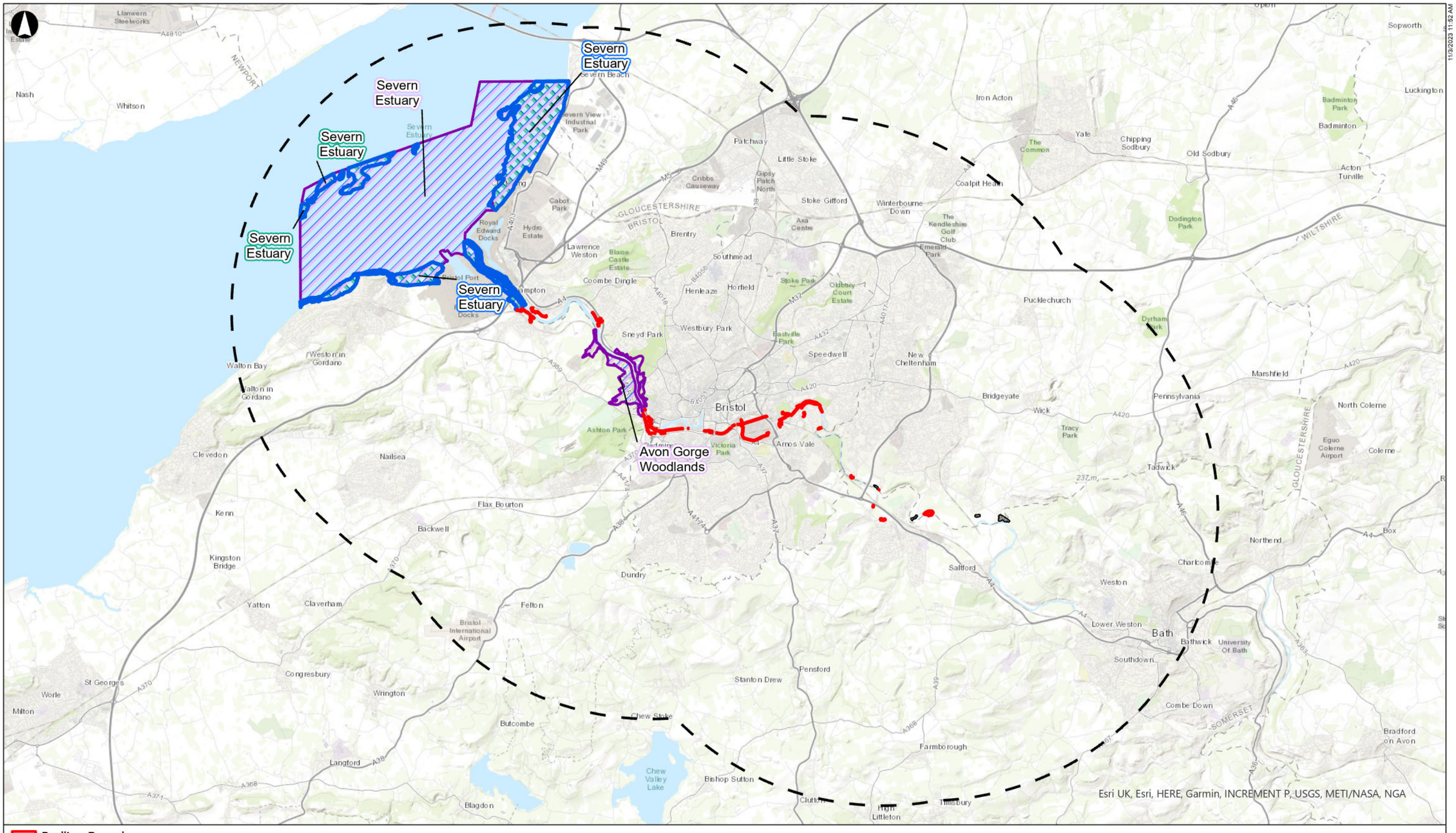
Drawing Title
Figure 6.1 - Heritage Assets (Page 3 of 3)

Scale at A3
1:25,000
Role
Environment
Suitability
For Information
Project Number
28598200
Rev
P01
Drawing Name
285983-ARP-XX-DR-ENV-007

B:\285000\285982-00_BristolAvonFlood\Workspaces\GBR_28598200_BAFS_EIAFigures\P02_Workspace\Figure 2.5 Heritage Assets.aprx



Coordinate System: British National Grid

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Project Name
Bristol Avon Flood Strategy

Drawing Title
6.2 Designated Ecology Receptors 10km

Scale at A3
1:130,000

Role
Environment

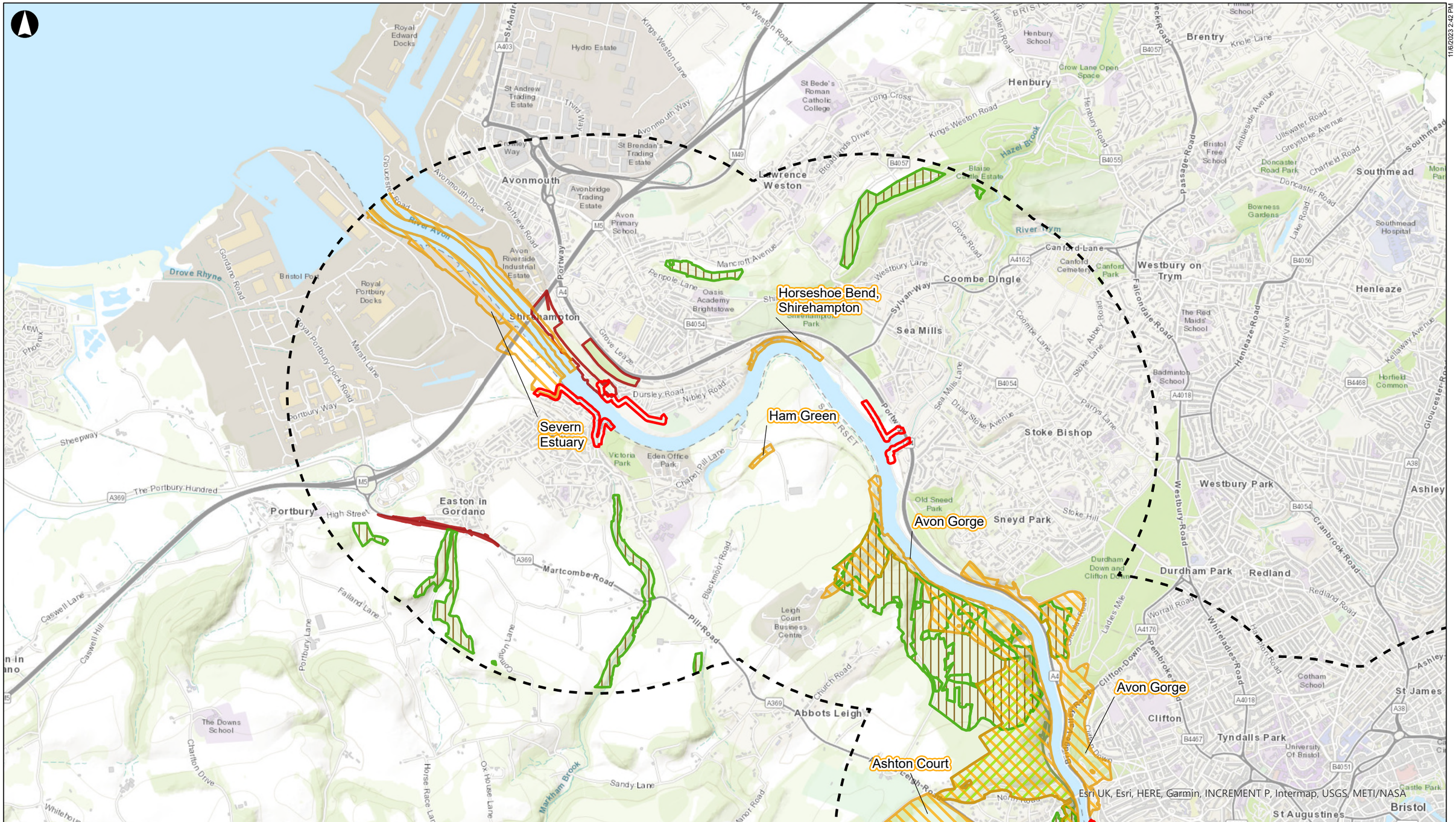
Suitability
For Information

Project Number
28598200

Rev
P01

Drawing Name
285983-ARP-XX-DR-ENV-008

B:\285000\285982-00_BristolAvonFlood\Workspaces\GBR_28598200_BAFS_EIAFigures\P02_Workspace\Figure 2.12 Designated Ecology Receptors 10km.aprx



Redline Boundary
2km Buffer
PFR Buildings
Sites of Specific Scientific Interest
Ancient Woodland
National Nature Reserve
Local Nature Reserve

Kilometers
0 1 2

Coordinate System: British National Grid

--

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Project Name
Bristol Avon Flood Strategy

Drawing Title
Figure 6.3 - Designated Ecology Receptors 2km (Page 1 of 3)

Scale at A3
1:30,000
Role
Environment
Suitability
For Information
Project Number
28598200
Rev
P01
Drawing Name
285983-ARP-XX-DR-ENV-009

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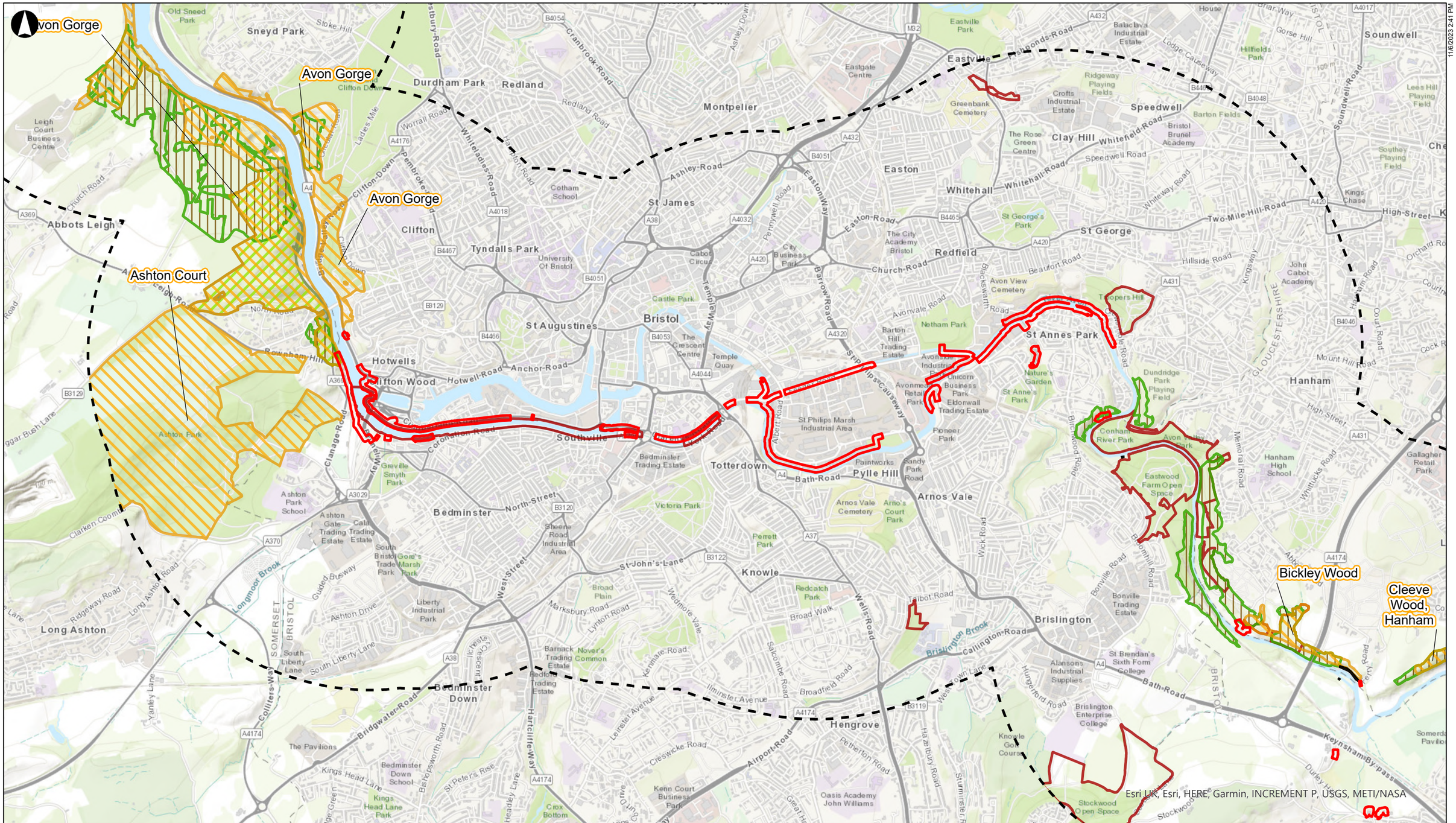

Redline Boundary
2km Buffer
PFR Buildings
Sites of Specific Scientific Interest
Ancient Woodland
National Nature Reserve
Local Nature Reserve

Kilometers
0 1 2

Coordinate System: British National Grid

--

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Drawing Title
Figure 6.3 - Designated Ecology Receptors 2km (Page 2 of 3)

Scale at A3
1:30,000

Role
Environment

Suitability
For Information

Project Number
28598200

Rev
P01

Drawing Name
285983-ARP-XX-DR-ENV-010

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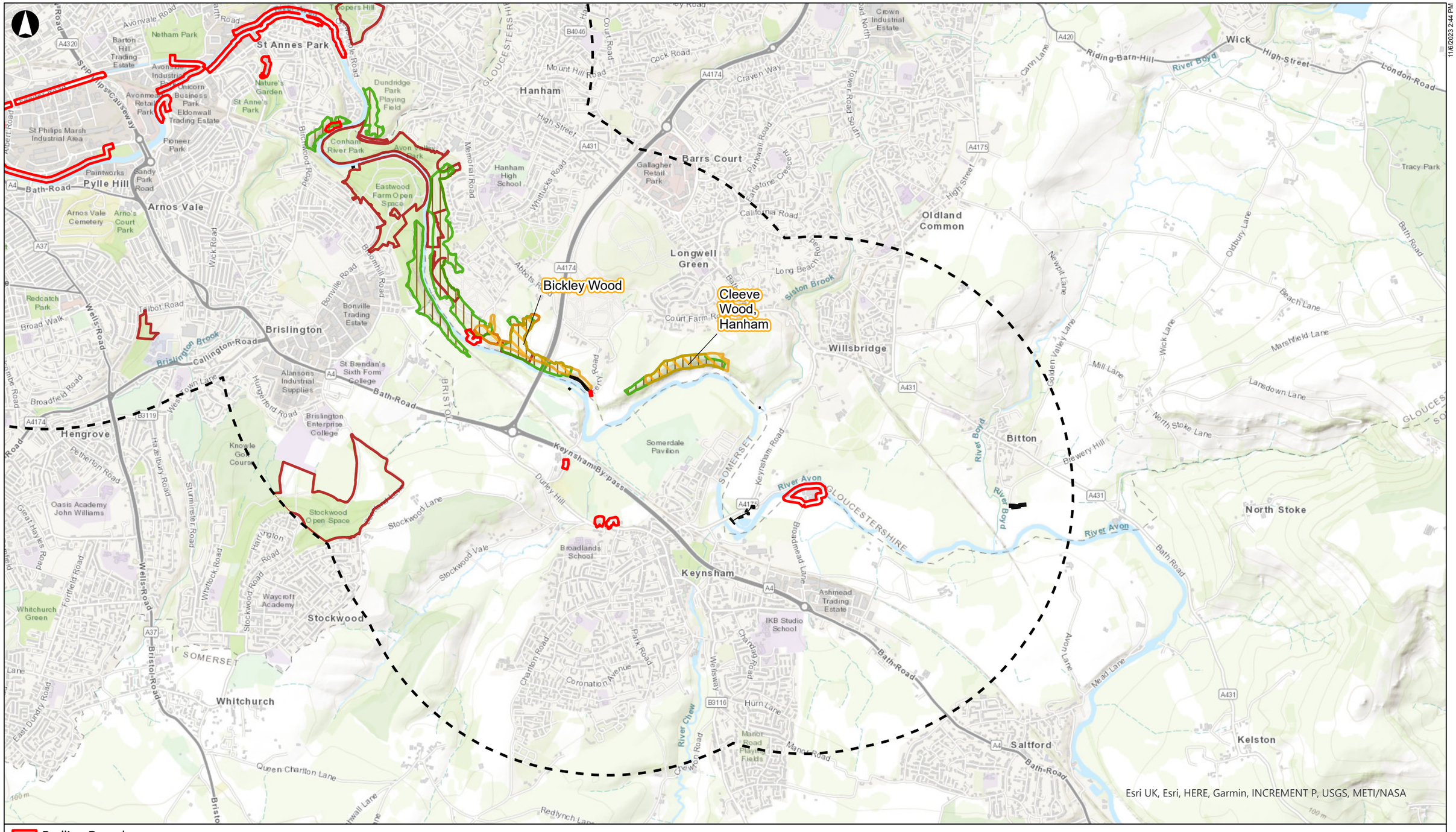

- Redline Boundary
- 2km Buffer
- PFR Buildings
- Sites of Specific Scientific Interest
- Ancient Woodland
- National Nature Reserve
- Local Nature Reserve

Kilometers
0 1 2

Coordinate System: British National Grid

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Drawing Title
Figure 6.3 - Designated Ecology Receptors 2km (Page 3 of 3)

Scale at A3
1:30,000
Role
Environment
Suitability
For Information
Project Number
28598200
Rev
P01
Drawing Name
285983-ARP-XX-DR-ENV-011

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11/6/2023 2:44 PM

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Redline Boundary

PFR Buildings

1:50k Geological Linear Figures

Inferred Coal Seam

Inferred Fault

Mineral Vein

Observed Coal Seam

Observed Fault

Reverse or Thrust Fault

For 1:50k Bedrock Geology, see Figure 6.12

Kilometers

0 1 2

Coordinate System: British National Grid

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Drawing Title

Figure 6.4 - Published Geology (Bedrock and Linear)

Scale at A3

1:60,000

Role

Environment

Suitability

For Information

Project Number

28598200

Rev

P01

Drawing Name

285983-ARP-XX-DR-ENV-007

B:\285000\285982-00_BristolAvonFlood\Workspaces\GBR_28598200_BAFS_EIAFigures\P02_Workspace\Figure 2.9 Geology 3 (Bedrock) 2.aprx

1:50k Geological Bedrock

- Avon Group - Limestone
- Avon Group - Mudstone and Limestone, Interbedded
- Beacon Limestone Formation - Limestone
- Black Nore Sandstone Formation - Sandstone
- Black Rock Limestone Subgroup - Dolomitised Limestone and Dolomite
- Blue Anchor Formation - Mudstone
- Blue Lias Member, Limestone and Mudstone, Interbedded
- Bridport Sand Formation - Sandstone
- Charmouth Mudstone Formation - Mudstone
- Clifton Down Limestone Formation - Limestone
- Clifton Down Mudstone Formation - Dolomite-Mudstone
- Cromhall Sandstone Formation - Sandstone
- Downend Member - Mudstone
- Downend Member - Sandstone
- Dyrham Formation - Siltstone
- Farrington Member and Barren Red Member (Undifferentiated) - Mudstone, Siltstone and Sandstone
- Farrington Member and Barren Red Member (Undifferentiated) - Sandstone
- Fuller's Earth Rock Member - Limestone
- Fuller's Earth Formation - Mudstone, Calcareous
- Goblin Combe Oolite Formation - Limestone, Ooidal
- Gully Oolite Formation - Limestone, Ooidal
- Inferior Oolite Group - Limestone
- Langport Member - Limestone
- Mangotsfield Member - Sandstone
- Mercia Mudstone Group - Mudstone and Halite-Stone
- Oxwich Head Limestone Formation - Limestone, Ooidal
- Oxwich Head Limestone Formation - Mudstone
- Penarth Group - Mudstone
- Pennant Sandstone Formation - Sandstone
- Portishead Formation - Sandstone
- Quartzitic Sandstone Formation - Mudstone
- Quartzitic Sandstone Formation - Sandstone
- Radstock Member - Mudstone, Silstone and Sandstone
- Redcliffe Sandstone Member - Sandstone
- Rugby and Limestone Member - Limestone and Mudstone, Interbedded
- Saltford Shale Member - Mudstone
- South Wales Middle Coal Measures Formation - Mudstone, Siltstone and Sandstone
- South Wales Middle Coal Measures Formation - Sandstone
- Shirehampton Formation - Limestone, Argillaceous Rocks and Subordinate Sandstone, Interbedded
- Upper Old Red Sandstone - Conglomerate
- Westbury Formation and Cotham Member (Undifferentiated) - Mudstone and Limestone, Interbedded
- Wilmcote Limestone Member - Limestone and Mudstone, Interbedded

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Project Name
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Drawing Title
Figure 6.4 - Published Geology (Bedrock and Linear) Supplementary Legend

Scale at A3
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Role
Environment

Suitability
For Information

Project Number
28598200

Rev
P01

Drawing Name
285983-ARP-XX-DR-ENV-0033

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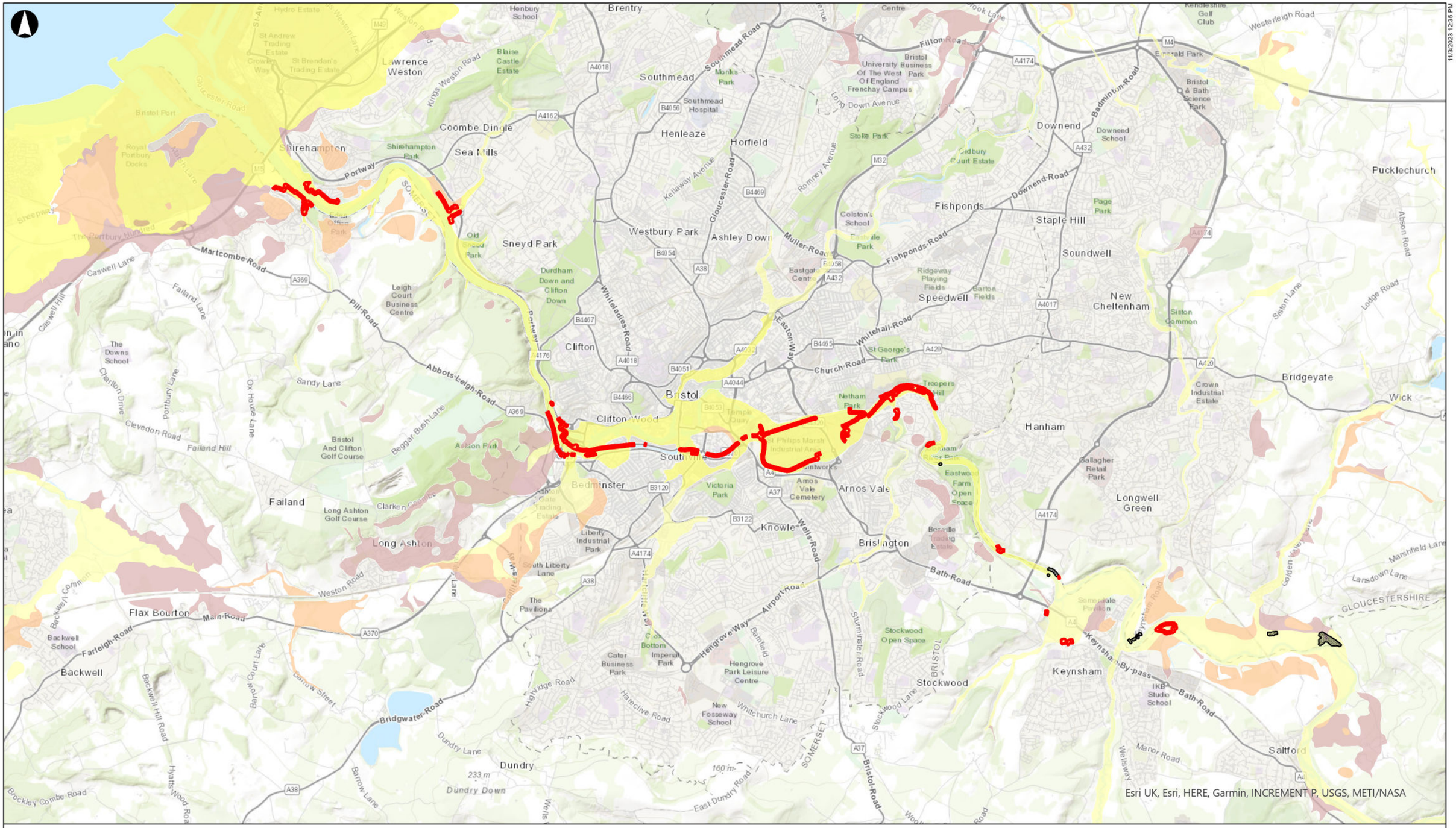

11/3/2023 12:35 PM

Redline Boundary

PFR Buildings

1:50K Geological Superficial Deposits

- Alluvium - Clay, Silt, Sand and Gravel
- Head - Clay, Silt, Sant and Gravel
- River Terrace Deposits - Sand and Gravel
- Tidal Flat Deposits - Clay and Silt

Kilometers

0 1 2

Coordinate System: British National Grid

--

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Project Name

Bristol Avon Flood Strategy

Drawing Title

Figure 6.5 - Published Superficial Geology

Scale at A3

1:60,000

Role

Environment

Suitability

For Information

Project Number

28598200

Rev

P01

Drawing Name

285983-ARP-XX-DR-ENV-015

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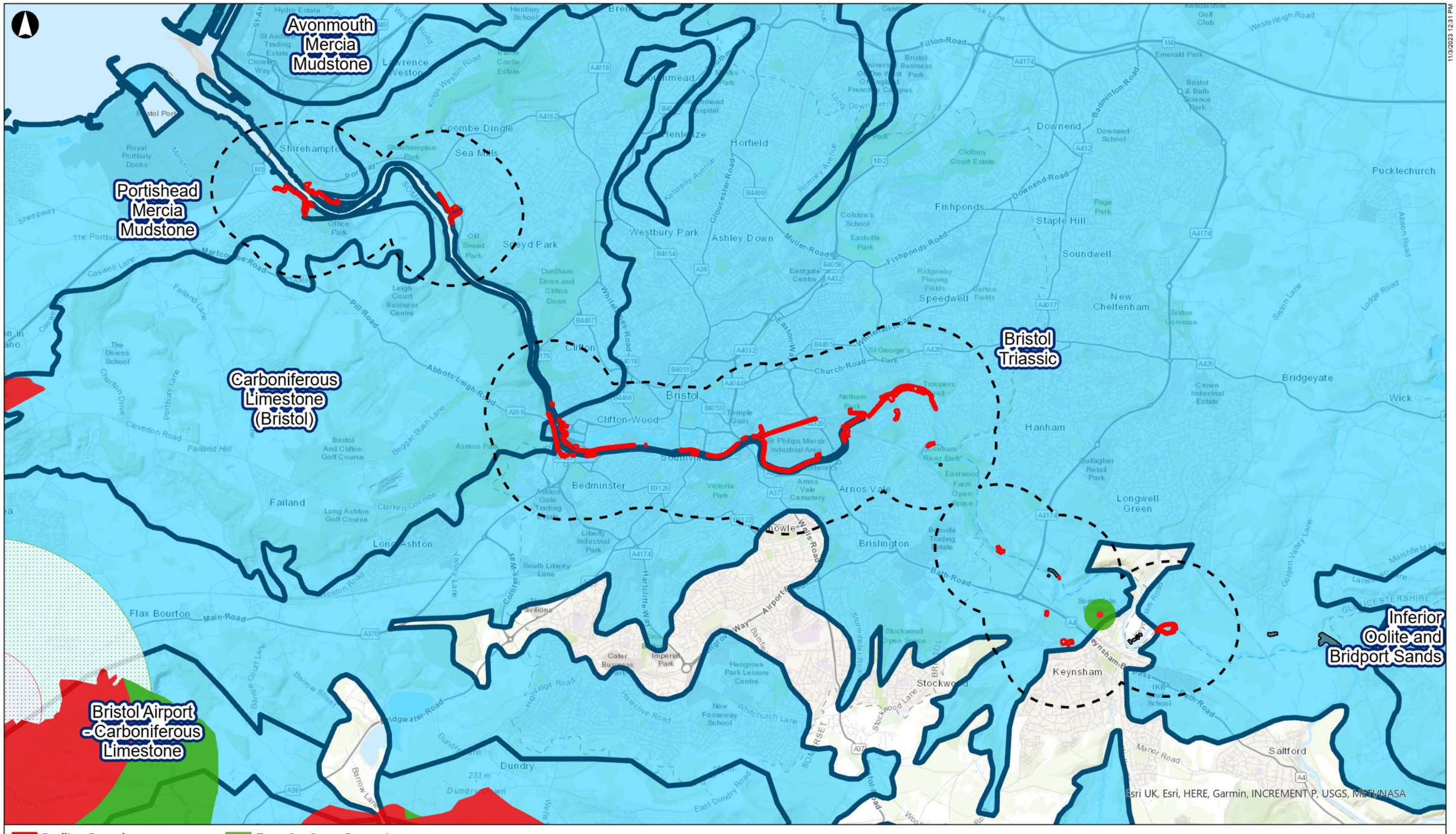

Redline Boundary
1km Buffer
PFR Buildings

Source Protection Zones

Zone 1 - Inner Protection Zone
Zone 1 - Subsurface Activity
Zone 2 - Outer Protection
Zone 2 - Subsurface Activity
Zone 3 - Total Catchment
Zone 3 - Subsurface Activity
Zone of Special Interest
WFD Groundwater Bodies Cycle 2

Kilometers
0 1 2

Coordinate System: British National Grid

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Rev	Date	By	Chkd	Appd	Authd
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Project Name
Bristol Avon Flood Strategy

Drawing Title
Figure 6.6 - Groundwater Features

Scale at A3
1:60,000

Role
Environment

Suitability
For Information

Project Number
28598200

Rev
P01

Drawing Name
285983-ARP-XX-DR-ENV-016

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B:\285000\285982-00_BristolAvonFlood\Workspaces\GBR_28598200_BAFS_EIAFigures\P02_Workspace\Figure 2.7 Groundwater features2.aprx

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- Redline Boundary
- 1km Buffer
- PFR Buildings

Agricultural Land Classification (ALC Grade)

- Exclusion
- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Grade 5
- Non Agricultural
- Urban

Kilometers: 0, 1, 2

Coordinate System: British National Grid

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Rev	Date	By	Chkd	Appd	Authd
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Client: **Bristol City Council**

Project Name: **Bristol Avon Flood Strategy**

Drawing Title: **Figure 6.7 - Agricultural Land Classification (Page 1 of 3)**

Scale at A3: **1:25,000**

Role: **Environment**

Suitability: **For Information**

Project Number: **28598200**

Rev: **P01**

Drawing Name: **285983-ARP-XX-DR-ENV-017**

B:\285000\285982-00_BristolAvonFlood\Workspaces\GBR_28598200_BAFS_EIAFigures\P02_Workspace\Figure 2.10 Agricultural Land Classification.aprx

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- Redline Boundary
- 1km Buffer
- PFR Buildings

Agricultural Land Classification (ALC Grade)

- Exclusion
- Grade 1
- Grade 2
- Grade 3
- Grade 4
- Grade 5
- Non Agricultural
- Urban

Kilometers: 0 1 2

Coordinate System: British National Grid

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Rev	Date	By	Chkd	Appd	Authd
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Client: **Bristol City Council**

Project Name: **Bristol Avon Flood Strategy**

Drawing Title: **Figure 6.7 - Agricultural Land Classification (Page 2 of 3)**

Scale at A3: **1:25,000**

Role: **Environment**

Suitability: **For Information**

Project Number: **28598200**

Rev: **P01**

Drawing Name: **285983-ARP-XX-DR-ENV-018**

B:\285000\285982-00_BristolAvonFlood\Workspaces\GBR_28598200_BAFS_EIAFigures\P02_Workspace\Figure 2.10 Agricultural Land Classification.aprx

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Redline Boundary
1km Buffer
PFR Buildings

Agricultural Land Classification (ALC Grade)

Exclusion
Grade 1
Grade 2
Grade 3
Grade 4
Grade 5
Non Agricultural
Urban

Kilometers
0 1 2

Coordinate System: British National Grid

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Project Name
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Drawing Title
Figure 6.7 - Agricultural Land Classification (Page 3 of 3)

Scale at A3
1:25,000
Role
Environment
Suitability
For Information
Project Number
28598200
Rev
P01
Drawing Name
285983-ARP-XX-DR-ENV-019

B:\285000\285982-00_BristolAvonFlood\Workspaces\GBR_28598200_BAFS_EIAFigures\P02_Workspace\Figure 2.10 Agricultural Land Classification.aprx

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Redline Boundary
250m Buffer
PFR Buildings

Trace Metals in Soils (pH)
- 4.60- 5.50
- 5.50 - 6.00
- 6.00- 6.50
- 6.50- 6.80
- 6.80 - 7.20

Permitted Waste Sites - Authorised Landfill Site Boundaries
Historical Landfill Sites
Brownfield Sites

Kilometers
0 0.5 1

Coordinate System: British National Grid

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Project Name
Bristol Avon Flood Strategy

Drawing Title
Figure 6.8 - Potential Contamination Sources Downstream (Sheet 1 of 3)

Scale at A3
1:25,000

Role
Environment

Suitability
For Information

Project Number
28598200

Rev
P01

Drawing Name
285983-ARP-XX-DR-ENV-020

B:\285000\285982-00_BristolAvonFlood\Workspaces\GBR_28598200_BAFS_EIAFigures\P02_Workspace\Figure 2.11 Contaminated Land.aprx

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Redline Boundary
250m Buffer
PFR Buildings
Trace Metals in Soils (pH)
4.60- 5.50
5.50 - 6.00
6.00- 6.50
6.50- 6.80
6.80 - 7.20
Permitted Waste Sites - Authorised Landfill Site Boundaries
Historical Landfill Sites
Brownfield Sites

Kilometers
0 0.5 1

Esri UK, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA

Coordinate System: British National Grid

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Client
Bristol City Council

Project Name
Bristol Avon Flood Strategy

Drawing Title
Figure 6.8 - Potential Contamination Sources City Centre (Sheet 2 of 3)

Scale at A3
1:25,000
Role
Environment
Suitability
For Information
Project Number
28598200
Rev
P01
Drawing Name
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B:\285000\285982-00_BristolAvonFlood\Workspaces\GBR_28598200_BAFS_EIAFigures\P02_Workspace\Figure 2.11 Contaminated Land.aprx

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Redline Boundary
250m Buffer
PFR Buildings
Trace Metals in Soils (pH)
4.60- 5.50
5.50 - 6.00
6.00- 6.50
6.50- 6.80
6.80 - 7.20
Permitted Waste Sites - Authorised Landfill Site Boundaries
Historical Landfill Sites
Brownfield Sites

Kilometers
0 0.5 1

Esri UK, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA

Coordinate System: British National Grid

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Project Name
Bristol Avon Flood Strategy

Drawing Title
Figure 6.8 - Potential Contamination Sources Upstream (Sheet 3 of 3)

Scale at A3
1:25,000
Role
Environment
Suitability
For Information
Project Number
28598200
Rev
P01
Drawing Name
285983-ARP-XX-DR-ENV-022

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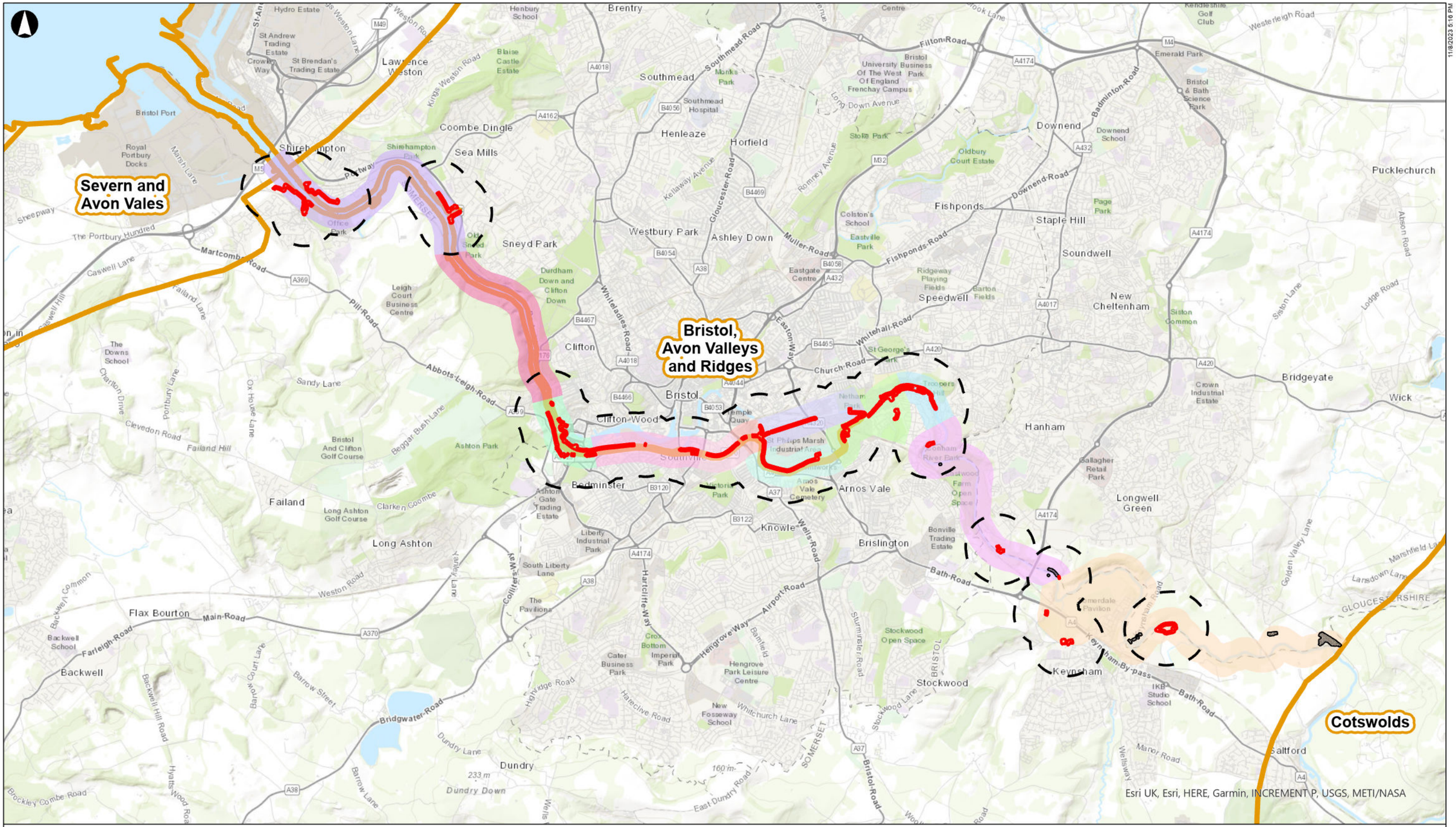

11/8/2023 5:16 PM

Redline Boundary
500m Buffer
PFR Buildings
Landscape Character Area
Avon Gorge
Avonmouth Floodplain
Cattle Reach
Crews Hole
Cumberland Road
Entrance Lock
Feeder Road
Keynsham Floodplain
Redcliffe
St Phillips Marsh
Whitby Reach
Wooded Avon Valley
National Character Areas

Kilometers
0 1 2

Coordinate System: British National Grid

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Drawing Title
Figure 6.9 - Landscape Character Areas

Scale at A3
1:60,000
Role
Environment
Suitability
For Information
Project Number
28598200
Rev
P01
Drawing Name
285983-ARP-XX-DR-ENV-023

B:\285000\285982-00_BristolAvonFlood\Workspaces\GBR_28598200_BAFS_EIAFigures\P02_Workspace\Figure 2.13 Landscape designation and character areas.aprx

KINGS WESTON HOUSE

BLAISE CASTLE AND HAMLET

ROYAL VICTORIA PARK (FORMERLY BRENTRY HOUSE)

OLDBURY COURT

STOKE PARK

GOLDNEY HOUSE

LEIGH COURT

BRISTOL UNIVERSITY BOTANIC GARDENS AND RAYNE THATCH

WARMLEY HOUSE

ARNOS VALE CEMETERY

ASHTON COURT

TYNTESFIELD

The park and garden to Brislington House (known as Long Fox Manor)

Landscape at the former CEGB Headquarters

KELSTON PARK

BARROW COURT

Esri UK, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA

11/8/2023 5:08 PM

Redline Boundary
500m Buffer
PFR Buildings
Train Station
Railway Network
Cycle Network
Public Right of Way

Tree Protection Order (Trunk)
Ancient Woodland
Country Parks
Tree Protection Order (Canopy)
Open Access Land
Registered Parks and Gardens
Important Open Space

Kilometers
0 1 2

Coordinate System: British National Grid

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Drawing Title
Figure 6.13- Landscape designation

