

Environmental Impact Assessment Report

Appendix B10 Water Environment

Grangemouth Flood Protection Scheme 2024
Falkirk Council



GRANGEMOUTH
Flood Protection Scheme
Protecting the heart of our communities

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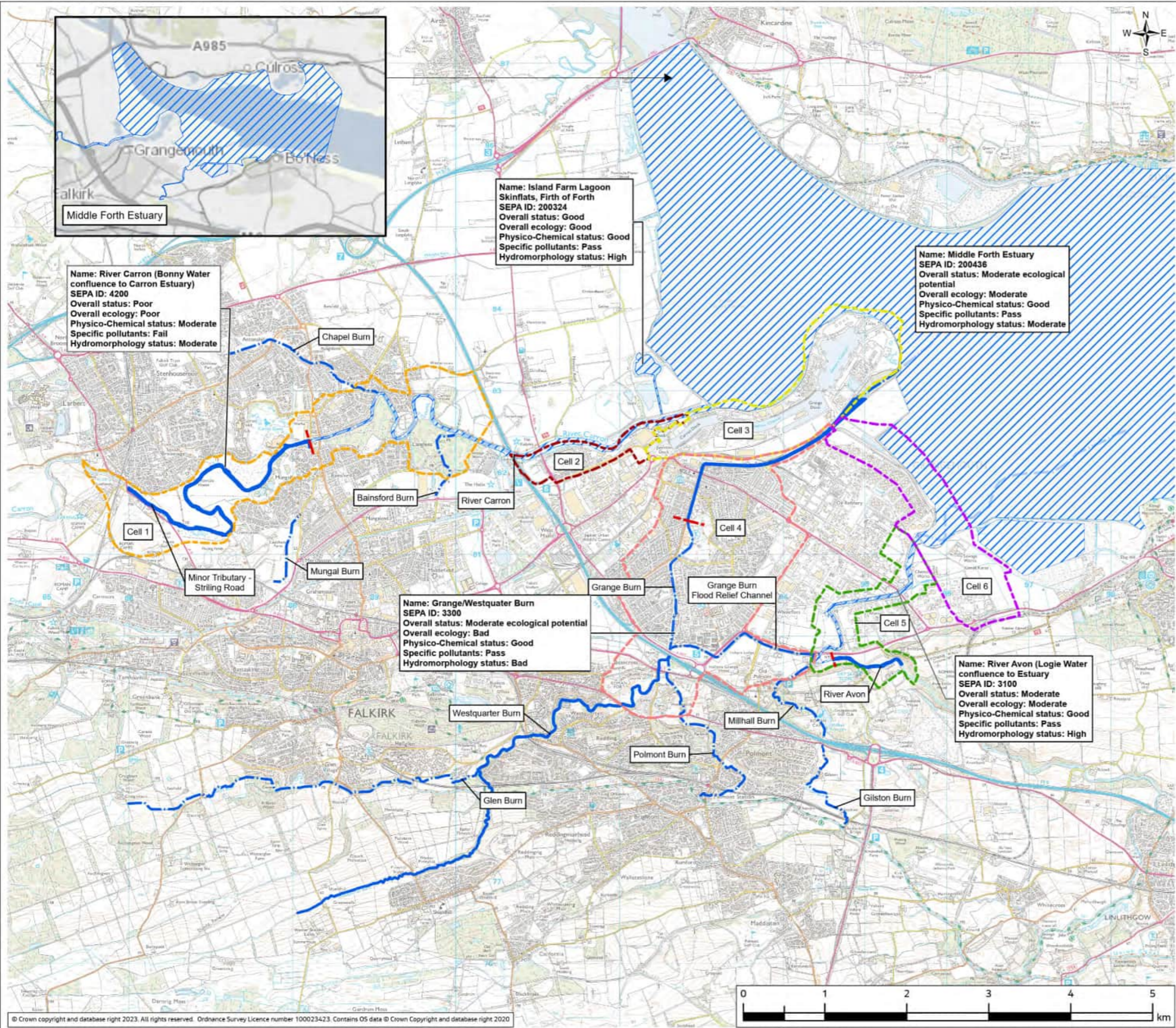
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FIGURE B10.1



Legend

Flood Cell

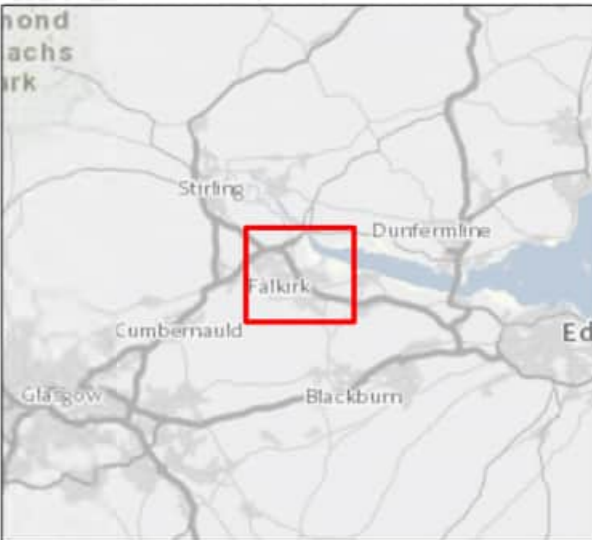
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- 6

Surface Water Features

Tidal Limit

Water Framework Directive Transitional Water

Water Framework Directive Surface Water



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Project

Grangemouth
Flood Protection Scheme

Drawing Title

SURFACE WATER FEATURES

SHEET: 1 OF 1

Drawing Status

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Jacobs No B2386100

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Drawing No. FIGURE B10.1

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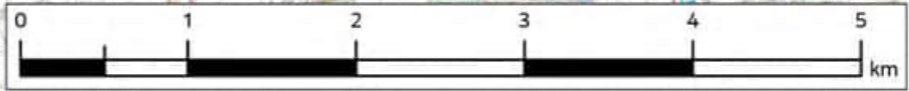
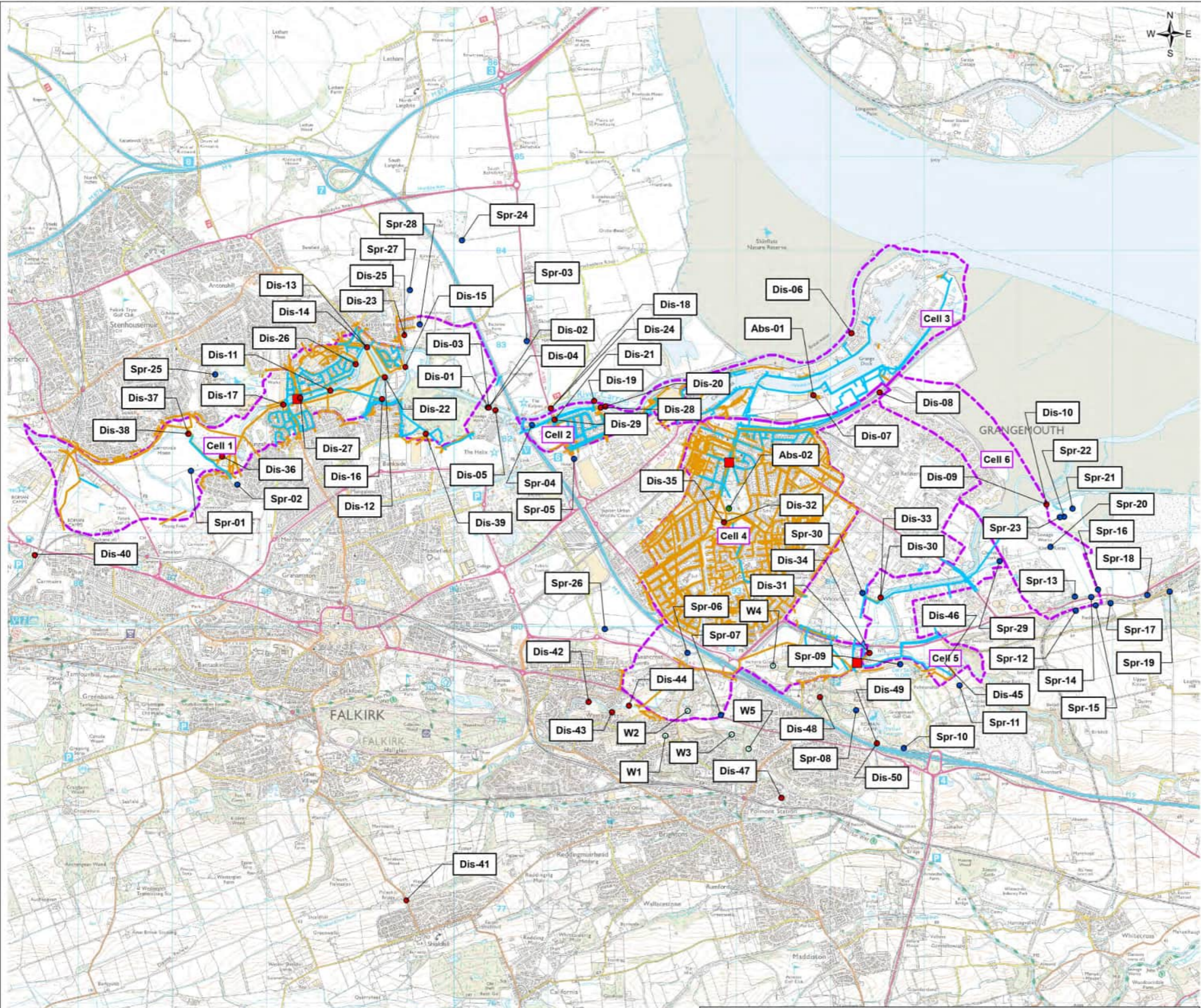


FIGURE B10.2

Legend


- Cell
- New Bridges
- Abstraction Point
- Discharge Point
- Spring
- Well
- Water Main
- Sewer



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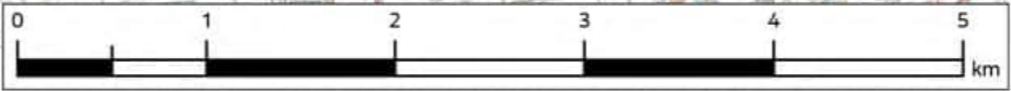
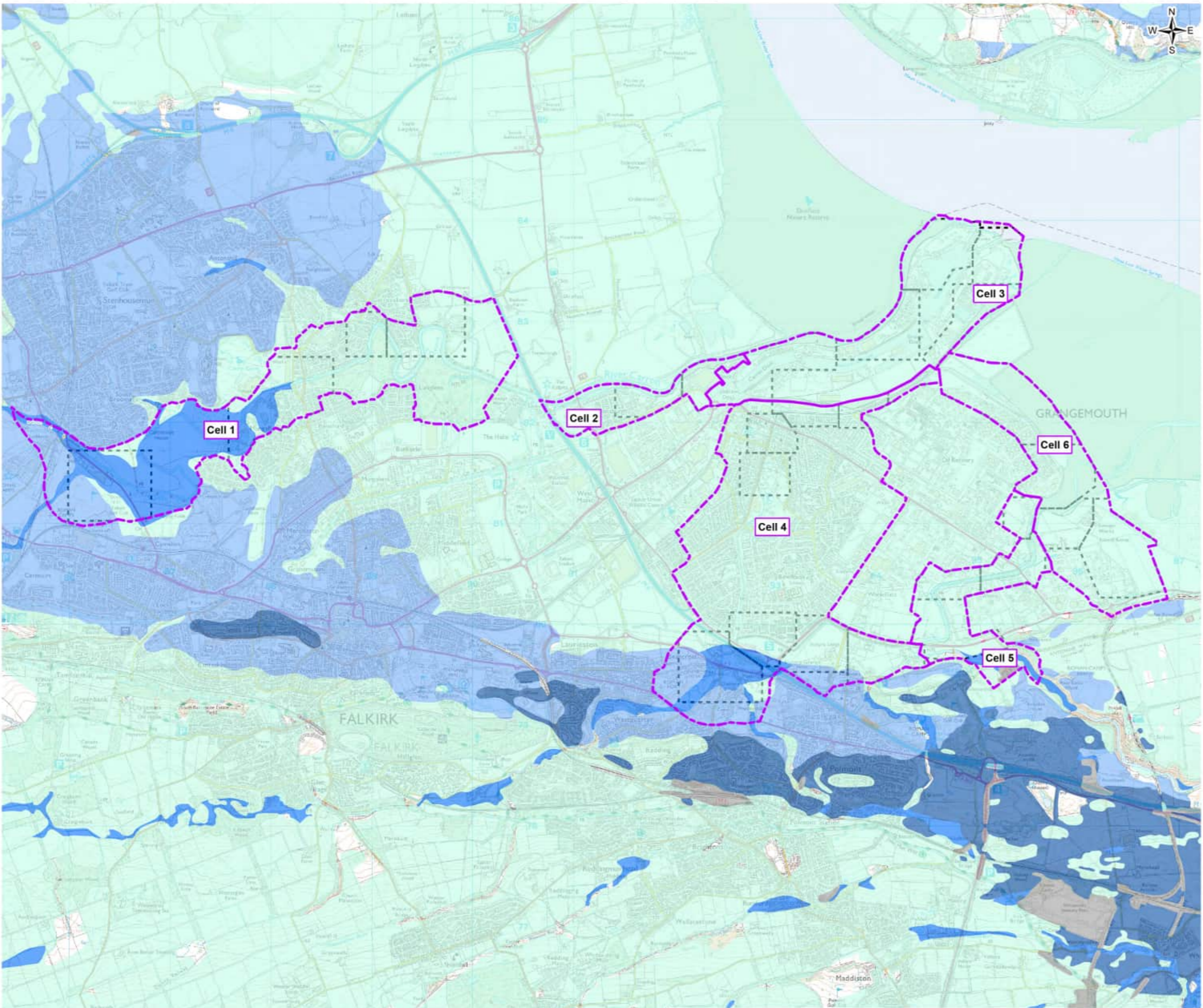
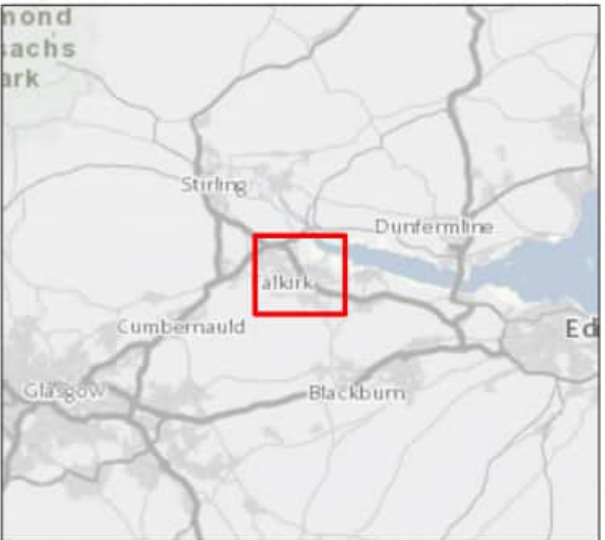