Scale at A3
1:60,000

Role
Environment

Suitability
For Information

Project Number
28598200

Rev
P01

Drawing Name
285983-ARP-XX-DR-ENV-033

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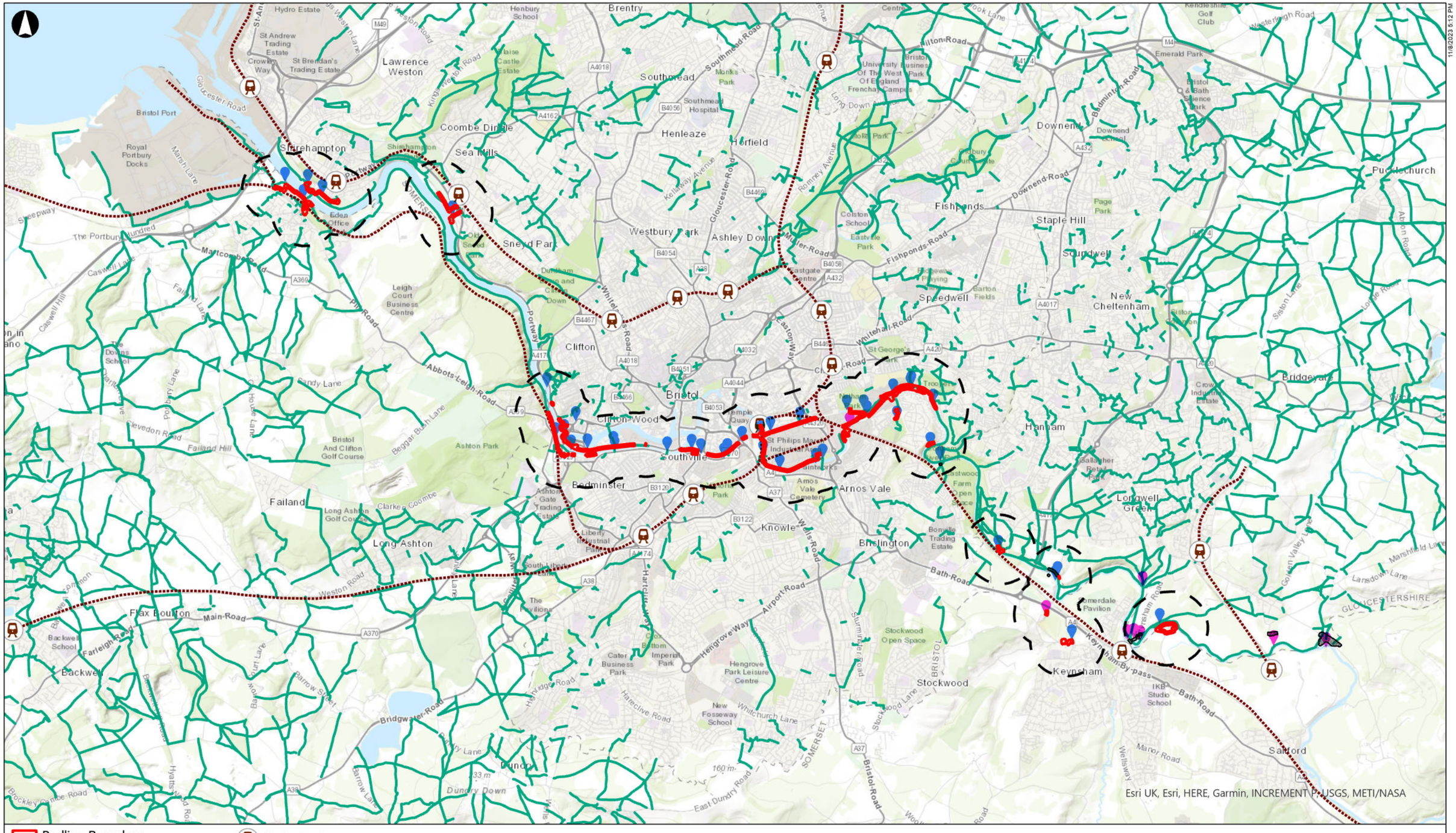

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Drawing Title
Figure 6.14 - Landscape viewpoints

Scale at A3
1:60,000

Role
Environment

Suitability
For Information

Project Number
28598200

Rev
P01

Drawing Name
285983-ARP-XX-DR-ENV-034

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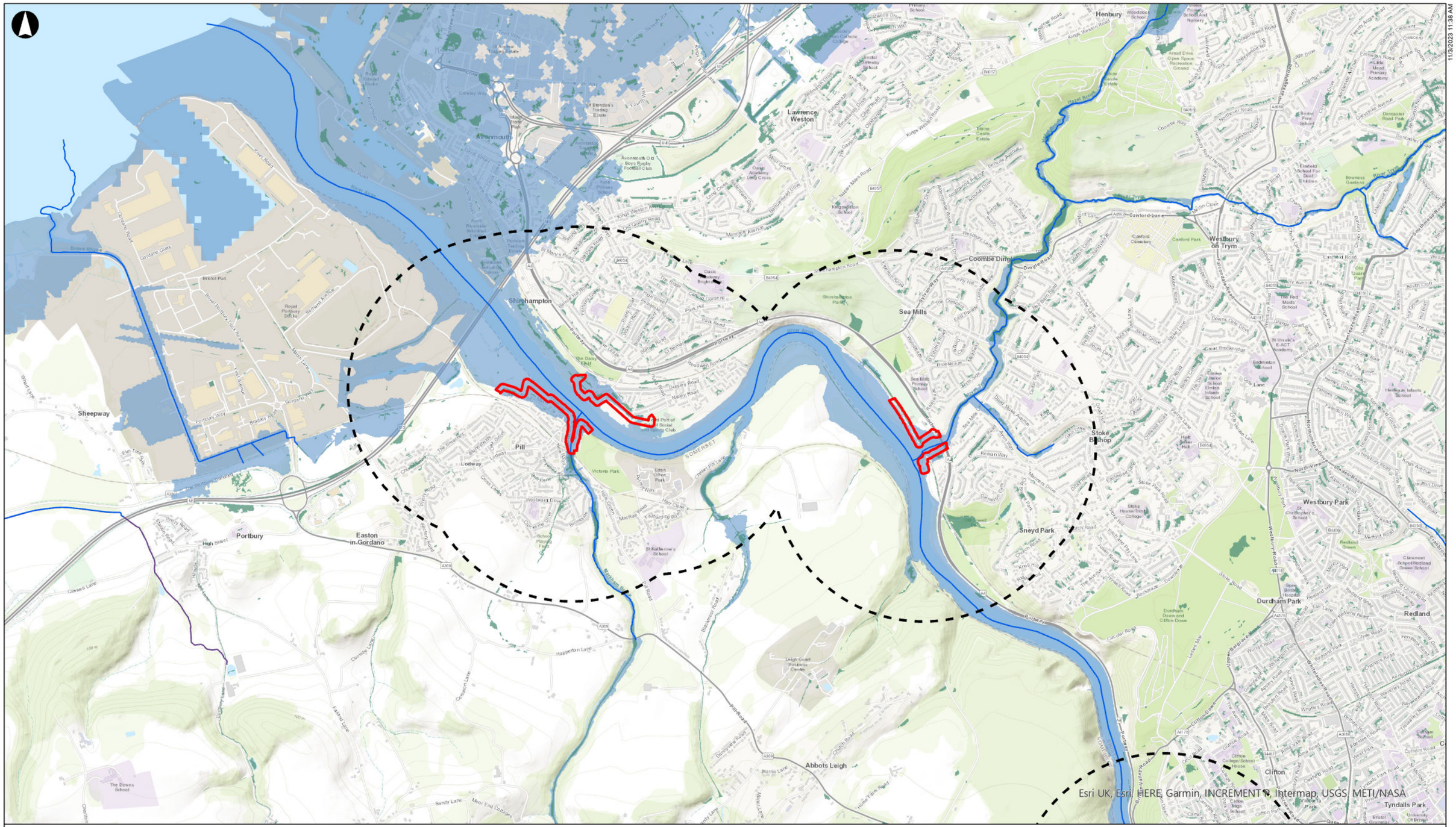

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Redline Boundary
1km Buffer
PFR Buildings
Main Rivers
Surface Water Flood Risk (1 in 30 years)
Risk of Flooding from Rivers and Sea

Kilometers
0 1 2

Coordinate System: British National Grid

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Project Name
Bristol Avon Flood Strategy

Drawing Title
Figure 6.10 - Baseline Flood Risk (Page 1 of 3)

Scale at A3
1:25,000

Role
Environment

Suitability
For Information

Project Number
28598200

Rev
P01

Drawing Name
285983-ARP-XX-DR-ENV-024

B:\285000\285982-00_BristolAvonFlood\Workspaces\GBR_28598200_BAFS_EIAFigures\P02_Workspace\Figure 2.8 Baseline Flood Risk.aprx

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- Redline Boundary
- 1km Buffer
- PFR Buildings
- Main Rivers
- Surface Water Flood Risk (1 in 30 years)
- Risk of Flooding from Rivers and Sea

Kilometers
0 1 2

Coordinate System: British National Grid

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Bristol Avon Flood Strategy

Drawing Title
Figure 6.10 - Baseline Flood Risk (Page 2 of 3)

Scale at A3
1:25,000
Role
Environment
Suitability
For Information
Project Number
28598200
Rev
P01
Drawing Name
285983-ARP-XX-DR-ENV-025

B:\285000\285982-00_BristolAvonFlood\Workspaces\GBR_28598200_BAFS_EIAFigures\P02_Workspace\Figure 2.8 Baseline Flood Risk.aprx

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Redline Boundary
1km Buffer
PFR Buildings
Main Rivers
Surface Water Flood Risk (1 in 30 years)
Risk of Flooding from Rivers and Sea

Kilometers
0 1 2

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Project Name
Bristol Avon Flood Strategy

Drawing Title
Figure 6.10 - Baseline Flood Risk (Page 3 of 3)

Scale at A3
1:25,000

Role
Environment

Suitability
For Information

Project Number
28598200

Rev
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Drawing Name
285983-ARP-XX-DR-ENV-026

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Redline Boundary
1km Buffer
PFR Buildings
Main Rivers
WFD River Canal Land Surface Transfer Water Bodies
Special Protection Areas
Special Areas of Conservation
Sites of Specific Scientific Interest
Sites of Nature Conservation Interest
Floodzone 2
Floodzone 3

Kilometers
0 1 2

Coordinate System: British National Grid

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Drawing Title
Figure 6.11 - Surface Water Features (Page 1 of 3)

Scale at A3
1:25,000
Role
Environment
Suitability
For Information
Project Number
28598200
Rev
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Drawing Name
285983-ARP-XX-DR-ENV-027

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Redline Boundary
1km Buffer
PFR Buildings
Main Rivers
WFD River Canal Land Surface Transfer Water Bodies
Special Protection Areas
Special Areas of Conservation
Sites of Specific Scientific Interest
Sites of Nature Conservation Interest
Floodzone 2
Floodzone 3

Kilometers
0 1 2

Esri UK, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA

Coordinate System: British National Grid

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Bristol Avon Flood Strategy

Drawing Title
Figure 6.11 - Surface Water Features (Page 2 of 3)

Scale at A3
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Role
Environment
Suitability
For Information
Project Number
28598200
Rev
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Drawing Name
285983-ARP-XX-DR-ENV-028

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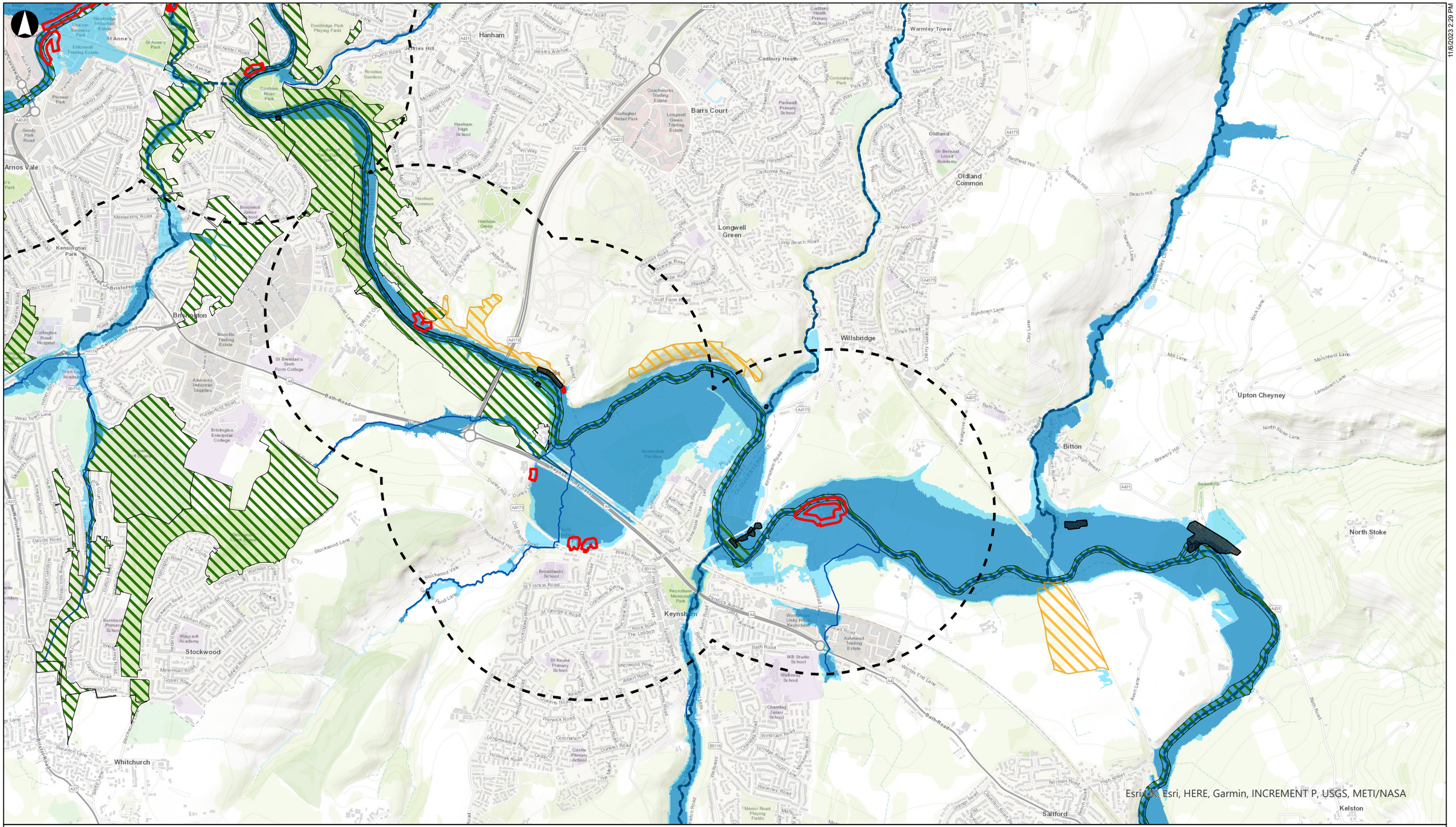

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Redline Boundary
1km Buffer
PFR Buildings
Main Rivers
WFD River Canal Land Surface Transfer Water Bodies
Special Protection Areas
Special Areas of Conservation
Sites of Specific Scientific Interest
Sites of Nature Conservation Interest
Floodzone 2
Floodzone 3

Kilometers
0 1 2

Coordinate System: British National Grid

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Drawing Title
Figure 6.11 - Surface Water Features (Page 3 of 3)

Scale at A3
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Role
Environment
Suitability
For Information
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Drawing Name
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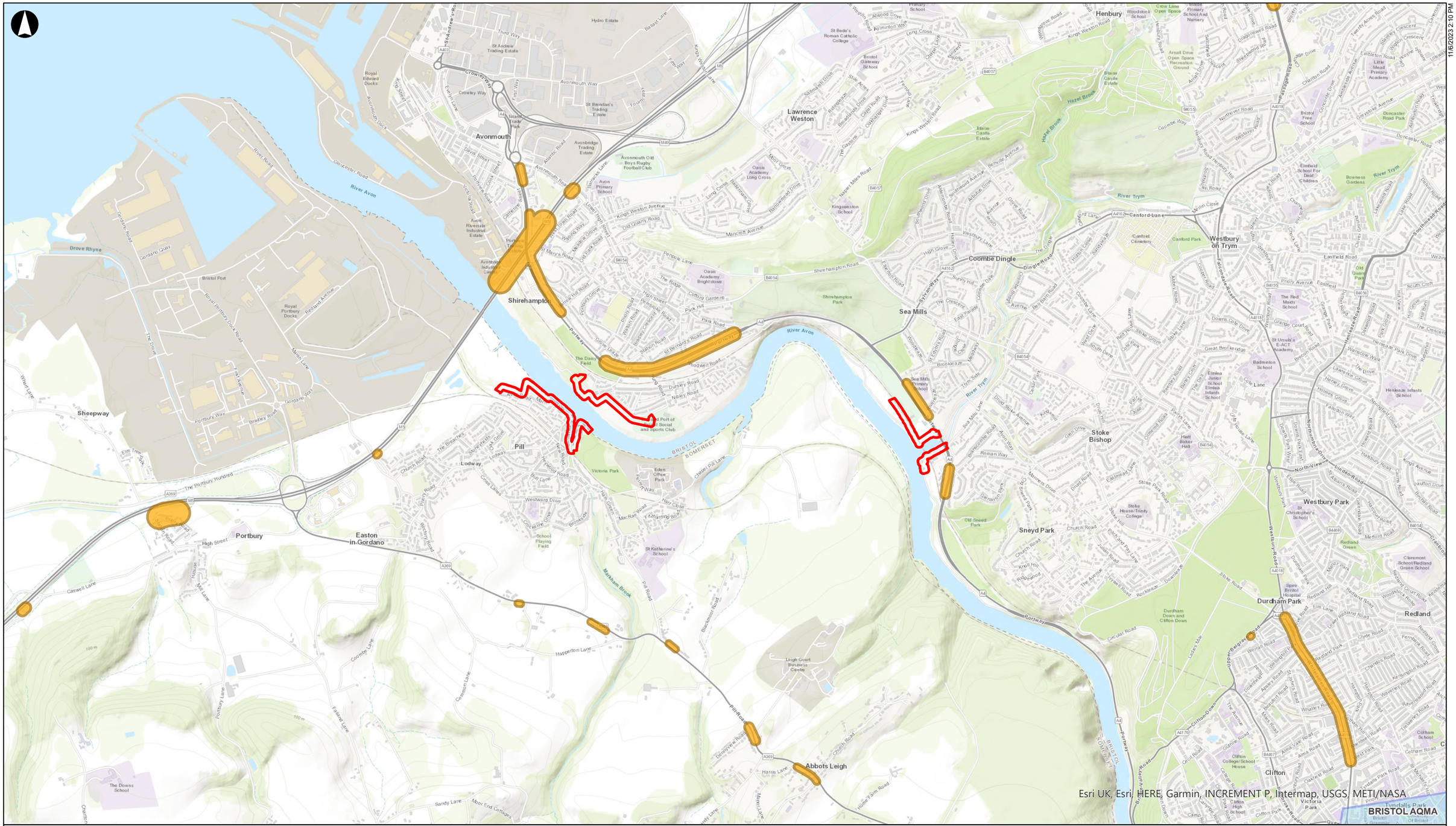

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Redline Boundary
PFR Buildings
Air Quality Management Area (AQMA)
Noise Important Areas

Kilometers
0 1 2

Coordinate System: British National Grid

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Drawing Title
Figure 7.1 - Environmental Constraints (Page 1 of 3)

Scale at A3
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Role
Environment
Suitability
For Information
Project Number
28598200
Rev
P01
Drawing Name
285983-ARP-XX-DR-ENV-030

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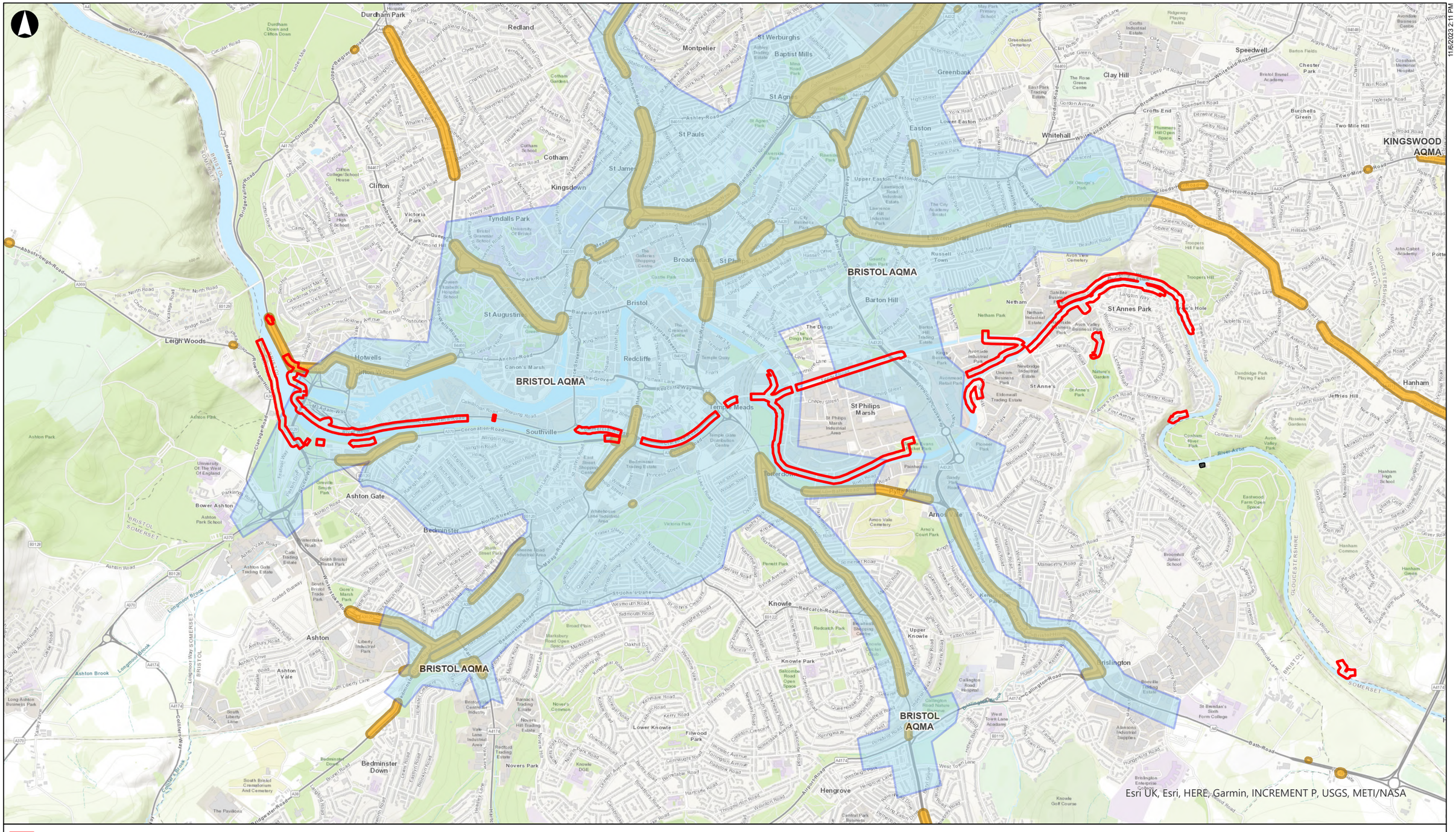

Redline Boundary
PFR Buildings
Air Quality Management Area (AQMA)
Noise Important Areas

Kilometers
0 1 2

Coordinate System: British National Grid

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Project Name
Bristol Avon Flood Strategy

Drawing Title
Figure 7.1 - Environmental Constraints (Page 2 of 3)

Scale at A3
1:25,000

Role
Environment

Suitability
For Information

Project Number
28598200

Rev
P01

Drawing Name
285983-ARP-XX-DR-ENV-031

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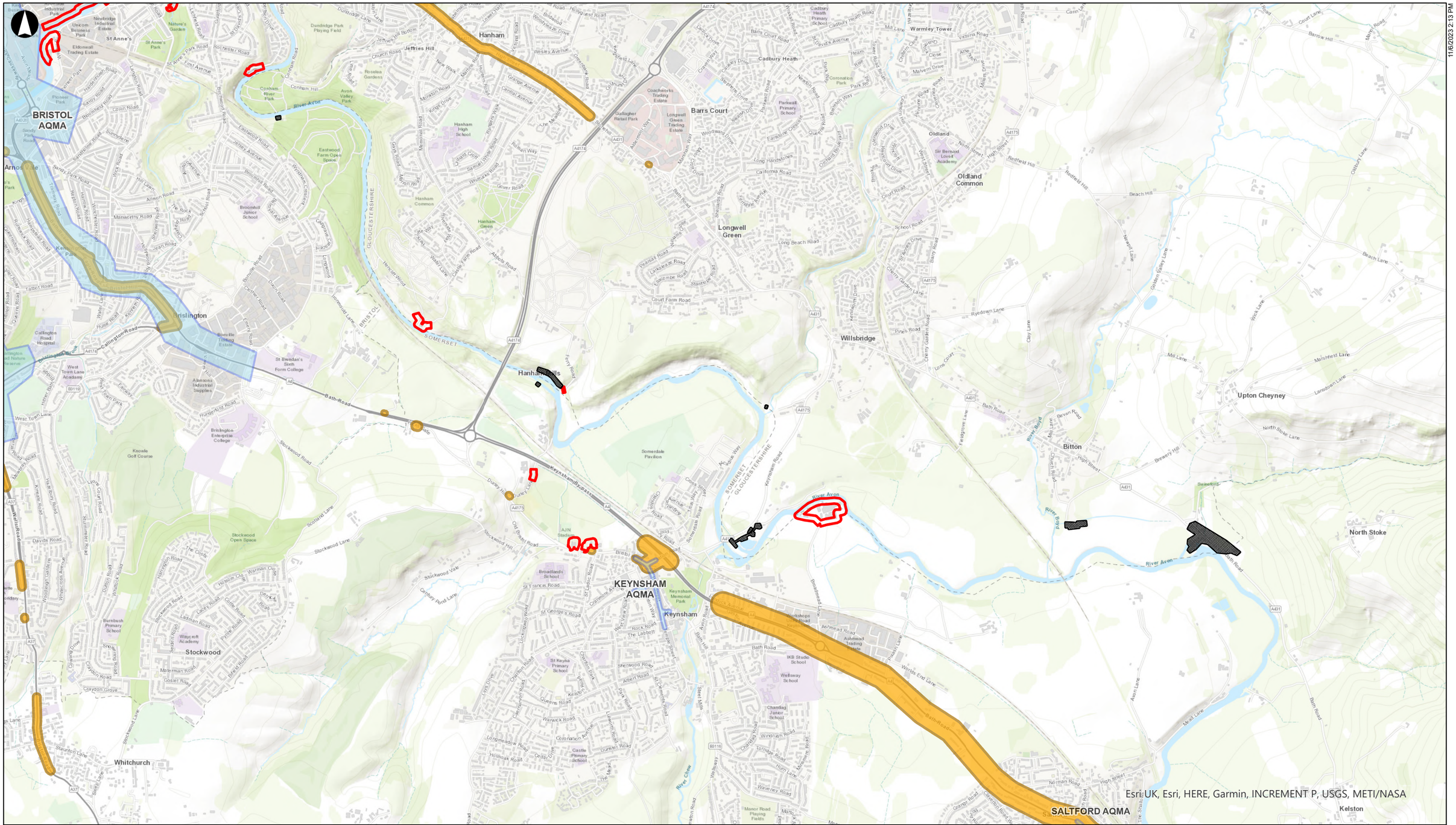

- Redline Boundary
- PFR Buildings
- Air Quality Management Area (AQMA)
- Noise Important Areas

Kilometers
0 1 2

Coordinate System: British National Grid

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Drawing Title
Figure 7.1 - Environmental Constraints (Page 3 of 3)

Scale at A3
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Role
Environment
Suitability
For Information
Project Number
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Rev
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Bristol Avon Flood Strategy

Draft Environmental Impact Assessment Scoping Report

Reference: BAFS_ARP_ENV_001

ISSUE | 30 January 2024

Job number 285982-00

Ove Arup and Partners Limited
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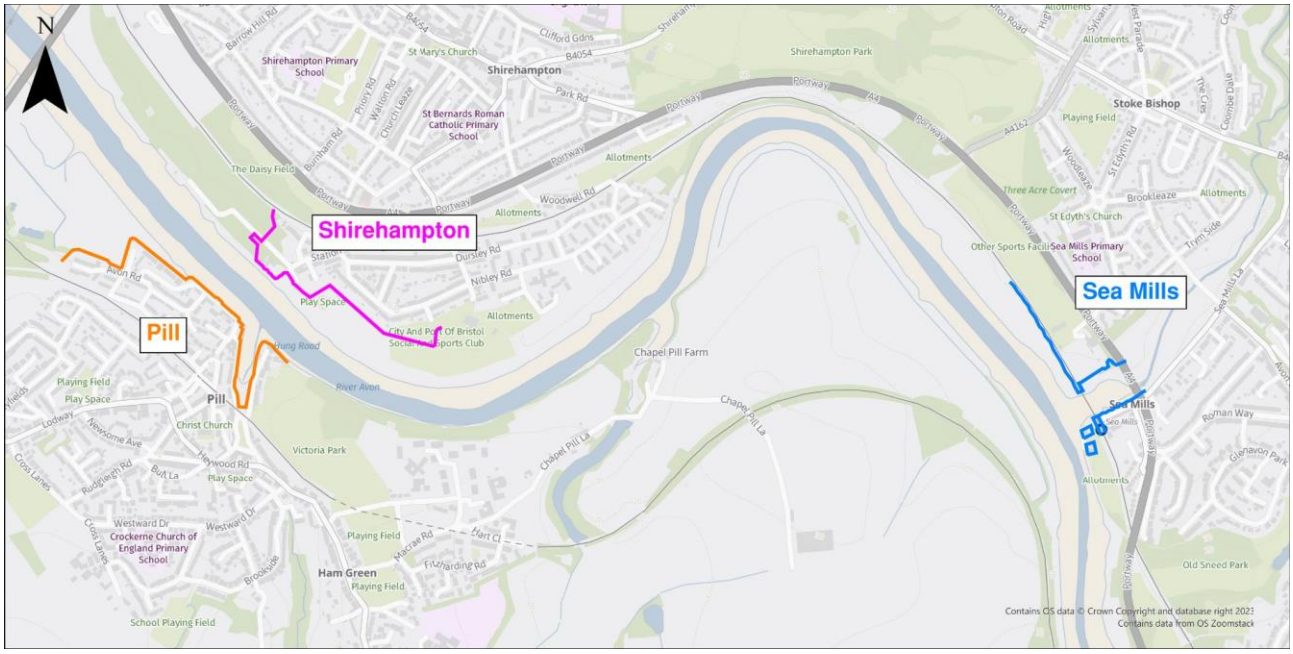
BS1 6JZ
United Kingdom
arup.com

Contents

Tables

Figures



Drawings

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Pictures

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Photographs

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Attachments

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Appendices

1. Introduction

1.1 Background

Bristol City Council (BCC) ('the Applicant') is working in partnership with the Environment Agency (EA) to deliver the long-term Bristol and Avon Flood Strategy ('the Strategy'), and is committed to undertaking an EIA to be reported in an Environmental Statement which will accompany the application for the Proposed Development.

Bristol City Council commissioned Ove Arup and Partners Ltd. (Arup) to prepare a Draft Environmental Impact Assessment (EIA) Scoping Report to inform the Outline Business Case (OBC) stage of the Strategy, which at Full Business Case (FBC) stage is intended to be developed further submitted as part of proposals for the development of the Proposed Development.

Tidal and fluvial flooding from the River Avon represent an increasingly significant risk to Bristol and its neighbouring communities with the potential for severe consequences. The city is at risk from both tidal surges from downstream and high river flows from upstream. Climate change is increasing sea levels and peak river flows meaning that widespread flooding of central Bristol is likely to become a relatively frequent occurrence. The impact would be felt across the West of England due to Bristol's regional importance for employment, transport, recreation, tourism and economic growth.

Bristol City Council is working with the Environment Agency and key stakeholders to create a vital long-term strategy to protect the city from increased flood events, supported by Arup. The Strategy includes the provision of flood defence infrastructure to manage the flood risk from the River Avon to the centre of Bristol with placemaking to seek opportunities for inclusive growth, quality of life, environmental improvement and resilience.

The Strategic Outline Case was developed in 2020, informed by a Strategic Environmental Assessment[1] (and Addendum[2]).

1.2 Purpose of Draft EIA Scoping Report

A Scoping Report sets out the proposed scope of an EIA and the contents of the ES to be submitted accompanying a planning application. This Draft EIA Scoping Report has been prepared in part to meet this function, but to also identify further work required at FBC to complete a full EIA Scoping Report.

The Draft EIA Scoping Report is therefore based on the emerging design, which will be developed further at FBC. This Draft EIA Scoping Report will consider the potential impact of the Proposed Development on receptors and the surrounding environment, informed by the design details available at the OBC stage, and will outline the topics likely to be scoped in or out of the Environmental Statement. This will be used to inform Full Business Case (FBC) and will inform the formal submission of an EIA Scoping Report.

A formal EIA Scoping Report will be prepared and submitted to the determining authority during the FBC stage.

1.3 The Need for an EIA

EIA is a systematic process that examines the potential impacts on the environment resulting from the future construction and operation of a Proposed Development. The findings of an EIA are presented in a document known as an Environmental Statement (ES), which can then be used to inform decision makers and the public about the possible environmental implications of a development, and help determine the application. This is a process prescribed by the EIA Directive, which requires the EIA to determine 'likely significant environmental effects' caused by a development.

There are a variety of consenting routes for the Proposed Development. The main consenting routes are captured below including Transport and Works Act, Town and Country Planning, and Marine Licencing.

The formal EIA Scoping Report to be submitted to the determining authority at FBC will include the chosen consenting route.

Transport and Works Act 1992

Under section 3 of the Transport and Works Act 1992 (TWA) the Secretary of State (SoS) can make orders (TWAO) relating to the carrying out of works which interfere with rights of navigation in waters within or adjacent to England and Wales and which are of a description prescribed by an order under section 4. An order made under section 4 (the Transport and Works (Descriptions of Works Interfering with Navigation) Order 1992) lists various works which can be authorised by a TWAO. These include "any other structure for impounding, or diverting or controlling the flow of, water". . Consideration must also be given to the "works" involved which in this case would refer to the construction, emplacement, removal, demolition, alteration or modification.

An Environmental Impact Assessment (EIA) will be prepared in accordance with the Transport and Works (Application and Objections Procedure) (England and Wales) Rules 2006 (S.I. 2006/1466) (hereafter referred to as the Application Rules) which implements the requirements of the European Community Directive 2011/92/EU as amended by Directive 2014/52/EU (EIA Directive). The Proposed Development is considered an Annex II development under the EIA Directive: 10 (f) Inland-waterway construction not included in Annex I, canalisation and flood-relief works.

Town and Country Planning (Environmental Impact Assessment) Regulations 2017

The EIA Directive is transposed to English law by Statutory Instruments, including The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (the EIA Regulations). Within the EIA Regulations, projects are divided into Schedule 1 and Schedule 2 developments. Schedule 1 defines projects where an EIA is always required, and Schedule 2 defines project only requiring EIA if certain criteria are met and is deemed likely to give rise to significant environmental effects. The Proposed Development does not meet criteria within Schedule 1. However, it does meet the 'infrastructure projects' criteria listed in Schedule 2 of the EIA Regulations, Part 10(h) "*Inland-waterway construction not included in Schedule 1, canalisation and flood-relief works*", where the applicable threshold criteria is an area of works which exceeds 1 hectare.

Marine Licencing

In addition, consent is likely to be required in respect of the works below Mean High Water Springs (MHWS). An application could be made to the Marine Management Organisation to obtain this consent. If required, this is likely to be required alongside other consenting routes.

1.4 Structure of the Scoping Report

The contents of this Draft EIA Scoping Report is reflective of the information available at Outline Business Case (OBC) stage. Design development and constructability is ongoing and with detailed studies, including transport modelling, have not been undertaken.

Key Environmental Topics are included within Chapter 6. This contains the key environmental topics that have been identified within the OBC scope and deliverables enabling a good level of scoping to be undertaken. Topics include Cultural heritage, Biodiversity, Ground conditions and contaminated land, Water environment and flood risk, and Townscape and visual impact.

Additional Environmental Topics are included within Chapter 7 and include environmental topics that are dependent on the availability of more detailed information not available at OBC. This includes topics such as Air quality, Noise and vibration, Traffic and transportation, Climate change, Socio-economics, and Health. These topics are considered as part of the Draft EIA scoping Report but acknowledge the need for further detail and that these will be assessed in more detail at FBC.

This document is recognised as being 'live' and iterative through to FBC stage when a formal EIA Scoping Opinion will be sought with the determining authority.

The structure of this Draft Scoping Report is described in Table 1-1.

Table 1-1: Chapter list and contents

Chapter	Contents
Chapter 1 Introduction	Provides an overview of the background of the Proposed Development, the need for an EIA, the purpose of this Draft Scoping Report, its structure and an introduction to the project team.
Chapter 2 Site and surroundings	Describes the existing application site and its surroundings.
Chapter 3 The Proposed Development	Provides a description of the Proposed Development during construction and operation, its components and main alternatives considered as part of a sifting process.
Chapter 4 Policy context	Describes the policy and regulatory context for the Proposed Development
Chapter 5 Approach to assessment	Sets out the requirements for scoping and where they are addressed in this report, the general approach to EIA, and provides definitions for some of the key terms used within the EIA process
Chapter 6 Key Environmental Topics	Sets out those environmental topics where investigations have been undertaken at OBC, and identifies potential effects and mitigation to be embedded as design develops
Chapter 7 Additional Environmental Topics	Presents further environmental topics likely to require assessment
Chapter 8 Summary and next steps	Identifies environmental topics which will require further detail at FBC.

This document is supported by other studies which include:

- Outline Heritage Desk-Based Assessment (Appendix A)
- Preliminary Ecological Appraisal (Appendix B)
- Biodiversity Net Gain Screening (Appendix C)
- Draft Habitats Regulation Assessment Stage 1 and 2 (Appendix D)
- Preliminary Water Environment Regulations Compliance Assessment (Appendix E)
- Preliminary Whole Life Carbon Assessment (Appendix F)
- Ground Conditions Phase 1 Report (Appendix G)

1.5 Project team

This Draft EIA Scoping Report has been prepared by competent experts who will undertake the EIA and prepare the ES. Arup holds the Institute of Environmental Management and Assessment's (IEMA) EIA Quality Mark.

All environmental topic inputs are provided by Arup on behalf of BCC.

2. Site and Surrounding Area

2.1 Site context

The Proposed Development is located at several locations along the River Avon; the majority of the Proposed Development is located in the centre of Bristol city on the River Avon, with parts of the Proposed Development extending east upstream, and west downstream, see Figure 2.1. The Proposed Development extends from Pill and Shirehampton in the west, to Swineford and Bitton in the east, with a total length of defences of approximately 14.7km. Existing land use in the extent of the Proposed Development is a mixture of developed urban environment and rural.

Bristol lies adjacent to the River Severn Estuary, a tidal water body that has the second highest tidal range in the world. The River Avon that flows through Bristol discharges to the estuary and is therefore also tidal, and the influence of the tide extends upstream as far as Saltford near Bath.

The River Avon is a designated main river, and is constrained in many places by existing development. There are a number of environmental designations within and adjacent to Proposed Development including the River Avon, which forms a Site of Nature Conservation Interest throughout the city and links Important Open Spaces.

The Proposed Development comprises accessible public open space, footpaths adjacent to active roads, and business premises. There is a strong heritage presence throughout Bristol city centre and along the extents of the Proposed Development as a result of its historic harbourside setting. The character of the reaches along the river varies significantly. From the wide-open estuarine environment at Pill and Shirehampton, to the iconic setting of the River Avon gorge, the urban historic townscape of the New Cut, the original river course upstream of Temple Meads with both urban and natural settings, and then to wooded river valley at Conham.

2.2 Site Description

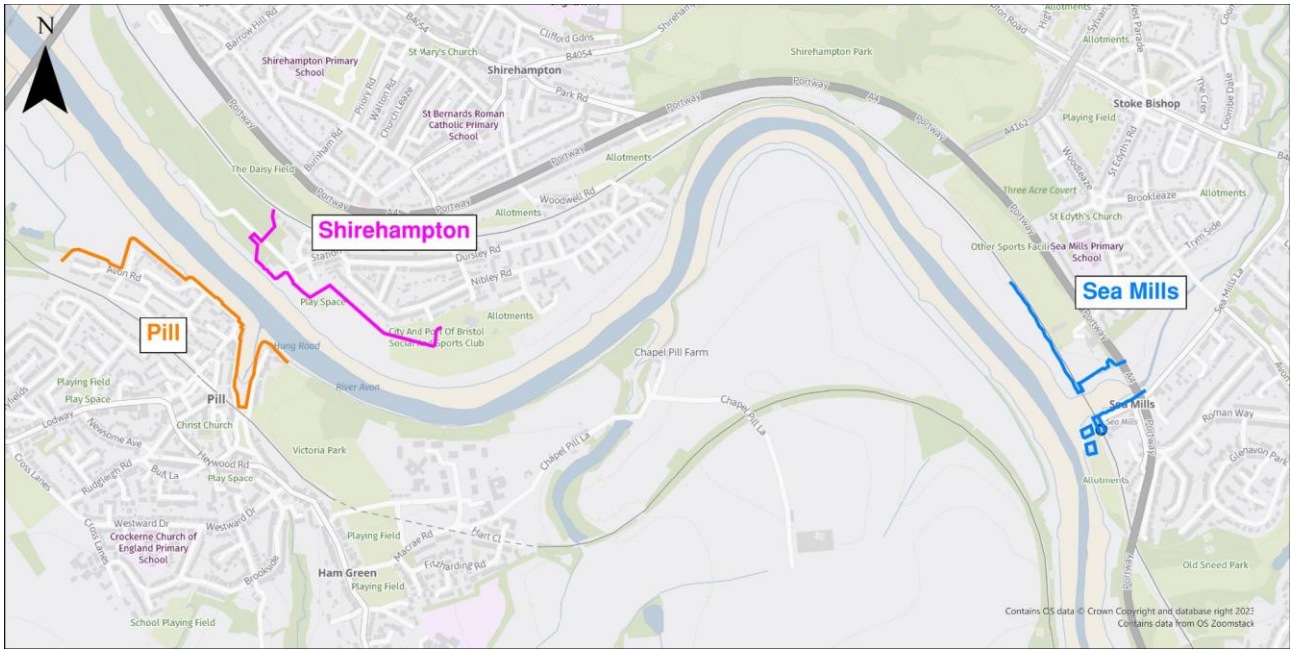
It should be noted that the area of works for the Proposed Development, as shown in Figure 2.1, is indicative at this stage, but is sufficient to identify land likely to be required for the Proposed Development and therefore consistent with information required to form a Scoping Opinion as described in the EIA Regulations (see **Chapter 5 Approach to EIA**).

The Bristol Avon Flood Strategy consists of three broad areas:

- Downstream defences: Shirehampton, Pill and Sea Mills;
- Central Bristol; and
- Upstream defences: Detriment defences in isolated areas upstream of Crews Hole Road.

2.2.1 Downstream defences

Downstream of central Bristol, defences are required in Shirehampton, Pill and Sea Mills, shown in Inset 1. These sites are described further below.



Inset 11: Pill, Shirehampton and Sea Mills Defence Areas

Shirehampton

Shirehampton is a district of Bristol on the north bank of the Avon, just upstream of Avonmouth and the M5 bridge. Long distance footpath, the Severn Way, is of local importance and loops around the district in parallel both with the River Avon and a railway line which serves two stations in the suburb.

The Proposed Development is partially located in Shirehampton Conservation Area and is in close proximity to a number of designated heritage assets including Grade II Listed Lamplighters Public House, Wellington House and attached stables, and 103 and 105 Station Road. Archaeological remains may be present, particularly those related to the non-designated heritage asset Lamplighters Ferry, including its route, stone slipway and former ticket office. The Proposed Development is also partially within Lamplighters Marsh Local Nature Reserve (LNR) and close to the Severn Estuary Site of Special Scientific Interest (SSSI), Special Protection Area (SPA), Special Area of Conservation (SAC) and Ramsar Site.

Pill

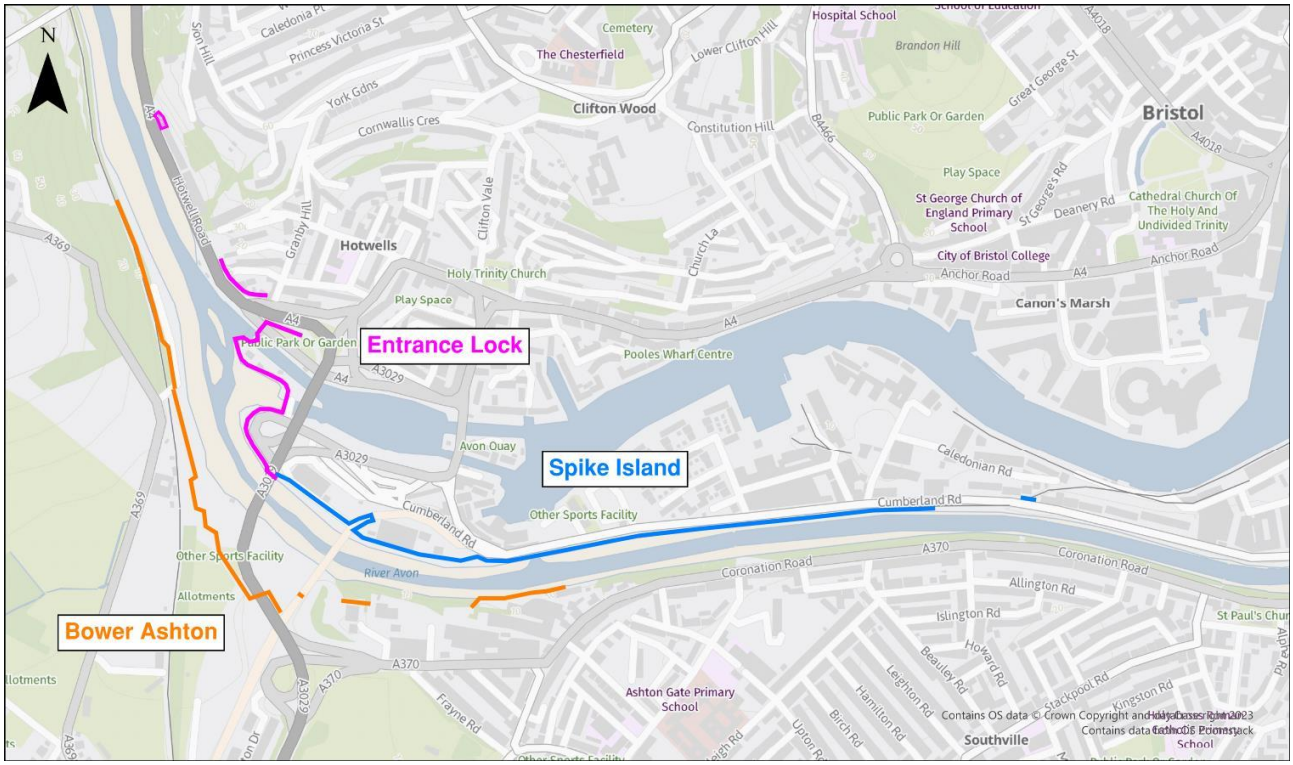
Pill is a district directly opposite Shirehampton on the south bank of the Avon, in North Somerset. The Site is partially within the Severn Estuary SSSI, SPA, SAC and Ramsar Site and close to Lamplighters Marsh LNR. Designated heritage assets include the Grade II Listed Watch House and Grade II Listed Mulberry Cottage. There are also a number of non-designated heritage assets including and a locally listed park associated with Ham Green Hospital, Pill Harbour, Portishead and Bedminster Railway and features associated with the Lamplighters Ferry. There is high archaeological potential within Pill Harbour and its surrounds.

Sea Mills

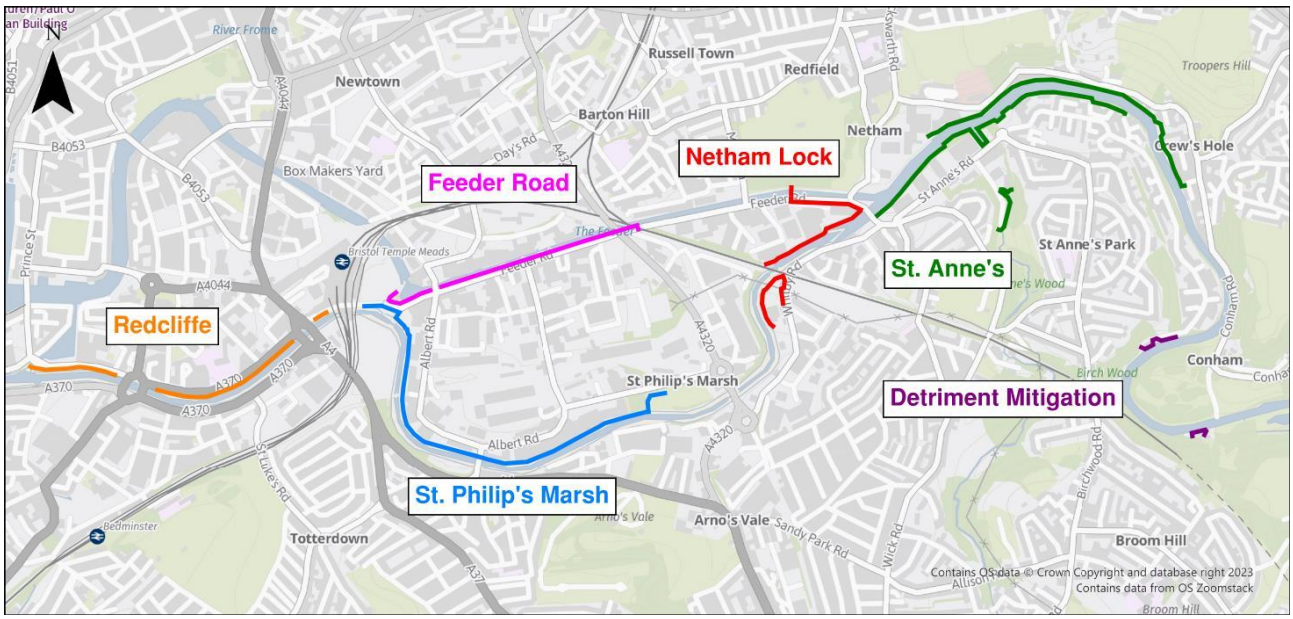
Sea Mills is a suburb of Bristol directly upstream of Shirehampton. The Severn Way, a long distance footpath, passes to the south of the suburb, running parallel to the Avon and passing through Sea Mills railway station. There are three designated heritage assets in close proximity to the Proposed Development: a Scheduled Monument (part of the Roman Settlement of Abonae), the Grade II Listed Harbour walls of Sea Mills Docks and Sea Mills Conservation Area. Non-designated heritage assets include locally listed Sea Mills Signal Station and Railway Station and Station Master's House. There is high potential for archaeological remains. The Proposed Development is also in close proximity to Avon Gorge Woodlands SAC and SSSI.

2.2.2 Central Bristol

For the purposes of design and ease of reference, the central Bristol defences have been split into eight interventions, shown in Inset 2 and 3. These sites are described further below.



Inset 22: Bower Ashton, Entrance Lock and Spike Island Defence Areas



Inset 33: Redcliffe, Feeder Road, St. Philip's Marsh, Netham Lock and St. Anne's Defence Areas (including some detriment mitigation)

Bower Ashton

This area of the Proposed Development includes isolated sections of the south bank of the Avon at Payne's Shipyard and the Tannery. There is then a continuous line of defence from the east side of Brunel Way, downstream adjacent to the railway line and along the existing towpath to a point roughly adjacent to 400 Hotwell Rd. The River Avon Trail footpath, popular with walkers, runs parallel with the Avon and part of the defence. The Proposed Development is partially within the Avon Gorge Woodlands SAC and SSSI and Leigh Woods National Nature Reserve (NNR). Part of the area is also within the City Docks Conservation

Area and non-designated heritage assets include Portishead and Bedminster Branch Railway. There is potential for archaeological remains.

Entrance Lock

The Entrance Lock area is from Hotwell Road, around the Tongue Head and end of Spike Island to the Brunel Way flyover. The lock itself is the entrance to the western end of Bristol's floating harbour. The lock gates are managed by BCC's harbour operations team.

This area is accessible to the general public with designated footways, cycleways - namely the Severn Way - and amenity public open space. Much of the area is also used for harbour operations.

The area is entirely within City Docks Conservation Area with several Grade II and II* Listed Buildings and structures in the vicinity. There are various areas of intertidal mudflats and coastal saltmarsh across this area, which are designated as Avon New Cut Site of Nature Conservation Importance (SNCI) and LNR.

Spike Island

The Spike Island section of defences runs from the Brunel Way flyover, past the Bonded Warehouses and along the Chocolate Path before tying into high ground as it raises towards Wapping Wharf. The works within this section also include the area between Wapping Wharf and the Chocolate Path, where it passes underneath Cumberland Road. This area is accessible to the general public with designated footways, cycleways - namely the Chocolate Path Severn Way - and amenity public open space.

The area is entirely within City Docks Conservation Area with several Grade II and II* Listed Buildings and structures in the vicinity, as well as Underfall Yard Scheduled Ancient Monument. The Proposed Development is partially within Avon New Cut SNCI and LNR.

Redcliffe

The Redcliffe section of the defence runs on the northern bank of the River Avon from Bathurst Dam in the west, along Commercial Road and Clarence Road to Cattle Market Road and tying into the underpass beneath Temple Meads station in the east.

Redcliffe and City Docks Conservation Areas span across this location with several Grade I and II Listed Buildings and structures in the vicinity, including Bristol Temple Meads Grade I, National Rail bridge. Of note, the stones arches on the existing wall along Commercial Road are not listed but are an important part of the character of the area.

There are various areas of intertidal mudflats and coastal saltmarsh across this area, which are designated as a Avon New Cut SNCI and LNR, as well as mature trees along or near the river.

Feeder Road

The Feeder Road section runs from the western end of Feeder Road, where it meets Cattle Market Road, and runs along the southern edge of the Feeder Canal up to the railway bridge at the intersection of Cole Road.

Parts of the flood defences are located within Silverthorne Lane Conservation Area, which includes various Grade II and II* listed industrial warehouses. There are also non-designated heritage assets including Feeder Canal, Canal at St Philip's Marsh and Rhubarb Tavern along with potential for archaeological remains in some areas of the site.

An area of open space where Cattle Market Road meets Feeder Road, contains large trees and shrubs and is used as amenity space. It is located close to Avon New Cut SNCI and LNR.

St Philip's Marsh

The St Philip's Marsh section starts at the eastern abutment of the Grade I listed railway bridge that forms part of Temple Meads station, runs along the southern side of Cattle Market Road and follows the north side of the existing foot- and cyclepath to Sparke Evans Park. Other designated heritage assets include Grade I Listed Temple Meads station and Grade II Listed Warehouse, former premises of Marble Mosaic Company.

Non-designated heritage assets include Totterdown Bridge, Sparke Evans Park and Totterdown Basin and Lock. The Proposed Development is close to Avon New Cut SNCI and LNR.

Netham Lock

This area incorporates part of the eastern end of Feeder Road, around the edge of St Philip's Marsh and along the North bank of the Avon past Netham Lock to tie in to the existing railway bridge. Netham Lock is operated by BCC to allow navigation from the River Avon into the eastern end of the floating harbour.

This area sits within the Avon Valley Conservation Area, there are various Grade II Listed assets associated including Lock Keeper's House and Netham Lock including the remains of the bridge. Non-designated heritage assets include Netham dam, New Brislington Bridge and Bailey Bridges and it is possible there may be archaeological remains. Netham Park is an area of public open space, with associated PROW's.

St Anne's

This section includes both the north and south bank of the Avon upstream of Netham Lock. On the North bank it extends along the existing River Avon footpath from Satellite Business Park to Butlers Walk. On the south bank, there is a line of existing sheet piling from Riverside Business Park to Pilgrims Wharf. The area is within the Avon Valley Conservation Area and has the potential for archaeological remains. The Proposed Development is close to Troopers Hill LNR, Eastwood Farm LNR and Avon Valley Woodland LNR.

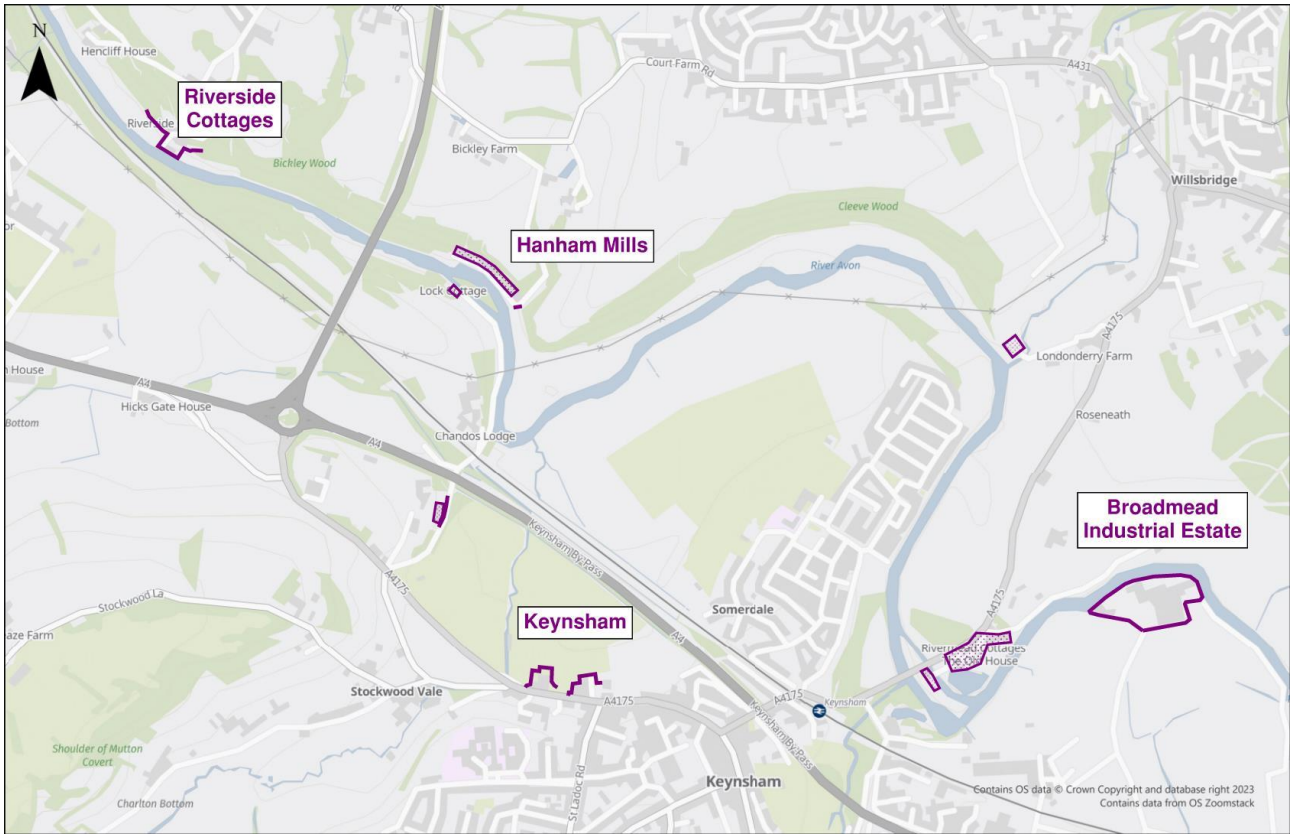
2.2.3 Upstream defences

Upstream of St Anne's, property flood resilience works are required on a total of fifty-seven properties in:

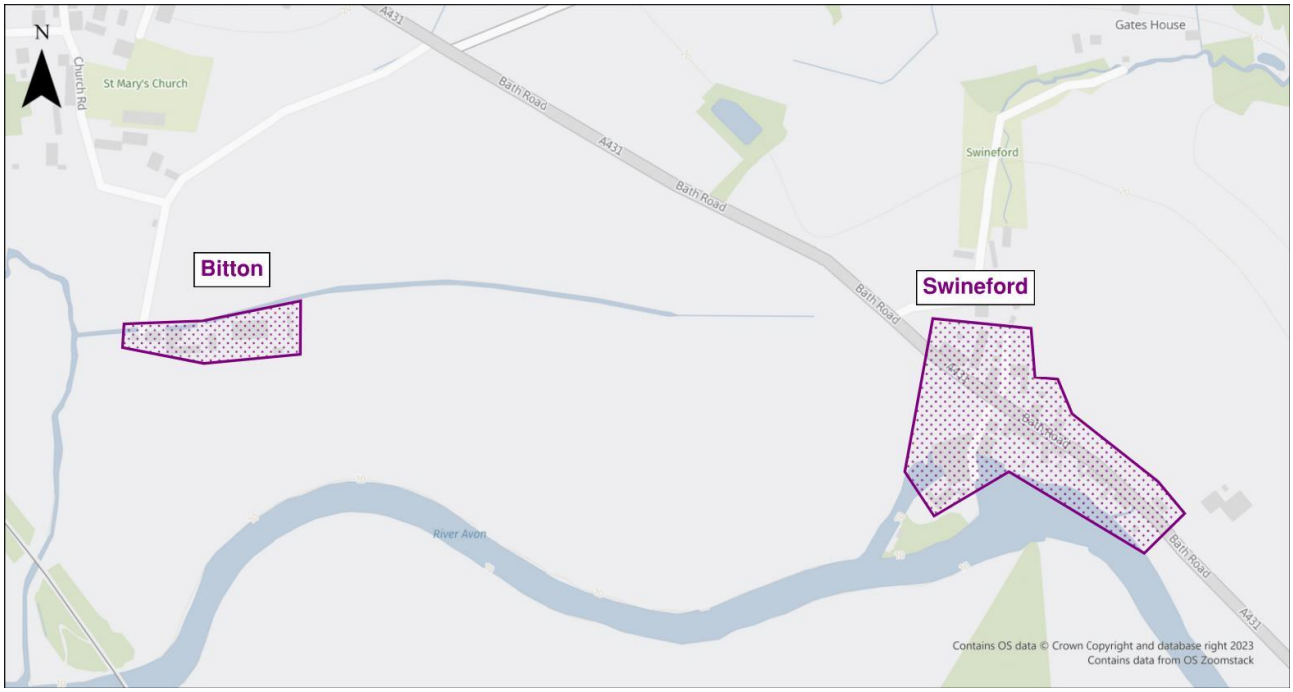
- Hanham Mills – located near the riverbank just north of Lock Cottage, and within Hanham Abbots Conservation Area the Proposed Development is partially within Bickley Wood SSSI and has Listed Buildings including Grade II Listed Picnic House and Grade II Listed 1-4 Hanham Mills Road.
- Keynsham – a small town immediately south of the River Avon part of which is designated as Keynsham Conservation Area. There are many Listed Buildings including Grade II Listed Ile D'Avon Club and the remains of Keynsham Abbey which is Grade I Listed and a Scheduled Monument;
- Bitton – a village to the north of the River Avon located within Bitton Conservation Area. Also present are the Scheduled Monuments Medieval Enclosure and a Round Barrow and Listed Buildings including Grade I Listed Parish Church of St Mary; and
- Swineford – a small village to the north of the River Avon with Listed Buildings including Grade II Listed Swineford Copper Mills including waterwheels and machinery.

In addition, engineered defences are required:

- adjacent to Riverside Cottages at Hanham Mills;
- around the Broadmead Lane Industrial Estate;
- adjacent to Beese's Bar; and
- at Keynsham Rugby football club.



Inset 4: Keynsham and Neighbouring Defence Areas



Inset 5: Bitton and Swineford Defence Areas

3. The Proposed Development

This chapter of the Draft EIA Scoping Report outlines the need for, and purpose of, the Proposed Development. This chapter provides a description of its main components, including an outline of construction and operational requirements.

The Draft EIA Scoping Report is based on the emerging design, which will be developed further to take into account the findings of the EIA, and to have regard to consultation responses where feasible. A formal EIA Scoping Report will be prepared and submitted to the determining authority during FBC.

3.1 Strategic case for the Project

Tidal and fluvial flooding from the River Avon represent an increasingly significant risk to Bristol and its neighbouring communities with the potential for severe consequences. The city is at risk from both tidal surges from downstream and high river flows from upstream of Bristol city. Climate change is increasing sea levels and peak river flows meaning that widespread flooding of central Bristol is likely to become a relatively frequent occurrence.

Bristol has a long history of flooding. Over twenty minor events in the last decade have flooded properties and/or roads around the river including areas of Sea Mills, the Portway, Cumberland Basin, Avon Crescent, Coronation Road, Cattle Market Road and at St Philip's. In March 2020, Bristol experienced the highest tidal event (of 8.81m AOD) since records began. This led to very high flood depths under the Clifton Suspension Bridge, at Junction Lock and at Cattle Market Road, and disruption as a result of road closures. Whilst defences largely protected properties, if this event had coincided with storm surges seen just a few weeks earlier the event could have been significantly worse.

Flooding currently poses a threat to lives, properties, wellbeing and the long-term economic prosperity of the city and wider region. A severe flood today would result in lasting widespread impact from hazardous flood water, damage to property, damage and disruption to infrastructure as well cultural heritage assets.

Bristol's Floating Harbour forms a fundamental part of the city's current River Avon flood defences. The harbour's capacity is limited and the tidal flood gates are increasingly vulnerable to operational failure, overtopping and outflanking by flood water.

3.2 The need for the Project

The continuation of the status quo in terms of the existing activities and the current flood defences as detailed below may be unable to address the required future flooding protection of Bristol and neighbouring communities ("do minimum" scenario). The threat from climate change is likely to have a significant impact across the city, but notably in areas at risk of tidal flooding. This would not only pose a threat to life in the city but also currently placing a constraint on future planning and regeneration in the city.

3.2.1 Futureproofing the city and neighbouring communities

Without investment, Bristol and neighbouring communities are at increasing risk of widespread flooding. Around 1,000 homes and businesses near the city centre and 400 properties in neighbouring communities are at risk of being flooded in either a severe fluvial or tidal flood from the River Avon creating an environment hazardous to life in places. Without action, by the end of the century almost 3,100 existing properties could be at risk in severe floods.

3.2.2 Enabling a greener, more active city

Creating and improving flood defences presents an opportunity to improve walking and cycling routes along the River Avon with improved active travel links being integrated into the defences. Links would be created with other parts of the city, better connecting people with housing, work and recreation. In areas where more space is available, defences could take the form of a green space that provide additional wildlife and recreation benefits every day. Access to the riverside could be improved, whilst areas with historic features, such as retaining walls, would be restored and maintained to prolong their life.

3.2.3 Unlocking Bristol's potential

Currently, without a Flood Risk Management Strategy that has reasonable certainty of delivery, new development must individually deliver flood risk mitigation to ensure the development is safe for its lifetime (100 years for residential uses) without increasing flood risk elsewhere, and benefits from safe, dry access during a "design flood". In some locations this is extremely challenging to achieve, meaning development is unlikely to comply with national planning policy and may be refused on this basis. Hence, regeneration in the area is stagnating. The proposed approach has learnt lessons from other cities divided by rivers that have successfully delivered similar opportunities including Derby, Leeds and Sheffield. By defending areas currently at risk of flooding, the proposed defences would also unlock wider benefits to the city through supporting growth and regeneration such as the jobs, homes and public spaces that will ensure Bristol is a resilient city where people and business can thrive.

3.3 Options Selection Process

A long list of options was considered for managing the flood risk for Bristol City Centre. The long list development and appraisal was originally undertaken in the 2017 Study, and summarised in the SOC in 2020. Given that the leading option was identified during the SOC, no further development of the longlist has taken place at OBC. The options are outlined in Table 3-1 below, and explained further in the main OBC document.

Table 3-1 Summary of the strategic options considered

Option	Description	Outcome
Do Nothing	A scenario where all maintenance, repair and renewal work of existing flood defences, together with assets whose function influences flood risk would cease immediately. Harbour flood gates assumed to be in open position.	Not an acceptable or viable approach. Included as a baseline against which strategic options could be compared.
Do Minimum	Maintain the 'status quo' i.e. continued maintenance of all existing defences and the existing Floating Harbour water level control structures, but no new defences and no raising of defences.	Not an acceptable or viable approach. Included as a baseline against which strategic options could be compared. Harbour operation increasingly prone to failure due to frequent inundation.
'Low' defences	Constructing new defences, to a chosen standard of protection for 2030, as an interim measure	Considered viable to take to the shortlist in combination with other measures.
'High' defences	Constructing defences to a chosen standard of protection for 2130. Implemented by constructing a new defence or raising a low defence.	Considered viable to take to the shortlist in combination with other measures.
Wide tidal barrier	Construction and operation of a tidal barrier across a 'wide' section of the River Avon downstream of Bristol at Pill and Shirehampton, approximately 500m upstream of the M5 road bridge	Considered viable to take to the shortlist in combination with other measures.
Narrow tidal barrier	Construction and operation of a tidal barrier across a 'narrow' section of the River Avon downstream of Bristol at Ham Green / Nibley Road, approximately 1500m upstream of the wide barrier option location.	Potential secondary uses (generation of tidal energy and provision of transport links) found not to be viable.
Local scale measures	Property resilience measures (such as flood plans, flood doors and flood resilient buildings) and temporary defences	Considered viable to take to the shortlist in combination with other measures.

Several flood defence techniques were not included in the long list appraisal, as they were discounted from a technical perspective. These included:

- Source techniques to slow the flow upstream (such as flood storage, working with nature or land management) to capture and store water, slow and somewhat reduce the peak river flows from upstream tributaries, smaller streams or rivers that flow into the River Avon were discounted on technical grounds due to the impractically large scale of required upstream works for the 2,200km2 upstream catchment and the fact that this approach would not reduce tidal flooding from the estuary.

  However, SOC consultation demonstrated a high level of support for such measures and the wider benefits. BCC will continue work with neighbouring authorities, the Environment Agency and other organisations to exploit opportunities as they arise to help reduce peak flows from upstream and bring wider ecological benefits to the area where possible. A study looking at potential NFM measures that reduce peak river flows has been carried out as part of the OBC.

- Pathway techniques to increase the river flow conveyance capacity– Whilst this may potentially reduce fluvial flooding this would increase tidal flood risk by allowing more water to flow up the river from the estuary and space is constrained.

- Storing the flood water in the Floating Harbour - there is not enough storage space in the harbour and it would be overwhelmed during a severe flood.

The long-list options were formed through the combination of strategic options to enable increased flood resilience until 2069 in the first instance, followed by increased flood resilience until 2130 to ensure long term resilience from flooding. Each long-listed option was developed in terms of concept and spatial influence to enable a multi-criteria assessment and alignment with Strategy objectives. The appraisal found that raised defences were the preferred option when assessed against a range of criteria including in terms of flood risk reduction from fluvial and tidal sources, cost, technical, adaptability and environmental impact. The preferred option would consist of the construction of raised defences constructed to a 1 in 100 year standard of protection for fluvial flood risk, and a 1 in 200 year standard of protection for tidal flood risk for 2069. The defences would be upgraded to provide the same standard of protection for both fluvial and tidal for 2130.

Design development of the preferred solution and consideration of alternatives has been undertaken and remains ongoing. For further detail on the design development process and options considered, please see the Options Appraisal Report.

3.4 Project Description

The Bristol Avon Flood Strategy recognises a long term need for flood resilience and the delivery of this is split into two phases:

- Phase 1 [the Proposed Development] is expected to commence in the 2020s. This will provide a 1 in 100 year standard of protection for fluvial flood risk, and a 1 in 200 year standard of protection for tidal flood risk for 2069. This will be achieved through the provision of raised defences through the use of an ‘adaptive’ strategy, meaning defences constructed within will be designed to enable future raising of defences to allow for increased flood protection. This will enable long term flood resilience without the need to fully rebuild defences in the future; and

- Phase 2 [excluded from this application] will consist of a future phase of works which will include additional defences and raising of existing defences in the 2060s. This second phase would be subject to its own planning consent and assessment appropriate to the time when consent is required, therefore, is excluded from this Draft EIA Scoping Report.

This report focusses on the delivery of **Phase 1 defences only**. These are split into three geographical areas:

- Downstream defences: Shirehampton, Pill and Sea Mills;

- Central Bristol; and

- Upstream defences: Detriment defences– these are isolated areas upstream of Conham River Park.

The extent of flood defences in each area is shown in Figures 2.2, 2.3 and 2.4.

Table 3-2 Description of Proposed Development

Location	Proposed Development
Pill	Works are proposed to follow the line of existing flood defences including the embankment adjacent to the Avon Road and Marine Parade. The flood defences will continue alongside Marine Parade, past Underbanks to Watch House Road. Works will include: • raising of the existing embankment adjacent to Avon Rd to Marine Parade by 0.8m to a new height of up to 1.3m, over a distance of approximately 530m. • raising of the existing sea wall along Marine Parade and Underbanks by 0.9m to a new height of up to 1.3m, for 440m length – the associated footpath will require raising to maintain views. • new piled and gravity floodwall, approximately 320m in length, would be proposed along Watch House Road with piled foundations up to 2.3m in height.
Shirehampton	Defences here will extend from the west of Wellington Mews, between the existing properties and the river before tying into higher ground at City and Port of Bristol Social and Sports Club. Works will include: • new embankment across the Lamplighters nature reserve and in front of the Avonmouth Sea Cadets approximately 320m in length and up to 2.9m in height. • raising of an existing floodwall around 80m in length in front of Shirehampton Sailing Club by approximately 0.8m to a new height of up to 2m. • new embankment set back behind the open space and pitches approximately 490m in length and up to 1.1m in height.
Sea Mills	Works will follow the western side of the railway line on the northern bank of the River Trym, then adjacent to Bristol Manor Farm Football Club to the A4 Portway. On the southern bank of the River Trym, works will extend along Sea Mills Lane to the A4 Portway, as well as works around isolated properties with existing walls around them. Works will include: • a new gravity floodwall adjacent to the railway line on the right bank of the River Trym up to 1.4m in height for a distance of 300m. • a new embankment adjacent to the right bank of the River Trym, up to 2.7m in height for a distance of 120m. • a railway bridge parapet retrofit around 100m in length with a defence height of up to 0.4m. • replace/ raising around 170m of existing walls around two isolated properties on the left bank of the River Trym to a new height of up to 0.5m. • a new floodwall interfacing with the railway station, approximately 30m in length with a height of up to 0.5m. This defence includes a floodgate across the single track road. • a new embankment adjacent to the River Trym ending at the A4 Portway up to 3.2m in height for a distance of 120m.
Bower Ashton	This section of defence runs on the South bank of the Avon downstream of Entrance Lock and Spike Island. It consists of:

Location	Proposed Development
	• a new gravity floodwall between the railway line and existing footpath up to 2.5m in height for a distance of 410m. • a new embankment from the Rownham Hill footbridge to Brunel Way up to 1.6m in height, for a distance of 460m. Around 60m of the natural ground is high enough to not require raising. • a new gravity floodwall underneath Brunel Way with a length of approximately 25m and a height of up to 0.6m. • raising of around 10m of road along the Metrobus route, with a height of up to 0.9m. • a new gravity floodwall between the riverbank and pumping station with a length of approximately 50m and a height of up to 1.1m. • a new gravity floodwall inbetween the riverbank and Bristol Metal Spraying approximately 160m in length with a height of up to 3.5m.
Entrance Lock	This section runs from Hotwell Road at the downstream end, around the Knuckle / Tongue Head and Brunel Dam. The length of this section is approximately 410m. Works include: • Property Flood Resilience (PFR) measures installed in properties on Hotwell Road by Clifton Rocks Railway. • floodproofing and the provision of floodgates to 120m of existing wall adjacent to Hotwell Road between Freeland Place and Granby Hill, with a new wall height of up to 2.1m (matching the existing wall) • a new gravity floodwall adjacent to Bennet Way approximately 60m in length, with a height of up to 0.7m and tapering down where the Bennet Way ramp reaches the required defence height. • raising of Hotwell Road over a distance of 10m to a new defence height of up to 0.8m. • new outer lock gates to replace the existing outer gates, around 25m in length extending approximately 1.9m higher than the height of the existing gates and designed to keep floodwater out from the Avon, as well as retaining the Floating Harbour • new piled floodwall, approximately 180m in length and up to 2m in height, around the perimeter of the Knuckle and across the Tounge including terracing steps to reduce relative defence height. • the raising of Brunel Dam and associated swing bridge by up to 0.4m above the existing bridge parapet.
Spike Island	This section runs from Brunel Dam, around the North bank of the Avon and along Cumberland Road. The length of this section is approximately 1.2km. Works include: • using the existing off-ramp from Brunel Way, with isolated sections (45m) infilled to a height of up to 1.3m with a gravity wall. • a new piled and gravity floodwall between the riverbank and bonded warehouses, approximately 500m in length and up to 1.9m in height. • a new piled floodwall, approximately 770m in length and up to 2m in height, along the Chocolate Path including active travel improvements and incorporating the existing heritage railway.

Location	Proposed Development
	• a new flood gate under Cumberland Road on the footpath to Museum Road approximately 10m in length and up to 1.8m in height.
Redcliffe	This section includes Bathurst Dam and extends upstream to the Bath Bridge roundabout. The length of this section is approximately 800m. There is a short section adjacent to Coronation Rd on the South bank of the Avon immediately downstream of Bedminster bridge. Works include: • the raising of Bathurst Dam to a new height of up to 1.8m. • a new piled and gravity floodwall along Commercial Road, approximately 320m in length with a height of up to 1.4m. • a new piled floodwall along Clarence Road, approximately 620m in length and up to 1.9m high. • a new piled floodwall along Cattle Market Road, approximately 90m in length and up to 2.1m high.
Feeder Road	This section extends from the Totterdown basin, adjacent to Feeder Road for a distance of approximately 950m. Works include: • a new piled floodwall along the line of the existing footpath adjacent to Feeder Road west of Avon Street, approximately 200m in length and up to 1m high. • a new piled floodwall along the line of the existing footpath adjacent to Feeder Road east of Avon Street, approximately 740m in length and up to 1.6m high. • the raising of 10m of Feeder Road by approximately 0.7m in height to tie into the existing railway bridge abutment, with a new defence height of up to 0.9m. • the works will incorporate a cycle path as part of the amendments within this section.
St Philip's Marsh	This section runs from Cattle Market Road, along the north bank of the River Avon, through Sparke Evans Park and ends at Albert Road. Works include: • a new floodwall approximately 1.5km in length with a height of up to 2m. The new flood wall will be founded on mini-piles due to the constrained river corridor, proximity of existing buildings and need to maintain access. • a new embankment within Sparke Evans Park approximately 250m in length with a height of up to 1.1m.
Netham Lock	This section runs from Feeder Road opposite St Vincent's trading estate on the South bank of the Feeder Canal, to its confluence with the River Avon, and then extends along the North Bank of the Avon to the railway bridge. Works includes: • a flood gate across the Feeder Canal to be closed in fluvial flood events with associated electrical and mechanical infrastructure. • local raising of Feeder Road by up to 0.9m in height over a distance of 100m, • a new gravity floodwall along the south side of Feeder Road, approximately 250m in length and up to 1.9m in height. • a new sheet-piled wall on the north bank of the Avon to tie into the abutments of the railway bridge, approximately 400m in length and up to 1.7m high. This will include access gates to the existing steps used for maintenance and operation of the Netham weir sluices.

Location	Proposed Development
Whitby Road	• a new gravity floodwall around a number of industrial units on the South bank of the Avon, approximately 240m in length with a height of up to 0.4m. • a new gravity floodwall adjacent to Whitby Road, approximately 100m in length and up to 0.5m high.
St Annes	On the north bank of the River Avon, this section runs from Satellite Business Park, along to the riverside footpath to Butlers Walk over a distance of 1.2km. Works include: • a new mini-piled floodwall along the north bank of the Avon south of Crew's Hole Road, approximately 1200m in length with a height of up to 3m. This will include sections of floodproofing existing wall and fence. • a new sheet-piled floodwall along the south bank of the Avon south of Crew's Hole Road, approximately 1100m in length and up to 1.8m high.
Chapel Way	The existing fence / masonry wall along the left bank of the Brislington Brook will be replaced with a new flood wall approximately 1.2m in height, over a length of 220m.
Detriment Defences	*Pump House Lane* A new piled floodwall approximately 70m in length and up to 2.4m in height around the existing property. This will be combined with PFR measures to the property.
	Riverside Cottages A new flood embankment approximately 190m in length and up to 2m in height between the existing road and riverbank.
	Hanham Mills Road raising up to a new height of 0.5m, over a distance of 75m, on the corner outside the Old Lock and Weir public house to improve access in flood events.
	Keynsham A new flood wall approximately 1.4m in height behind Keynsham Rugby Football Club, 280m in length. This will include flood gates for access.
	Broadmead Lane Industrial Estate A new flood wall approximately 1.1m in height surrounding Broadmead Lane Industrial Estate, 800m in length. The works will also include raising the incoming access road.
	Property Flood Resilience PFR is proposed at 57 properties in Hanham Mills, Keynsham, Bitton and Swineford.

Note: many of the defence heights described are based on estimated ground levels from LiDAR, and will require confirmation from topographic survey.

3.4.1 Construction

Programme

Construction delivery of Phase 1 of the Proposed Development is likely to be phased in concurrent stages to ensure a balance between disruption to the city centre and efficient build methods. An indicative staged programme is described below:

- Downstream defences: 24 months
- Central Bristol: 96 months
- Upstream defences: 18 months

Early negotiation and access agreements with local interested parties and BCC dependent, total programme could be around 8 years (indicative), to be delivered in the late 2020s/early 2030s.

Construction of Phase 2 of the Proposed Development would likely take place in the 2060s, and will be appropriately programmed nearer the time.

Onsite works

Construction compounds will be sought to be located in land adjacent to or in close proximity to proposed works. These will likely be in BCC ownership (e.g. car parks) or otherwise in agreement with private owners. Confirmation of the location and extent of these compounds will be confirmed in FBC and therefore have been excluded from the scope of this Draft EIA Scoping Report.

Construction may require the temporary partial closure of roads and traffic management adjacent to defence locations and/or temporary jetty platforms over the riverbank of the River Avon in constrained locations. This may include sections along Commercial Road, Clarence Road, and Feeder Road. The extent of these will be determined at FBC.

Offsite works

An offsite construction compound would be required to support the construction of the Proposed Development. This offsite compound is likely to be located on a brownfield site in Avonmouth due to its connectivity with the Strategic Highway Network and port. The location, extent of site, duration and likely activities are yet to be defined, therefore offsite works are excluded from the scope of this EIA Scoping Report.

The identification and assessment of both onsite and offsite works will be undertaken at FBC stage to ensure consideration of level of impact and implications associated with the Proposed Development.