FIGURE B10.3



Legend

- Cell
- Working Area
- BGS Superficial Deposits Aquifer Productivity**
- Intergranular Flow; High Productivity
- Intergranular Flow; Moderate to High Productivity
- Intergranular Flow; Low to Moderate Productivity
- Not a significant aquifer
- Unknown Geology



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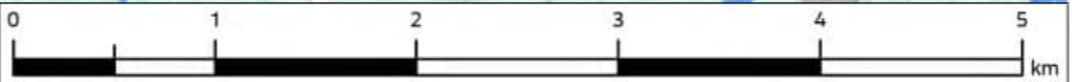





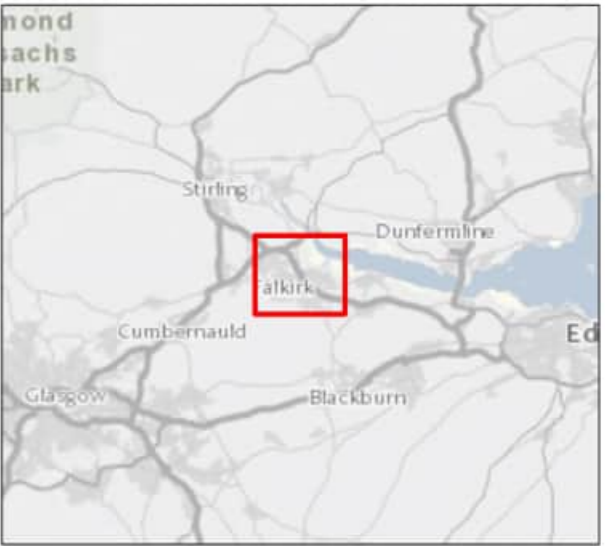
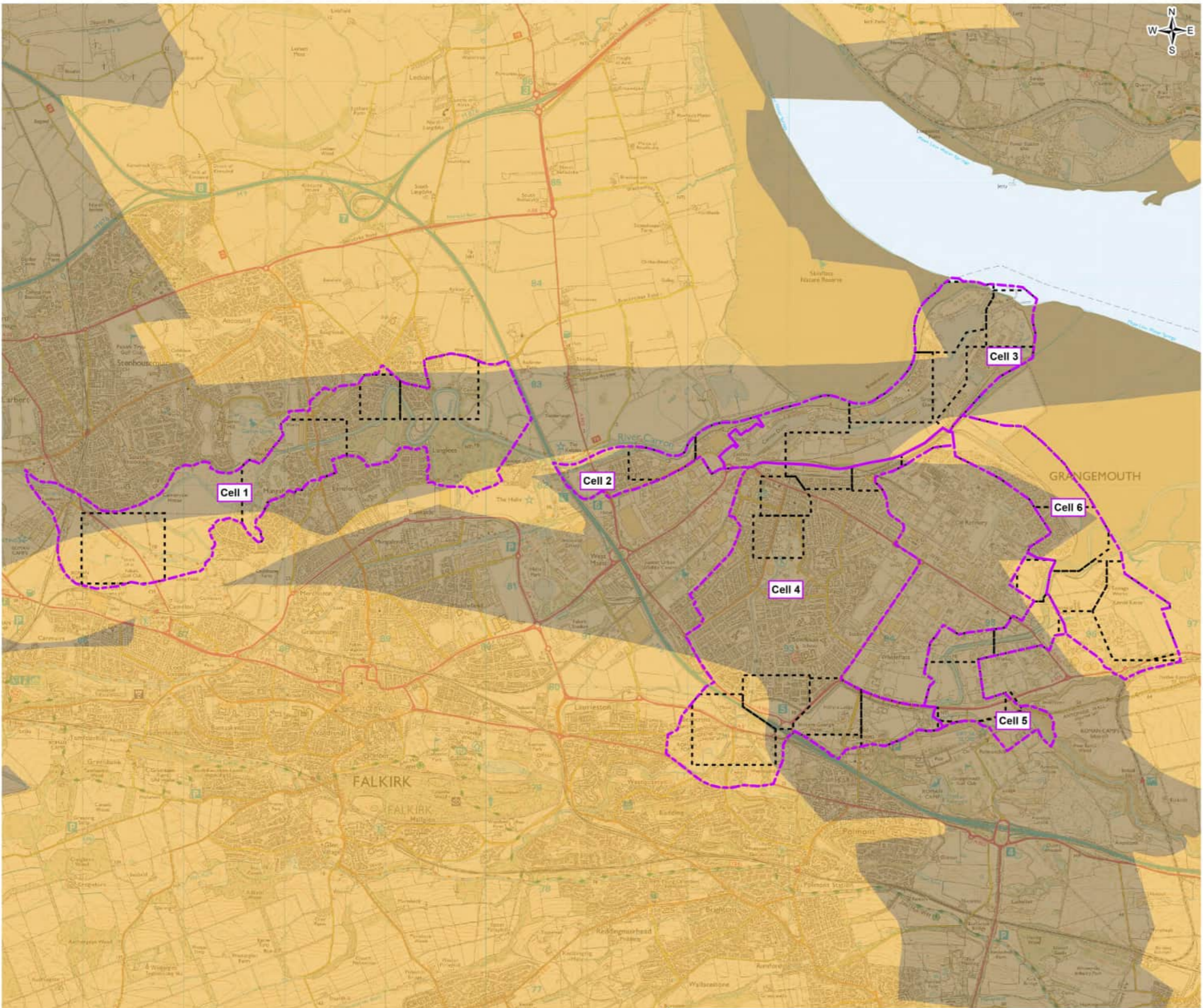