3.4.2 Operation

The Proposed Development looks to utilise 'passive' flood defences as much as possible – i.e. defences that do not require operation to provide flood protection. However, the design still includes a number of flood gates which will require manual closure. Prior to predicted potential flood events, BCC on behalf of the EA would be responsible for the closure of flood gates, and their reopening after flood events. Warning signs would be used to warn users at the entrance to longer waterside routes that have ramped access not to enter the area. Operation of the new lock gates at Entrance Lock will continue to be managed by BCC for navigation, and they will also be shut when necessary to provide flood defence.

Inspections and maintenance of all assets would be undertaken regularly in line with best practice. Inspections will typically be undertaken annually by BCC, with repairs carried out as necessary following the inspections. This would include:

- Wall and flap valve inspection and cleaning;
- Outfall system CCTV surveys and jetting;
- Patch repairs to joints and walls; and
- Grass cutting on embankments.

Most permanent works are expected to have a design life of over 100 years. Flood gates are planned to be replaced every thirty-five years.

BCC and the Environment Agency have a Collaborative Agreement in place, which sets out the respective roles and responsibilities. It is expected that a further legal agreement will be required to enable the Council to build and maintain the defences.

3.4.3 Decommissioning

It is considered that the defences, once operational, will be permanently functional, and that the site will not be undertaking activities that pose a long-term risk requiring detailed decommissioning plans or assessment.

4. Local Policy Context

Local policies within Bristol City Council, South Gloucestershire Council, North Somerset Council and Bath and North-East Somerset Council which are considered relevant to the Proposed Development have been considered within the following Key Environmental Topics:

- Cultural heritage;
- Biodiversity;
- Ground conditions and contaminated land;
- Townscape and visual impact; and
- Water environment and flood risk.

Table 3-1 below identifies the local policies in relation to:

- Principles of development; and
- Design.

Table 3-1 Summary of relevant planning policies

Topic	Bristol City Council Core Strategy (2011)[3], Site Allocations and Development Management Policies (2014)[4] and Bristol Local Plan: Publication Version (2023)[5]	South Gloucestershire Council Core Strategy 2006-2027 (2013)[6] and Local Plan: Policies, Sites and Places Plan (2017)[7]	North Somerset Council Core Strategy (2017)[8] and emerging Local Plan 2038 Consultation Draft Preferred Options (2022)[9]	Bath and North East Somerset Core Strategy and Placemaking Plan incorporating the Local Plan Partial Update (2023)[10]
Principles of development	Core Strategy (2011) • BCS1: South Bristol • BCS2: Bristol City Centre • BCS11: Infrastructure and Developer Contributions Site Allocations and Development Management Policies (2014) • DM1: Presumption in favour of sustainable development • SA1: Site Allocations • DM22: Development Adjacent to Waterways Bristol Local Plan: Publication Version (2023) • DS1: Bristol City Centre • DS2: Bristol Temple Quarter • DS3: St Philip's Marsh • DS4: Western Harbour	Core Strategy 2006-2027 (2013) • CS4a: Presumption on favour of sustainable development • CS6: Infrastructure and Developer Contributions Local Plan: Policies, Sites and Places Plan (2017) • PSP47: Site Allocations and Safeguarding	Core Strategy (2017) • CS6: North Somerset's Green Belt • CS34: Infrastructure delivery and development contributions Emerging Local Plan 2038 Consultation Draft Preferred Options (2022) • SP1: Sustainable development • SP7: Green Belt • DP12: Development in the Green Belt • DP64: Infrastructure delivery and development contributions	Core Strategy and Placemaking Plan incorporating the Local Plan Partial Update (2023) • CP8: Green Belt • GB1: Visual Amenities of the Green Belt

Topic	Bristol City Council Core Strategy (2011)[3], Site Allocations and Development Management Policies (2014)[4] and Bristol Local Plan: Publication Version (2023)[5]	South Gloucestershire Council Core Strategy 2006-2027 (2013)[6] and Local Plan: Policies, Sites and Places Plan (2017)[7]	North Somerset Council Core Strategy (2017)[8] and emerging Local Plan 2038 Consultation Draft Preferred Options (2022)[9]	Bath and North East Somerset Core Strategy and Placemaking Plan incorporating the Local Plan Partial Update (2023)[10]
	• FR2: Bristol Avon Flood Strategy			
Design	Core Strategy (2011) • Policy BCS15: Sustainable Design and Construction • Policy BCS21: Quality Urban Design Site Allocations and Development Management Policies (2014) • DM26: Local Character and Distinctiveness • DM27: Layout and Form • DM28: Public Realm Bristol Local Plan: Publication Version (2023) • BG1: Green infrastructure and biodiversity in new development • BG5: Biodiversity and access to Bristol's waterways • NZC1: Climate change, sustainable design and construction	Core Strategy 2006-2027 (2013) • CS1 High quality design Local Plan: Policies, Sites and Places Plan (2017) • PSP1: Local Distinctiveness • PSP2: Landscape	Core Strategy (2017) • CS2: Delivering sustainable design and construction • CS12: Achieving high quality design and place-making Emerging Local Plan 2038 Consultation Draft Preferred Options (2022) • DP1: High quality design • SP4: Placemaking • LP14: Local Green Space • DP6: Net zero construction • DP8: Efficient use of land • DP13: Highway safety, traffic and provision of infrastructure associated with development	Core Strategy and Placemaking Plan incorporating the Local Plan Partial Update (2023) • CP6 Environmental Quality • CP7 Green Infrastructure • D1: General Urban Design Principles • D2: Local Character and Distinctiveness • D3: Urban Fabric • D10: Public Realm

Topic	Bristol City Council Core Strategy (2011)[3], Site Allocations and Development Management Policies (2014)[4] and Bristol Local Plan: Publication Version (2023)[5]	South Gloucestershire Council Core Strategy 2006-2027 (2013)[6] and Local Plan: Policies, Sites and Places Plan (2017)[7]	North Somerset Council Core Strategy (2017)[8] and emerging Local Plan 2038 Consultation Draft Preferred Options (2022)[9]	Bath and North East Somerset Core Strategy and Placemaking Plan incorporating the Local Plan Partial Update (2023)[10]
	• NZC3: Embodied carbon, materials and circular economy • NZC4: Adaptation to a changing climate • DPM1: Delivering well-designed, inclusive places			

5. Approach to EIA

5.1 Introduction

This chapter provides an overview of the approach to the EIA, including the approach to the EIA assessment scenarios, and general methodology used to provide consistency across assessment topics. Information on other proposed assessments associated with, but separate to the EIA, is also provided.

5.2 Approach to Scoping

A request for a Scoping Opinion should define the scope and level of detail of the information to be provided in the Environmental Statement. Table 5-1 lists requirements under Part 4 Regulation 15 of the EIA Regulations, and where they are addressed in this Scoping Report.

Table 5-1: Requirements identified in the EIA Regulations

Requirement	Location in this Scoping Report
A plan sufficient to identify the land	See Figure 2.1. The red line boundary shown in the Figures of this Scoping Report represents that land identified as required for the Proposed Development at this stage, but is subject to change as part of ongoing development work.
A brief description of the nature and purpose of the development, including its location and technical capacity	Chapter 3 The Proposed Development
An explanation of the likely significant effects of the development on the environment	Individual factor chapters (Chapters 6 and 7)
Such other information or representations as the person making the request may wish to provide or make.	Table 1-1 summarises the remaining information provided as part of this Scoping Report.

Regulation 14 and Schedule 4 of the EIA Regulations identifies the information for inclusion in an ES. This includes the identification of environmental factors considered likely to be significantly affected by the Proposed Development. These significant effects may be direct or indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent or temporary, positive or negative.

5.2.1 Topics scoped out

At this stage, early identification of matters which have the potential to be scoped out have been justified in Sections 6 and 7 of this report. Determination of matters to be scoped out of the EIA will be determined at FBC subject to further baseline data gathering, engagement with stakeholders and agreement of assessment methodologies.

Further consideration for major accidents and disasters, heat and radiation and transboundary effects have been provided below.

Major accidents and disasters

Health and safety on site will be covered by legal requirements and codes (including but not limited to Health and Safety at Work Act, 1974; The Management of Health and Safety at Work Regulations, 1999; CDM 2015 Regulations; and The Workplace (Health, Safety and Welfare) Regulations 1992), safety mechanisms and best practice construction practices will address risks associated with severe weather and power failures, a Construction Traffic Management Plan will manage traffic disruption risks and, in the event of flooding, adherence to the EAP and Emergency Response Plan and/or an Emergency Evacuation Plan will reduce the risk of a pollution incident and/or injury. The operation of the Proposed Development will reduce

the risk of flooding and will provide beneficial effects in the avoidance of major flood events. Consequentially, no significant adverse effects on major accidents and disasters during construction or operation are anticipated. This factor has been scoped out at OBC and will be considered further at FBC.

Heat and radiation

Due to the nature and scale of the Proposed Development, no heat and radiation effects are foreseen, therefore, this factor has been scoped out at OBC and will be considered further at FBC.

Transboundary effects

Due to the nature and scale of the Proposed Development, no transboundary effects are foreseen, therefore, this factor has been scoped out at OBC and will be considered further at FBC.

5.3 The Environmental Impact Assessment Process

5.3.1 Overview

EIA is a systematic process for ensuring that the likely significant effects of a development on the environment are understood and taken into account in the design and planning process.

Due to the potential for significant environmental effects on the environment, it is considered that an EIA will be required for the Proposed Development and a Scoping Opinion will be sought on this basis.

The EIA will be undertaken in accordance with the EIA Regulations, the Planning Act, and relevant guidance. The EIA will be carried out in a number of stages as follows:

- Scoping: The Scoping Report collates initial information on the Proposed Development. This includes information regarding the construction and operation, topics to be scoped into the EIA or out, how they will be assessed and the potential likely significant effects as a result of the Proposed Development.
- Baseline: This provides the description of existing environmental conditions within the defined Study Area for each topic. This may include site survey data, or information available through public records or directly from stakeholders such as Historic England.
- Consultation: Stakeholder bodies will be consulted as part of the scoping process, supported by wider pre-application non-statutory stakeholder engagement activities undertaken as part of the planning process.
- Initial effects assessment: The EIA will identify the likely significant environmental effects (both positive and negative) of the Proposed Development.
- Identification of mitigation measures: This includes measures beyond those embedded within the design of the Proposed Development. Additional mitigation will be identified in response to significant adverse effects identified in the EIA.
- Residual effects assessment: The EIA will identify the residual environmental effects of the Proposed Development; those effects which remain after the effectiveness of proposed mitigation measures have been taken into account.
- Preparation of and ES: the final reporting of the whole EIA process in an ES which may comprise several documents, volumes and appendices and will be supported by a non-technical summary. These documents will be submitted with the planning application.

The EIA will be undertaken following the requirements of the EIA Regulations and the ES will provide the following relevant information:

- a description of the proposed development comprising information on the site, design, size and other relevant features of the development;
- a description of the likely significant effects of the proposed development on the environment;

- a description of any features of the proposed development, or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;
- a description of the reasonable alternatives studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment;
- a non-technical summary of the information; and
- any additional information specified in Schedule 4 of the EIA Regulations, relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.

5.3.2 Establishing the baseline and receptors

The current environmental and physical conditions of the site ('the baseline') need to be established so that receptors can be identified. Receptors are defined as the physical resource or user group that would experience an effect. The environmental effect would depend on the spatial relationship between the source and the receptor. Some receptors will be more sensitive to certain environmental effects than others.

The baseline can then be used to undertake a comparison of future changes as a result of the Proposed Development can be understood, and potentially significant effects can be identified.

Site visits, walkover surveys and initial desk-based baseline data collection has been undertaken prior to scoping to inform this report. Details of specific visits and surveys are provided in individual topic chapters of this Scoping Report. Further, more extensive, studies will be undertaken to inform the EIA.

Due to the long timescales required to deliver the construction of the Proposed Development, the EIA will need to be carried out in relation to conditions that are likely to occur in future construction and operational years, defined further below.

5.3.3 Spatial and temporal scope

An appropriate spatial scope or 'study area' will be determined for each environmental topic, and defined in each topic section (Chapters 6 and 7). This may include an area larger than the immediate footprint of the Proposed Development, and will allow for the assessment of both direct and indirect effects.

The temporal scope will be defined by considering the likely duration of construction and operational activities. This Draft EIA Scoping Report considers only construction and operation for Phase 1 (as defined in Section 3.3 of this Scoping Report). The assessment will likely consider:

- a baseline scenario ('current conditions'),
- future baseline scenario at estimated commencement of Phase 1 construction; and
- an operational date upon completion of Phase 1 construction.

5.3.4 Future baseline

The future baseline scenario at estimated commencement of Phase 1 construction; and operational date upon completion of Phase 1 construction should be defined and considered as part of EIA scoping once the consenting route and construction timescales have been defined. As these are presently unknown, these future scenarios are excluded from this EIA Scoping Report.

5.3.5 Assumptions and limitations

In accordance with the EIA Regulations, difficulties encountered during assessment work and limitations and assumptions used for individual assessment areas will be set out in the ES. Known environmental topic specific assumptions and limitations will be defined in Chapters 6 and 7.

General limitations include:

- Baseline conditions are specific to each topic and are considered to be accurate at the time when surveys were undertaken, however, it is recognised that environmental conditions may change during the course of the Proposed Development.
- The scope presented in this EIA Scoping Report is based on construction and operational information available at the time of writing.

5.3.6 Assessment of effects

Impacts vs effects

The terms 'impact' and 'effect' in EIA are distinctly different. The EIA Regulations state that an assessment of project environmental impacts is required; however, the impacts of the Proposed Development may or may not result in significant effects on the environment. It is an assessment of effects that is required by Schedule 4 of the EIA Regulations.

To provide consistency across all topics within the EIA, and for ease of comparison, the methodology described in this section will be applied where appropriate. Where topic-specific alternatives exist (following industry-wide guidance or best practice) these are presented within the relevant topic chapters of this Scoping Report.

Impacts: The following factors will be taken into account when identifying potential impacts, in accordance with the EIA Regulations:

- the magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);
- the nature of the impact;
- the intensity and complexity of the impact;
- the probability of the impact;
- the expected onset, duration, frequency and reversibility of the impact;
- the cumulation of the impact with the impact of other existing and/or approved development; and
- the possibility of effectively reducing the impact.

Effects: Resulting effects will be described as significant or not significant. This will take into consideration the sensitivity and value of a receptor, and the magnitude of impacts upon these receptors.

Generalised descriptions which follow are based on most recent experience of environmental assessments undertaken by the accredited professionals in the EIA team.

Receptor value/sensitivity

Table 5-2 provides a general description of the classification of receptor value/sensitivity.

Table 5-2: General description of receptor value and sensitivity

Value/Sensitivity	Description
High	Value: Feature/receptor possesses key characteristics which contribute significantly to the distinctiveness, rarity and character of the site/receptor. For example, national or international designation. Sensitivity: Feature/receptor has a very low tolerance or capacity to accommodate the proposed changes.
Medium	Value: Feature/receptor possesses key characteristics which contribute significantly to the distinctiveness and character of the site/receptor. For example, national or regional designation.

Value/Sensitivity	Description
	Sensitivity: Feature/receptor has a low tolerance or capacity to accommodate the proposed changes.
Low	Value: Feature/receptor not designated or only designated at a district or local level. Feature/receptor only possesses characteristics which are locally significant. Sensitivity: Feature/receptor has some tolerance or capacity to accommodate the proposed changes.
Very low	Value: Feature/receptor not designated. Feature/receptor characteristics do not make a significant contribution to local character or distinctiveness. Sensitivity: Feature/receptor is tolerant or has a capacity to accommodate the proposed changes.

Magnitude

Table 5-3 provides a general description of magnitude, i.e. the extent of change form the identified baseline conditions irrespective of value or sensitivity of a receptor.

Table 5-3: General description of magnitude of change

Magnitude	Description
High	Large-scale changes to key characteristics or features of the particular environmental aspect's character or distinctiveness. Within the site and beyond.
Medium	Medium-scale changes to key characteristics or features of the particular environmental aspect's character or distinctiveness. Within the site and potentially beyond.
Low	Noticeable but small-scale changes to key characteristics or features of the particular environmental aspect's character or distinctiveness.
Very low	Noticeable, but very small-scale change, or barely discernible changes to key characteristics or features of the particular environmental aspect's character or distinctiveness.

Defining significance

A generic matrix used for the classification of effects is provided in Table 5-4. As with the descriptions of value/sensitivity and magnitude, where topic-specific alternatives exist, these are presented in the relevant topic chapters of this Draft Scoping Report.

Table 5-4: Generic Significance Matrix

	Value/ Sensitivity of receptor			
Magnitude	**Very Low**	**Low**	**Medium**	**High**
Very Low	Negligible	Negligible	Minor	Minor
Low	Negligible	Minor	Moderate or Minor	Moderate
Medium	Minor	Moderate or Minor	Moderate	Major
High	Minor	Moderate	Major	Major

A generic description of effects is provided in Table 5-5.

Table 5-5: Generic description of effects

Effect	Description
Major	A large or very large change to the environmental or socio-economic conditions. These are likely to include effects, positive or negative, associated with regional or national, or international issues, objectives or legislation and are crucial to the decision-making process.

Effect	Description
Moderate	A medium change to the environmental or socio-economic conditions. These are likely to include effects, positive or negative, associated with local or regional issues, objectives or legislation and are likely to be of importance to the decision-making process.
Minor	A small change to the environmental or socio-economic conditions. These are likely to include effects, positive or negative, associated with local issues and are unlikely to be of importance to the decision-making process.
Negligible	No discernible change to the environmental or socio-economic conditions. An effect likely to have a neutral or negligible influence.

Major and moderate effects are considered to be significant, whilst minor and negligible effects are considered to be not significant. However, the professional judgement of technical experts may also be applied where necessary.

5.3.7 In-combination and Cumulative effects

The EIA Regulations require that the ES includes a description of the cumulation of effects with other existing or approved projects. Cumulative effects are effects that, in combination with each other, may be more (or less) than the sum of the individual effects. These may result from incremental changes caused by other existing or approved projects together with the Proposed Development.

The purpose of undertaking a cumulative assessment is to identify whether other developments may lead to an elevated effect on the environment during construction, or once a development is built and in use. Other developments need to be of a sufficient scale and/or proximity to the Proposed Development for potential cumulative effects to be likely. Other developments may also precede the development being assessed thereby changing future baseline conditions, or in some cases introducing new sensitive receptors. The zone of influence will vary on a topic-by-topic basis.

The environmental impact assessment for Bristol Avon Flood Strategy (BAFS) will assess in-combination and cumulative effects.

5.3.8 Approach to mitigation

Where adverse effects can be reduced to acceptable levels through incorporation of practical and cost-effective design or management measures, these will be identified.

In line with IEMA Guidance[11] and professional best practice, consideration will be given to three key types of mitigation:

- Embedded mitigation: intrinsic as a result of design evolution, which then forms part of the Proposed Development.
- Additional mitigation: issue specific mitigation identified as a result of topic specific assessments.
- Good Practice mitigation: required regardless of any EIA assessment i.e. as a result of standard good practice and legislative requirements.

Where possible, opportunities for enhancement will also be sought as part of the EIA.

5.4 Stakeholder engagement and consultation

Consultation has been undertaken with Bristol City Council and the Environment Agency throughout the design evolution of the Proposed Development to date. The Environment Agency provide a Project Representative from the Wessex Area team to work with BCC on a weekly basis to represent the interests and requirements of the Environment Agency and provide general advice for delivery of the Strategy. Other statutory bodies with an interest in the Strategy (specifically Historic England, Natural England, Wessex Water, Port of Bristol, and neighbouring risk management authorities as well as BCC and Environment Agency in their role as regulators) support through a stakeholder working group.

During SOC, consultation was undertaken with a range of stakeholders and feedback recorded ahead of progressing the Proposed Development to OBC. The consultation found that overall there was strong support for the proposals. In particular 84% of respondents agreed with the proposal for adaptive flood defences[12]. To support the consultation a Strategic Environmental Assessment (2021)[13] was published sharing works to date.

Key consultees and consultation undertaken to date for each of the environmental topics are discussed in Chapter 6.

Further more detailed consultation will be required in FBC to agree the scope and methodology of the EIA with relevant Local Planning Authorities and statutory bodies.

6. Key Environmental Topics

The following topics are considered in this section as defined by the scope of the OBC:

- Cultural Heritage
- Biodiversity
- Geology and Soils (Ground conditions)
- Landscape and Visual Impact
- Water Environment and Flood Risk

A full review of all EIA topics will be required for the formal EIA Scoping Report at FBC.

6.1 Cultural Heritage

6.1.1 Introduction

This chapter outlines the scope and methodology for the assessment of the potential likely significant effects arising from the construction and operation of the Proposed Development on Cultural Heritage.

Cultural Heritage aspects considered within this chapter for the Proposed Development include:

- Designated heritage assets: including Scheduled Monuments, Listed Buildings, Registered Parks and Gardens, Registered Battlefields, World Heritage Sites and Conservation Areas.
- Non-designated heritage assets: including archaeological remains, historic landscape character and historic building information, and information on previous events (archaeological surveys and investigations) known at the time of writing.

This chapter is supported by the following appendices and figures:

- Outline Heritage Desk Based Assessment (Appendix A)
- Figure 6.1 Heritage Assets

There may be interrelationships with other disciplines, therefore, this chapter should be read in conjunction with the following chapters:

- Effects on some historic landscape features, landscape character and valued views, including those from heritage assets, are considered in Chapter 6.4 Townscape and Visual Impact.
- Construction noise, dust and vibration may affect heritage assets. These are considered in Section 7.1 Air Quality and Section 7.2 Noise and Vibration.

6.1.2 Legislation, policy and guidance

This scoping report has been prepared in accordance with relevant legislation, planning policy and guidance which will also apply to the future EIA assessments. It is recognised that this list is non-exhaustive and will be kept under review to take account of any later legislation or policy changes.

Legislation

The relevant legislation includes:

- Ancient Monuments and Archaeological Areas Act (1979) (as amended)[14]
- Planning (Listed Buildings and Conservation Areas) Act (1990)[15]

National policy

The relevant national policies include:

- NPPF, Chapter 16: Conserving and enhancing the historic environment, supported by definition/s in Annex 2[16]

Local policy

There may be interrelationships with other disciplines, therefore, this chapter should be read in conjunction with the following chapters:

- Effects on some historic landscape features, landscape character and valued views, including those from heritage assets, are considered in Chapter 6.4 Townscape and Visual Impact.
- Construction noise, dust and vibration may affect heritage assets. These are considered in Section 7.1 Air Quality and Section 7.2 Noise and Vibration.

The relevant local policies are listed in Table 6-1:

Table 6-1 List of relevant local policy – Cultural Heritage

Local authority	Relevant local policy
Bristol City Council	Bristol Development Framework Core Strategy (2011) BCS22: Conserving the Historic Environment
Bristol City Council	Bristol Site Allocations and Development Management Policies (2014) DM31: Heritage Assets
Bristol City Council	Bristol Local Plan: Publication Version (2023) CHE1: Conservation and the historic environment
South Gloucestershire	South Gloucestershire Core Strategy 2006-2027 CS9: Managing the environment and heritage
South Gloucestershire	South Gloucestershire Local Plan: Policies, Sites and Places Plan PSP17: Heritage assets and the historic environment
North Somerset	North Somerset Core Strategy 2017 CS5: Landscape and the historic environment
North Somerset	Emerging Local Plan 2038 Consultation Draft Preferred Options (2022) SP11: Green infrastructure and historic environment DP38: Built Heritage DP39: Archaeology and non designated heritage assets DP40: Historic Parks and Gardens
Bath and North East Somerset	Core Strategy and Placemaking Plan incorporating the Local Plan Partial Update (January 2023) CP6: Environmental Quality HE1: Historic Environment

Guidance and standards

Relevant guidance and standards which have been used as part of the scoping process and will be taken into account as part of the EIA include:

- CIfA Code of Conduct: professional ethics in archaeology[17]
- Historic England Managing significance in decision-taking in the historic environment, Historic Environment Good Practice Advice in Planning: 2[18]
- Historic England The Setting of Heritage Assets, Historic Environment Good Practice Advice in Planning Note 3 (Second Edition)[19]
- Historic England Statements of Heritage Significance: Analysing Significance in Heritage Assets. Historic England Advice Note 12[20]
- English Heritage (now Historic England) Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment [21]
- CIRIA Archaeology and Construction: good practice guidance (C799D)[22]
- IEMA Principles of Cultural Heritage Impact Assessment in the UK[23]
- Bristol City Council Our Inherited City – Heritage Statement Guidance[24]

6.1.3 Study area

The study areas established to inform this scoping chapter, which will also be used in the subsequent EIA and presented in the ES are as follows:

- Designated heritage assets within 100m of the Proposed Development (Figure 6.1). This will also inform a setting assessment of heritage assets identified as potentially being affected by the construction of the Proposed Development, as well as the protection of heritage assets from flooding during operation. The urban nature of the site and the type of works proposed during construction mean that heritage assets located beyond this distance are considerably less likely to be impacted.
- Non-designated heritage assets within 250m of the Proposed Development (Figure 6.1). A larger study area is proposed than for designated assets as the data used to identify non-designated heritage assets also provides evidence for potential heritage assets not previously identified – primarily buried archaeological remains.

A qualitative assessment, informed by professional judgement and observation of the area through a site visit, has also been used to identify additional assets which may be impacted. From this review the Grade I listed Clifton Suspension Bridge was identified for inclusion in the EIA.

6.1.4 Baseline conditions

The baseline described in this chapter has been informed by data sources listed in Table 6-2.

Table 6-2 Baseline data sources to inform scoping

Baseline Data	Source
The National Heritage List for England (NHLE)	Historic England
Bristol Historic Environment Record (HER)	Bristol County Council
South Gloucestershire HER	South Gloucestershire Council
North Somerset HER	North Somerset Council
Bath and North-East Somerset HER	South West Heritage Trust
Historic mapping and archival images	Know Your Place
Archaeological reports (grey literature)	Know Your Place and Archaeological Data Service
Conservation Area assessments	Bristol City Council
Qualitative setting assessment and observation	Cultural heritage walkover survey (24.5.23)

Baseline

The following sections present the existing baseline established at scoping. The Outline DBA (Appendix A) includes further detail of the cultural heritage baseline and assets listed below.

Designated heritage assets

- Scheduled Monuments (3) – part of the Roman settlement of Abonae, Underfall Yard, and Fairbairn Crane, which is also Grade II* listed.
- Grade I listed buildings (4) – Temple Meads Station, Temple Meads Old Station, and the Avon Bridge, as well as the Clifton Suspension Bridge, which is included due to its landmark status although beyond the study area.
- Grade II* listed buildings (12, one of which, Fairburn Crane, is also a Scheduled Monument)
- Grade II listed buildings (69)
- Grade II* registered park and garden (1 – Ashton Court)
- Conservation areas (12)

Non-Designated heritage assets

- Locally listed parks and gardens (14)
- Locally listed buildings (58)

- HER records of potential non-designated heritage assets (314)

6.1.5 Engagement

Engagement will be undertaken with relevant stakeholders in relation to the Proposed Development to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design. This will be undertaken by the EIA Team.

The following bodies will be consulted during the EIA process:

- Historic England
- Bristol City Council Historic Environment Officer
- North Somerset Historic Environment Officer
- South Gloucestershire Historic Environment Officer

Engagement undertaken to date is listed in Table 6-3.

Table 6-3 Summary of engagement undertaken to date

Meeting Information	Brief summary of discussion
Historic England and BCC Principal Historic Environment Officer 6/6/23	Meeting to discuss the approach to baseline assessment and the key challenges of the Proposed Development for the historic environment, focusing on the works proposed at the Cumberland Basin and Underfall Yard. This discussion fed into design development and option appraisal.
SEA Consultation with Historic England, 2017	The SEA Consultation response detailed potential for impacts to the historic environment from the Proposed Development and commented on the heritage baseline work undertaken to inform the assessment.
Historic England, letter dated 10/11/2017	Highlighted key potential risks for heritage and recommended proportionate assessment of the historic environment and potentially impacted heritage assets.

6.1.6 Approach to assessment

Additional baseline data collection

Due to the significance of the historic environment potentially impacted by the Proposed Development, an Outline Heritage Desk-Based Assessment has been undertaken to inform the design and scoping process (Appendix A). The Outline Heritage Desk-Based Assessment is intended to provide a consistent level of baseline data for the whole of the Proposed Development to a level of detail sufficient both to inform design development and to form the baseline for future impact assessment.

It is proposed that this baseline will be revised, if applicable, to include any areas not currently assessed and to provide any updates required at the time that the impact assessment is undertaken. In addition to updating the baseline data detailed in Table 6-2, the following data sources will also be accessed:

- Results of geotechnical baseline survey and ground investigations carried out to inform the Proposed Development.
- Forthcoming publication of the results of the excavations at Abonae (Sea Mills), if available at the time of assessment.

Assessment methodology

The approach to assessment for cultural heritage will follow that presented in Section 5.3.5, following the additional standards and best-practice guidance listed in section 6.2.2.

6.1.7 Potential impacts

Construction

The Proposed Development is likely to have impacts on both individual heritage assets and on the overarching historic landscape of the Avon, Floating Harbour, New Cut and Feeder Canal. The Bristol Heritage Framework: Our Inherited City[25] describes the Floating Harbour, and the associated New Cut, as 'Bristol's primary heritage asset'. The potential for overarching beneficial and adverse impacts to this historic landscape will be assessed.

Across the Proposed Development, there is the potential for adverse impacts to previously unrecorded archaeological remains which may be removed or truncated as part of construction activities.

Construction impacts are likely to include:

- Direct physical impacts to heritage assets, ranging from complete removal to minor modification. These impacts are likely to be permanent.
- Impacts arising from change to the setting of heritage assets from the presence of new structures and/or removal of aspects of their historic surroundings. These impacts arise from the change to the contribution an asset's setting makes to its value and are likely to be permanent.
- Impacts arising from the appearance of construction activity and associated noise, vibration and dust which alter the setting of a heritage asset. These impacts are likely to be temporary, with the exception of vibration, which has the potential to cause permanent adverse impacts.
- Indirect impacts arising from changes to hydrology and silt deposition, which have the potential to cause temporary or permanent impacts to heritage assets, both beneficial and adverse.

By geographic area, Table 6-4 details the heritage assets identified being potentially impacted by construction.

Table 6-4 Potentially impacted heritage assets by geographic area (construction impacts)

Area	Heritage assets
Pill and Shirehampton	Watch House, Retaining Walls to the River and Garage (Grade II listed building, NHLE: 1129831) Mulberry Cottage (Grade II listed building, NHLE: 1320644) The Lamplighters Public House (Grade II listed building, NHLE: 1202597) Wellington House and attached stables (Grade II listed building, NHLE: 1208805) 105, Station Road (Grade II listed building, NHLE: 1282096) 103, Station Road (Grade II listed building, NHLE: 1292983) Myrtle Hall (Grade II listed building, NHLE: 1292908) Shirehampton Conservation Area Non-designated heritage assets: Lamplighters ferry, Pill Harbour, Portishead and Bedminster Railway and Viaduct, Duke of Cornwall public house, Haven Master's Office.
Sea Mills	Part of the Roman Settlement of Abonae (Scheduled Monument, NHLE: 1408558) Harbour Walls of Sea Mills Docks (Grade II listed building, NHLE: 1202563) Sea Mills Conservation Area Non-designated heritage assets: Sea Mills Signal Station, Sea Mills Railway Station, Station Master's House, Old Signal Station, No.79 Sea Mills Lane, The Coach House, Limekilns west of the railway, Railway Bridge
Ashton	Clifton Suspension Bridge (Grade I listed building, NHLE: 1205734) Ashton Swing Bridge (Grade II listed building, NHLE: 1380341)

Area	Heritage assets
	The Colonnade and attached front garden railings (Grade II* listed building, NHLE: 1208848) St Vincent's Parade, and attached front area railings and gates (Grade II listed building, NHLE: 1202312) 16-19, Freeland Place (Grade II listed building, NHLE: 1202223) 20 and 21 Freeland Place (Grade II listed building, NHLE: 1282268) Freeland Court (Grade II* listed building, NHLE: 1282232) 3, Granby Hill (Grade II listed building, NHLE: 1187386) 5, Granby Hill (Grade II listed building, NHLE: 1202239) The Downs Conservation Area Non-designated heritage assets: Clift House Tannery and former galvanized iron works, Portishead and Bedminster Branch Railway
Entrance Locks	Cumberland Basin walls and attached features including Junction Lock Swing Bridge (Grade II listed building, NHLE: 1202185) Brunel's swing bridge alongside north entrance lock (Grade II* listed building, NHLE: 1202186) Brunel's south entrance lock and swing bridge (Grade II* listed building, NHLE: 1207824) Clifton Suspension Bridge (Grade I listed building, NHLE: 1205734) City Docks Conservation Area
Spike Island	Underfall Yard (Scheduled Monument, NHLE: 1005419) Cumberland Basin walls and attached features including Junction Lock Swing Bridge (Grade II listed building, NHLE: 1202185) A Bond Tobacco Warehouse (Grade II listed building, NHLE: 1202189) B Bond Tobacco Warehouse (Grade II listed building, NHLE: 1208330) Ashton Swing Bridge (Grade II listed building, NHLE: 1380341) Avon Crescent Substation (Grade II listed building, NHLE: 1485360) Numbers 6 and 7 and attached garden walls and piers, numbers 9 and 25 and attached piers (Grade II listed building, NHLE: 1201974) Former Shipwright's Shop (NHLE: 1202647) Former pattern maker's shop and stores (Grade II listed building, NHLE: 1218630) Patent slip and quay walls (Grade II listed building, NHLE: 1218703) Hydraulic Engine House (Grade II* listed building, NHLE: 1202648) Chimney of hydraulic engine house (Grade II listed building, NHLE: 1218654) Machine Shop (Grade II* listed building, NHLE, 1218669) Vauxhall Bridge (Grade II listed building, NHLE: 1202162) City Docks Conservation Area Non-designated heritage assets: Heritage railway and Chocolate Path, Nos. 1-7 Ashton Avenue, Plimsoll Bridge swing bridge control tower, remains of bonded warehouse wharf and mooring posts, Coronation Bridge and Slipway of the Gaol Ferry
Redcliffe	2-6, Bathurst Parade (Grade II listed, NHLE: 1204021) 7, 8 and 9, Bathurst Parade (Grade II listed, NHLE: 1282390) The Louisiana Public House (Grade II listed, NHLE: 1202665) Walls, Quays and Bollards to Bathurst Basin (Grade II listed, NHLE: 1204010) Bedminster Bridge (Grade II listed, NHLE: 1201994)

Area	Heritage assets
	Drinking fountain approximately 3 metres north west of Bedminster Bridge (Grade II listed, NHLE: 1202146) Langton Street Bridge (Grade II listed, NHLE: 1202723) Bristol Temple Meads (Collett House and New Cut Bridge) (Grade I listed building, NHLE: 1282106) City Docks Conservation Area Bedminster Conservation Area Redcliffe Conservation Area Non-designated heritage assets: the entrance lock from the New Cut, the northern entrance lock, early 20th century swing bridge remains, former Cardiff and Channel Steamship Co. shed, ramped path in God's garden, relieving arches under Commercial road and mooring posts
Feeder Road	St Vincent's Works and attached front area railings (Grade II* listed building, NHLE: 1282118) St Vincent's Works Factory (Grade II listed, NHLE: 1202565) St Vincent's Works, gateway and attached wall to south west (Grade II listed building, NHLE: 1202566) Warehouse, premises of Clarks Wood Company (Grade II listed building, NHLE: 1202567) Gasworks perimeter wall (Grade II listed building, NHLE: 1279549) St Vincent's Works north gateway and attached walls (Grade II listed building: NHLE: 1282119) Silverthorne Lane Conservation Area Non-designated heritage assets: Marsh Bridge, Marsh Lane Bridge, Feeder Canal, Canal at St Phillip's Marsh, Rhubarb Tavern, Barton Hill Nursery School, Railway bridge)
St Phillip's Marsh	Bristol Temple Meads (Grade I listed building, NHLE: 1282106) Warehouse, former premises of Marble Mosaic Company (Grade II listed, NHLE: 1201975) Avon Bridge (Grade I listed building, NHLE: 1219892). Silverthorne Lane Conservation Area Non-designated heritage assets: Cholera burial ground, site of Colour Works, Sparke Evans Park Bridge, Albert Road Relief Line Viaduct, Sparke Evans Park, Disused railway bridge on the north side of Avon Bridge, Railway bridge on the south side of Avon Bridge, Totterdown Bridge, site of brickyard, Brislington Gate, site of Avon Works, Site of Boatbuilding Yard, Site of Avonside Varnish Works, remains of the former Bath Road now overgrown along the southern bank of the River Avon, Totterdown Basin and Lock and Totterdown Lock Bridge
Netham Lock	Netham lock, including remains of bridge (Grade II listed building, NHLE: 102559) Lock Keeper's House at Netham Locks (Grade II listed building, NHLE: 1282061) Avon Valley Conservation Area Non-designated heritage assets: Any parts of the lock which would not otherwise be considered listed, Netham dam (also known as Netham weir), New Brislington Bridge, Bailey Bridges, Netham Lock
St Anne's	Crew's Hole Garden Building (Grade II* listed building, NHLE: 1202182) Avon Valley Conservation Area

Area	Heritage assets
	Non-designated heritage assets: St Anne's Well, St Anne's ferry
Upstream	Fox's Wood Tunnel West Portal (Grade II* listed building, NHLE: 1409150) Riverside (Grade II listed building, NHLE: 1116831) 1-4, Hanham Mills Road (Grade II listed building, NHLE: 1230936) Picnic House (Grade II listed building, NHLE: 1116829) Ile D'Avon Club (Grade II listed building, NHLE: 1116826) Causeway and lockbridge northeast of Ile D'Avon (Grade II listed building, NHLE: 1116825) Weighbridge at Londonderry Wharf (Grade II listed building, NHLE: 1319791) Swineford Copper Mills including waterwheels and machinery (Grade II listed building, NHLE: 1116761) Avon Valley Conservation Area Hanham Abbots Conservation Area Bitton Conservation Area Keynsham Conservation Area Non-designated heritage assets: Brislington House – locally listed additional extent beyond the Grade II* registered park and garden, Conham Ferry and associated landing Steps, Riverside Cottages, Pump House associated with the GWR mainline, Roman Road (Bath to Bristol), Durley Park, River Avon Navigation, site of 19th century soap and chemical works, Rivermead, Rivermead Cottages, Pye Bridge, Mill leat Swineford Copper Mill and Tail Race at Swineford Mill.

Operation

From a perspective of protecting and preserving cultural heritage assets, the improved protection from flooding would likely result in permanent beneficial impacts as the setting and the fabric of heritage assets would be protected from future flood events.

The operation of flood gates across waterways and highways during flood events have the potential to result in temporary adverse impacts on the setting and character of heritage assets in their vicinity.

It is also possible that there will be an overarching adverse operational impact on the ongoing pattern of use within the historic landscape of the Floating Harbour, New Cut and River Avon.

6.1.8 Mitigation

Embedded

The character, setting, and heritage significance of potentially impacted heritage assets will be considered through the evolution of the design to reduce and, where possible, avoid harm.

Additional

It is likely that archaeological and built heritage recording (preservation by record) will be required in advance of and/or during construction.

No operational mitigation is likely to be proposed.

Enhancement

It is intended that the Strategy will include placemaking to promote and support inclusive growth, quality of life, environmental setting and resilience within the city. Within this there is opportunity to contribute to the enhancement of the existing character, setting and appearance of heritage assets and historic landscape and

townscape character. Particular areas of opportunity include the Cumberland Basin, Feeder Road, St Phillip's Marsh and Netham Lock.

6.2 Biodiversity

6.2.1 Introduction

This section outlines the scope and methodology for the assessment of potential likely significant effects arising from the construction and operation of the Proposed Development on biodiversity.

Biodiversity aspects considered within this chapter for the Proposed Development include:

- statutory and non-statutory designated sites;
- habitats; and
- protected and notable species.

This section is supported by the following appendices:

- Preliminary Ecological Appraisal 2023
- Biodiversity Net Gain Report 2023
- Figures 6.2 and 6.3

There are interrelationships with other discipline assessments, therefore, this chapter should be read in conjunction with the following chapters:

- Section 6.4 Townscape and Visual Impact: consideration of landscape requirements and planting arrangements, overlapping with sensitive ecological receptors and requirements for Biodiversity Net Gain.
- Section 6.5 Water Environment and Flood Risk: consideration of the effects of the construction and operation of the Proposed Development on water receptors, which overlap with ecological receptors, e.g. migratory fish.
- Section 7.1 Air Quality: consideration of possible construction impacts on air quality, in relation to sensitive ecological receptors, e.g. designated sites.
- Section 7.2 Noise and Vibration: consideration of possible construction impacts on receptors sensitive to noise and vibration disturbances, e.g. bat roosts and/or migratory fish.
- Section 7.4 Climate Change and Greenhouse Gases: consideration for landscape requirement and appropriate planting to accommodate both changes in temperatures and sea-level rise.

6.2.2 Legislation, policy and guidance

This scoping report has been prepared in accordance with relevant legislation, planning policy and guidance which will also apply to the future EIA. It is recognised that this list is non-exhaustive and will be kept under review to take account of any later legislation or policy changes.

Legislation

The relevant legislation includes:

- The Environment Act 2021
- The Conservation of Habitats and Species Regulations 2017
- Ramsar Convention 1971
- Wildlife and Countryside Act 1981
- The Invasive Alien Species (Enforcement and Permitting) Order 2019

- National Park and Access to the Countryside Act 1949 (as amended)
- Natural Environment and Rural Communities (NERC) Act 2006
- The Wild Mammals (Protection) Act 1996
- The Hedgerow Regulations 1997
- The Badgers Act, 1992
- The Salmon and Freshwater Fisheries Act 1975 (as amended)
- The Eels (England and Wales) Regulations 2009

National policy

The relevant national policies include:

- National Planning Policy Framework (NPPF)
- UK Post-2010 Biodiversity Framework

Local policy

The relevant local policies, plans and guidance listed by Bristol City Council, South Gloucestershire Council and Bath and North-East Somerset are included in Table 6-5.

Table 6-5 List of relevant local policy – Biodiversity

Local authority	Relevant local policy
Bristol City Council	Bristol Development Framework Core Strategy (2011) BCS9: Green Infrastructure BCS13: Climate change BCS15: Sustainable Design and Construction BCS23: PollutionBCS9: Green Infrastructure BCS13: Climate change BCS15: Sustainable Design and Construction BCS23: Pollution
Bristol City Council	Site Allocations and Development Management Policies (2014) DM17: Development Involving Existing Green Infrastructure DM15: Green Infrastructure Provision DM19: Development and Nature Conservation DM20: Regionally Important Geological Sites DM17: Development Involving Existing Green Infrastructure DM15: Green Infrastructure Provision DM19: Development and Nature Conservation DM20: Regionally Important Geological Sites DM33: Pollution Control, Air Quality and Water Quality
Bristol City Council	Bristol Local Plan: Publication Version (2023) BG1: Green Infrastructure and Biodiversity in New Development BG2: Nature Conservation and Recovery BG3: Achieving Biodiversity Gains BG4: Trees BG5: Biodiversity and Access to Bristol's Waterways

Local authority	Relevant local policy
	HW1: Pollution Control and Water Quality
Bristol City Council	Bristol Biodiversity Action Plan (BAP)[26] and Species and Habitat Action Plans[27]
Bristol City Council	One City Ecological Emergency Strategy[28]
Bristol City Council	Ecological Emergency Action Plan 2021 – 2025[29]
Bristol City Council	Bristol Species and Habitat Action Plans[30]
South Gloucestershire Council	South Gloucestershire Local Plan: Policies, Sites and Places Plan CS9: Managing the environment and heritage CS9: Managing the environment and heritage
South Gloucestershire Council	Policies, Sites and Places Plan (PSP plan, adopted 2017) PSP3 – Trees and Woodland PSP18 – Statutory Wildlife Sites: European Sites and Sites of Special Scientific Interest (SSSIs) PSP19: Wider Biodiversity PSP21: Environmental Pollution and Impacts PSP18 – Statutory Wildlife Sites: European Sites and Sites of Special Scientific Interest (SSSIs) PSP19: Wider Biodiversity PSP21: Environmental Pollution and Impacts
South Gloucestershire Council	Biodiversity Action Plan (2016 – 2026)[31]
South Gloucestershire Council	Local Nature Action Plan
South Gloucestershire Council	Climate Emergency Strategy (Adopted 2020)
North Somerset Council	North Somerset and Mendip Bats Special Area of Conservation (SAC) Guidance on Development: Supplementary Planning Document. 2018.[32]
North Somerset Council	North Somerset Council Green Infrastructure (GI) Strategy, January 2021.
North Somerset Council	North Somerset Council Core Strategy 2017 CS1: Addressing climate change and carbon reduction CS4: Nature conservation CS9: Green infrastructure
North Somerset Council	Emerging Local Plan 2038 Consultation Draft Preferred Options (2022) DP1: High quality design DP5: Climate change adaptation and resilience DP31: Green infrastructure DP32:Nature conservation DP33: Biodiversity Net Gain DP34: Trees and Woodlands
Bath and North-East Somerset	Core Strategy and Placemaking Plan incorporating the Local Plan Partial update (January 2023) CP6 Environmental Quality

Local authority	Relevant local policy
	NE3: Sites, habitats and species NE4: Ecosystem Services NE5: Ecological Networks and Nature Recovery NE6: Trees and woodland conservation NE3a Biodiversity Net Gain
Bath and North-East Somerset	Climate Emergency Strategy 2019- 2030 [33]

Further local policies

Guidance and standards

Relevant guidance and standards which have been used as part of the scoping process and will be taken into account as part of the EIA include:

- CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.

Impacts of the Proposed Development on European Sites will be assessed in accordance with the Conservation of Habitats and Species Regulations 2017 and reported separately in a Habitats Regulations Assessment report. Loss of habitats will be furthermore considered through the Biodiversity Net Gain process, as a requirement of the Environment Act.

6.2.3 Study area

The study areas established to inform this scoping chapter, which will also be used in the subsequent EIA and presented in the ES are as follows :

- For European Sites (including SACs, SPAs, candidate and potential SACs and SPAs, and Ramsar sites), the study area is considered as 10km from the site boundary.
- Bat SACs are considered to a greater distance due to the mobility and distances at which bats can navigate and forage across the landscape from their roosts. The Proposed Development is partially within Band B and C of the consultation areas[34] of the North Somerset and Mendips Bats SAC. Bat SACs further than 15km away are not included with consideration for the proportionality of the proposed works and the scale of potential impact.
- Marine mammal SACs are considered – Bristol Channel Approaches SAC is the only marine mammal SAC which has been considered in this Scoping Report initially, as the Proposed Development is within the Celtic and Irish Sea Marine Mammal Management Unit[35]. This management unit should consider all potential impacts on mobile qualifying features which for this SAC are only Harbour porpoise Phocoena 40hocoena. Harbour porpoise could be present within the River Avon, and also form part of the Bristol Channel Approaches SAC. Although harbour porpoise visit shallow bays, estuaries, and tidal channels less than 200m in depth, and have been known to swim up rivers (including some evidence for their occasional presence in the River Avon, e.g. October 2020) the proposed works are over 100km from the SAC. Therefore construction and operation assessments will aim to scope out impacts to the Bristol Channel Approaches SAC.
- For statutory designated sites of national/local value (including LNRs, NNRs, and SSSIs), and protected and notable species, the study area is considered as 2km from the site boundary.
- For non-statutory designated sites (including Road Verges of Ecological Importance (RVEI), SNCIs, Bristol Wildlife Network Sites (BWNS), Strategic Nature Areas (SNAs), Avon Wildlife Trust Reserves (AWTRs)) the study area is considered as 1km from the site boundary.

These study areas are considered as an appropriate zone of influence for the Proposed Development considering likely effects, in relation to CIEEM guidance[45].

6.2.4 Baseline conditions

Baseline data sources

The baseline described in this chapter has been informed by the following data sources in Table 6-6.

Table 6-6 Baseline data sources to inform scoping

Baseline Data	Source
Preliminary Ecological Appraisal	Arup, 2023
Biodiversity Net Gain Report.	Arup, 2023
Local Environment Records Search	Bristol Regional Environmental Records Centre, 2023

Baseline

The following sections present the existing baseline established at scoping. At this stage of the project, surveys have only been undertaken to identify habitats and the potential for protected and notable species. This survey work was used to inform a Preliminary Ecological Appraisal (Appendix B) and a baseline Biodiversity Net Gain report (Appendix C). Desk study data were received from Bristol Regional Environmental Records Centre (BRERC), however it is important to note that the desk study records do not cover the most eastern areas of the site where property level flood resilience measures are proposed. This includes records of protected/notable species and local non-statutory designated sites at the time of writing.

Summary of ecological receptors

Statutory designated sites: international value

- Avon Gorge Woodlands SAC, partially within the Proposed Development
- Severn Estuary SAC, partially within the Proposed Development
- Severn Estuary SPA, partially within the Proposed Development
- Severn Estuary Ramsar site, partially within the Proposed Development
- Chew Valley Lake SPA, 10.4km south
- North Somerset and Mendip Bats SAC, 12.2km south-west
- Bath and Bradford-on-Avon Bats, 9.9km south-east
- Bristol Channel Approaches SAC, 115km west

Statutory designated sites: national value

- Avon Gorge SSSI, partially within the Proposed Development
- Severn Estuary SSSI, partially within the Proposed Development
- Leigh Woods NNR, partially within the Proposed Development
- Bickley Wood SSSI, 25m north
- Ashton Court SSSI, 71m west
- Horseshoe Bend, Shirehampton SSSI, 550m north-east
- Ham Green SSSI, 738m south-east
- Cleeve Wood Hanham SSSI, 440m east

- Stidham Farm SSSI, 530m north

Statutory designated sites: local value

- Lamplighters Marsh LNR, partially within the Proposed Development
- Avon New Cut LNR, partially within the Proposed Development
- Eastwood Farm LNR, immediately south
- Avon Valley Woodland LNR, 31m north
- Troopers Hill LNR, 86m north-east
- St George's Flower Bank LNR, 1.16km south
- Stockwood Open Space LNR, 1.17km south
- Royate Hill LNR, 1.64km north
- Callington Road LNR, 1.77km south

Non-statutory designated sites: local value

- SNCIs (all overlapping with the Proposed Development or within 10m, further SNCIs are present at a greater distance from the Proposed Development which will be considered within the EIA): River Avon (Bristol), Land adjacent to Severn Estuary SSSI (Portbury), Lamplighter's Marsh, Avon Gorge and Leigh Woods, Feeder Side, Conham Vale and Dundridge Farm Woodland, St Anne's Wood, Birch Wood, Eastwood Farm, River Avon (South Gloucestershire), Severn Estuary, Crew's Hole Woodland, and Avon Valley, Bickley Wood.
- Strategic Nature Areas (all overlapping with the Proposed Development): Gorge and Downs, Abbots Leigh, Mudflats.
- Bristol Wildlife Network Sites (all overlapping with the Proposed Development or within 10m): Lamplighters Open Space, City and Port of Bristol Sports Ground, River Trym Confluence with River Avon, Cumberland Basin Lock, Land between railway line and the River Avon, Land between Brunel Way and the River Avon, Bower Ashton Playing Fields, Sparke Evans Park, Railway land Barrow Rd to River Avon, New Brislington Bridge, Land West of Riverside Surgery, Land between River Avon and Riverside Steps, WNS_BCC_296, Bower Ashton Railway Line, Butterfly Junction, Land between River Avon and Cattle Market Road, Land between Whitby Road and River Avon, Land near New Brislington Bridge, Land North of St Annes Wood SNCI, Manor Farm Sports Ground & Playing Fields, Netham Park, Railway by Manor Farm Sports Ground, Railway land between Barrow Rd and Lawrence Hill, Signal Station Allotments & Harbour Wall, White City Allotments, Avon Valley Hencliff Wood, and Avon Valley, Hanham Fields.

Habitats

- Habitats of Principal Importance (HPI)[36] (all overlapping with the Proposed Development): coastal and floodplain grazing marsh, coastal saltmarsh, mudflats, deciduous woodland. HPIs up to 500m from the Proposed Development: lowland heathland, traditional orchard, lowland calcareous grassland, lowland meadows, lowland dry acid grassland.
- Ancient Woodland Inventory (AWI) sites (all overlapping with the site boundary): Rownham Wood / Leigh Woods, Birch Wood, and Hencliff Wood. AWIs up to 500m from the Proposed Development: four unnamed woodlands, Bickley Wood, Leigh Wood/Markham Bottom, and Cleeve Wood.
- In general, habitat types are varied reflecting the intertidal, freshwater, and terrestrial components on site. The River Avon downstream of Netham Weir is largely intertidal with coastal saltmarsh, and mudflats. Terrestrial habitats are varied reflecting the urban nature of Bristol City and the progression to more suburban and rural areas away from the city centre. Habitats recorded include developed land, buildings, grasslands, hedgerows woodland, and scrub.

Protected and notable species

- Bats: Potential for roosting bats was identified across the Proposed Development within more mature trees, and built structures. A number of roosts were identified within 1km of the area of works for the Proposed Development. Bat surveys undertaken between 2014 and 2018, and data review undertaken, as part of the MetroWest planning application[37] identified two underground sites with bat roosts in close proximity to Bower Ashton. The caves and adits within the Avon Gorge Woodlands are cited as an important roost resource for bats locally, with lesser horseshoe bats regularly using these resources in winter. Two tunnels at the western edge of Leigh Woods, one of which is within 500m of the Proposed Development, support low numbers of roosting bats over winter. There is an abundance of suitable foraging and commuting habitat present across the Proposed Development and surrounding areas, including hedgerows, scrub, woodland edge habitat and the river corridor.
- Badger: Suitable habitat was identified for badgers *Meles meles* within the Proposed Development.
- Beaver: Suitable habitat was identified for beaver *Castor fiber* within the Proposed Development along the River Avon and its tributaries.
- Hazel dormouse: Presence is likely, particularly within the overlapping Leigh Woods within Bower Ashton, and also within connecting habitats. Dormouse *Muscardinus avellanarius* presence is considered unlikely in habitats associated with the city centre.
- Otter: Suitable habitat was identified for otter *Lutra lutra* within the Proposed Development.
- Water vole: Presence of water vole *Arvicola amphibius* is considered possible in areas where there are relatively recent historical records of water vole (north of Shirehampton) and where suitable habitat was identified at some of the upstream sites.
- White-clawed crayfish: It is considered likely that white-clawed crayfish *Austropotamobius pallipes* are absent from across the Proposed Development. White-clawed crayfish require clean and well oxygenated watercourses, preferably with shallow waters and overhanging vegetation[38]. The River Avon that falls within the Proposed Development is generally considered non-optimal for white-clawed crayfish, given the relatively polluted and deep nature of the river. The stream at St Annes offers some limited potential, given whilst it is shallow and slow moving in parts, however given the lack of desk study records, it is considered likely that white-clawed crayfish are absent from the Proposed Development. The EIA will aim to scope out impacts to white-clawed crayfish.
- Breeding birds: Habitat is suitable for a range of common breeding birds as well as those which receive additional legal protection from disturbance, e.g. kingfisher *Alcedo atthis* (Schedule 1 of the Wildlife and Countryside Act).
- Wintering birds: Habitat is suitable for wintering and passage birds associated with the intertidal areas, most notably downstream of Bower Ashton. Birds of consideration include those associated with statutory and non-statutory designated sites, as well as species of conservation concern..
- Reptiles: Suitable reptile habitats were identified within the Proposed Development in tussocky grassland, scrub, and woodland, as well as wetland habitats.
- Great crested newt: Waterbodies and terrestrial habitat suitable for great crested newt *Triturus cristatus* were identified within the Proposed Development.
- Invertebrates:. Suitable habitat was identified across the Proposed Development which appeared sufficiently species-rich and complex that they may support more rare or notable terrestrial invertebrate species/populations. The River Avon itself may support significant aquatic invertebrate populations, in particular the more tidally influenced areas to the west which overlap with the Severn Estuary SSSI (one feature of which is invertebrate populations of considerable interest).
- Fish: The River Avon and its tributaries are likely to support common fish species. Species for which the Severn Estuary SAC is designated may be present within the River Avon.
- Hedgerow and woodland habitats across the site may provide suitable habitat for species listed on Section 41 of the NERC Act, e.g. hedgehog *Erinaceus europaeus.*

6.2.5 Engagement

To date engagement has been undertaken with the EA and Natural England. Consultation on a Statement to Inform an Appropriate Assessment was received from NE on 16th December 2020. Engagement will be undertaken with relevant stakeholders in relation to the Proposed Development to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design. This will be undertaken by EIA Team.

The following bodies will be consulted during the EIA process:

- Bristol City Council
- South Gloucestershire Council
- North Somerset Council
- Bath and North East Somerset Council
- Avon Wildlife Trust
- Environment Agency
- Natural England
- Marine Management Organisation

Additional baseline data collection

The following data sources will be accessed to characterise the existing environment with respect to Biodiversity:

- The Multi-Agency Geographic Information for the Countryside (MAGIC)
- The Woodland Trust's Ancient Tree Inventory map[39]
- Biodiversity data to be obtained from BRERC

The surveys that will be undertaken to inform the assessment in accordance with industry guidelines and agreed in advance with stakeholders include:

- Bats: Surveys will be undertaken in accordance with the latest guidance[40], and assessments in line with additional recent guidance[41]. Consideration to be given to emerging bat survey guidance.
- Buildings and trees within and adjacent to the Proposed Development will be assessed to determine their potential to support bat roosts. Tree climbing and/or emergence surveys will be undertaken where appropriate. All surveys and any inspections would be undertaken by experienced bat workers, with relevant Natural England survey licences where required.
- Badger: A badger survey is proposed to identify any setts within or adjacent to the Proposed Development works areas (up to 30 m).
- Beaver: A beaver survey is proposed to identify any of their breeding sites or resting places in areas potentially impacted by the Proposed Development.
- Hazel dormouse: A dormouse presence/likely absence survey should be conducted within suitable habitat (connected woodland, hedgerow and scrub) in relevant areas of vegetation, if they are likely to be impacted by the works associated with the Proposed Development.
- Otter: An otter survey is proposed to identify any of their places of rest in areas potentially impacted by the Proposed Development.
- Water vole: Surveys are proposed to be undertaken, in accordance with best practice guidance[42], to confirm the presence/likely absence of water vole. Surveys may comprise both walkover bank-based surveys, as well as boat-based surveys to cover areas not safely or easily accessible by foot.

- White-clawed crayfish: Further surveys are to be scoped out, pending consultation with the Environmental Agency and with consideration for further design detail.
- Breeding birds: At least three survey visits may be required (but potentially up to six survey visits) across all of the Proposed Development due to the location and extent of suitable breeding habitat. The requirement for survey will depend upon the potential extent of vegetation clearance and potential disturbance effects.
- Wintering birds: Monthly visits from October to March, inclusive, to cover the intertidal areas downstream of Bower Ashton. The nature of and need for these survey visits (i.e. high/low tide, diurnal/nocturnal), should be reviewed by a suitably experienced ecologist as the project design progresses.
- Reptiles: Given the presence of suitable reptile habitats, a reptile survey of these habitats is recommended if they are likely to be impacted significantly.
- Great crested newt: Habitat suitability index (his) assessments[43] should be conducted on suitable waterbodies within 500m of the site and suitably connected to assess potential for great crested newt *Triturus cristatus*. Ponds would potentially require further survey depending on the outcome of thisHSI assessments[44]. This may comprise an initial eDNA sampling survey to initially establish presence/absence. If a positive result is obtained then a full presence/absence survey would be required, to inform any licensing requirements and associated mitigation.
- Invertebrates: Targeted terrestrial and aquatic invertebrate survey potentially required if suitable habitat to be impacted.
- Botany: National Vegetation Classification (NVC) surveys will be undertaken for areas potentially impacted within Avon Gorge Woodland SAC and in the Severn Estuary SAC and SSSI.
- Fish: Surveys for fish are not currently proposed, however their requirement will be reviewed following design progression.
- Signs of species listed on Section 41 of the NERC Act will be noted during the course of other surveys. Specific surveys for such species are thus not currently proposed.

Following these baseline surveys, as required with consideration for updated designs, the Proposed Development's impact will be assessed and designs updated, as appropriate, following the mitigation hierarchy.

Assessment methodology

The assessment will be based on the Guidelines for Ecological Impact Assessment in the UK and Ireland Terrestrial, Freshwater, Coastal and Marine produced by CIEEM[45]. It will also be in line with the EIA Regulations as set out in Chapter 5 of this report.

The assessment will document the habitats, species and sites of nature conservation interest recorded in and around the Proposed Development and provide an assessment of the ecological value of these within the Proposed Development's context.

Potential impacts resulting from the construction and operation of the Proposed Development will be assessed and reported in terms of their significance for the integrity and conservation status of ecological receptors. For example, these will include impacts to both terrestrial habitats resulting from habitat loss and disturbance during construction, as well as impacts to winter birds resulting from disturbance during construction. Impacts are considered for Phase 1 of this Proposed Development.

Avoidance, mitigation, compensation and/or enhancement measures will be proposed to reduce negative impacts and achieve biodiversity gains, where feasible and appropriate. The predicted residual effects of the proposed development will then be quantified and consequences for decision making discussed in view of the mitigation measures proposed and the value of any ecological receptors affected.

Significance criteria

The significance criteria outlined within the CIEEM guidance[45] (and briefly summarised in the following paragraph) will be used for the assessment of effects on nature conservation.

Beneficial or adverse, reversible or permanent impacts will be determined to be significant or not depending upon the effect on integrity of a defined site or ecosystem(s) and/or the conservation status of a habitat or species, and whether this effect is in accordance with policy. The scale at which the significant effect will be determined according to the value of the receptor/resource. It is important to note however that in accordance with the CIEEM guidelines, the actual determination of whether an impact is ecologically significant is made irrespective of the value of the receptor in question. In this respect the CIEEM methodology differs from some other approaches to EIA.

6.2.6 Potential impacts

The assessment of the effects of the Proposed Development will include those arising from the permanent land take required for the Proposed Development as well as other construction activities; and the operation of the Proposed Development.

Construction

The potential impacts of the permanent land take for the Proposed Development would primarily arise from habitat loss, which as well as resulting in the loss of habitat of intrinsic value in its own right, would reduce the area available for foraging, commuting and breeding animals. Reducing the area can reduce viability of the habitat and lead to a reduction in the diversity of plant and animal communities present. The integrity of the habitat could therefore be altered, and the conservation status of species affected.

The potential impacts of the Proposed Development during construction would include, in the absence of mitigation:

- additional habitat loss as a result of the construction of the Proposed Development resulting from use of land for soil storage areas or construction compounds etc.;
- potential hydrological impacts of the flood defences resulting in changes in water levels in watercourses and wetland areas;
- temporary severance/fragmentation of habitats or corridors used by species;
- disturbance to sensitive species in adjacent areas from noise, light, unaccustomed human activity;
- impacts of air pollution from construction vehicle exhaust gases and dust from haul roads;
- potential impacts of pollution from inappropriate storage of chemicals or spillages, or mobilisation of ground contaminants, on nearby or more distant receptors;
- potential impacts of run-off from the construction area resulting in particulate pollution of watercourses; and
- species mortality / injury, as a direct result of construction activities.

These identified construction impacts have the potential to lead to significant effects which will be assessed as part of the EIA.

Operation

The impacts to be assessed relating to operation of the Proposed Development would include, in the absence of mitigation:

- increased inundation and scour on riverine habitats from increased flooding events as a result of the Proposed Development, leading to:
  - habitat degradation / community simplification; and
  - habitat loss / gain.

- increased flooding in additional areas, as a result of the Proposed Development, leading to habitat degradation and/or community simplification;
- permanent impact on the ecological quality of water features associated with the Proposed Development or to habitats which are hydrologically connected;
- severance of habitats and blocking movement of animals, as a result of new defences; and
- potential ecological benefits of new landscape provision and management, including through Biodiversity Net Gain.

These identified operational impacts have the potential to lead to significant effects which will be assessed as part of the EIA.

6.2.7 Mitigation

Embedded

Throughout the design process, the mitigation hierarchy will be followed, which will aim to avoid impacts though design change. For example, these design changes will aim to avoid or minimise works within designated sites and/or alter the construction programme to avoid temporally sensitive periods. Biodiversity Net Gain, as a legislative requirement of the Environment Act 2021, will aim to avoid and reduce habitat loss through embedded design measures and the mitigation hierarchy.

Additional

Additional mitigation is likely to be required to reduce the impact of construction or operational effects, and to deliver the legislative requirement to achieve at least 10% BNG. Potential mitigation to be considered includes:

- Adoption of a Construction Environment Management Plan, which will stipulate requirements to control, in part, pollution and sediment run-off impacts into waterbodies and/or sensitive habitats.
- Adoption of a Landscape Environment Management Plan, which will stipulate requirements to implement and manage habitats for at least 30 years, as a requirement of Biodiversity Net Gain.
- Planting of trees and habitats to replace those habitats lost during construction. These habitats will also be delivered through the requirements of Biodiversity Net Gain. Protection of trees and habitats will also be implemented during construction.
- Potential measures to control noise and vibration effects from any associated piling, e.g. soft-starts and barriers.
- Implementation of biosecurity measures to avoid the spread of invasive non-native species;
- Adherence to guidance on lighting control during construction and operation[46].
- Supervision of works in or near sensitive ecological receptors during construction by an Ecological Clerk of Works.

Through legislative requirements, impacts to some species and designated sites will require licencing and/or approval through Natural England. As part of this legislative process, mitigation will be stipulated to avoid and reduce impacts to acceptable levels.

Consideration will be given throughout the design process on the additionality principles of BNG[47].

Enhancement

Delivery of habitats for BNG will create an environment which will benefit species, who utilise that habitat.

6.3 Ground Conditions and Contaminated Land

6.3.1 Introduction

This chapter outlines the scope and methodology for the assessment of the potential likely significant effects arising from the construction and operation of the Proposed Development on ground conditions and contaminated land.

Ground conditions and contaminated land aspects considered within this chapter for the Proposed Development include:

- Underlying geology and associated designated sites of geological value.
- Agricultural land.
- Mineral resources.
- Land contamin–tion - initial Conceptual Site Model to identify potential sources of land contamination and sensitive receptors.

This chapter is supported by the following figures:

- Figure 6.4 Published geology (bedrock and linear)
- Figure 6.5 Published superficial geology
- Figure 6.7 Agricultural land classification
- Figure 6.8 Potential contamination sources downstream

There may be interrelationships with other disciplines. Therefore, this chapter should be read in conjunction with the following chapters:

- Section 6.5 Water Environment and Flood Risk – identification of baseline conditions with respect to water environment features, which are considered sensitive receptors to potential land contamination sources present within the Proposed Development.

6.3.2 Legislation, policy and guidance

This scoping report has been prepared in accordance with relevant legislation, planning policy and guidance which will also apply to the future EIA. It is recognised that this list is non-exhaustive and will be kept under review to take account of any later legislation or policy changes.

Legislation

The relevant legislation includes:

- Wildlife and Countryside Act (1981)
- National Parks and Access to the Countryside Act (1949)
- Environmental Protection Act, Part 2A: Contaminated Land Statutory Guidance (1990)
- Environment Act (1995)
- Water Resources Act. The Water Resources Act (1991) (as amended by the Water Act (2003))
- Contaminated Land (England) Regulations (2006)
- Environmental Damage (Prevention and Remediation) (England) Regulations (2015)
- Construction (Design and Management) Regulations (2015)

- Environmental Permitting (England and Wales) Regulations (2016)
- Groundwater (Water Framework Directive) (England) Direction (2016)
- Water Environment (Water Framework Directive) (England and Wales) Regulations (2017)
- Water Framework Directive (Standards and Classification) Directions (England and Wales) (2015).

National policy

The relevant national policies include:

- National Planning Policy Framework (2023) (NPPF), Section 15 Conserving and enhancing the natural environment: states that impacts on geodiversity should be reduced by preventing harm to geological conservation interests.
- NPPF, Section 15, paragraph 174: states that planning policies and decisions should contribute to and enhance the natural and local environment by preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of land instability. The benefits of the best and most versatile agricultural land should be recognised.
- NPPF, Section 15, paragraphs 183 and 184: emphasises the requirement to understand the ground risks such as land contamination and land instability, also those arising from natural hazards or former activities such as mining, and on the development of appropriate remediation to make ground hazards material considerations during the planning process. The developer is responsible for securing safe development.
- NPPF, Section 15, paragraphs 183(a): states that planning policies and decisions should ensure that a site is suitable for its proposed use taking account of ground conditions and any risks arising from land instability. This includes risks arising from natural hazards or former activities such as mining, and any proposals for mitigation including land remediation (as well as potential impacts on the natural environment arising from that remediation).
- NPPF, Section 17, paragraph 210: states that planning policies and decisions should safeguard mineral resources by establishing Mineral Safeguarding Areas and so they are not sterilised by non-mineral development and ensure that alternatives to primary mineral resources are considered like recycled materials.

Local policy

The relevant local policies listed in Table 6-7:

Table 6-7 List of relevant local policy – Ground conditions and contaminated land

Local authority	Relevant local policy
Bristol City Council	Bristol Development Framework Core Strategy (2011) BCS9: Green Infrastructure BCS22: Conservation and the Historic Environment BCS22: Pollution
Bristol City Council	Bristol Site Allocations and Development Management Policies (2014) DM20: Regionally Important Geological Sites DM33: Pollution Control, Air Quality and Water Quality DM34: Contaminated Land DM37: Unstable Land
Bristol City Council	Bristol Local Plan: Publication Version (2023) BG2: Nature Conservation and Recovery HW1: Pollution Control and Water Quality

Local authority	Relevant local policy
	HW1B: Contaminated Land UM2: Unstable Land UM3: Minerals Safeguarding Areas
South Gloucestershire Council	South Gloucestershire Core Strategy 2006-2027 CS9: Managing the Environment and Heritage CS10: Minerals
South Gloucestershire Council	South Gloucestershire Local Plan: Policies, Sites and Places Plan PSP5: Undesignated Open Spaces within Urban Area and Settlements PSP18: Statutory Wildlife Sites: European Sites and Sites of Special Scientific Interest (SSSIs) PSP19: Wider Biodiversity PSP21: Environmental Pollution and Impacts PSP23: Mineral Working and Restoration PSP24: Mineral Safeguarding Areas
North Somerset Council	North Somerset Core Strategy 2017 CS8 Minerals planning
North Somerset Council	Emerging Local Plan 2038 Consultation Draft Preferred Options (2022) DP29: Control of non-mineral development DP30: Mineral working exploration, extraction and processing
Bath and North East Somerset Council	Core Strategy and Placemaking Plan incorporating the Local Plan Partial Update (January 2023) CP6: Environmental Quality CP8a: Minerals NE2: Conserving and enhancing the landscape and landscape character PCS1: Pollution and Nuisance PCS5: Contamination PCS6: Unstable Land PCS7: Water Source Protection Zones M1: Mineral Safeguarding Areas M2: Minerals Allocations

Guidance and standards

Relevant guidance and standards which have been used as part of the scoping process which will be taken into account as part of the EIA are listed below:

- Department for Environment, Food and Rural Affairs (Defra), Contaminated Land Statutory Guidance (2012)
- Defra and Environment Agency, Land contamination: risk management (2021)
- Construction Industry Research and Information Association (CIRIA), A Guide for Safe Working on Contaminated Sites (R132)
- British Standards (BS), Code of Practice for Site Investigations (5930: 2015 + A1:2020)
- BS, Code of Practice for Investigation of Potentially Contaminated Sites (10175:2011 + A2 2017)
- Environment Agency, Groundwater protection

- CIRIA, Contaminated Land Risk Assessment, A guide to good practice (C552)
- CIRIA, Unexploded ordnance (UXO) A guide for the construction industry (C681)
- CIRIA, Asbestos in soil and Made Ground: a guide to understanding and managing risks (C733)
- CIRIA, Asbestos in soil and Made Ground: good practice site guide (C765)
- National House-Building Council, Guidance for the Safe Development of Housing on Land Affected by Contamination (R&D Publication 66, Volume 1)
- Environment Agency, Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention
- Defra, Construction Code of Practice for the Sustainable Use of Soils on Construction Sites
- Natural England, Agricultural Land Classification: protecting the best and most versatile agricultural land.

6.3.3 Study area

The study areas established to inform this scoping chapter, which will also be used in the subsequent EIA and presented in the ES are as follows:

- The study area for the geology, mineral resources and soils assessment incorporates the footprint of the Proposed Development including the city centre, upstream and downstream defences. A further 250m study area around the Proposed Development has also been considered in relation to impact on human health from potential sources of contaminated land. This distance has been established using professional judgement informed by published guidance[48] and is typical at the hazard identification stage of an assessment. The extent of the 250m buffer zone is shown in Figure 6.8 Potential Contamination Sources.
- In order to consider potential impacts to sensitive controlled waters receptors (surface water bodies and groundwater resources), a 1km study area around the Proposed Development has been used. No significant contamination migration is expected beyond these distances. These distances have been established using professional judgement. The extent of the 1km buffer zone is shown in Figure 6.6 Groundwater features.

6.3.4 Baseline conditions

Baseline data sources

The baseline described in this chapter has been informed by the data sources detailed in Table 6-8.

Table 6-8 Baseline data sources to inform scoping

Baseline Data	Source
Site History	Know Your Place – Interactive Map [49] Historic England - Aerial Photography[50] Arup Desk Studies (Bristol-Avon-Flood-Strategy): City centre Feasibility Study[51] Entrance Lock/Western Harbour Desk Study[52] Cumberland Road Feasibility Study[53] Reach 8 – Netham Lock Defences Feasibility Study[54], St Philip's Defences Feasibility Study[55]
UXO	Arup Desk Studies [51 52 53 54 55] Zetica Unexploded Bomb Risk Map[56]
Mining	Arup Desk Studies[51 52 53 54 55 55] British Geological Survey – The Coal Authority Interactive Map[57]

Baseline Data	Source
Geological Designations	DEFRA Magic Interactive Maps[58] Bristol City Council Heat Network Local Development Order – GIS Map[59] Bristol City Council Heat Network Local Development Order – GIS Map[60]
Agricultural Land Classification	DEFRA Magic Interactive Maps [58]
Mineral Safeguarding Areas	Bristol City Council Local Plan – Interactive Map[61] South Gloucestershire Council Local Plan – Interactive Map South Gloucestershire Council Local Plan – Interactive Map
Regionally Important Geological Sites	Bath & North East Somerset Council Local Plan – Interactive Map[62] Bristol City Council Heat Network Local Development Order – GIS Map[60]
Published Geology	British Geological Survey, Mineral Resources maps[63]
Mineral Resources	British Geological Survey, on-line mapping[64]
Land contamination potential sources	Arup Desk Studies [51 52 53 54 55] National Library of Scotland- Side By Side Interactive Map[65] Know Your Place – Interactive Map [49]

Baseline

The following sections present the existing baseline established at scoping.

History

Bristol City and surrounding areas have been subject to ground raising and subsequent residential and commercial land-use development since the 1800s. The nature of the fill used for the ground raising is unknown and may have been placed with poor engineering control. Furthermore, the fill may contain contaminants, considering the extensive historic industrial uses of the land across the Proposed Development.

Arup desk studies were reviewed to obtain information on the historical evolution of the locations where the Proposed Development will be sited. Where Desk studies were unavailable, historical maps and aerial photography of the site were reviewed used instead.

Table 6-9 presents an overview of the key features/developments within each location since the 1800s.

Table 6-9 Overview of key historic developments

Date	Key Developments	Location
1828-1888	Construction of Avon New Cut, Cumberland Basin, Floating Harbour, Cumberland Road, Brunel's Swivel Bridge, Entrance Lock.	Spike Island, Entrance Lock
1880	Timber yards, sawmills, residential houses and warehouses	Spike Island, Entrance Lock
1960s	Engineering works and asphalt works on site	Spike Island, Entrance Lock
1948-1967	Southern lock removed, construction of Plimsoll Swing Bridge, chlorination station, and present-day road network	Entrance Lock

Date	Key Developments	Location
1750-1828	Construction of Bathurst Basin & Dam, Bedminster Bridge, Bath Bridge, Old City Gaol, Temple Gate Works.	Redcliffe
1844-1888	Development, inc. General Hospital, coal yard, brewery, tannery.	Redcliffe
1888-1967	Coal yard removed, glue works replaces brewery and tannery, warehouse built on Bathurst Basin.	Redcliffe
1999	Residential development, Bedminster Bridge and Bath Bridge re-established as roundabouts.	Redcliffe
2014-2018	Construction, inc. emergency concrete buttress, Metrobus Bridge.	Redcliffe
1840-1888	Development/-construction, Feeder Canal, Netham Lock, Old Dock, Netham Weir, Netham Chemical Works, railway line	Netham Lock, Feeder Road
1903	Site occupied by Netham Constructional Steel Works	Netham Lock
1903	Old Dock infilled, New Brislington Bridge constructed, railway extended to site, steel works established	Netham Lock, Chapel way
1948-1976	Netham Chemical Works removed and ground raised, construction of Netham Dam,	Netham Lock,
1984-1990	Site occupied by St. Vincent's Trading Estate.	Netham Lock,
1840-1914	Oil, iron, chemical, manure, varnish and acid works on site	St. Philip's Marsh
1840-1914	Ground raised, construction of railway station (Bristol Temple Meads), and Totterdown Bridge.	St. Philip's Marsh
1937-1965	Manure works replaced by linoleum works, removal of paint factory, petrol depot, iron works and acid works.	St. Philip's Marsh
1828-1890	Industrial development, Marsh Oil Mill, timber yard, clay pit, Great Western Colliery, gas, iron, vitriol, manure, pottery, glue, alkali, and glass works on site.	Feeder Road
1840-1890	Residential development, construction of Great Western Railway Bridge, dock and Feeder Float Lock	Feeder Road
1887-1939	Colliery, gasworks, vitriol works, and clay pit no longer present/disused, dock backfilled with unknown material	Feeder Road
1948	Site occupied by engineering works	Feeder Road
2012-2019	Construction of A4320 and footbridge	Feeder Road
2023	All works replaced with light industrial use	St. Philip's Marsh, Feeder Road
1912-1972	Site occupied by printing works	Chapel way
1840-1880	Site occupied by quarry and Conham ferry station	Pump house lane
1888-1965	Construction of Riverside Cottages, quarries in surrounding area	Riverside cottages

Date	Key Developments	Location
1873-1888	Site occupied by Hanham Mill and quarry	Hanham Mills
1840-1880	Construction of Hanham Lock	Beeses bar
1840-1888	Brass works, tannery and quarry on site	Keynsham
1885-1965	Construction of canal, brass works replaced by sewage works and Avon Paper Mill	Keynsham
1873-1913	Site occupied by soap works	Broadmead Lane Ind. Estate
1888-1913	Small scale buildings	Bitton
1873-1888	Residential development	Swineford

UXO

Bristol Harbour and the surrounding areas are known to have been targeted in World War II, with various known Luftwaffe Targets and several UXO items found in the proximity to the Proposed Development.

Based on the Unexploded Bomb Risk Map by Zetica UXO[56], elements of the Proposed Development that are classed as either High or Moderate Bomb Risk Areas are shown in Table 6-10.

Table 6-10 Significant UXO risk areas

UXO Bomb Risk	Proposed Development Elements
High	Entrance Lock, Spike Island, Redcliffe, St. Philip's Marsh, Feeder Road, Netham Lock, Whitby Road, Pump House Lane.
Moderate	Hanham Mills, Riverside Cottages, Beese's Bar, Broadmead Lane Industrial Estate, Bitton, Keynsham .

Geology

Artificial ground is shown to underlie the majority of the Proposed Development in Bristol. However, Made Ground is anticipated to be present in all areas of works for the Proposed Development related to the historical and current development and the presence of infilled land.

Made ground is underlain by Tidal Flat Deposits typically comprising clay and silt, which are present in all locations except of parts of Spike Island defences.

Published superficial geology is shown on Figure 6.5 Published superficial geology.

The bedrock underlying the Proposed Development mainly consists of Redcliffe Sandstone, but primarily comprises mudstones and sandstones, other types of sandstone, mudstone and limestone are also present. This information is summarised in Table 6-11 and shown on Figure 6.4 Published geology (bedrock and linear).

Table 6-11 Geological formations

Deposit	Brief description	Scheme elements
Superficial deposits		
Artificial ground	Made ground (undivided)	Entrance Lock, Spike Island, Redcliffe, St Philip's Marsh, Feeder Road, Netham Lock,
Tidal Flat Deposits	Clay and silt	All locations within Proposed Development except Spike Island
Bedrock		

Deposit	Brief description	Scheme elements
Redcliff Sandstone Member	Sandstone	Entrance Lock, Spike Island, Redcliffe, St Philips Marsh Netham Lock, Whitby Road, Feeder Road
Mercia Mudstone Group	Mudstone and Halite-stone	Redcliffe, St Philip's Marsh , Feeder Road
Mangotsfield Member	Mudstone, siltstone and sandstone	Chapel Way, Pump House Lane, Riverside Cottages, Hanham Mills, Beese's Bar.
Farrington Member and Barren Red Member	Sandstone	Keynsham
Saltford Shale Member	Mudstone	Keynsham
Charmouth Mudstone Formation	Mudstone	Bitton, Swineford
Blue Lias Formation	Limestone and Mudstone, interbedded	Broadmead Lane Industrial Estate
Langport Member	Limestone	Keynsham

No faults have been identified within the Proposed Development. However, fault lines are shown on geology plans within 250m of Chapel Way, Hanham Mills, Beeses's Bar, Pump House Lane , Keynsham. The linear features are shown on Figure 6.4 Published geology (bedrock and linear).

Mineral Resources

Local authorities' development plans do not identify local mineral resources and Mineral Safeguarding Areas within the Proposed Development except for the area of the Proposed Development containing the upstream defences, Riverside Cottages and Hanham Mills, which are located within the South Gloucestershire Mineral Safeguarding Area.

BGS Mineral plans indicate that some of the Proposed Development elements are located within areas identified as mineral resources, as summarised in Table 6-12.

Table 6-12 Mineral resources

Deposit	Brief description	Scheme elements
Sub-alluvial: Inferred resources	Alluvium - clay, silt, sand and gravel	Upstream defences: Hanham Mills, Keynsham, Broadmead Lande Industrial Estate, Bitton, Swineford

Geological designations

There are no statutory or non-statutory designated sites of geological importance (Local Geological Sites) within the Proposed Development. However, there are SSSI and RIGS (Regionally Important Geological Sites) within 250m of the Proposed Developments summarised in Table 6-13.