FIGURE B10.4

- Legend**
-  Cell
 -  Working Area
- BGS Bedrock Aquifer**
-  Significantly Intergranular Flow; High Productivity
 -  Intergranular and Fracture Flow; Moderate Productivity
 -  Intergranular and Fracture Flow; Low Productivity




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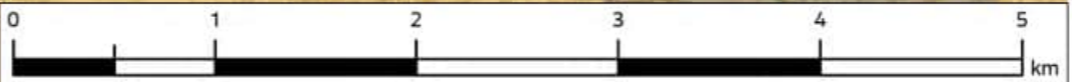
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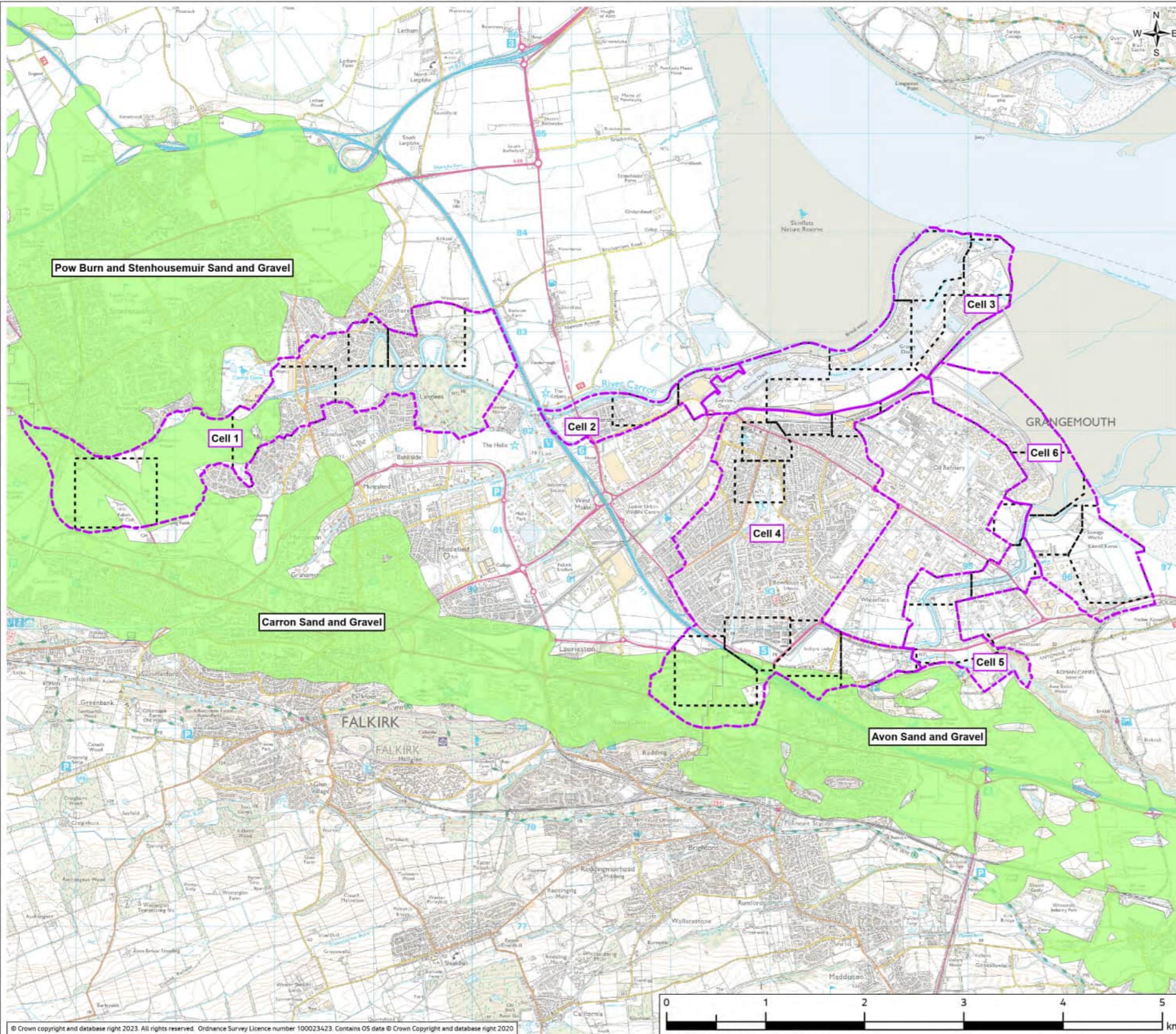