Table 6-13 Geological statutory and non-statutory sites

Geological Site	Designation	Proposed Developments within 250m
Bickley Wood	SSSI	Riverside Cottages (70m northwest), Hanham Mills (10m north), Beeses Bar (90m north)

Geological Site	Designation	Proposed Developments within 250m
Avon Gorge	SSSI	Entrance lock (250m northwest)
Redcliffe Caves	RIGS	Redcliffe (140m north)

Hydrology and Hydrogeology

Key hydrology and hydrogeology features are outlined below, further detail and context is given within Chapter 6.5 Water Environment and Flood Risk.

- Groundwater Features within the Proposed Development include, Bristol Triassic Water Body, Carboniferous Limestone (Bristol) Water Body and Portishead Mercia Mudstone Water Body.
- The WFD classified surface water features include, Bristol Floating Harbour Water Body, Bristol Avon Water Body, The Malago, Frome, Brislington Brook, Siston Brook, Chew, Boyd and Trym.
- The Proposed Development is underlain by Secondary A, and Secondary B bedrock aquifers in most areas. However, Principal (Entrance Lock) and Secondary Undifferentiated (Bitton, Keynsham), Bedrock Aquifers are also present.
- Superficial Drift Aquifers are present within the Proposed Development, these include, Secondary A (Bitton, Keynsham) and Unproductive (Redcliffe, Spike Island, Entrance Lock).
- Groundwater bodies in the study area are likely to support local abstractions for potable water supply.
- There are no groundwater drinking water safeguard zones within the study area. However, two GWDTEs are present (Severn Estuary, Avon Gorge).

Mining

Bristol falls within the Coal Authority Consultation area and has been subject to extensive coal mining in its recent history. The Proposed Development lies across areas within the Abandoned Mines Catalogue or Development High Risk Areas, where probable shallow coal workings cross the site. Where a location falls within a Development High Risk Area, the Local Authority planning department may require a coal mining risk assessment to be undertaken by a qualified mining geologist or engineer.

Within the Proposed Development, there are several Proposed Development elements that are within 250m of recorded mine entries or workings and past shallow coal mine workings. This information is summarised in Table 6-14.

Table 6-14 Mining Overview Mining Overview

Classification	Scheme elements
Development High Risk Area	Netham Lock, Entrance Lock, Spike Island, St Philip's Marsh, Feeder Road, Riverside Cottages, Pump House Lane.
Abandoned Mines Catalogue Area	Netham Lock, Redcliffe, St Philip's Marsh, Feeder Road, Spike Island.
Recorded Mine Entries/Workings	Netham Lock (100m North), St Philip's Marsh (100m East), Feeder Road (150m Southeast).
Past Shallow Coal Mine Workings	Netham Lock (below site).

Agricultural land

The Proposed Development is largely located within developed urban areas. This is apart from the Upstream Defences, which are set in areas dominated by agricultural land use. The Proposed Development elements

located within, or potentially encroaching on classified agricultural land are summarised in Table 6-15 and shown on Figure 6.7 Agricultural Land Classification.

Table 6-15 Agricultural Land Classification (ALC)

ALC	Brief description	Scheme elements
Grade 3	Good to Moderate Quality Land This land has moderate limitations that affect the choice of crops to be grown, timing and type of cultivation, harvesting or yield. The yield of more demanding crops grown on this land is generally lower or more variable than on Grade 1 and 2.	Downstream and upstream defences: Pill, Bitton, Keynsham , Broadmead Lane Industrial Estate

Potential sources of contamination

Made Ground is anticipated to be present across the entirety of the Proposed Development related to the historical and current development and the presence of infilled land. There is potential for this ground to have been derived from nearby industrial processes and as such it may present a potential source of contamination across the Proposed Development. In addition to this, there are various other sources of contamination within the vicinity of several elements of the Proposed Development, e.g. discharge consents, industrial land use, historical landfill sites, as summarised in Table 6-16 with indicative locations shown on Figure 6.8 Potential contamination sources downstream.

Table 6-16 Overview of Land Contamination Sources

Proposed Development	Land contamination source
Entrance Lock	Registered landfill, historical landfill, discharge consents, pollution incident, Made Ground, industrial land use (chlorination station)
Spike Island	Made Ground, Historical Landfill, Methane Gas Deposits, industrial land use (asphalt and engineering works)
Redcliffe	Made Ground, Industrial Land Use (coal yard, brewery, tannery, glue works)
Netham Lock	Historical Landfill, Made Ground, waste management facilities (scrap metal/rubber), discharge consents (1 active, 8 revoked), mine workings, Industrial Land Use (chemical works, steel works)
St. Philip's Marsh	Made Ground, historical landfill, mine workings, industrial land use (Oil, Iron, Chemical, Manure, Varnish linoleum and Acid works)
Feeder Road	Made ground, mine workings, industrial land use (engineering, Gas, Iron, Vitriol, manure, pottery, glue, alkali, and glass works, timber yard, clay pit, oil mill, colliery)
Whitby Road	Made Ground, Historical Landfill, Industrial Land Use, mine workings, Waste management facilities, discharge consents
Chapel Way	Made Ground, industrial land use (printing works)
Pump House Lane	Made Ground, industrial land use (quarry)
Riverside cottages	Made Ground, industrial land use (quarry)
Hanham Mills	Made Ground, industrial land use (forge mill, quarry)
Beeses Bar	Made Ground
Keynsham	Made Ground, historical sewage works, industrial land use (tannery, brass works, quarry)
Broadmead Lane Industrial Estate	Made Ground, industrial land use (soap/chemical works)

Proposed Development	Land contamination source
Bitton	Made Ground
Swineford	Made Ground, industrial land use (quarry)

Potential Receptors of contamination

The following potential receptors may be exposed to the potential sources of contamination within the Proposed Development:

- General public (baseline receptors potentially impacted during construction and operation).
- Proposed Development neighbours e.g. occupants residential, agricultural land users and commercial properties (baseline receptors potentially impacted during construction and operation).
- Maintenance workers (new receptor introduced as a result of the Proposed Development operation).
- Construction workers (new receptor introduced as a result of the Proposed Development construction).
- Surface water courses including the river Avon and other identified in Chapter 6.5 Water Environment and Flood Risk (baseline receptors potentially impacted during construction and operation).
- Groundwater aquifers and groundwater dependent features such as abstractions with associated source protection zones, springs, designated sites, as identified in Chapter 6.5 Water Environment and Flood Risk (baseline receptors potentially impacted during construction and operation).

6.3.5 Engagement

Engagement will be undertaken with relevant stakeholders in relation to the Proposed Development to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design. This will be undertaken by EIA Team.

The following Stakeholders will be consulted during the EIA process:

- Bristol City Council
- South Gloucestershire Council
- Bath & North East Somerset Council
- Environment Agency
- Local geological societies such as GeoConservationUK and affiliated groups such as Avon RIGS Group.

6.3.6 Approach to assessment

Additional baseline data collection

Geotechnical and geo-environmental desk studies have been prepared for the Central Bristol defences. Further desk studies will be undertaken to characterise the existing environment with respect to Ground Conditions and Contaminated Land. The following key data sources will be accessed:

- British Geological Survey memoirs, mapping and historic borehole logs for the wider geological background for the area.
- Records of GeoConservationUK to identify any further geological sites of local or reginal importance.
- Historical OS mapping to identify potential sources of contamination.

- Environment Agency databases for source protection zones, licenced and unlicenced abstraction data, discharge consents, aquifer designation (bedrock and superficial) mapping, historical landfills, licenced waste management facilities for identifying potential receptors and sources of contamination.
- Local authorities' databases for private water supplies, underground storage tanks, records of contaminated land under Part IIa for identifying potential receptors and sources of contamination.

The surveys that will be undertaken to inform the assessment in accordance with industry guidelines and agreed in advance with stakeholders include:

- walkover surveys; and
- geotechnical and geo-environmental ground investigations.

The data obtained through these surveys will form basis to the Proposed Development design development including land contamination and land stability (due to mining risks) risk assessments. These will be undertaken in line with published industry guidance and standards. The conclusions of these risk assessments will inform the impact assessments.

Assessment methodology

The impact assessment methodology will adopt the Highways England (now National Highways) standards for undertaking environmental impact assessments, as set out in their Design Manual for Roads and Bridges (DMRB). Although these standards provide a methodology and criteria for assessing the impact of road schemes on the environment, it is considered appropriate to be adopted for assessment of effects arising from other infrastructure schemes, which are linear in nature and of considerable geographic extent, such as the Proposed Development. These standards are widely applied by the industry and have been endorsed by the regulatory authorities.

The assessment of impact will follow the Environmental Impact Assessment process set out in Chapter 5. In addition, DMRB Standard LA 109 Geology[66] and soils will be applied, where relevant, with respect to specific aspects of impact on ground conditions and land contamination. Standard LA 109 requires the baseline scenario to be informed by a desk study and existing survey data, where available. The standards also set out the sensitivity criteria and magnitude of impact and typical descriptions specific to geology, soils and contamination.

6.3.7 Potential impacts

Construction

Geology

No designated sites or geologically sensitive features have been identified within the Proposed Development. The Proposed Development has no potential to impact the designated sites located away from the Proposed Development and therefore no impact on geology is anticipated. Consequently, it is proposed to scope out impacts of construction on geology.

During the construction of the Proposed Development, in areas of historical mining activities there is an increased risk of further detrimental impact on land stability potentially resulting in a significant effects. This will require consideration as part of the design potentially including ground investigations and assessments.

Mineral resources

The Proposed Development areas comprising upstream defences are located within the South Gloucestershire Mineral Safeguarding Area and within an area of identified mineral resources. These flood mitigation interventions are focusing on already developed land. In addition, considering their footprint, they have limited potential to have a significant detrimental impact on access to or exploration of these the mineral resources. Therefore, significant effects are not anticipated. Consequently, it is proposed to scope out impacts of construction on mineral resources.

Agricultural land

The Proposed Development areas comprising a number of upstream defences are located within or adjacent to land classified as ALC Grade 3. The proposed interventions are focusing on already developed land, with the proposed measures potentially encroaching on the surrounding agricultural land. Any land used to temporarily accommodate the construction activities would be reinstated and returned to its original use. Therefore, the Proposed Development has a limited potential to have a significant detrimental impact on the agricultural land. Consequently, it is proposed to scope out impacts of construction on agricultural land.

Land contamination

The Proposed Development would introduce new receptors such as construction workers in addition to the baseline receptors. These new receptors may be exposed to soils/ soil dusts via ingestion, inhalation and/or dermal exposure. Although made ground is a potential source of ground gases such as methane or carbon dioxide, it is unlikely that made ground would have sufficient gas generation potential to pose a significant risk to construction workers. No other significant sources of ground gas have been identified.

During construction, site operatives and site neighbours may be exposed to the potential sources of contamination present within the Proposed Development area such as made ground due to dust migration beyond the construction areas. Areas of previously unidentified contamination may be encountered during the construction phase requiring suitable control measures to be employed. This includes previously unencountered made ground or evidence of contamination.

The earthworks may pose a temporary risk to controlled waters due to increased rainwater infiltration through the made ground and also potential mobilisation of contamination from site vicinity due to active dewatering, if required. These are unlikely to result in significant effects subject to application of environmental management and control during construction.

Some flood defence would require piled foundations. Construction of piled foundations has a potential to introduce new pathways for vertical contamination migration towards groundwater receptors. Although it is unlikely to result in a significant effect, this may have an adverse permanent impact on environmental receptors and would require consideration as part of the design process.

The Proposed Development may result in generation of surplus materials, primarily due to excavated materials being unsuitable for reuse as engineering fill. The surplus materials would require off-site disposal. Consideration would need to be given to waste disposal or recycle options.

Construction activities, particularly where piling takes places may encounter UXO which may result in explosion. This would have a significant impact on identified receptors.

Operation

Geology

No impact on geology is anticipated during the Proposed Development operation. Consequently, it is proposed to scope out impacts of operation on geology.

Mineral resources

During the operation of the Proposed Development, no further impact on mineral resources to that identified during construction is anticipated. Consequently, it is proposed to scope out impacts of construction on mineral resources.

Agricultural land

During the operation of the Proposed Development, no further adverse impact on agricultural land to that identified during construction is anticipated. However, there may be beneficial impacts to agricultural land from reduced flooding.

Land contamination

The Proposed Development would introduce new receptors such as maintenance workers. These new receptors may be exposed to soils/ soil dusts via ingestion, inhalation and/or dermal exposure during intrusive repair works. The maintenance workers would be unlikely to be exposed to ground gas.

During operation, general public or site neighbours may be exposed to the potential sources of contamination present within the Proposed Development such as reused made ground. Reuse of made ground may also result in leaching of contaminants into the underlying groundwater. Although these are unlikely to result in significant effects, any potential impacts on the identified human receptors would require suitable control measures as part of the design.

6.3.8 Mitigation

Embedded

Geology

The design development would ensure that no designated sites of geological importance are located within the footprint or direct vicinity of the Proposed Development, including construction activities e.g. access routes or construction compounds.

Land stability risks associated with mining hazards would be considered as part of the design in line with published industry standards and guidance.[67] Where required by the design, ground investigations would be undertaken to understand underlying geology and inform appropriate risk assessments. These may include intrusive boreholes or trial pits, or geophysical surveys. Should unacceptable risks be identified, the design would incorporate appropriate engineering solutions to mitigate the risks and deliver a safe design.

Agricultural land

The design development would ensure that impacts on agricultural land are minimised where practically possible. Temporary works areas would be reinstated to their previous land use. Works would be undertaken in accordance with good practice, which would be captured in a soil management plan and would form part of a CEMP.

Mineral resources

The design development would ensure that the footprint of the Proposed Development is optimal to the achieve the project objectives and minimise the impact on the mineral resources, where present.

Land contamination

The contamination risk management would be undertaken as part of the design in line with current government guidance. No contamination posing a significant risk to potential receptors is however anticipated within the area of the Proposed Development.

Intrusive investigations comprising geo-environmental testing and monitoring would be undertaken to assess the identified risks. The results of these investigations would inform human health and controlled waters risk assessments for the Proposed Development. If the risk assessments identify unacceptable risk to site end users or controlled waters, a remediation strategy and implementation, and verification plan would be produced.

Subject to the assessments, typical good pollution control and health and safety practice is likely to be sufficient to mitigate potential effects from the presence of made ground during construction. These would be presented in the CEMP. The results of the investigations will inform health and safety and materials management.

Depending on the design, there may be a requirement to retain materials on site for reuse. Measures would be taken to establish acceptable reuse and import criteria and procedures defined for ensuring that the suitability of material can be demonstrated and verified. A discovery strategy would be developed to enable unforeseen ground conditions to be addressed if or when encountered during construction. These would be set out in a Materials Management Plan developed for the Proposed Development as part of the CEMP. The Materials Management Plan would also set out disposal strategy and plan.

For elements of the Proposed Development where piling would be required, as part of the detailed design, a foundation works risk assessment would be undertaken to identify an appropriate piling methodology with respect to potential risks to human health and controlled waters.

Additional

The potential for significant effects on geology, agricultural land, mineral resources or land contamination is likely to be sufficiently managed by embedded mitigation, and therefore no additional mitigation would be necessary.

Enhancement

There are no enhancement opportunities envisaged.

6.4 Townscape and Visual Impact

6.4.1 Introduction

This chapter outlines the scope and methodology for the assessment of the potential likely significant effects arising from the construction and operation of the Proposed Development on townscape and visual impact.

The European Landscape Convention (ELC) defines landscape as *"an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors"*[68]

The Landscape Institute (LI) in partnership with Institute of Environmental Management Assessment (IEMA) provide guidance on the application of ELC definition of landscape which is *"inclusive and covers natural, rural, urban and peri-urban areas"* …and therefore applies to *"both rural landscapes and the landscape of villages, towns and cities (townscape)".* Their Guidelines for Landscape and Visual Impact Assessment Third Edition (GLVIA3) states this guidance is *"equally applicable to all forms of landscape and does not separate out townscape for special treatment."*[69].

6.4.2 Legislation, policy and guidance

This scoping report has been prepared in accordance with relevant legislation, planning policy and guidance which will also apply to the future EIA. It is recognised that this list is non-exhaustive and will be kept under review to take account of any later legislation or policy changes.

International guidance

The relevant legislation includes Paragraph 2.7 of the GLVIA3 define townscape as: *"the landscape within the built-up area, including the buildings, the relationship between them, the different types of urban open spaces, including green spaces and the relationship between buildings and open spaces*."[70].

A Townscape Visual Impact Assessment (TVIA) will be prepared, with emphasis on the distinct character of both the urban and rural environment, as well as people's views and visual amenity. The GLVIA3 specifies the distinct differences between landscape effects and visual effects, with the following distinctions made:

- Landscape effects relate to changes to the landscape as a resource, including physical changes to the fabric or individual elements of the landscape, its aesthetic or perceptual qualities, and landscape character.
- Visual effects relate to changes to existing views of identified visual receptors ('people'), from the loss or addition of landscape features within their view due to the Proposed Development.

The TVIA will therefore assess and report the likely impacts of the Proposed Development on the landscape and visual receptors separately. The quality and completeness of the assessment will be approved by a Chartered Member of the Landscape Institute (CMLI).

National policy

The relevant national policies include:

- National Planning Policy Framework (NPPF)[71] Section 12 Achieving well-designed places paragraph 126 states "*Good design is a key aspect of sustainable development, creates better places in which to live and work and helps make development acceptable to communities"*.
- NPPF, Section 12, paragraph 130 states that planning policies and decisions should ensure that developments "*function well and add to the overall quality of the area, not just for the short term but over the lifetime of the development*". Importantly they are "*visually attractive as a result of good architecture, layout and appropriate and effective landscaping*" and "*sympathetic to local character".* To ultimately "*establish or maintain a strong sense of place*", "*sustain an appropriate amount and mix of development (including green and other public space)*" and *"create places that are safe, inclusive and accessible… with a high standard of amenity for existing and future users*".
- NPPF, Section 15, Conserving and enhancing the natural environment paragraph 174 states that planning policies and decisions should contribute to and enhance the natural and local environment by "*protecting*

and enhancing valued landscapes". Whilst *"recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services"* and minimise "*impacts on and providing net gains for biodiversity".*

- NPPF, Section 15, paragraph 175 states that plans should *"take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries*".

Local policy

The relevant local policies listed in Table 6-17:

Table 6-17 List of relevant local policy – Townscape and Visual Impact

Local authority	Relevant local policy
Bristol City Council	Bristol Development Framework Core Strategy (2011) BCS9: Green Infrastructure BCS10: Transport and Assess Improvements BCS21: Quality Urban Design BCS22: Conservation and the historic environment
Bristol City Council	Bristol Site Allocations and Development Management Policies (2014) DM15: Green Infrastructure Provision DM17: Development Involving Existing Green Infrastructure DM26: Local Character and Distinctiveness
Bristol City Council	Bristol Local Plan: Publication Version (2023) SV1: Social Value and Inclusion SSE2: Development in Bristol's Centres BG1: Green Infrastructure and Biodiversity in New Development BG5: Biodiversity and Access to Bristol's Waterways T5: Public Rights of Way T6: Active Travel Routes DPM1: Delivering Well-designed, Inclusive Places CHE1: Conservation and the Historic Environment
Bristol City Council	Bristol City Council Central Area Plan (2015)72 policies relevant to the Proposed Development are as follows: A Greener City Centre - standards for sustainable design are set out (BCAP20) and the approach to green infrastructure in the city centre is addressed (BCAP22 – 25). Quayside walkways (Policy BCAP32) – element of the route network to create a traffic free quayside walkway around the floating harbour for recreation and pedestrian use. Bristol Temple Quarter (Policy BCAP35) – development of over 100,000 m2 of new flexible workspace, a focus for creative businesses and new initiatives, major indoor arena, transport interchange, new homes and supporting uses and facilities.
Bristol City Council	Bristol City Council New Cut Greenway, 2017
West of England Combined Authority	West of England Combined Authority, Green Infrastructure Strategy. West of England Combined Authority, West of England Joint Green Infrastructure Strategy, 2020-203073

Local authority	Relevant local policy
West of England Combined Authority	The Local Cycling and Walking infrastructure plan 2020-203674
South Gloucestershire Council	South Gloucestershire Core Strategy 2006-2027 CS1: High quality design CS2: Green infrastructure CS9: Managing the environment and heritage
South Gloucestershire Council	South Gloucestershire Local Plan: Policies, Sites and Places Plan PSP2: Landscape PSP17: Heritage assets and the historic environment
North Somerset	North Somerset – Core Strategy (2017) CS5: Landscape and the historic environment CS9: Green Infrastructure CS12: Achieving high quality design and place-making
North Somerset	Emerging Local Plan 2038 Consultation Draft Preferred Options (2022) SP4: Placemaking LP14: Local Green Space DP31: Green Infrastructure DP34: Trees and Woodlands DP35: Landscape DP36: Green spaces not designated as Local Green Space
Bath and North East Somerset Council	Core Strategy and Placemaking Plan incorporating the Local Plan Partial Update (January 2023) CP6: Environmental Quality D1: General Urban Design Principles D2: Local Character and Distinctiveness NE2: Conserving and Enhancing the Landscape and Landscape Character
Bath and North East Somerset Council	Valuing people, place and nature: A green infrastructure strategy for Bath & North East Somerset75

Guidance and standards

Relevant guidance and standards which have been used as part of the scoping process and will be taken into account as part of the EIA include:

- The Landscape Institute and Institute of Environmental Management and Assessment 'Guidelines for Landscape and Visual Impact Assessment' (GLVIA3), Third. Oxon: Routledge, 2013
- Landscape Institute, 'Technical Guidance Note: Visual Representation of Development Proposals', 2019;
- National Character Area Profiles (NCA) (Natural England, 2014); NCA 118: Bristol, Avon Valleys and Ridges;
- West of England Combined Authority, Green Infrastructure Strategy. West of England Combined Authority, West of England Joint Green Infrastructure Strategy, 2020-2030.
- Bristol City Council New Cut Greenway, 2017

6.4.3 Study area

The study areas established to inform this scoping chapter, which will also be used in the subsequent EIA and presented in the ES are as follows:

- A 500m study area was selected, based on the built form and topography of the landscape which constrains the visual envelope, as well as the height of the Proposed Development. To view this, refer to Figure 6.9 Landscape character areas.

6.4.4 Baseline conditions

The following sections present the sources of baseline information and existing baseline established at scoping.

Baseline data sources

The baseline described in this chapter has been informed by the following studies data sources:

Table 6-18 Baseline data sources to inform scoping

Baseline Data	Source
Visibility, constituent characteristics, quality, condition and overall character of the landscape	Field work undertaken by Landscape architects Google Earth Pro and Street View DEFRA Magic Interactive Map Rowmaps Geographical Information Systems (GIS) Designation data sets
Ordnance Survey Open Data	Ordnance Survey
National Character Area 118: Bristol Avon Valley and Ridges	Natural England
Bristol City Council Conservation Area Character Appraisals	Clifton & Hotwells Character Appraisal & Management Proposals (Bristol City Council, 2010) Shirehampton Conservation Area Character Appraisal (Bristol City Council, 2023) Sea Mills Character Appraisal & Management Proposals (Bristol City Council, 2011) The City Docks Character Appraisal & Management Proposals (Bristol City Council, 2011) The Bedminster Conservation Area Character Appraisal (Bristol City Council, 2013) The Redcliffe Character Appraisal (Bristol City Council, 2008)
New Cut Greenway Study (2017)	Bristol City Council
North Somerset Council Landscape Character Assessment (2018)	North Somerset Council
Bath and North East Somerset Landscape Character Assessment (2003)	Bath and North East Somerset Council
South Gloucestershire Landscape Character Assessment (2014)	South Gloucestershire Council

Landscape Baseline

Landscape conditions and designations

A description of the landscape with the potential to receive impacts from the Proposed Development are listed in Table 6-21 along with identification of the ecological and heritage designated sites of relevance to the landscape. Section 6.1.4 provides cultural heritage context with regard to Conservation Areas, Listed Buildings and Scheduled Monuments, and Section 6.2.1 Biodiversity described further identified ecological designations which are all relevant within the scope the landscape assessment.

Table 6-19 Landscape description and designations of relevance to assessment

Location	Landscape Description	Designations of relevance to landscape assessment
Downstream defences		
Pill	Pill is a village located at the tidal inlet of the River Avon and the Severn Estuary, near the Royal Portbury Docks and the M5. The low-density residential housing is intersected by the decommissioned Portishead Railway line and surrounded to the east and south by agricultural farmland. Victoria Park and notable listed buildings are among the key landscape features.	• Severn Estuary SPA • Severn Estuary SAC • Severn Estuary Ramsar Site • Severn Estuary SSSI
Shirehampton	Shirehampton is a village located at the tidal inlet of the River Avon and the Severn Estuary, accessible via major routes which include the M5 and M49. It has low-density residential housing, a high street with notable listed buildings, and public open spaces such as Shirehampton Park. As well as Blaise Castle Estate Kings Weston House parkland in the northeast. The Serven Beach railway line and the A4 provide direct access to and from Bristol City Centre.	• Lamplighters Marsh LNR • Shirehampton Conservation Area
Sea Mills	Sea Mills is a low-density residential suburb near the confluence of the River Trym and the River Avon. The A4 and the Serven Beach railway line runs through the suburb, providing direct access to Bristol City Centre. Part of the Roman settlement of Abonae, is an important landscape feature which contributes to the area's character.	• Sea Mills Conservation Area
Central defences		
Entrance Lock	The entrance lock has an urban built form and is surrounded by high density residential development to the north. The transport routes A4 and Long Ashton bypass, as well as pockets of open space such as the Cumberland Piazza, intersect the area. Among the key landscape features are Brunel's swing bridge and the Tobacco Warehouse, both of which are listed buildings.	• Avon New Cut LNR • City Docks Conservation Area
Spike Island	Spike Island has seen significant urban development, primarily in the residential and industrial sectors. In addition to cultural and art venues such as Brunel’s SS Great Britain and M	• Avon New Cut LNR

Location	Landscape Description	Designations of relevance to landscape assessment
	Shed, which contribute to the area's character. Bristol Harbour Railway to the north and Cumberland Road to the south run parallel to the area, providing important pedestrian connections within the city centre.	
Redcliffe	Redcliffe is located in the city centre, near major transportation hubs such as Bristol Temple Meads Station. Its high-rise urban development is predominantly residential and commercial in nature, but it also includes higher education facilities. There are pockets of open green space, such as Temple Gardens, as well as significant landmarks, such as St Mary Redcliffe Church.	• Avon New Cut LNR • Redcliffe Conservation Area
Feeder Road	Feeder Road runs east from Bristol Temple Meads Station towards Netham Park. The harbour feeder canal runs parallel to Feeder Road, separated by grassy banks and a tree line. The canal is surrounded by industrial and commercial buildings, with a University of Bristol building to the west.	• Silverthorne Lane Conservation Area
St. Philip's Marsh	The industrial suburb of St Phillips Marsh is bounded to the north by the harbour feeder canal and to the south by the River Avon. Sparks Evans Pocket Park, located on the banks of the River Avon, is the principal amenity green open space. An accessible trail and cycleway surrounded by woodland and scrub vegetation connects the area to the surrounding city centre.	
Netham Lock	Netham lock connects the Harbour Feeder Canal to the River Avon and is a grade two listed building with important historical significance. Numerous industrial estates surround the area, including Avonside Industrial Park and Netham Industrial Estate, which are linked by Netham Road. Netham Park, a significant open green space north of the canal, is bordered by mature trees and shrub vegetation.	• Avon Valley Conservation Area
Bower Ashton	Bower Ashton suburb is bound to the north by the open green space Ashton Court to the north, transport route Long Ashton bypass to the south and the River Avon to the east. It has primarily high-density residential development with the University of the West of England (UWE) campus to the north. Ashton Court Estate and Leigh woods are among its key landscape features.	• Avon Gorge Woodland SAC • Avon Gorge SSSI • Leigh Woods National Nature Reserve • Avon New Cut LNR • Ashton Court Registered Parks and Gardens • The Downs Conservation Area • City Docks Conservation Area
St Annes	St Annes is a high-density residential suburb along the River Avon, with commercial and industrial units dispersed within its built form.	

Location	Landscape Description	Designations of relevance to landscape assessment
	The Avon View Cemetery to the north and Troopers Hill to the northeast are two prominent landscape features.	
Whitby Road	Whitby Road is an industrial area that is crossed by the railway line leading to the city of Bath. The listed building Avon Bridge is one of the key landscape elements.	• Avon Valley Conservation Area
Upstream defences		
Swineford	The village of Swineford is situated near the Swineford canal lock on the River Avon. Bath Road intersects it to the north, and it is bordered by an agricultural farmland.	
Bitton	Bitton is located near the confluence of the River Boyd and the River Avon; it has low-rise residential development cut by the Bath Road and is surrounded by agricultural farmland.	
Keynsham	Keynsham town is dominated by high-density residential development, pockets of industrial land, a commercial high street. The town is surrounded by agricultural farmland, which is crossed by the railway line and the A4 to Bath. The rivers Avon and Chew converge near Keynsham canal and lock to the north.	
Hanham Mills	Isolated commercial and residential properties bordered by the River Avon and the Hanam lock. Woodland, including ancient woodland, and agricultural farms surround the properties.	• Bickley Wood SSSI
Riverside cottages at Hanam Mills	Isolated residential properties along the River Avon, including the listed building Riverside. The properties are surrounded by woodland, which includes ancient woodland, and agricultural farmland.	• Bickley Wood SSSI • Avon Valley Woodland LNR
Broadmead Lane Industrial Estate	Industrial unit south of the River Avon bounded by agriculture farmland to the north and south and isolated residential properties.	
Pump House Lane and Beeses Bar	Isolated commercial properties on the River Avon's meander. Beyond this, the landscape is dominated by woodland, including pockets of ancient woodland, with low-rise residential development. Eastwood Farm and Cotham River Park are important landscape features.	• Eastwood Farm LNR • Avon Valley Conservation Area

Landscape character

The landscape character areas are shown in Figure 6.9 and are described below.

National Character Area

The Proposed Development sits within the National Character Area (NCA) profile 118: Bristol, Avon Valleys and Ridges.

The NCA encompasses the City of Bristol with its historic port. The area is characterised by *"alternating ridges and broad valleys, with some steep, wooded slopes and open rolling farmland"*, Bristol City is at the heart of the NCA *"with the most distinctive townscapes being the old city centre, the docks and Clifton, with its downs' and the 'provision of green infrastructure and quality green space"*[76] valued by the City.

The NCA provides a comprehensive assessment of the character area on a broad scale. However, the City of Bristol's character is blurred as a consequence of this, so it has been scoped out in favour of regional landscape character assessments across the city.

Local character area

Bristol Landscape Character Areas (LCA) are not characterised or described, therefore bespoke, project specific character areas at a scale appropriate and proportional to the assessment of this Proposed Development have been defined for the purpose of identifying the scope of the landscape assessment. These have been defined as:

- Avonmouth Floodplain
- Avon Gorge
- Entrance Lock
- Cumberland Road
- Redcliffe
- Cattle Market Reach
- St Phillips Marsh
- Feeder Road
- Whitby Reach
- Crews Hole
- Wooded Avon Valley
- Keynsham Floodplain

Please refer to Table 6-20 for a full description of each Landscape Character Area.

The following wider character assessments have been considered to support this assessment.

Conservation area character appraisals

The Bristol conservation area character appraisals take into account landscape-related characteristics such as the landscape setting, landmarks, key views, and a character area analysis. A total of six conservation area character appraisals has been identified to provide a finer level of detail to inform the assessment of landscape effects.

- Clifton & Hotwells Character Appraisal & Management Proposals (Bristol City Council, 2010)
- Shirehampton Conservation Area Character Appraisal (Bristol City Council, 2023)
- Sea Mills Character Appraisal & Management Proposals (Bristol City Council, 2011)
- The City Docks Character Appraisal & Management Proposals (Bristol City Council, 2011)
- The Bedminster Conservation Area Character Appraisal (Bristol City Council, 2013)
- The Redcliffe Character Appraisal (Bristol City Council, 2008)

New Cut Greenway (2017)[77]

Bristol City Council led by the City Design Group, commissioned the New Cut Greenway study to explore the opportunities in flood risk management and infrastructure along the River Avon and New Cut between Netham Lock and Cumberland Basin. A part of this work was to identify the distinct character of the river corridor to understand their functionality and future scope for flood risk integration. Nine corridor character areas were recognised, each with character and key features, assets, users, opportunities, and key links analysed.

- Cumberland Basin
- Ashton Reach
- Vauxhall Reach
- Gaol Ferry Reach
- Clarence Reach
- Cattle Market Reach
- Albert Reach
- Whitby Reach
- Netham Lock

Local Authority landscape character assessments

The Proposed Development is also situated within North Somerset Council, Bath and North East Somerset Council and South Gloucestershire council local authorities. All local authorities have identified regional landscape character areas within formal landscape character assessments.

The landscape character areas covering the study area are listed below:

- Avon Rolling Valley Farmland (North Somerset Council Landscape Assessment, 2018)
- Avon Valley (Bath and North East Somerset Landscape Character Assessment, 2003)
- Avon Valley (South Gloucestershire Landscape Character Assessment, 2014)

Summary of landscape baseline

Table 6-20 sets out the landscape receptors that will form the basis of the assessment of landscape effects.

Table 6-20 Summary of Landscape receptors

Character areas	Key Features	Assets	Conservation Areas	Associated Character Assessments (Formal and Informal)	Scoped in/out
Avonmouth Floodplain	Lowland area with gentle slopes and a varied landform composition containing residential, farmland, transport and recreational land uses. Village and district edge settlements are distinguished by a mix of modern and traditional brick composition in 1920-1970 styles, with pockets of amenity grassland. Arable pasture in medium to large geometric fields border the urban boundaries and along the banks of the River Avon woodland belt meets coastal saltmarsh. Views	Severn Beach and Portbury Dock Railway Lines. Leigh Woods. Blaise Castle Estate. A4 main road. Ancient Woodland	Shirehampton Kingsweston and Trym Valley Sea Mills	North Somerset Council Landscape Character Assessment Shirehampton Conservation Area Character Appraisal Sea Mills Character Appraisal & Management Proposals	Scoped in

Character areas	Key Features	Assets	Conservation Areas	Associated Character Assessments (Formal and Informal)	Scoped in/out
	across the River Avon are varied and open. A wider network of roads, recreational routes, and railway lines divide the area and connect it to the Avon Gorge, while historic parkland to the north serves as the setting for the Blaise Castle Estate.				
Avon Gorge	A narrow valley formation with steep slopes and natural cliff exposures, creating a sense of enclosure. Woodland and amenity grassland cover the scarp slopes, which meet the pre-1900 traditional brick terrace housing. The dominant land use here is transportation, with main roads and footpaths on the northern slopes and a railway line to the south connecting to the city centre. The area is intersected by Brunel's Clifton suspension bridge, which provides wide panoramic views in contrast to those within the valley, which are intermediate and framed.	Long distance views to and from Brunel's Clifton suspension bridge. Ancient woodland cover on valley sides. Swathes of exposed cliff.	Sneyd Park The Downs	North Somerset Council Landscape Character Assessment	Scoped out, as there are no works within the character area.
Entrance Lock	A basin formation dominated by industrial dockside, residential and transportation land use. The area has a strong built form, with high density settlement in a mix of modern post-1980 development and several notable listed buildings built between1900 and 1920, some of which are in a local building style. Main transportation routes run through the basin, which contains underutilised parkland and amenity grass, the River Avon is also surrounded by woodland here. The landscape is busy and varied, with broad views towards the Avon Gorge and Brunel's Clifton Suspension Bridge.	Sylvia Crowe Landscape public realm. Historic lock gates and Brunel's Swing Bridge. Historical listed buildings A, B and C Bond. Links over Ashton Avenue Bridge.	City Docks	Clifton & Hotwells Character Appraisal & Management Proposals The City Docks Character Appraisal & Management Proposals New Cut Greenway character areas	Scoped in
Cumberland Road	The area has flat topography with residential, commercial, industrial and transportation land uses. The built urban form contains post-1980s modern development, including terrace and multistorey housing and industrial plots. Transport connections provide good accessibility to the city centre and Wapping Wharf, with a pedestrian and cycle path, historic railway, and main road running parallel to the River Avon. Here woodland and scrub boarder the river banks which screen views, the green corridor extents and connects	Chocolate path a major recreation route following the riverbank. Metro bus route. Gods Garden. Pedestrian access across Gaol Ferry Bridge and Vauxhall Bridge.	City Docks	The City Docks Character Appraisal & Management Proposals New Cut Greenway character areas	Scoped in

Character areas	Key Features	Assets	Conservation Areas	Associated Character Assessments (Formal and Informal)	Scoped in/out
	to the butterfly junction. Reflecting the varied land use, views are complex and both interrupted and busy.	Spike Island arts centre.			
Redcliffe	The flat landscape is formed by residential, commercial and transportation land uses, interspersed with historic assets. The urban built form contains a mix of 1950-1970 development with post 2009 high storey modern development, with pockets of amenity greenspace. Primary transport routes edge and cross the river with pedestrian and cycle access across at Langton Street Bridge. Here an avenue of trees to the north and woodland scrub to the south line the River Avon banks and also screening views. Views within the area are both busy and interrupted.	Sweeping views along the River Avon. St Mary Redcliffe and Temple Church of England School Generous pedestrian riverside footpath with segregated cycle path along Clarance Road.	Redcliffe Bedminster	The Redcliffe Character Appraisal The Bedminster Conservation Area Character Appraisal New Cut Greenway character areas	Scoped in
Cattle Market Reach	A built-up area dominated by transport and industrial land uses. The area is crossed by Bristol Temple Meads station and railway, and sits within the Bristol Temple Quarter Zone, which will see future development. The existing built form is modern, having been constructed after 2009, but it is interspersed with listed buildings, indicating the area's strong historical ties. Popular active travel routes run along the Avon riverbank here, with a tree-lined edge limiting views except from Arena Bridge, which has open medium views.	Views from Arena bridge Close proximity to Bristol Temple Meads. Large northern bank area with trees and shrubs. Historic Royal Mail sorting office		New Cut Greenway character areas	Scoped in

Character areas	Key Features	Assets	Conservation Areas	Associated Character Assessments (Formal and Informal)	Scoped in/out
St Phillips Marsh	The area has flat topography and is bounded to the south by the River Avon; industrial development is the primary land use that developed after 2009 and creates a simple landform composition. A linear enclosed pedestrian and cycle path edges the Avon riverbank, providing access to Bristol Temple Meads and connecting to larger historical residential development dating back to the early 1900s. The riverbanks are colonised by a woodland and scrub that connects to Sparkes Evans Pocket park in the east, which provides open grassland. Views are enclosed and calm interrupted by vegetation cover.	Sparkes Evans Pocket Park. Footbridges across the River Avon. Occasional views of the River Avon through vegetation. Close proximity to Arno's Valley Cemetery.		New Cut Greenway character areas	Scoped in
Feeder Road	Feeder Canal connects with the River Avon at the historic Netham Lock east to the area. It is surrounded by commercial, industrial, and transportation land uses that were developed between 1950 and 1970. Netham Park connects to the canal and had accessible open grassland edged with mature trees. Transport connections boarder the canal including a pedestrian and cycle path alongside. Views are framed and uniform and are limited to this linear route.	Netham Park Historic Netham Lock listed building and Netham Lock Keepers Cottage.	Silverthorne Lane		Scoped in
Whitby Reach	Here, the River Avon is bordered by built up industrial and commercial land use developed in the mid 20th century. There is no active frontage along the river's edge close to Netham Weir, but access across the river is provided by the Feeder Road and the Netham Bridge. The historic Avon Bridge is crossed by the Great Western Railway Line, which also traverses the landscape. Beyond this industrial setting, St Annes Wood is bordered by a low-rise residential cul-de-sac and woodland edge. Views are enclosed and fragmented within the industrial form yet are much more unified towards St Annes Woods.	Historic Avon Bridge listed building. Netham Weir. St Annes Wood.	Avon Valley	New Cut Greenway character areas	Scoped in
Crews Holes	The area is dominated by mid 20th century and modern low-rise residential housing, in a network of cul-de-sac roads with pockets of small open greenspace. Pedestrian and cycle paths run adjacent to the Avon River here, connecting to	Major recreation route following the riverbank. Crews Hole Woodland.	Avon Valley		Scoped in

Character areas	Key Features	Assets	Conservation Areas	Associated Character Assessments (Formal and Informal)	Scoped in/out
	notable green spaces including, Troopers Hill Local Nature Reserve and Crew Hole Woodland. Views are semi-enclosed and confined within the urban grain and along the River Avon.	Close proximity to Avonview Cemetery.			
Wooded Avon Valley	The landscape is characterised by a broad open valley cut by the River Avon and edged with linear woodland, including areas of ancient woodland, with mid-century residential development beyond. The area contains numerous green open spaces that invite access to the river's edge. Views are restricted to the River Avon due to the woodland form.	Major recreation route following the riverbank. Cotham River and Avon Valley Park Eastwood Farm Open Space	Avon Valley		Scoped in
Keynsham floodplain	The River Avon's sinuous and meandering form cuts through the flat landscape and is primarily used for recreation. Large to medium patchwork arable and grassland fields are interspersed with meadows and a few small woods. Much of the area's noise is generated by the prominent Great Western railway line and the A4 Bristol to Bath Road. There is residential, light industrial and utility facilities nearby. Views are open and varied across the landscape.	Numerous lock gates along the Avon and the Port Avon Marina. Seasonal flooding events. Small woodlands, including ancient woodland cover. Major recreation route following the riverbank.	Avon Valley	South Gloucestershire Landscape Character Assessment Bath and Northeast Somerset Landscape Character Assessment	Scoped in

Visual baseline

A Zone of Theoretical Visibility (ZTV) has not been produced for scoping. Even at the finest 2m resolution of Opensource LIDAR data, a ZTV would only offer limited information to inform the study area and the selection of viewpoints. The low-level nature of the Proposed Development and the visual containment from nearby built form in the urban environment will confine visibility and the likelihood of any potential significant effects to areas very close to the proposed structures. Therefore, the focus of effort in scoping this study has been on field work and ground-truthing.

Existing views

Central defences

Views in the city centre are predominantly towards the River Avon and harbour from major transportation routes that intersect and run adjacent to the river, as well as from key open spaces such as Sparke Evans Pocket Park, and Netham Park. Views out are limited by the river valley topography and urban built form of Bristol city centre, but there are long-distance views towards the city centre from Clifton Suspension Bridge and Brandon Hill offering panoramic views.

Upstream and Downstream Defences

Views from upstream and downstream defence locations are towards the River Avon but views out are limited by settlement edges and mature vegetation along the riverbanks.

Visual receptor groups

The visual receptors identified include community, recreational and transport receptors.

Community receptors include:

- Residential communities
- Users of local amenities
- Business and retail users

Recreational receptors include:

- Users of public open spaces
- Local public rights of way network

Transport receptors include:

- Users of the main trunk roads
- Users of the local road network
- Railway users
- Boat mooring and ship users

Summary of visual baseline

Table 6-21 Visual receptors for the assessment of visual effects

Visual receptor	Scoped in/out	Rationale
Downstream defences		
Recreational users of the PRoW LA8 5/10 (VP1)	Scoped in	Direct views of the raised existing embankment.
Recreational users of West Town Road Open Space and PRoW BCC 54/10 (VP2)	Scoped in	Long distance views of the embankment
Residents along Underbanks, Watch House Road and Marine Paradise (VP3)	Scoped in	Direct views in close proximity of the raised existing floodwall and new floodwall.
Recreational users of Lamplighters and Nibley Road Open Space and PRoW BCC 544/10 (VP4)	Scoped in	Direct views of the new embankment and long-distance views of the raised and new floodwalls.
Users of Sea Mills Train Station and PRoW BCC 535/10 (VP5)	Scoped in	Direct views in close proximity of the new floodwalls and embankments surrounding the existing railway line.
Central defences		
Users of Clifton Suspension Bridge (VP6)	Scoped in	Long-distance views of the new lock gate, floodwalls and embankments towards Cumberland Basin.

Visual receptor	Scoped in/out	Rationale
Residents of Hotwells and users of PRoW BCC 383/10 (VP7)	Scoped in	Views of the new lock gate and road raising at Cumberland Basin
Users of the cycle route 33 and Brunel Way (VP8)	Scoped in	Direct views in close proximity of the new flood walls and new lock gate at Cumberland Basin.
Recreational users of PRoW BCC 200A/20, cycle route 41 and the long-distance footpaths Monarchs Way and Avon River Trail (VP9)	Scoped in	Direct views in close proximity to the new flood walls and long distance views of the new lock gate at Cumberland Basin.
Recreational users of Ashton Avenue Bridge and the long distance route Festival Way (VP10)	Scoped in	Direct views of the new gravity wall along Cumberland Road.
Residents along Avon Crescent (VP11)	Scoped in	Direct views in close proximity of the new floodwall along Cumberland Road
Residents along A370 (VP12)	Scoped in	Views of the new floodwall along Cumberland Road.
Residents along Cumberland Road and recreational users of Vauxhall bridge, cycle route 33, PRoW BCC 393/10 and the long-distance footpaths Monarchs Way, Avon River Trail and Festival Way route (VP13)	Scoped in	Direct views in close proximity of the new floodwall along Cumberland Road.
Recreational users of Gaol Ferry Bridge, cycle route 41 and PRoW BCC 399/10 (VP14)	Scoped in	Long-distance views of the new floodwall along Cumberland Road.
Residents along Commercial Road (VP15)	Scoped in	Direct views in close proximity of the new floodwall along Commercial Road.
Users of A370 bridge crossing (VP16)	Scoped in	Views of the new floodwall along Commercial Road and A370
Residents along York Street (VP17)	Scoped in	Views of the new floodwall along the A370.
Recreational users of Langton Street Bridge and PRoW BCC 400/10 (VP18)	Scoped in	Views of the new floodwall along the A370.
Users of Bath Bridge Roundabout (VP19)	Scoped in	Views of the new floodwall along Cattle Market Road.
Recreational users of cycle route 3 (VP20)	Scoped in	Views of the new floodwall along cycle route 3 and new embankment along Feeder Road.
Recreational users PRoW BCC 405/10, cycle route 3 and the long-distance footpath Avon River Trail (VP21)	Scoped in	Direct views of the new floodwall along cycle route 3.
Users of Avon Street Bridge (VP22)	Scoped in	Direct views in close proximity of the new embankment along Feeder Road.

Visual receptor	Scoped in/out	Rationale
Recreational users of Totterdown bridge, cycle route 3 and the long-distance footpath Avon River Trail (VP23)	Scoped in	Direct views of the new floodwall along cycle route 3.
Recreational users of PRoW BCC 407/10 and the long-distance footpath Monarchs Way (VP24)	Scoped in	Views of the new Floodwall along Feeder Road.
Residents of Paintworks development (VP25)	Scoped in	Direct views of the new floodwall along cycle route 3 and Sparks Evans Pocket Park.
Recreational users of Sparks Evans Pocket Park, PRoW BCC 409/10, cycle route 3 and the long distance footpath River Avon Trail (VP26)	Scoped in	Direct views in close proximity of the new floodwall in Sparks Evans Pocket Park.
Users of Whitby Road (VP27)	Scoped out	Views screened by industrial estate.
Users of Netham Park and the long-distance footpath Monarchs Way (VP28)	Scoped in	Long distance views of the new floodgate tied into the riverbank, and associated road raising at Netham Lock.
Users of PRoW BCC 192/10 and the long-distance footpaths River Avon Trail and Monarchs Way (VP29)	Scoped in	Direct views of the new floodgate tied into the riverbank, and associated road raising at Netham Lock.
Users of Feeder Road Bridge and the long-distance footpath Monarchs Way (VP30)	Scoped in	Direct views of the new floodgate tied into the riverbank, and associated road raising at Netham Lock.
Recreational receptors of St Annes Wood PRoW BCC 608/10 (VP31)	Scoped in	Direct views of the raised existing dam.
Recreational users of PRoW BCC 524/10 and the long-distance footpaths Monarchs Way and River Avon Trail (VP32)	Scoped in	Views of the new stub wall along the River Avon banks.
Residents of Burgess Green Crescent (VP33)	Scoped in	Direct views in close proximity of the new stub wall along the River Avon banks.
Recreational users of PRoW192/20 and the long-distance footpaths River Avon Trail and Monarchs Way (VP34)	Scoped in	Views of the new stub walls River Avon banks.
Residents along Crews Hole Road, recreational users of PRoW BCC 192/50 and the long-distance footpaths River Avon Trail and Monarchs Way (VP35)	Scoped in	Direct views of new stub wall along the River Avon banks.
Upstream defences		
Recreational users of Bridleway BCC 192A/10 and the long distance footpaths River Avon Trail and Monarchs Way (VP36)	Scoped in	Direct views in close proximity of new floodwall along Pumphouse Lane.

Visual receptor	Scoped in/out	Rationale
Recreational users of Bridleway BCC 192A/10 and the long distance footpaths River Avon Trail and Monarchs Way (VP37)	Scoped in	Direct views in close proximity of new floodwall along Pumphouse Lane.
Recreational users of Bridleway 192/20 and the long distance footpaths River Avon Trail and Monarchs Way (VP38)	Scoped in	Property Flood Resilience modifications.
Users of Bridleway PHA 21/20, PRoW PHA 35/10 and the long distance footpaths River Avon Trail and Monarchs Way (VP39)	Scoped in	Views of the new embankment along Ferry Road.
Users of PRoW BA 27/4 (VP40)	Scoped in	Views of the new embankment along Ferry Road.
Residents of Durley Lane and recreational users of Durley Park (VP41)	Scoped out	Property Flood Resilience modifications.
Residents off Bristol Road and recreational users of Durley Park (VP42)	Scoped in	Direct views in close proximity of the new floodwall and raised existing floodwall.
Recreational users of PRoW PHA 35/50 and the long distance footpaths River Avon Trail and Monarchs Way (VP43)	Scoped out	Property Flood Resilience modifications.
Users of the A4175 (VP44)	Scoped out	Property Flood Resilience modifications.
Users of Keynsham Marina (VP45)	Scoped out	Property Flood Resilience modifications.
Recreational users of the PRoW PHA 35/20 and the long distance footpaths River Avon Trail and Monarchs Way (VP46)	Scoped out	Property Flood Resilience modifications.
Recreational users of PRoW PBN 67/30 and PBN 68/30 and the long distance footpaths River Avon Trail and Monarchs Way (VP47)	Scoped in	Views of the new floodwall near Broadmead Industrial estate.
Recreational users of the PRoW PBN 67/30 and the long distance footpath River Avon Trail (VP48)	Scoped out	Property Flood Resilience modifications.
Recreational users of the PRoW BA 27/69 and the long distance footpath River Avon Trail (VP49)	Scoped out	Property Flood Resilience modifications.

The visual receptors can be viewed as representative viewpoints shown in Figure 6.11.

6.4.5 Engagement

Engagement will be undertaken with relevant stakeholders in relation to the Proposed Development to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design. This will be undertaken by EIA Team.

The following bodies will be consulted during the EIA process:

- Environment Agency
- Bristol City Council
- North Somerset Council

- Bath and North East Somerset Council
- South Gloucestershire Council

6.4.6 Approach to assessment

Additional baseline data collection

The surveys that will be undertaken to inform the assessment in accordance with industry guidelines and agreed in advance with stakeholders will likely include:

- Walkover surveys
- Photographic survey
- Arboriculture survey

Assessment methodology

The approach for assessing the landscape and visual effects will be based on the GLVIA3[78] . Initially, baseline data will be gathered through desktop research, which will include studies and supporting evidence-based documents, aerial photography, mapping, and field work. This information will be used to determine the sensitivity of landscape and visual receptors, taking into account the value attached to the landscape or views as well as each receptor's susceptibility to change.

The magnitude of the change in relation to the size, scale, duration and reversibility of the Proposed Development would then be determined. The relationship between the sensitivity of the receptor and the magnitude of change would then considered. These considerations are then combined to form a professional judgement on the overall level of adverse or beneficial effect, and if this is significant or not.

6.4.7 Potential impacts

Landscape potential impacts

Construction

The presence of activities associated with the construction of flood defences, vehicle movement and limited access has the potential to have a direct impact on the landscape's character. To facilitate development, temporary construction equipment, compounds, and storage will also be present, the exact location of this is currently unknown. Vegetation clearance and the excavation of topsoil, subsoil, and other materials will be required. These impacts will be limited to the study area but could extend to the wider landscape, increasing noise levels and visual disturbances such as machinery noise. Where construction is required within the city centre the scale of effects is likely to be small and unlikely to be distinguishable from existing activity due to the study areas urban form. Construction effects will be temporary and therefore unlikely to give rise to significant effects.

Operation

During the operational phase, the presence of new and modified flood walls and embankments has the potential to have a direct impact on the landscape's character. Resulting in permanent changes in land cover and perceptual qualities of the landscape. Temporary effects from vegetation loss, replacement, will also result in changes in views. However, there may be no direct effect where the landscape is easily able to absorb the new and modified flood defences, and where properties are undergoing flood resilience modifications. Assuming there is no embedded mitigation within the design, some areas are more likely to give rise to significant effects. These areas include the follow:

- Avonmouth Floodplain
- Entrance Lock
- Cumberland Road

- Redcliffe
- Cattle Market
- Feeder Road
- Whitby road
- Crews Hole
- Keynsham floodplain

Visual potential impacts

Construction

The presence of construction compounds and associated activities will create temporary significant effects changes to direct and long-distance views and the visual amenity from around the study area for sensitive receptors. This will include residential receptors in particular, the communities of Pill, Shirehampton, Hotwells and Spike Island and residents along the A370, Commercial Road and York Street within the city centre. As well as recreational users of the PRoW and long-distance footpaths throughout the city towards the Avon Valley. Vegetation clearance necessitated through excavation and construction may also create temporary views of construction works, which will be more apparent during winter months with leaf off conditions.

Operation

During the operational phase, assuming there is no embedded mitigation within the design, some sensitive visual receptors are more likely to experience significant effects. The most significant visual changes are likely to be where the flood defences are proposed to be at or above eye level of nearby receptors in proximity, thereby foreshortening outward views. Long distance views are unlikely to experience significant effects.

Cumulative effects

Construction

The likelihood of cumulative effects from the construction of new and modified flood defences in conjunction with any other concurrent construction activities within the same character areas, or intervisible with the proposed development will be assessed.

Operation

There are no other known concurrent flood defence or comparable linear infrastructure projects that, when combined with the proposed development, would result in cumulative landscape or visual effects. Therefore, we proposed to scope out cumulative effects.

6.4.8 Mitigation

Embedded

Mitigation has not been secured, however will be developed through an iterative design process to become embedded into the Proposed Development. Proposed embedded mitigation may include:

- Construction compounds and temporary construction facilities would be sited with temporary fencing and located outside any designated land, to minimise the effects on the landscape and visual resource.
- Seek to minimise tree and vegetation loss as much as possible and maximise tree and shrub replanting with a focus on habitat creation developed within an iterative landscape design.
- The appearance and finish of floodwalls would be of high quality in keeping with the local character. Cladding and rendering would be sympathetic to the setting with reference to existing materials within

the surrounding area. The use of glass panel tops would retain visual resource and also retain important views.

- Seek to maximise the creation of inviting and multifunctional spaces.

Additional

Additional mitigation will be determined once significant effects have been identified during the EIA. Mitigation interventions such as additional planting and landscaping in specific locations will then be identified.

Enhancement

Enhancement opportunities will be identified where appropriate to further improve the landscape character and experience for visual receptors, such as improvements to wayfinding and interpretation.

6.4.9 Assumptions and limitations

This section sets out the assumptions which have been made and the limitations which inform the scope of TVIA.

- The Proposed Development is split into two delivery phases, phase 1 is the initial construction to be delivered in 2020's. Phase 2 is an additional phase of construction to be delivered in 2060, which will require its own planning consent and assessment and as such excluded from this TVIA.
- The area of works for the Proposed Development, whilst sufficient to identify land likely to be required for the Proposed Development, is indicative at this stage and may be subject to alterations during Phase 1 Build stages 1 and 2.
- The mitigation design is not completed at this stage and therefore we will not be able to assess the effects until full business case (FBC).
- The landscape character areas have not been characterised within a published townscape character assessment for Bristol, therefore limiting determination of their sensitivity.
- Viewpoints need to be agreed upon and confirmed by the relevant local authorities, Bristol City Council, North Somerset Council, Bath and North East Somerset Council and South Gloucestershire Council.
- A Zone of Theoretical Visibility (ZTV) has been scoped out due to the low laying nature of the proposed development, and that is it visually contained due to the existing built form and topography.
- Photorealistic verified photomontages will not be produced at this stage due to insufficient design development including embedded mitigation. Therefore we propose to scoped this out at this stage.
- Night-time lighting impact assessment is proposed to be scoped out due to the assumption that the night-time lighting conditions won't change.
- Field work and photography has been scoped out and not undertaken at this stage.
- Arboricultural survey has not been undertaken at this stage.
- There are no other known concurrent flood defence or comparable linear infrastructure projects to be considered as part of the cumulative effects assessment.

6.5 Water Environment and Flood Risk

6.5.1 Introduction

This chapter outlines the scope and methodology for the assessment of the potential likely significant effects arising from the construction and operation of the Proposed Development on the water environment and flood risk.

Water environment and flood risk aspects considered within this chapter for the Proposed Development include:

- the water quality, quantity and hydro-morphology of surface water bodies;
- groundwater quality, quantity and groundwater-dependent features such as springs, wells, boreholes and groundwater-dependent terrestrial ecosystems (GWDTEs); and
- flood risk.

There may be interrelationships with other disciplines. Therefore, this chapter should be read in conjunction with the following chapters:

- Section 6.2 Biodiversity
- Section 6.3 Ground Conditions and Contaminated Land

6.5.2 Legislation, policy and guidance

This scoping report has been prepared in accordance with relevant legislation, planning policy and guidance which will also apply to the future EIA. It is recognised that this list is non-exhaustive and will be kept under review to take account of any later legislation or policy changes.

Legislation

The relevant legislation includes:

- The Environmental Permitting (England and Wales) (Amendment) (EU Exit) Regulations 2019[79]
- The Environment (Amendment etc.) (EU Exit) Regulations 2020[80]
- Environmental Protection Act 1990[81]
- Environment Act 1995[82]
- Environment Act 2021[83]
- The Environmental Permitting Regulations 2016[84]
- Water Resources Act 1991[85]
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (WFD)[86]
- Land Drainage Act 1991[87]
- Water Act 2014[88]
- Water Resources (Abstraction and Impounding) Regulations 2006[89]
- The Water Abstraction and Impounding (Exemptions) Regulations 2017[90]
- Flood Risk Regulations 2009[91]
- The Water Supply (Water Quality) Regulations 2018[92]
- Flood and Water Management Act 2010[93]
- The Environmental Damage (Prevention and Remediation) (England) Regulations 2015[94]
- The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015[95]
- The Groundwater (Water Framework Directive) (England) Direction 2016[96]
- The Conservation of Habitats and Species Regulations 2017[97]
- The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019)[98]

National policy

The national policies relevant to water environment and flood risk are primarily identified in the National Planning Policy Framework (NPPF) (2021)[99] Section 14 and Annex 3 in relation to flood risk and climate change, and NPPF Section 15 in relation to protection of the water environment. In addition to the Planning Practice Guidance (PPG) notes on flood risk and coastal change, water supply, wastewater and water quality; and Guidance for Pollution Prevention (GPPs)[100] which are the documents that replace the old series of guidance document (PPGs), including GPP5: works and maintenance in or near water.

Local policy

The relevant local policies are listed in Table 6-22.

Table 6-19 List of relevant local policy – Water Environment and Flood Risk

Local authority	Relevant local policy
Bristol City Council	Bristol Development Framework Core Strategy (2011) BC515: Flood Risk and Water Management BCS16: Flood Risk and Water Management DM33: Pollution Control, Air Quality and Water Quality
Bristol City Council	Bristol Site Allocations and Development Management Policies (2014) DM22: Development Adjacent to Waterways DM28: Public Realm DM33: Pollution Control, Air Quality and Water Quality
Bristol City Council	Bristol Local Plan: Publication Version (2023) BG5: Biodiversity and Access to Bristol's Waterways FR1: Flood Risk and Water Management FR2: Bristol Avon Flood Strategy HW1: Pollution Control and Water Quality NZC4: Adaptation to a Changing Climate
Bristol City Council	Bristol Local Flood Risk Management Strategy (2023)[101]
South Gloucestershire	South Gloucestershire Local Plan: Policies, Sites and Places Plan PSP20: Flood Risk, Surface Water and Watercourse Management PSP21: Environmental Pollution and Impacts
South Gloucestershire	South Gloucestershire Core Strategy 2006-2027 CS9: Managing the environment and heritage
North Somerset	Emerging Local Plan 2038 Consultation Draft Preferred Options (2022) SP2: Climate change DP5: Climate change adaptation and resilience DP9: Flood risk DP10: Sustainable drainage DP11: Rivers, watercourses and springs DP41: Coastal erosion and marine management
North Somerset	North Somerset Core Strategy 2017 CS3: Environmental impacts and flood risk assessment
Bath and North East Somerset	Core Strategy and Placemaking Plan incorporating the Local Plan Partial Update (January 2023) CP5 Flood Risk Management

Local authority	Relevant local policy
	CP6 Environmental Quality SU1: Sustainable Drainage PCS7: Water Source Protection Zones

Guidance and standards

Relevant guidance and standards which have been used as part of the scoping process and will be taken into account as part of the EIA are listed below.

Design Manual for Roads and Bridges

There is no standard methodology for a water environment assessment, therefore, in the absence of any sector guidance, the methodology provided by the Design Manual for Roads and Bridges (DMRB) LA 113 Road drainage and the water environment (referred to hereafter as 'LA 113') is recognised as a tried, tested and robust approach.

LA 113 provides a methodology and criteria for identifying the likely impacts of a proposed road project on the water environment and predicting their magnitude and the significance of the resulting effects. LA 113 It is specifically designed for assessing the impacts of road or bridge construction on the water environment and therefore, sections of it are not directly applicable to the Proposed Development. However, as a linear infrastructure project, the approach is appropriate to assessing the Proposed Development.

Additional guidance

- UK government guidance for preventing pollution[102], working on or near water[103] and for managing water on land[104]
- Construction Industry Research and Information Association (CIRIA) guidance used to inform the assessment including:
  - Control of Water Pollution from Construction Sites – Guide to Good Practice (SP156)[105];
  - Control of Water Pollution from Construction Sites – Guidance for Consultants and Contractors (CG532)[106];
  - Control of Water Pollution from Linear Construction Projects – Technical Guidance (C649)[107];
  - Environmental good practice on site (C692)[108];
  - Groundwater control: design and practice (second edition) (C750)[109];
  - The SuDS Manual (C753)[110]; and
  - Guidance on the construction of SuDS (C768)[111].

6.5.3 Study area

The Water Environment scoping study area is defined by the Proposed Development footprint and the Proposed Development area, as shown on Figure 2.1, plus a 1km buffer. This is based on the 'source-pathway-receptor' pollutant linkage principle and professional judgement of the potential impacts and pathways related to the Proposed Development for surface water, groundwater and flood risk receptors.

Extension of the study area beyond the 1km buffer may be necessary to capture potential impacts to receptors beyond the standard study area. This may be important where the project is likely to impact receptors upstream and downstream of the study area. A risk-based approach will be taken to the extension of the study area based on assessment of impact pathways and this will be kept under review as understanding of interactions evolves.

6.5.4 Baseline conditions

Baseline data sources

The baseline described in this chapter has been informed by the following data sources shown in Table 6-23:

Table 6-20 Baseline data sources to inform scoping

Baseline Data	Source
Water Framework Directive (WFD) data	Catchment Data Explorer[112]
Ordnance Survey Open Data	Ordnance Survey[113]
Designated and Protected Sites	Defra MAGIC[114]
Flood risk maps	Environment Agency[115]
British Geological Survey (BGS)	1:50,000 Digital Geology Mapping "GeoIndex"[116]
Drinking Water Safeguard Zones (surface water and groundwater)	Environment Agency[117]
Groundwater Dependant Terrestrial Ecosystems (GWDTEs)	Environment Agency[118]
BCC Strategic Flood Risk Assessment (SFRA)	BCC[119]

Designated and protected sites

Several designated and protected sites are located within the study area and are shown in Table 6-24.

Table 6-21 Designated sites relevant for the water environment and flood risk scoping assessment

Designated site	Location
Cotswold Area of Outstanding Natural Beauty (AONB)	Approximately 890m east of Bitton. Located within Swineford
Willsbridge Valley LNR	Approximately 850m north of Keynsham
Avon Valley Woodland LNR	Approximately 890m north-west of Keynsham
Troopers Hill LNR	Adjacent to St Anne's
Avon New Cut LNR	Adjacent to Redcliffe Adjacent to Temple Meads Adjacent to Spike Island Adjacent to Bower Ashton Adjacent to Entrance Lock
Lamplighters Marsh LNR	Adjacent to Pill and Shirehampton
Leigh Woods NNR	Adjacent to Bower Ashton Approximately 670m north-west of Entrance Lock
Severn Estuary Ramsar/ SSSI/SAC	Adjacent to Pill and Shirehampton Downstream of all sites
Horseshoe Bend, Shirehampton SSSI	Approximately 700m north-east of Pill and Shirehampton
Avon Gorge SSSI/SAC	Adjacent to Sea Mills Adjacent to Entrance Lock Adjacent to Bower Ashton Adjacent to Spike Island

Surface water

Surface water features are shown in Figure 6.13.

WFD classified surface water features

Several surface water bodies are located within the study areas, that have been assigned a WFD classification, which, along with their tributaries are considered to be potential surface water receptors within the study areas of the main and detriment defences. Surface water bodies are detailed in Table 6-25.

Table 6-22 Surface water receptors relevant for the water environment and flood risk scoping assessment

Water body name (ID)	Location	Current overall WFD status (2019)
Bristol Floating Harbour Water Body (GB70910601)	Adjacent to Entrance Lock, Feeder Road, and Netham Lock Approximately 270m north of Spike Island Approximately 400m north of Redcliffe Adjacent to Feeder Road Approximately 970m north of St Phillip's Marsh Approximately 550m north of Temple Meads Approximately 100m north of St Anne's Approximately 570m north of Whitby Road Approximately 710m west of Chapel Way	Moderate
Bristol Avon Water Body (GB530905415405)	Adjacent to Entrance Lock, Spike Island, Redcliffe, St Phillip's Marsh, Netham Lock, Bower Ashton, Temple Meads, St Anne's, Pill and Shirehampton, and Sea Mills Approximately 130m south of Feeder Road Approximately 160m west of Whitby Road Approximately 710m west of Chapel Way Adjacent to Pump House Lane Adjacent to Riverside Cottages Adjacent to Hanham Mills Adjacent to Beeses Bar Adjacent to Broadmead Lane Industrial Estate Adjacent to Swineford	Moderate
The Malago – source to conf R Avon Water Body (GB109053021970)	Approximately 270m west of Temple Meads	Moderate
Frome (Brist) – Bradley Bk to conf Floating Harbour Water Body (GB109053027840)	Approximately 420m west of Temple Meads	Moderate
Bristol Avon (By Bk to Netham Weir) Water Body (GB109053027371)	Approximately 150m west of Keynsham	Moderate
Brislington Bk – source to conf R Avon (Brist) Water Body (GB109053021980)	Adjacent to St Anne's	Moderate

Water body name (ID)	Location	Current overall WFD status (2019)
Siston Bk – source to conf R Avon (Brist) Water Body (GB109053027450)	Adjacent to Keynsham	Moderate
Chew – conf Winford Bk to conf R Avon (Brist) Water Body (GB109053021950)	Approximately 150m west of Keynsham	Moderate
Boyd – source to conf R Avon (Brist) Water Body (GB109053027510)	Approximately 300m west of Bitton	Moderate
Trym - source to conf R Avon (Brist) Water Body (GB109053027530)	Adjacent to Sea Mills	Moderate

Non-WFD classified surface water features

In addition to the surface water bodies detailed in Table 6-25, there are non-WFD designated unnamed artificial drainage features, including, unnamed ponds approximately 800m south-east and approximately 400m west of Pill and Shirehampton; unnamed ponds 600m south and 740m north-west of Swineford; and an unnamed pond approximately 950m south-east of Sea Mills.

Surface water Drinking Water Safeguard Zones

There are no surface water Drinking Water Safeguard Zones within the study area.

Groundwater

Groundwater features are shown in Figure 6.6.

WFD classified groundwater features

Several groundwater bodies are located within the study area that have been assigned a WFD classification, which, are considered to be potential groundwater receptors within the study area of the main and detriment defences. Groundwater bodies are detailed in Table 6-26.

Table 6-23 Groundwater receptors relevant for the water environment and flood risk scoping assessment

Water body name (ID)	Location	Current overall WFD status (2019)
Bristol Triassic Water Body (GB40902G804800)	Located beneath Bitton, Keynsham, St Anne's, Temple Meads, Bower Ashton, Pill and Shirehampton, Entrance Lock, Spike Island, Redcliffe, Feeder Road, Netham, St Phillip's Marsh, Whitby Road, Chapel Way, Pump House Lane, Riverside Cottages, Hamham Mills, Beeses Bar, Broadmead Lane Industrial Estate and Swineford	Good
Carboniferous Limestone (Bristol) Water Body (GB40901G806800)	Located beneath Bower Ashton, Sea Mills, and Pill and Shirehampton	Good
Portishead Mercia Mudstone Water Body (GB40902G805300)	Located beneath Pill and Shirehampton	Poor

Springs
Five possible springs have been identified within the study area. Further research is required to verify the existence of the springs, this section will be updated at FBC.

Superficial deposits
BGS 1:50k Digital Mapping has been reviewed. It shows that the city centre, upstream and downstream defences are predominantly underlain by superficial deposits comprising Tidal Flat Deposits – Clay and Silt. Mapped superficial deposits comprise several areas of River Terrace Deposits, 1 – Sand and Gravel and River Terrace Deposits, 2 – Sand and Gravel. Further detail is provided in Chapter 6.3 Ground Conditions and Contaminated Land.

Bedrock geology
Mapped bedrock geology varies across the study area from Keynsham to the mouth of the Bristol Avon. The predominant bedrock geology types include: Charmouth Mudstone Formation – Mudstone; Wilmcote Limestone Member – Limestone and Mudstone, Interbedded; Blue Anchor Formation – Mudstone; Farrington Member and Barren Member (Undifferentiated) – Sandstone; Mercia Mudstone Group – Mudstone and Halite-stone; Redcliffe Sandstone Member – Sandstone; and Quartzitic Sandstone Formation – Sandstone. Further detail is provided in Chapter 6.3 Ground Conditions and Contaminated Land.

Aquifers
The study area is underlain by several aquifers including: Principal, Secondary A, Secondary B, and Secondary (undifferentiated) as detailed in Table 6-27.

Table 6-24 Aquifers relevant for the water environment and flood risk scoping assessment

Aquifer	Superficial drift	Bedrock
Principal	None within to study area.	Located beneath Entrance Lock, Bower Ashton and Sea Mills.
Secondary A	Located beneath Bitton, Keynsham, St Anne's, Sea Mills, Pill and Shirehampton.	Located beneath Redcliffe, Spike Island and Entrance Lock.
Secondary B	None within to study area.	Located beneath Keynsham, St Philip's Marsh, Feeder Road, Pill and Shirehampton.
Secondary (undifferentiated)	None within to study area.	Located beneath Bitton, Keynsham,
Unproductive	Located beneath Redcliffe, Spike Island, Entrance Lock and Sea Mills.	None within to study area.

Groundwater Source Protection Zones (SPZs)
There are no groundwater SPZs located within the study area.

Groundwater abstractions
Groundwater bodies in the study area are likely to support local abstractions for potable water supply. Upon receipt of data from the Environment Agency and BCC, this section will be updated at FBC.

Groundwater Drinking Water Safeguard Zones
There are no groundwater Drinking Water Safeguard Zones within the study area.

GWDTEs
There are two known GWDTEs within the study area:

- Severn Estuary SSSI adjacent to Pill and Shirehampton
- Avon Gorge SSSI adjacent to Sea Mills, Entrance Lock, Bower Ashton, and Spike Island

Flood risk

Rivers and sea
River flooding occurs when the discharge of a river is too great for its channel to hold, resulting in water flowing over bank causing flooding. Coastal floods are caused by extreme sea levels, which arise as a combination of four main factors: waves, astronomical tides, storm surges and relative mean sea level.

The Proposed Development, including all city centre, upstream and downstream defences are located within Flood Zone 3, which is defined as having a 1 in 100 or greater annual probability of river flooding (>1%), or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.

Surface water
Typically, surface water flooding is caused by a significant amount of rainfall and the high speed at which it hits the ground falling over a short period of time, which overwhelms drainage networks. This causes a build-up that prevents the existing drainage systems from draining it. Across the Proposed Developments, all city centre, upstream and downstream defences are associated with localised areas of low (area has a chance of flooding of between 0.1% and 1% each year) to high (area has a chance of flooding of greater than 3.3% each year) surface water flood risk, likely to be associated with localised depressions owing to the topography of the landscape.

Groundwater flooding
Groundwater flooding is defined as the emergence of groundwater at the ground surface away from perennial river valleys or the rising of groundwater into man-made ground under conditions where the 'normal' range of groundwater levels and groundwater flows is exceeded.

There is likely to be some risk of groundwater flooding in the study area related to the underlying geology, however this has not been confirmed at this stage of the assessment.

Reservoir flooding
There are reservoir dams in the surrounding areas of Bristol, which in the event of a collapse could potentially result in flooding in Bristol. The raised reservoirs that pose a flood risk to central Bristol and surrounds within the study area are the Barrow reservoirs (to the south west of Bristol) and Chew Valley Lake reservoir (to the south of Bristol)[120].

Other artificial water retaining structures
Within the study area, the Bristol Floating Harbour is a significant body of retained water in an area of high flood risk in central Bristol. The failure of the complex arrangement of locks, which control flows between the harbour and the tidal/fluvial flows of the River Avon and River Frome, could potentially cause flooding in the surrounding areas.

Sewer flooding
Within the study area, surrounds of the Bristol Floating Harbour have a history of sewer flooding.

Historic flooding
Historic flooding is prevalent across the study area, as detailed in the BCC SFRA[119], and as shown in the Level 1 SFRA Historic Flood Map[121].

6.5.5 Engagement
Engagement will be undertaken with relevant stakeholders in relation to the Proposed Development to obtain any information that they hold to supplement the assessment and to seek their views with regards to the evolving design. This will be undertaken by the EIA Team.

The following bodies will be consulted during the EIA process:

- Environment Agency
- Bristol City Council
- South Gloucestershire Council
- Bath and North East Somerset Council
- Wessex Water

6.5.6 Approach to assessment

Desk based study
A comprehensive desk-based study will be completed using publicly available data and data received from stakeholders through consultation. The desk study will identify potential water receptors and sensitive areas within the study area, which may include peat, groundwater and surface water dependent features, private water supplies and locations of watercourse crossings that cannot be avoided.

Potential GWDTEs will be identified following identification of appropriate habitats following biodiversity surveys (as detailed in Section 6.2).

Additional baseline data collection
The following data sources will be accessed to characterise the existing environment with respect to water environment and flood risk:

- Ecology data for the presence of GWDTEs.
- Environment Agency licensed and unlicensed abstractions data.
- Private abstractions data from BCC, South Gloucestershire Council and Bath, and North East Somerset.

The surveys that will be undertaken to inform the assessment in accordance with industry guidelines and agreed in advance with stakeholders include:

- Site reconnaissance will be conducted to ground-truth and expand on the data received during the desk study and to gain a complete understanding of the existing topography, hydrological and hydrogeological conditions of the study area. Additionally, the surveys will include an appraisal of the proposed watercourse crossing locations to inform the design of the Proposed Development and construction methods as well as private water supply visits if required.
- If the desk-based study reveals a presence of potential GWDTEs, then they may be subject to further hydrological and hydrogeological surveys.

6.5.7 Potential impacts

Assessment scenarios
Construction

Construction is defined as all the works undertaken to build the Proposed Development and typically the majority of the impacts on the water environment and flood risk will occur during this phase as this is when physical changes occur.

Impacts which have the potential to lead to significant effects to the water environment and flood risk during the construction phase of all city centre, upstream and downstream defences include:

- Increased pollution entering the watercourses from mobilised suspended solids and spillage of fuels or other harmful substances that may migrate to surface water and groundwater receptors.

- Impacts to the hydromorphological and ecological quality of watercourses associated with works within or in close proximity to watercourses, including physical change to the watercourses and longer-term changes associated with sediment deposition.
- Impacts to local land drainage structures, that may alter existing drainage patterns within catchments and provide potential pathways for pollution.
- Impacts on local hydrogeology and groundwater resources including GWDTEs, private water supplies and abstractions. Changes to groundwater levels, flows and quality arising from construction activities, primarily dewatering; earthworks and intrusive investigation works creating new flow paths for groundwater.
- Impacts on receiving surface water and groundwater quality from the leaching of pollution from soils into groundwater during construction.
- Impacts on groundwater quality and quantity due to piling foundations and sheet piling of flood walls.
- Impacts from contaminated land and soils are further considered in Chapter 6.3: Ground Conditions and Contaminated Land.
- Changes to surface flow paths and land drainage systems could modify drainage and increase flood risk.

While it is likely that the effects on water quality and quantity effects would be mitigated through the implementation of a Construction Environmental Management Plan (CEMP) which will include best practice measures during construction, it is considered that there is additional survey and assessment work is required to understand the Proposed Development's water environment and the likely effects, develop the bespoke mitigation plans required and confirm the residual effects and their significance. Therefore, the construction effects for surface water and groundwater quality and quantity, and flood risk are scoped in.

Operation

Operation is defined as the post-construction phase of the Proposed Development, including maintenance activities, until there is further development or until the site ceases to operate. Some impacts on the water environment and flood risk may occur during this phase.

Impacts which have the potential to lead to significant effects on the water environment during the operation phase of the main and detriment defences include:

- Permanent impact to the hydromorphological and ecological quality of water features associated with works within or in close proximity to water features.
- Permanent impacts to catchment hydrology and hydrogeology caused by the introduction of a barrier to natural overland flow.
- Permanent changes in river baseflow and groundwater availability for GWDTEs, private water supplies and abstractions due to underground sub-structures.
- Permanent beneficial impact upon flood risk to various receptors

6.5.8 Mitigation

Embedded – Construction

Surface water quality and WFD

To mitigate construction impacts, a Construction Environmental Management Plan (CEMP) would be implemented. Pollution risk during construction would be reduced by adoption of good working practices and adherence to Construction Industry Research and Information Association (CIRIA) guidance. Mitigation measures and best practices would also be applied prior to and during the construction phase. This would include the following:

- Use of sediment control measures such as fences and sediment-trapping bunds to reduce input into watercourses.

- Limiting the extent of vegetation clearance to mitigate the potential erosion and release of sediment from cleared areas.
- Building temporary storage lagoons to contain surface run-off and sediments.
- Separating construction activities from watercourses where possible.
- Using site construction materials free from contamination to avoid potential pollution of watercourses or groundwater (e.g., from wet cement).
- Testing of made and reworked soils to identify any pollutants.
- Preparing an incident response plan for the construction phase informing all site workers of required actions in the event of a pollution incident.

Groundwater

To mitigate potential impacts on groundwater quality, an CEMP would be implemented during the construction phase to ensure appropriate construction management techniques to prevent pollution. Where possible, works should look to minimise changes to groundwater flow pathways, notably around sensitive sites including surface waters, abstractions and GWDTEs.

During the construction phase, the following assessments should be undertaken to assess the potential impacts on groundwater quality and quantity:

- A hydrogeological impact assessment.
- A foundation works risk assessment.

Flood risk

Mitigation measures, best practices and guidance would be applied during the construction phase and outlined in a CEMP. This includes the following:

- Flow in watercourses should be maintained.
- Temporary encroachment into floodplains and areas of mapped surface water flooding should be minimised during construction.
- Site compounds and storage areas should be located beyond Flood Zone 3 and outside areas at high risk of surface water flooding.
- Temporary storage of materials should not introduce a barrier to flow paths.

Embedded – Operation

Surface water quality and WFD

Mitigation of surface water quality and WFD impacts for all city centre, upstream and downstream defences would include measures to minimise water quality impacts, such as the development and installation of drainage design and the update of any water crossing features such as culverts.

Groundwater

Mitigation of groundwater impacts for the Proposed Development should include the following:

- Avoidance of creating new flow pathways to groundwater through detailed drainage design and foundation works risk assessment.
- Design of embankments to minimise potential impacts on groundwater bodies and existing abstractions.

Additional – Construction

Additional mitigation is not expected to be likely. The application of best practice standard mitigation, as well as bespoke mitigation plans informed by additional survey and assessment work undertaken as part of the EIA will be detailed in a CEMP and adhered to by the appointed contractor.

Additional – Operation

Site specific mitigation may be required to comply with the WFD regulations and mitigate any potential impacts on WFD status, however it cannot yet be outlined.

Enhancement

The creation and/or enhancement of both in-channel and riparian habitats should be considered to improve the quality of local waterbodies.

7. Additional Environmental Topics

This chapter identifies the additional environmental topics which will require further studies and may be included in the scope of the EIA following further design information and appraisal.

- Air Quality
- Noise and vibration
- Traffic and transportation
- Climate and greenhouse gases
- Socioeconomics
- Health

Baseline information gathered from publicly available sources has been provided to contextualise the Proposed Development further.

7.1 Air Quality

7.1.1 Introduction

This chapter outlines the baseline, potential impacts and mitigation arising from the construction, and operation of the Proposed Development on air quality and odour.

7.1.2 Study area

For construction dust and construction emissions onsite, the study area is defined by the qualitative assessment of construction phase impacts.

This chapter outlines the baseline, potential impacts and mitigation arising from the construction, and operation of the Proposed Development on air quality and odour.

In the absence of detailed traffic data and construction proposals at the time of writing this Draft EIA Scoping Report, it is assumed at the scoping stage that the air quality study area, would not extend more than 1km from the Proposed Development. This study area will be reviewed during the EIA following confirmation of traffic modelling routes, assessment of traffic data and development of construction proposals.

7.1.3 Baseline Conditions

This section presents the baseline conditions with respect to the local air quality within the study area.

- Construction phase dust and particulate matter emissions:
  - Human receptors within 250m of the construction works boundary and within 50m of routes used by construction vehicles (for routes used by construction-generated traffic up to 250m from the site entrances).
  - Ecological receptors within 50m of the construction works boundary and within 50m of routes used by construction vehicles (for routes used by construction-generated traffic up to 250m from the construction site entrances).
- Construction phase Non-Road Mobile Machinery (NRMM) emissions:
  - Human and ecological receptors within 250m of the construction works boundary where NRMM will be located.
- Construction and operational phase road traffic emissions:

- Human and ecological receptors within 200m of all roads that trigger the traffic screening criteria, as defined by the IAQM/EPUK guidance[122] and adjoining roads within 200m, referred to as the Affected Road Network (ARN). Whilst, it is not expected that operational vehicles will exceed the threshold they will be screened once available during the EIA.