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FIGURE B10.5a

Legend



-  Cell
-  Working Area
- WFD Classification**
-  Good
-  Poor



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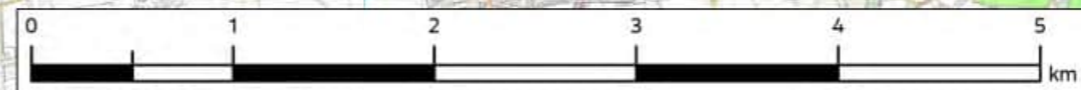
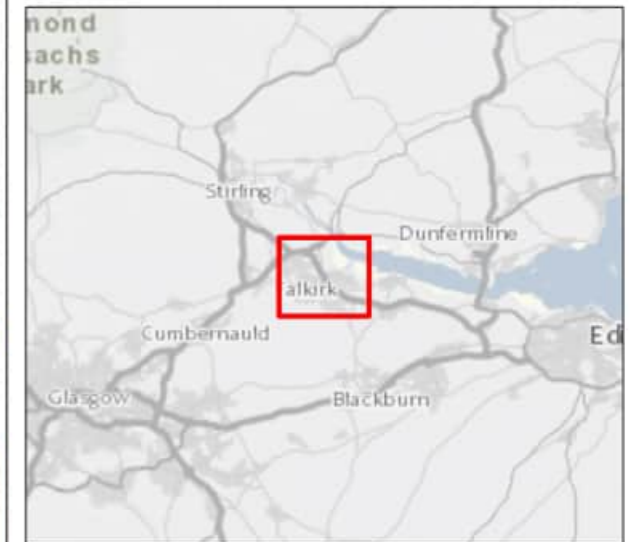
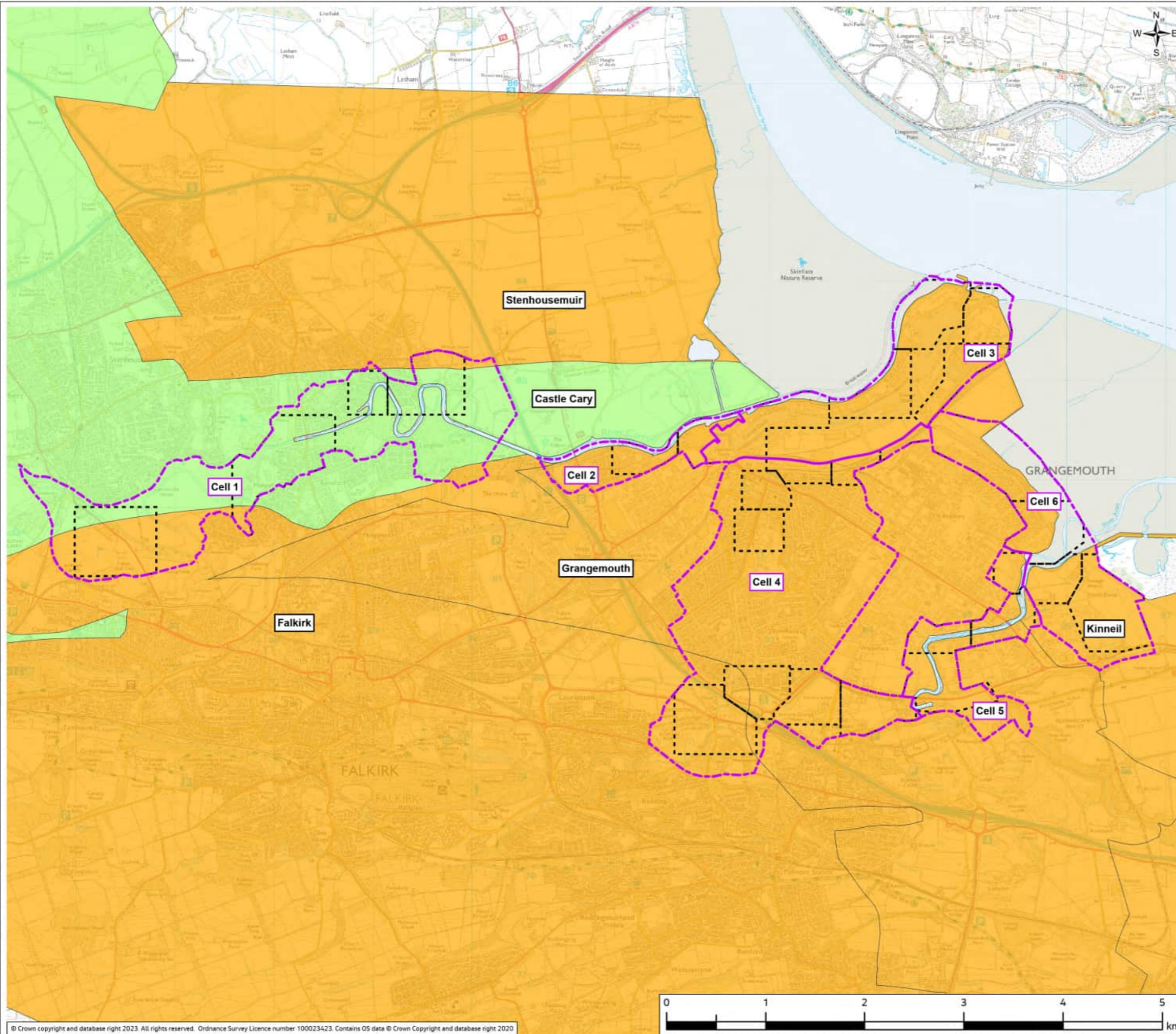


FIGURE B10.5b

Legend



- Cell
- Working Area
- WFD Classification**
- Good
- Poor



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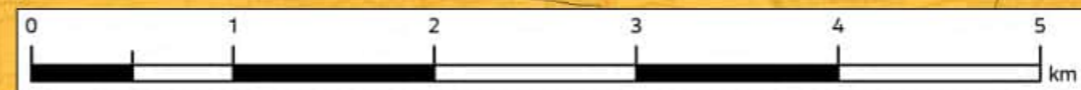
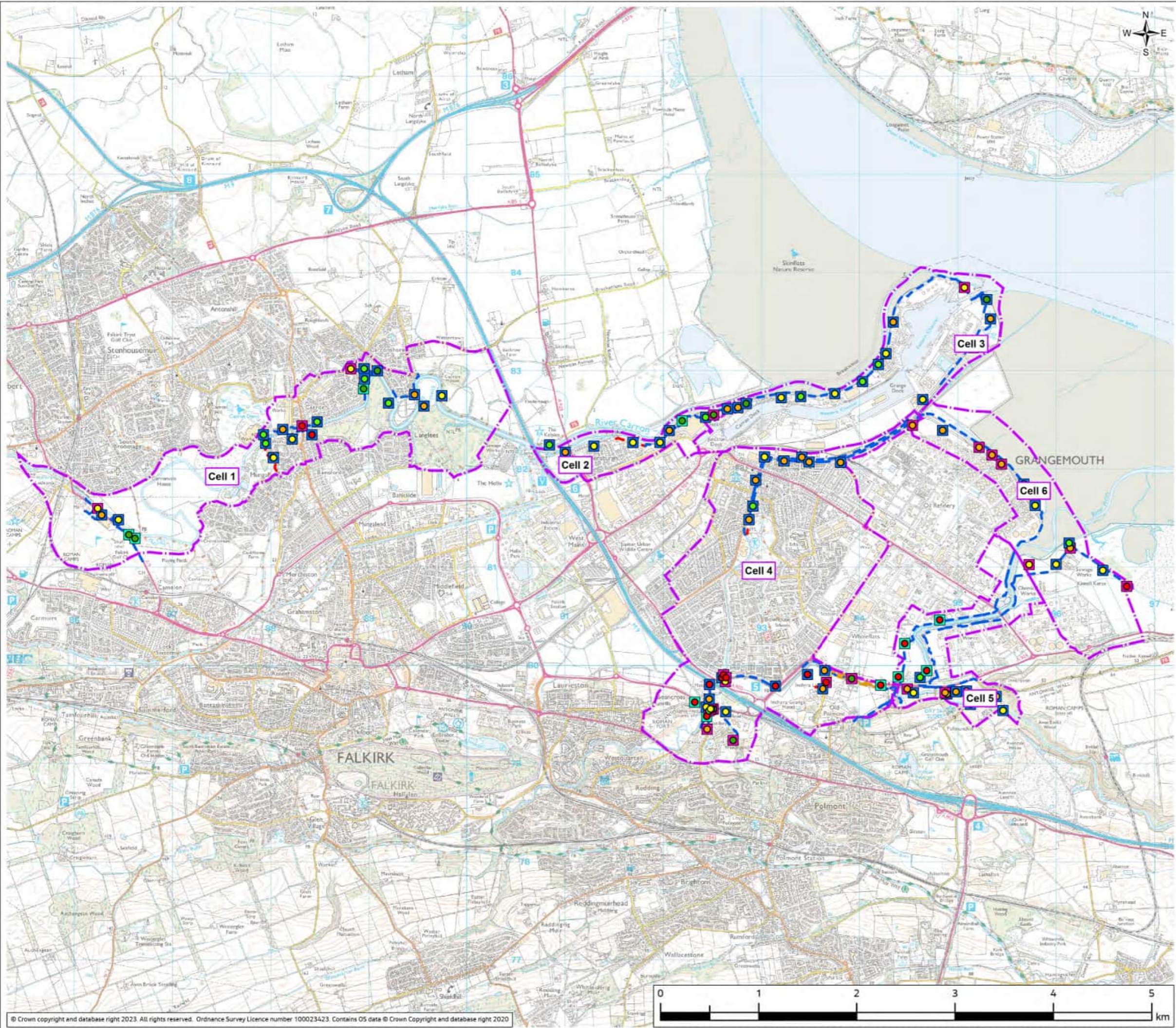


FIGURE B10.6



Legend

- Cell
 - Embankment
 - Ground Raising
 - Wall
- Groundwater Monitoring Data**
- 2.360000 - 0.000000
 - 0.000001 - 1.000000
 - 1.000001 - 2.000000
 - 2.000001 - 3.000000
 - 3.000001 - 17.100000
 - Datalogger
 - Manual
 - Vibrating wire piezometer (VWP)



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Flood Protection Scheme

Drawing Title
GROUNDWATER STRIKE AND MONITORING POINTS
SHEET: 1 OF 1

Drawing Status
SB-SUITABLE FOR STATUTORY CONSENT

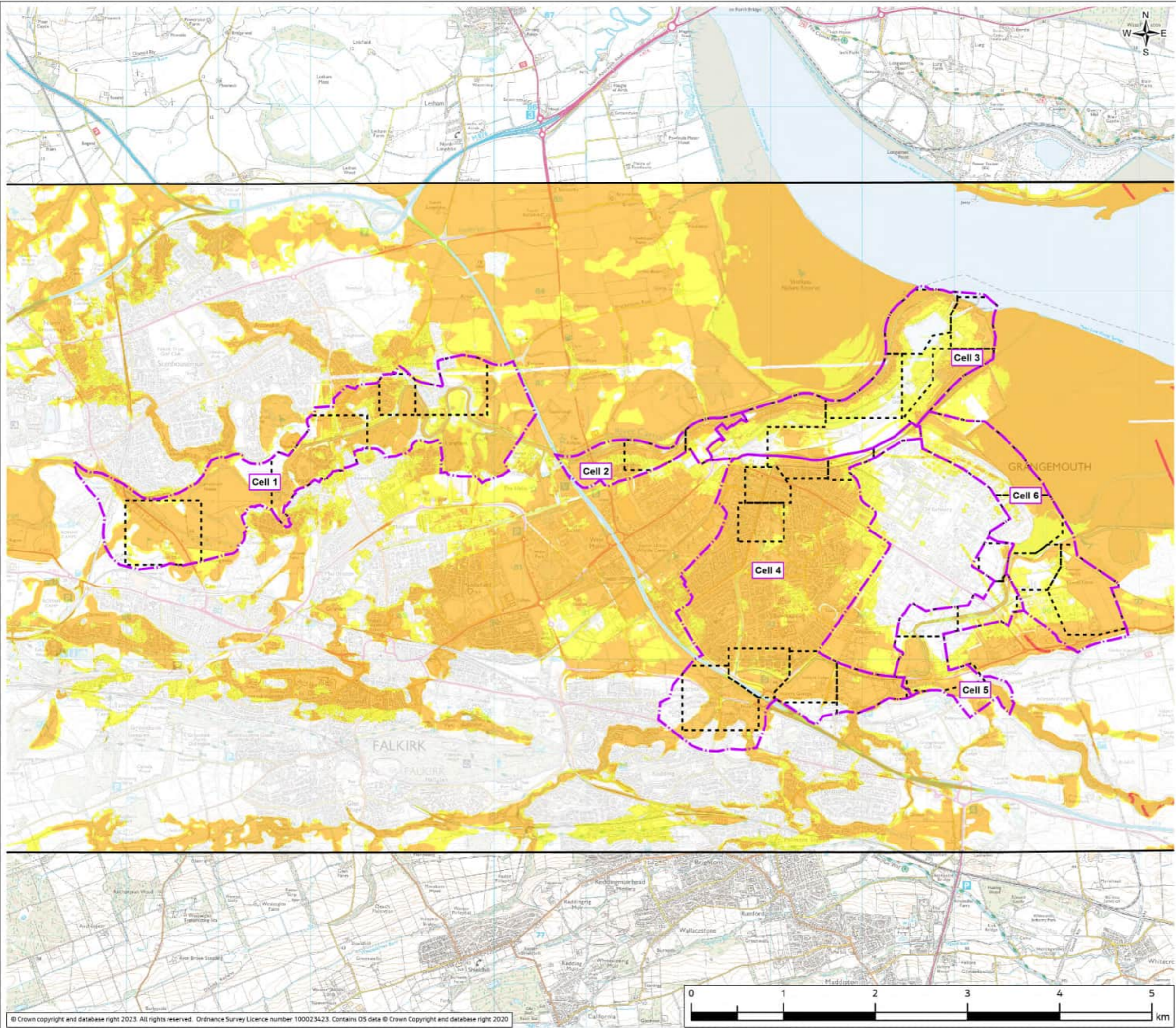
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FIGURE B10.6