It is assumed the Proposed Development will not include any operational combustion plant, therefore combustion air quality emissions have been excluded from further consideration.

The locations of the temporary construction sites and compounds are not known at this time of writing.

Sources of baseline data

Estimates of current and future year background pollutant concentrations in the UK are available on the Defra UK-Air website[123].

Requirement for further air quality monitoring to inform the air quality assessment will be determined at FBC.

Sources of air pollution

Traffic emissions

In recent decades, atmospheric emissions from transport on a national basis have grown to match or exceed other sources in respect of many pollutants, particularly in urban areas. Vehicle emissions are likely to be one of the more dominant sources of air pollutants in the vicinity of the urban areas within Bristol around the Proposed Development.

Industrial emissions

Industrial air pollution sources are regulated through a system of operating permits or authorisations, requiring stringent emission limits to be met and ensuring that any releases to the environment are minimised or rendered harmless. Regulated (or prescribed) industrial processes are classified as Part A or Part B processes, regulated through the Pollution Prevention and Control (PPC) system[124,125]. The larger more polluting processes are regulated by the Environment Agency (EA), and the smaller less polluting ones by the local authorities. Local authorities tend also to regulate only for emissions to air, whereas the EA regulates emissions to air, water and land.

Any impact of emissions from regulated industrial processes are assumed to be represented in the Defra background concentrations provided by Defra, and therefore have been considered in the assessment.

Local air quality

The Environment Act 2021[83] requires local authorities to review and assess air quality with respect to the objectives for seven pollutants specified in the National Air Quality Strategy. Local authorities are required to carry out an assessment and an Annual Status Report (ASR). If the ASR identifies potential hotspot areas likely to exceed air quality objectives, then a detailed assessment of those areas is required. Where objectives are not predicted to be met, local authorities must declare the area an AQMA. In addition, local authorities are required to produce an Air Quality Action Plan (AQAP), which includes measures to improve air quality within the AQMA.

The majority of works are within the Bristol AQMA (see Figure 7.1), which is designated due to exceedances the objectives for fine particulate matter (PM_{10}) and nitrogen dioxide (NO_2).

The Bristol's Clean Air Zone[126] was instated from 28 November 2022, and applies to almost all of the Proposed Development area. The expectation is that it will help improve air quality in the area over the coming years.

Air quality monitoring

Local authorities monitor pollutants in several ways such as automatic monitoring and non-automatic monitoring, to assess and manage air quality. Bristol City Council provide the air quality monitoring data via public web map[127]. A selection of sites have been selected to show local Air Quality, as seen in Table 7-1. An updated list will be provided in the future updates of this report. The sites indicate that for annual mean

NO_2 the concentrations close to the Proposed Development are below the objective of 40µg/m^3 in 2022. The years 2020 and 2021 are not considered representative due to the affects from the Covid-19 lockdowns.

Table 7-1 Selection of sites and NO_2 concentrations

Location	Site ID	Annual mean NO_2 concentration µg/m^3		
		2020	2021	2022
Southeastern stair access Plimsoll Bridge	556	31.7	35.0	31.8
York RD-CAZ Sign after bridge	635		25.3	23.8
Bath Road-CAZ-Lamppost by bus lane	636		26.2	25.5
Netham Lock Junction	675			26.4

Background concentrations

Background concentrations refer to the existing levels of pollution in the atmosphere, produced by a variety of stationary and non-stationary sources, such as roads and industrial processes. The Defra website includes estimated background pollutant concentrations for NO_2, PM_{10} and $PM_{2.5}$ for each 1km-by-1km OS grid square in the UK.

The current year (2023) background pollutant concentrations for the Bristol area are shown below in Table 7-2. Concentrations are below the annual air quality objectives for NO_2 (40µg/m3) and PM_{10} (40µg/m^3) in 2023. For $PM_{2.5}$, the background concentration is below the interim environmental target of (12µg/m^3) in 2023.

Table 7-2 Estimated background annual mean pollutant concentrations for 2023

Year	Annual mean concentration (µg/m^3)		
	NO_2	PM_{10}	$PM_{2.5}$
Min	7.2	10.8	7.0
Max	19.7	16.5	10.9
Average	11.8	13.3	8.8

Receptors

Human health receptors

For the purposes of the air quality assessment, sensitive human health receptors will include residential properties, locations of susceptible populations e.g. schools, hospitals and care homes, or any other location where a member of the public may be exposed to an air pollutant for the relevant exposure time period. Sensitive human health receptors within the study area will be identified in the EIA and presented within the ES.

Designated habitats

Designated habitats may contain features that are sensitive to increased concentrations of airborne pollutants. The IAQM (2020) guidance[128], requires assessment of air quality impacts on Ramsar sites, SPAs, SACs, SSSIs, NNRs, LNRs, LWSs and Ancient Woodland within 200m of any road affected by the Proposed Development.

Sensitive ecological receptors within the study area will be identified in the EIA and presented within the ES.

7.1.4 Potential impacts

The Proposed Development may result in the following air quality impacts to human or ecological receptors:

- Construction dust:
  - construction dust deposition;
  - visible dust plumes and particulates generation from works with have the potential to cause nuisance, loss of amenity, and health impacts to nearby sensitive receptors; and
  - elevated PM_{10} concentrations, as a result of dust generating activities within the Proposed Development.
- Traffic:
  - Increase in airborne particulate matter and NO_2 due to exhaust emissions from diesel powered vehicles and equipment on site.
  - The impact of emissions on receptors located close to the working area and along construction routes along the local network.
  - In areas where concentrations of traffic-based pollutants are already in exceedance of the limit of 40µg/m^3 for NO_2, the addition of construction traffic in this area could result in a further deterioration of pollutant concentrations.
- Generators and non-road mobile machinery:
  - Increase in pollutant emissions to air from the use of machinery and generators.
- Operation:
  - Limited impacts are expected due to the nature of flood defences during operation. Minor emission from infrequent site maintenance.

7.1.5 Mitigation

A Construction Environment Management Plan (CEMP) will be produced by the contractor prior to construction, this will be in place and will help to reduce the likelihood of impacts upon air quality impacts during construction.

Examples of good practice mitigation to reduce the impacts on air quality include the following measures:

- The site layout would be planned to locate machinery and dust-causing activities away from sensitive receptors, where reasonably practicable. Methods, such as the erection of hoardings or other barriers along the site boundary, would be used, where appropriate, to mitigate the spread of dust.
- Construction plant will be operated in accordance with the manufacturer's written recommendations.
- Construction vehicles to conform to the current emissions standards.
- Encouraging the use of lower carbon modes of transport by identifying and communicating local bus connections and pedestrian and cycle access routes to/from the Proposed Scheme to all construction staff.
- Implementing a Travel Plan to reduce the volume of construction staff and employee trips.
- Switching off vehicles and plant when not in use and ensuring construction vehicles conform to current EU emissions standards.

7.2 Noise and Vibration

7.2.1 Introduction

This chapter outlines the baseline, potential noise and vibration impacts and mitigation of the construction and operation of the Proposed Scheme. This chapter considers impacts upon human receptors, noise and

vibration sensitive buildings, and equipment. For impacts upon ecological receptors, please refer to Section 6.2.

7.2.2 Study area

Study areas around the proposed construction works of 300m to assess construction noise, and 100m for construction vibration are proposed. These study areas are based on best practice guidance and national standards, in particular British Standard BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction, and open sites Part 1 (noise) and Part 2 (vibration). The study areas are also based on projects of similar nature and scale.

Construction traffic noise also has the potential to impact sensitive receptors nearby, due to an increase in HGVs using nearby road network, or noise increase resulting from diversion routes. For construction traffic noise impacts, the study area is dependent upon the roads which will be used for construction, and therefore will be determined in FBC when these routes are known.

The Proposed Scheme is unlikely to result in noise emitting operational activities and therefore operational noise and vibration are proposed to be scoped out. Therefore no operational study area for operational noise is proposed. This would need to be confirmed at FBC once operational traffic modelling is known.

Noise and vibration sensitive receptors will be identified within the study area based on usage. Sensitive receptors include residential dwellings, educational spaces, hospitals, places of worship and public rights of way, amongst others.

7.2.3 Baseline conditions

The Proposed Scheme extends from Pill (Avonmouth) to Bitton, passing through Bristol. The nature of the proposed works are in locations that would protect structures and infrastructure used by people. The sound environment is therefore likely to be dominated by anthropogenic sources such as road, rail and industrial uses.

The main noise sources include the M5 to the north, Portway Road, Anchor Road, the A370 and Bath Road, as well as other smaller local roads within Bristol. There is also likely to be contribution from the Bristol to Weston-super-Mare railway. The future baseline of the site will also have contribution from the reopening of the Bristol to Portishead line.

Noise Important Areas (NIAs) are locations in England where the population is exposed to high levels of noise and are therefore more sensitive to any increase in noise. The Defra strategic noise mapping identifies the following road traffic NIAs in close proximity to Proposed Development: Hotwell Road (NIA ID:14831), Coronation Road (NIA ID: 277), Bedminster Bridge Roundabout (NIA ID: 265), York Road (NIA ID: 264), Temple Gate (NIA ID:14353) and Bath Road (NIA ID: 267, 299 and 268). There is also one railway NIA located south of Bristol around Victoria Park (NIA ID: RI_1331).

7.2.4 Potential impacts

The Proposed Development may result in the following noise and vibration impacts:

- construction activity noise arising from excavation works, building of embankments, concrete pouring and construction compounds;
- construction vibration arising from piling and ground compacting; and
- construction traffic noise using the existing nearby road network.

These construction works have the potential to result in significant effects, especially if they are undertaken during the night.

Should road raising be required, this may result in a small increase in noise emissions, however the noise changes would be minimal for the changes in vertical alignment expected as a result of the Proposed Scheme. Operational noise and vibration is, therefore, unlikely to lead to significant adverse effects and may potentially be scoped out of further assessment.

Assessment of potential construction noise and vibration effects is required at FBC and will be developed in the next stage, in line with best practice guidance, national standards and in consultation with the relevant local authorities.

7.2.5 Mitigation

Potential construction adverse effects may be mitigated through the implementation of a Construction Environmental Management Plan (CEMP). A CEMP would contain established control measures for environmental protection which would be adopted during construction.

Mitigation for construction activities would consider the predicted noise and vibration impacts of the Proposed Development and aim to avoid, mitigate and minimise adverse effects. This would include the use of best practicable means as outlined in Section 72 of the Control of Pollution Act 1974 and Section 79 of the Environmental Protection Act 1990 such as:

- The selection of quiet and low vibration equipment.
- Construction plant to be operated and maintained appropriately, having regard to the manufacturer's written recommendations or using other appropriate operation and maintenance programmes which reduce noise and vibration emissions.
- All vehicles and plant would be switched off when not in use.
- Review of construction programme and methodology to consider quieter methods e.g. bored piling instead of impact piling.
- Consideration of location of equipment on site.
- Control of working hours.
- The provision of acoustic enclosures and the use of less intrusive alarms (e.g. broadband vehicle reversing warnings).
- Screening of equipment, perimeter hoarding and/or temporary use of stockpiles.
- Noise control toolbox talks for site operatives.

7.3 Traffic and Transportation

7.3.1 Introduction

This chapter outlines the baseline, potential impacts and mitigation arising from the construction, and operation of the Proposed Scheme on traffic and transport.

7.3.2 Study area

The indicative study area for the Draft EIA Scoping Report can be broadly described as from the M5 to the west, A4162 to the North, the A370 and A4 to the south, and the A4174 to the east.

The study area for the assessment will be defined at FBC following stakeholder engagement and a review of those transport routes likely to be impacted by the Proposed Development. This would include those transport links that would be directly impacted by the Proposed Development (whether by road, rail or water), alongside those transport links likely to be impacted by changes in traffic associated with construction access and temporary road closures.

7.3.3 Baseline conditions

The River Avon is navigable from Bristol City Centre to the Severn Estuary by seagoing vessels and there is frequent commercial and non-commercial traffic on the river and in the harbour area. The river is navigable either side of high tide but dries to non-navigable steep sided muddy channel at low tide. Local sailing clubs operate on the Avon, including at Shirehampton and at Pill.

The A4 Portway on the north bank of the River Avon is a key road vehicle route into the city, an important public transport route supported by a local rail line and connected to a park and ride facility.

The south bank of the River Avon has an active freight railway to Portishead.

The highway network in the vicinity of the Proposed Development comprises the following key routes:

- The A4 Portway is a part single/part dual carriageway that provides access towards Bristol city centre from the M5.
- A369 Martcombe Road is a single carriageway that routes between the M5 and South Bristol.
- A3029 Brunel Way is a dual carriageway that routes between the A4 and the A370. It includes a bridge over the River Avon and Cumberland Basin.
- A4320 St Philip's Causeway is a dual carriageway that runs in a north/south alignment to the east of Bristol city centre.
- Various local roads, including Station Road, Brunel Lock Road, Feeder Road, St Anne's Road, Crews Hole Road and Conham Road.

In addition, there are several Public Rights of Way (PRoW) that may be impacted by the Proposed Development, including , but not limited to:

- BCC refs 49A, 54, 165, 192, 200A, 200B, 414, 416, 524, 544, 549, 598, 599 and 608; and
- NSC refs LA8/5/10, LA8/5/20, LA8/6/5, LA8/51/10 and LA8/57/20.

7.3.4 Potential impacts

Construction

There may be some temporary disruption to the PRoW and roads in the form of full or partial closures (and associated diversion). Bristol City Council and North Somerset Council will be consulted with, as the Highways Authority, to ensure any disruption for local residents and businesses is minimised, diversions implemented and any required licences applied for.

Details of the amount of additional construction traffic on the local road network is not known at this early stage in the Proposed Development's design, however during construction there will be Large Goods Vehicles and Heavy Goods Vehicles using the local road network to access the Proposed Development.

In determining the impact and the significance of road traffic on the highway, the IEMA Guidelines (2023)[129] suggests two basic rules, defined as:

- Highway links where traffic flows will increase by more than 30% (or the number of HGVs will increase by more than 30%); and
- Any specifically sensitive areas where the traffic flows have increased by 10% or more.

Based on previous project experience and professional judgement, it is not anticipated that the construction phase will increase flows by more than 30% nor are there considered to be any specifically sensitive areas to increased traffic flows. Diversions associated with temporary road closures may however result changes in traffic volumes in excess of 30%.

Navigational impacts of a barrier solution has potential to impact recreational sailing club activities and commercial navigation activities and this requires further detailed investigation.

Operation

The Proposed Development will only be visited occasionally for maintenance and therefore operational traffic is likely to be limited. During FBC, further consideration of the potential for operational traffic and transport impacts will be undertaken to determine if it can be scoped out of further EIA assessment.

7.3.5 Mitigation

A Construction Traffic Management Plan (CTMP) is anticipated to be required and would include traffic management measures to minimise the short-term impacts of construction traffic on the local transport network. This would include confirmed details of construction vehicle numbers (including deliveries and staff), construction delivery and staff parking and management, official construction traffic access routeing and how this will be controlled, and additional measures as necessary. The scope and content of the CTMP will be agreed with the highways departments at North Somerset Council and Bristol City Council. Subject to stakeholder engagement and the extent of the construction impacts on the transport network, further management plans may be required, including:

- Construction Worker Travel Plan – setting out measures to maximise the proportion of journeys made by sustainable modes of transport;
- Traffic Management Strategy – detailing the potential traffic management that may be required associated with temporary lane/road closures and diversions; and
- Rights of Way Management Plan – setting out how impacts on the Public Rights of Way network will be managed and mitigated.

Subject to further assessment and engagement, there may need to be a management plan associated with the potential impacts on recreational and commercial marine activities.

7.4 Climate change and greenhouse gases

7.4.1 Introduction

This chapter outlines the baseline, potential impacts and mitigation arising from the construction, and operation of the Proposed Scheme on climate change and greenhouse gases.

Three aspects of climate change assessment have been considered in this chapter:

- an assessment of the effects of the Proposed Development on climate – the Greenhouse Gas (GHG) assessment considers the change in GHG emissions due to the Proposed Development;
- an assessment of the vulnerability of the Proposed Development to climate change – the Climate Change Resilience (CCR) Assessment considers the resilience of the Proposed Development in the context of projected future changes in climate variables; and
- an assessment of the potential impacts of future climate conditions to act in-combination with the impacts of the Proposed Development on other environmental receptors - the in-combination climate change impact (ICCI) assessment ensures that environmental receptors that are vulnerable to impacts from both the Proposed Development and climatic factors are considered in the context of the changing climate.

7.4.2 Study area

As per the IEMA Guidance[130], a reference study period for the Proposed Development has been chosen as the basis for the GHG emissions assessment, based on the expected service life of the construction asset. The study period is 5-8 years for construction and 125 years for operation of the Proposed Development. The exact start dates of construction are not yet known.

GHG assessment

The study area for the lifecycle GHG assessment would consider all GHG emissions arising through the lifecycle of the Proposed Development. This includes direct GHG emissions arising from activities within the redline boundary and indirect emissions from activities outside the redline boundary (for example, the transportation of materials to the Proposed Development and embodied carbon within construction materials).

Climate Change Resilience Assessment and In-Combination Climate Change Impacts

The study area for the CCR Assessment and ICCI is based on the construction footprint and includes temporary and permanent works within the Proposed Development i.e., it covers all assets and infrastructure which constitute the Proposed Development, during construction, and operation.

The CCR Assessment and ICCI takes into account the construction phase of the Proposed Development (5-8 years) and the proposed lifetime (at least 125 years).

7.4.3 Baseline conditions

Existing GHGs

Presently there are no direct GHG emissions associated with existing infrastructure (defences) through the Proposed Development. GHG emissions associated with the do-nothing future baseline would however include emissions that result from maintenance requirements and emissions associated with the response to flood incidents should the existing defence line be breached.

Conditions for CCR and ICCI assessment

Historic climate data obtained from the Met office[131] recorded by the meteorological station closest to the Proposed Development (Filton) for the periods 1981-2010 and 1991-2020 are presented in Table 7-3. Baseline conditions described in the other discipline chapters are also relevant to the ICCI assessment.

Table 7-3: Historic data of climate variables

Climate variable	1981-2010	1991-2020
Average annual maximum daily temperature	14.21C	14.53C
Warmest month on average	July (mean maximum daily temperature 21.5C)	July (mean maximum daily temperature 21.74C)
Coldest month on average	February (mean minimum daily temperature 1.9C)	February (mean minimum daily temperature 2.42C)
Average total rainfall levels	802.14mm	819.01mm
Wettest month on average	December (85.91mm of rainfall on average for the month)	November (89.99mm of rainfall on average for the month)
Driest month on average	April (49.34mm of rainfall on average for the month)	April (47.87mm of rainfall on average for the month)

Regardless of whether or not the Proposed Development goes ahead, there is likely to be a change to the future baseline conditions as a result of climate change.

Projected changes in temperature, precipitation, and sea level change are presented in Table 7-4. This table includes the UKCP18 probabilistic projections[132] for the 25km^2 grid square where the Proposed Development is located. The first number in the range is RCP4.5 at the 50th percentile and the second number in the range is RCP8.5 at the 90th (except summer rainfall, which is the 10th percentile), calculated from UKCP 25 km Probabilistic Projections[133].

Table 7-4: Future projections of climate parameters

Climate parameter	Time period	
	2030s	2050s
Temperature		
Annual average air temperature (°C)	+0.8 to +1.6	+1.3 to +2.7

Climate parameter	Time period	
	2030s	2050s
Summer average air temperature (°C)	+1.0 to +2.2	+1.7 to +3.9
Winter average air temperature (°C)	+0.7 to +1.6	+1.1 to +2.6
Summer maximum air temperature (°C)	+1.1 to +2.6	+2.0 to +4.5
Winter minimum air temperature (°C)	+0.7 to +1.7	+1.2 to +2.9
Precipitation		
Summer precipitation rate anomaly (%)	-7 to -29	-12 to -42
Winter precipitation rate anomaly (%)	+6 to +19	+9 to +27
Sea level change		
Sea level change (m)	+0.14 to +0.19	+0.24 to +0.36

7.4.4 Potential impacts

GHG emissions

For the purposes of this assessment, it is considered that any GHG emissions from the Proposed Development compared to the baseline have the potential to have an impact upon the global climate (receptor) due to its high sensitivity to change.

Potential sources of GHG emissions as part of the Proposed Development may include:

- Construction
  - Product stage: Raw materials, product manufacturing, energy use
  - Construction processes: transportation of materials and construction equipment to site and within the site.
  - Construction activities: ground works, material storage, installation of materials, emissions associated with site water demand and waste management. Also includes change e.e. carbon emitted via loss of habitats.
- Operation
  - Operational use: operation of infrastructure – energy (e.g. lighting) and water use, waste production.
  - Operational maintenance: works activities and new materials for the maintenance, repair, replacement and refurbishment of the infrastructure

GHG impacts will be contextualised in terms of their impact on the UK's 5-year carbon budgets, including sub-sectoral budgets for energy generation which set legally binding targets for GHG emissions, and current recorded regional emissions to determine significance as part of the EIA.

Consideration should also be given to the avoidance of GHG emissions associated with the repair, maintenance and emergency response requirements during flood incidents that would likely be avoided on completion of the Proposed Development.

Climate Change Resilience Assessment

The Proposed Development is intended to be constructed during a 5-8 year programme, for completion by early 2030s. The operation of the Proposed Development is then intended from the early 2030s to 2060s after which further enhancements to defences may be needed. Based on these construction and operation periods, the scope of the CCR assessment considers the risks of the Proposed Development to the impacts of climate change on construction up to the next phase of design life.

Receptors with the potential to be affected by impacts of climate change may include:

- sourcing of materials and equipment for construction of all built assets;
- structures;
- staff facilities;
- access routes to construction sites; and
- workers on construction sites.

During operation, the only activities expected are maintenance and refurbishment of assets. Potential impacts of climate change on these activities may include risk to maintenance workers and access to required materials or equipment to undertake maintenance work.

The likely significance of these potential impacts will need to be explored further at FBC.

In-Combination Climate Change Impact Assessment

ICCI assessment identifies how the resilience of various receptors in the surrounding environment is affected by a combination of future climate conditions and the Proposed Development. The climate parameters relevant to the Proposed Development listed below:

- Temperature change
- Sea level rise
- Precipitation change (frequency and magnitude of precipitation events and droughts
- Wind

If the current trend of rising sea levels continues and accelerates, as expected due to climate change, the chance of flooding significantly increases which this Proposed Development is inherently seeking to address. Future fluvial/tidal flood risk is therefore addressed as part of design, therefore will not be considered further (subject to agreement at FBC).

7.4.5 Mitigation

The design of the Proposed Development has emerged as part of an iterative design process between the engineering and environmental assessment teams, as well as through statutory consultation and proactive engagement with statutory consultees, key stakeholders, and the community, which will continue into FBC.

In 2020 BCC published the Bristol One City Climate Strategy[134] setting out a strategy for a carbon neutral, climate resilient Bristol by 2030. The Bristol Avon Flood Strategy is one of the pilot projects for the draft Bristol City Council Sustainability Framework. This framework sets out a series of sustainability objectives and metrics, from carbon to biodiversity, for the capital portfolio as a whole.

The Environment Agency have committed[135] to becoming a net zero organisation by 2030. The construction of FCRM capital projects forms a major source of carbon emissions and early consideration of carbon is required to identify solutions that efficiently minimise whole life carbon impacts. As part of the net zero commitment, the Environment Agency aims to reduce the annual carbon emissions from construction by

45%[1], including by reducing the need for construction and achieving wider benefits like green spaces for communities and better wildlife habitat.

A key mitigation for GHG emissions is the use of an 'adaptive' strategy, meaning defences constructed within will enable future raising of defences to allow for increased flood protection. The foundations for these defences have been designed to allow for future raising and therefore will enable long term flood resilience without the need to rebuild defences.

GHG emissions

Throughout this design process, changes have been made and implemented into the design of the Proposed Development to avoid or reduce potential GHG emissions. These measures and changes are considered essential to the Proposed Development and are termed as 'embedded mitigation' and will need to continue to be developed in FBC.

Good practice measures proposed to be adopted during construction through the implementation of a Construction Environmental Management Plan (CEMP) will support the minimisation of GHG emissions from the Proposed Development. Measures may include:

- increasing recyclability by segregating construction waste to be re-used and recycled where reasonably practicable;
- adopting the Considerate Constructors Scheme (CCS) to assist in reducing pollution, including GHGs, from the Proposed Development by employing good industry practice measures;
- designing, constructing and implementing the Proposed Development in such a way as to minimise the creation of waste and maximise the use of alternative materials with lower embodied carbon, such as locally sourced products and materials with a higher recycled content where feasible;
- reusing suitable infrastructure and resources already available in the Proposed Development where possible to minimise the use of natural resources and unnecessary materials (e.g. reusing excavated soil for fill requirements or storing, preserving and restoring top soil);
- encouraging the use of lower carbon modes of transport by identifying and communicating local bus connections and pedestrian and cycle access routes to/ from the Proposed Development to all construction staff, and providing appropriate facilities for the safe storage of cycles;
- liaising with construction personnel for the potential to implement staff minibuses and car sharing options;
- implementing a Travel Plan to reduce the volume of construction staff and employee trips to the Proposed Development;
- switching vehicles and plant off when not in use and ensuring construction vehicles conform to current European Union (EU) emissions standards;
- conducting regular planned maintenance of the construction plant and machinery to optimise efficiency;
- making the scheme as passive as possible, reducing the risk of failure, operational maintenance and electricity use;
- reducing defence lengths and relative heights though interrogation of the hydraulic model and topographic data;
- incorporating natural flood management (NFM) measures that sequester carbon;
    - exploring where recycled steel and low carbon concrete can be substituted within the design;

[1] Environment Agency, "Reaching Net Zero by 2030" [online]. Available: https://assets.publishing.service.gov.uk/media/60ae699be90e071b5d705d20/EA-net-zero-2030.pdf

- carrying out structural and geotechnical investigations to determine the extent to which existing structures can be used or refurbished rather than replaced; and
- working with contractors at an early stage to minimise transport distances for materials in construction, and reduction in temporary works.

Climate Change Resilience

Proposed embedded design measures to manage impacts associated with climate change resilience which will be considered further in FBC may include design specification to high future climate scenarios, and material specification with higher tolerance to fluctuations in temperature, precipitation and extremes.

Other measure to be considered for implementation during construction and captured within a CEMP may include:

- using equipment's cooling systems where necessary/adapting working practices and equipment used based on current weather conditions;
- protecting workers and resources from extreme weather conditions; and
- monitoring weather forecasts and the news for Environment Agency flood warnings, relevant weather warnings, and water levels of the local waterways.

7.5 Socio-economics

7.5.1 Introduction

This chapter outlines the baseline, potential impacts and mitigation arising from the construction, and operation of the Proposed Scheme on socio-economics.

7.5.2 Study area

The study area for direct impacts on businesses and other socio-economic receptors would comprise wards within 500m of the Proposed Development. For impacts related to employment, skills and training opportunities, and to changes in flood risk, the assessment would consider a wider study area, taking into account labour market conditions in the local authority areas of Bristol City Council, North Somerset, South Gloucestershire, and Bath and North East Somerset (BaNES), and the locations of concentrations of businesses and commercial developments particularly in Bristol City Centre.

7.5.3 Baseline conditions

Data from the Office for National Statistics has been reviewed to determine the current socio-economic baseline conditions for the study area.

Economic activity rates are higher than average across all of the local authorities within the study area, at 86% in North Somerset, 84.9% in South Gloucestershire, 80.7% in Bristol and 79.1% in BaNES, compared with a national figure of 78.6%. Employment is also generally above average, with the exception of BaNES where it is slightly below the national figure. Unemployment is above average in BaNES, but below average in all other local authority areas.

It is likely that there is considerable variation in employment and economic activity at ward level. For example, inner city wards of Bristol such as Lawrence Hill and Easton, which could fall within the study area, record considerably higher levels of unemployment than the city as a whole. In January 2023, for example, Lawrence Hill recorded the highest unemployment rate of any ward in Bristol, with 72 residents per 1,000 residents aged 16-64 claiming unemployment related benefits. Lawrence Hill also a very high proportion of residents in younger age groups, with 23.4% aged 0-15 and 17.8% aged 16-24.

Data from the Annual Survey of Hours and Earnings shows that weekly wages for residents of Bristol are in line with the average for England, above average in South Gloucestershire and BaNES, and slightly below average in North Somerset. However, the study area includes areas of high multiple deprivation, particularly in central Bristol but also further west, around Shirehampton and Lawrence Weston. Employment

deprivation and Education, Skills and Training Deprivation are also high in these areas, with several Lower Super Output Areas (LSOAs) falling within the 10% most deprived in England.

The study area includes areas of commercial and industrial development within Bristol, particularly around Cumberland Basin and St Philip's Marsh and Netham. Smaller clusters of businesses are also located at other points within the study area, including Shirehampton, Pill, and Crew's Hole. In addition to businesses located within the study area that could be directly affected by the construction of the Proposed Development, the assessment would also consider the potential for impacts on businesses located in Bristol City Centre as a result of changes in flood risk.

7.5.4 Potential impacts

Construction
The construction of the Proposed Development is likely to generate direct and indirect employment and supply chain opportunities. There may also be potential for training and apprenticeships associated with construction.

Construction activity could result in disruption to local road networks in the local study area, which could impact on access to businesses in the local study area and more widely across Bristol City Centre.

Effects on amenity from noise, visual and traffic impacts could also arise, potentially affecting sensitive businesses in the local study area.

Operation
Direct employment associated with the Proposed Development once in operation is expected to be relatively small, but there may still be some potential for the local supply chain to benefit from maintenance activities.

There could be beneficial effects for businesses as a result of greater flood protection, for businesses themselves and for local infrastructure including roads, reducing the potential for disruption from flood events in future.

7.5.5 Mitigation
Mitigation to manage the potential impacts associated with the Proposed Development on socio-economics may include:

- Environmental mitigation to reduce e.g. noise and traffic disruption (see relevant sections of this Scoping Report).
- Engagement with local businesses to plan works to reduce impacts as far as reasonably practicable (e.g. consideration of working hours).
- Engagement with local colleges and training providers and preparation of a Skills and Employment Plan to enhance the potential benefits associated with employment and training opportunities during construction.

7.6 Health

7.6.1 Introduction
This chapter outlines the baseline, potential impacts and mitigation arising from the construction, and operation of the Proposed Development on the health of the local population.

7.6.2 Study area
The study area would be the wards within 500m of the Proposed Development, in addition to Bristol as a whole as flood reduction benefits would be experienced at this scale.

7.6.3 Baseline conditions

Health profiles produced by the Office for Health Improvement and Disparities (OHID) provide baseline data on the health of people within the local area, compared to the average values for all areas of England.

The average life expectancy at birth for people living in Bristol is 78.5 for men and 82.7 for women. This compares to 79.4 (men) and 83.1 (women) across England. The health life expectancy at birth is considerably lower at 59.8 for men and 61.5 for women (compared to 63.1 for men and 63.9 for women across England). This means that both men and women, on average can expect to live for up to 20 years in poor health. The gap in life expectancy between least deprived areas of Bristol and most deprived has risen year on year and stands at approximately 7 years for men and 4 years for women.

Health outcomes for people in Bristol, when compared against the England average show that Bristolians have a significantly higher rate of cancer related deaths, whereas they have a significantly lower rate of deaths from circulatory disease, coronary heart disease and stroke. Deaths from respiratory disease is only slighter higher than the England rate. Obesity is a high priority for Bristol (comparative to across England) with approximately 56% of adults being overweight or obese. However, for 2022/23 67.2% of Bristol adults (age 16+) were physically active[136], which is higher than the national average (63.1%)[137].

The city reports above average rates of common mental health conditions (20.7% compared to 15.5% across England and higher than average suicide rates[138].

7.6.4 Potential impacts

Construction

During construction there are unlikely to be any significant health impacts. Noise and air quality impacts, in addition to any disruption to PRoW would be managed via appropriate management measures such that it is unlikely to result in any construction health impacts.

Operation

Potential impacts from flooding include increased rates of anxiety, depression and post-traumatic stress disorder. There may also be increased levels of illness for people whose property is flooded (predominantly residential but also business properties). Flooding is also a risk to life. Where flood risk is reduced, once the Proposed Development is complete, the impact is therefore likely to be reduced levels of adverse health outcomes.

Where flood defences incorporate improved access to green space and/or active travel provision, health benefits are likely to be experienced.

7.6.5 Mitigation

The Proposed Development intrinsically provides mitigation for the adverse health outcomes resulting from flooding. Additional mitigation will include the implementation of the appropriate management plans to manage health risks from any noise, air or access disruption impacts. Enhancement mitigation may include integration of flood management options with improved PRoW provision, or enhanced open/green space.

8. Summary and Next Steps

This Draft EIA Scoping Report has considered the potential impact of the Proposed Development on receptors and the surrounding environment, informed by the design details available at the OBC stage. Based on the findings of the environmental appraisal at this stage, Table 8-1 outlines the topics likely to be scoped in or out of the Environmental Statement.

Table 8-1: Proposed scope of the EIA Scoping Report for FBC

Topic	Scoped in or out	Comments / Justification
Cultural heritage	Scoped in	A cultural heritage assessment is likely to be scoped in due to identified impacts with potential to lead to significant effects to heritage assets and archaeology from the construction and operation of the Proposed Development.
Biodiversity	Scoped in	A biodiversity assessment and HRA is likely to be scoped in due to identified impacts with potential to lead to significant effects to habitats, protected species and designated sites from the construction and operation of the Proposed Development.
Ground conditions and contaminated land	Scoped in	A ground conditions and contaminated land assessment is likely to be scoped in due to identified impacts with potential to lead to significant effects to sensitive receptors from the construction of the Proposed Development.
Townscape and visual impact	Scoped in	A townscape and visual assessment is likely to be scoped in due to identified impacts with potential to lead to significant effects to sensitive receptors from the construction and operation of the Proposed Development.
Water environment and flood risk	Scoped in	A water environment and flood risk assessment is likely to be scoped in due to identified impacts with potential to lead to significant effects to sensitive receptors from the construction and operation of the Proposed Development.
Air quality	Further assessment required to determine potential significant effects and likelihood to scope in / out of the Environmental Statement.	A construction air quality assessment is likely to be scoped in based on the construction activities and likely impacts with potential to lead to significant effects due to changes of movements on the transportation network and to sources of pollution (e.g. construction dust). Operational air quality assessment may not be required as operational activities from the Proposed Development are not likely to give rise to significant effects.
Noise and vibration		A construction noise and vibration assessment is likely to be scoped in due to identified impacts with potential to lead to significant effects from the construction of the Proposed Development. An operational noise assessment may not be required as operational activities from the Proposed Development are not likely to give rise to significant effects. An operational vibration is not likely to be required as vibration is unlikely to occur during operation.
Traffic and transport		A construction traffic and transportation assessment is likely to be scoped in due to identified impacts with

Topic	Scoped in or out	Comments / Justification
		potential to lead to significant effects from the construction of the Proposed Development. It is yet to be determined whether an operational transport assessment would be required subject to further design details.
Climate and greenhouse gases		A greenhouse gas assessment is likely to be scoped in due to identified impacts with potential to lead to significant effects to global environment from the construction and operation of the Proposed Development. A climate change resilience assessment and in-combination climate change assessment are also likely to be scoped in due to identified impacts associated with the Proposed Development.
Socio-economics		A socio-economics assessment is likely to be scoped in due to identified impacts with potential to lead to significant effects to sensitive receptors from the construction and operation of the Proposed Development.
Health		A health and community assessment is likely to be scoped in due to identified impacts with potential to lead to significant effects to sensitive receptors from the construction and operation of the Proposed Development.
Cumulative effects assessment		Cumulative effects assessment is considered likely to be scoped in to the EIA due to interactions with other developments. A review of committed developments should be undertaken as part of the baseline data gathering at FBC for confirmation.
Major accidents and disasters		Major accidents and disasters are likely to be scoped out due to measures put in place during construction, and the reduced risk of flooding during operation.
Heat and radiation		Due to the nature and scale of the Proposed Development, no heat and radiation effects are foreseen, therefore, this factor has been scoped out at OBC and will be considered further at FBC.
Transboundary effects		Due to the nature and scale of the Proposed Development, no transboundary effects are foreseen, therefore, this factor has been scoped out at OBC and will be considered further at FBC.

All topics will need to further examine which aspects to scope in and out of the EIA at FBC informed by further design evolution, site surveys, baseline data gathering, and establishment of detailed assessment methodology. Stakeholder engagement with relevant stakeholders will be undertaken in FBC and the input used to shape and agree the scope and methodology of the EIA.

All topics set out in this report were and will continue to be involved in iterative design developments in FBC. They will help to shape the evolution of the Proposed Development's design to ensure the impacts on sensitive receptors and the surrounding environment are minimised, as far as possible, through design measures.

The latest design and baseline information will be used to update and revise this EIA Scoping Report which will then be submitted, in FBC, to the relevant statutory body for consideration alongside a request for a Scoping Opinion. This will inform the requirements of the Environmental Statement.

The following documents are likely to be required as part of the planning application in order to manage potential environmental effects arising from the proposed development:

- Draft Construction Environmental Management Plan (CEMP) – this will set out a series of proposed measures and standards to be applied throughout the construction period to provide effective planning, management and control of potential impacts upon people, businesses and the natural and historic environment;
- A landscape management plan specifying the protection, enhancement and treatment of landscaped areas (including for specific habitats where required) and setting out how the landscaping areas will be managed throughout the phasing of construction and operation of the proposed development;
- Transport Assessment;
- Flood Risk Assessment;
- Biodiversity Management Plan;
- Habitat Regulation Assessment;
- A WER assessment; and
- An arboricultural assessment.

Glossary and abbreviations

Term	Description
AAD	Average Annual Damage
AQMA	Air Quality Management Area
ARN	Affected Road Network
AWTR	Avon Wildlife Trust Reserves
BANES	Bath and North East Somerset Council
BCC	Bristol City Council
BGS	British Geological Survey
BRERC	Bristol Regional Environmental Records Centre
BRERC	Bristol Regional Environmental Records Centre
BS	British Standards
BWNS	Bristol Wildlife Network Sites
CEMP	Construction Environmental Management Plan
CIEEM	Charted Institute of Ecology and Environmental Management
CIRIA	Construction Industry Research and Information Association
CMLI	Chartered Member of the Landscape Institute
DBA	Doctor of Business Administration
Detailed design	Design which the principles of the proposed development have been fully developed to define the scale, materials, appearance and landscaping.
DMRB	Design Manual for Roads and Bridges
EIA Regulations	Town and Country Planning (Environmental Impact Assessment) Regulations 2017
ELC	European Landscape Convention
Environmental Impact Assessment (EIA)	The process of evaluating the likely environmental impacts of a proposed development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.
Environmental Statement	Presents the findings of the Environmental Impact Assessment undertaken for the proposed development in accordance with the EIA Regulations and will be submitted in support of the planning application.
FBC	Full Business Case
FHRC	Flood Hazard Research Centre
FRM	Flood Risk Management
GLVIA3	Guidelines for Landscape and Visual Impact Assessment Third Edition
GWDTW	Groundwater Dependent Terrestrial Ecosystem

Term	Description
HER	Historic Environmental Record
HPI	Habitats of Principal Importance
Hybrid Planning Application	An application that comprises part outline and part detailed planning application for the proposed development.
IEMA	Institute of Environmental Management and Assessment
LI	Landscape Institute
LNR	Local Nature Reserve
LWS	Local Wildlife Sites
MAGIC	The Multi-Agency Geographic Information for the Countryside
MCM	Multi Coloured Manual
NCA	National Character Area
NERC	National Environment and Rural Communities
NHLE	National Heritage List for England
NIAs	Noise Important Areas
NNR	National Nature Reserves
NO_2	Nitrogen Dioxide
NPPF	National Planning Policy Framework
NRD	National Receptor Dataset
NRMM	Non-Road Mobile Machinery
Outline design	Outline design established the scale and nature of a proposed development before fully detailed proposals are put forward.
Proposed Development	All works which consent is being sought for as part of the planning application, including works at Downstream defences, City Centre defences and Upstream defences.
PRoW	Public Right of Way
PSP	Polices, Sites and Places
RVEI	Road Verges of Ecological Importance
SAC	Special Areas of Conservation
Scoping Opinion	This is a formal opinion given by the Determining/Local Planning Authority setting out the information for inclusion in the Environmental Statement.
Scoping Report	This is a formal report issued by the applicant setting out the information for inclusion in the Environmental Statement in advance of the Scoping Opinion from the Determining/Local Planning Authority.
SEA	Strategic Environmental Assessment
SGC	South Gloucestershire Council
SNAs	Strategic Nature Areas
SNCIs	Sites of Nature Conservation Importance
SPA	Special Protection Areas

Term	Description
SPZ	Source Protection Zones
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Urban Drainage System
TFRMS	Tidal Flood Risk Management Strategy
The Applicant	Bristol City Council
TVIA	Townscape Visual Impact Assessment
UXO	Unexploded Ordnance
WFD	Water Framework Directive
ZTV	Zone of Theoretical Visibility

Appendix A: Outline Heritage Desk-Based Assessment

Appendix B: Preliminary Ecological Appraisal

Appendix C: Biodiversity Net Gain Screening

Appendix D: Draft Habitats Regulation Assessment Stage 1 and 2

Appendix E: Preliminary Water Environment Regulations Compliance Assessment

Appendix F: Preliminary Whole Life Carbon Assessment

Appendix G: Ground Conditions Phase 1 Report

Figures

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