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FIGURE B10.7

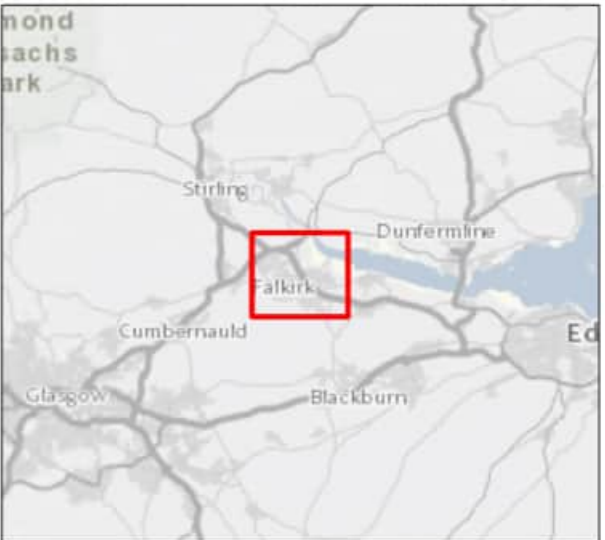


Legend

- Cell
- Working Area
- Data Extent

Groundwater Flooding Risk Class

- High
- Moderate
- Low
- Negligible



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Project: **Grangemouth Flood Protection Scheme**

Drawing Title: **GROUNDWATER FLOODING (GEOSMART)**

SHEET: 1 OF 1

Drawing Status: **S8-SUITABLE FOR STATUTORY CONSENT**

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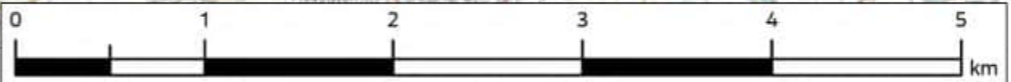


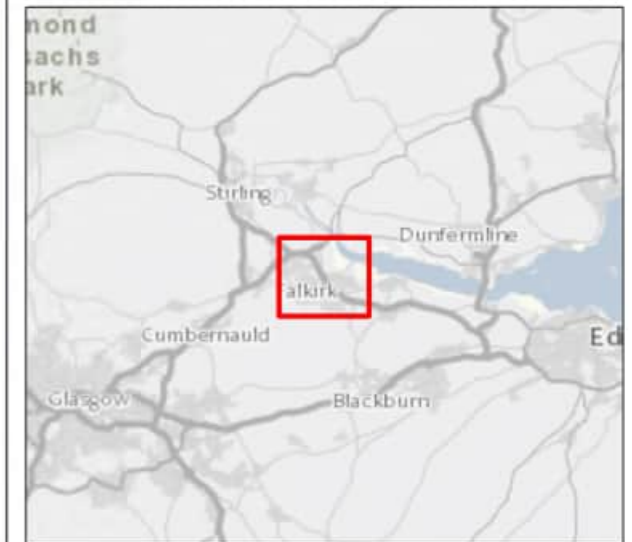
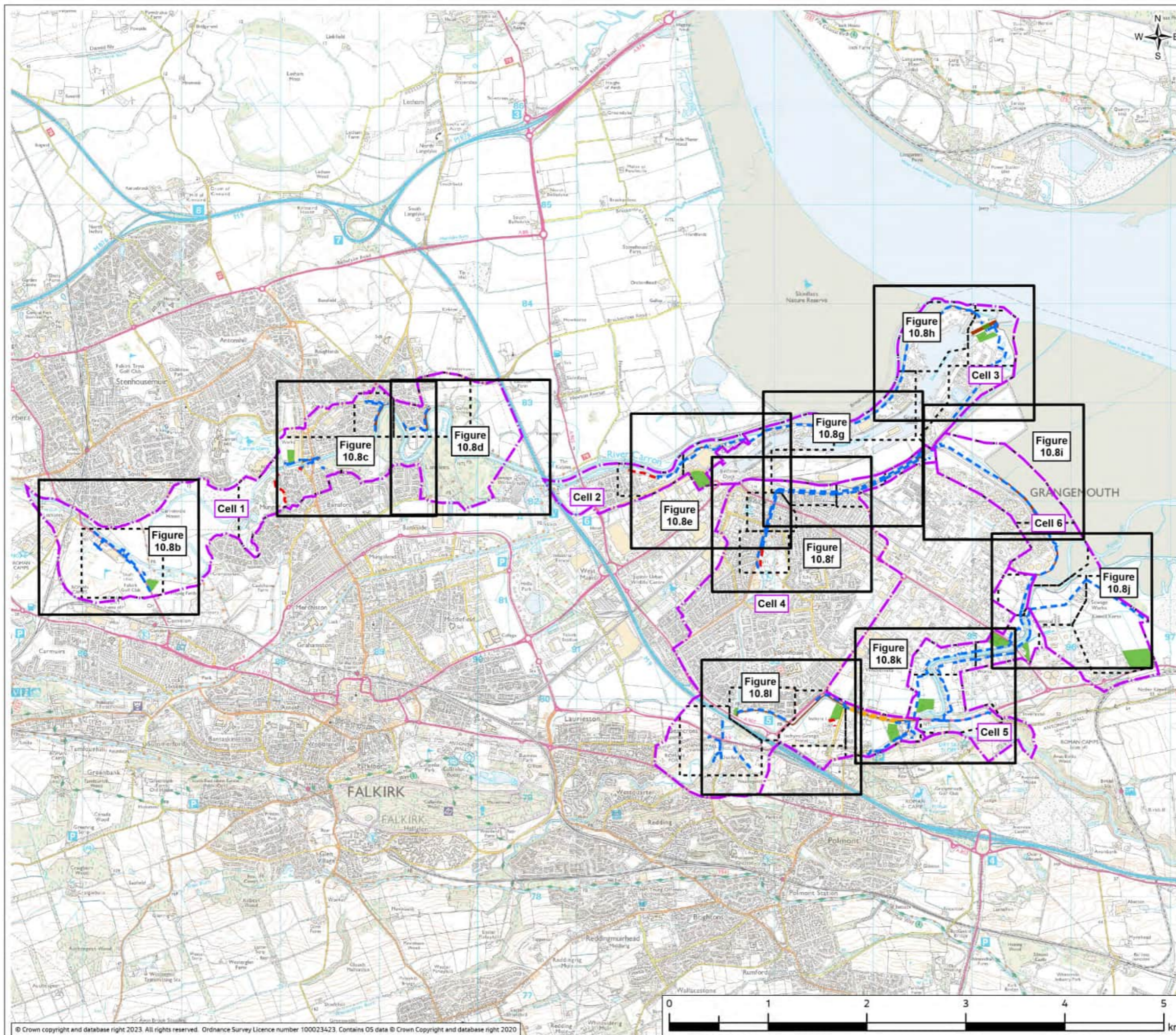
FIGURE B10.8a

Legend

Direct Defences

- Embankment
- Flood Wall
- Ground Rising


- Cell
- Working Area
- Site Compounds
- In-Water Working Area



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Drawing Title	TEMPORARY WORKS
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SHEET: 1 OF 11

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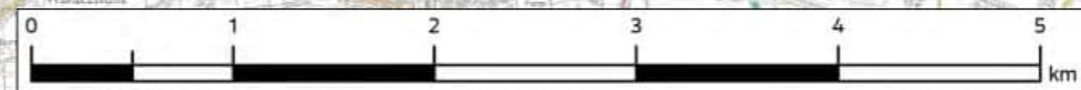
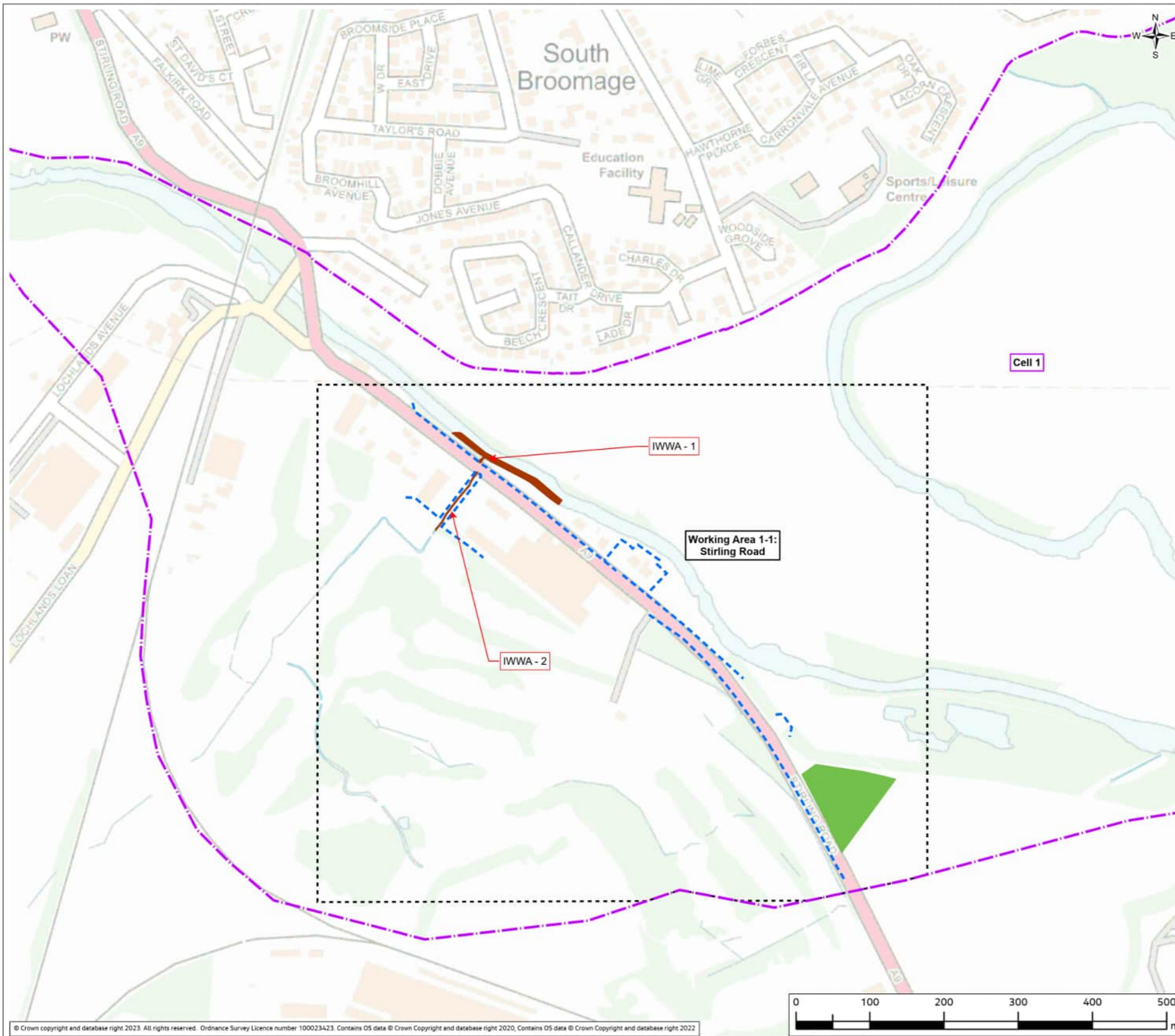


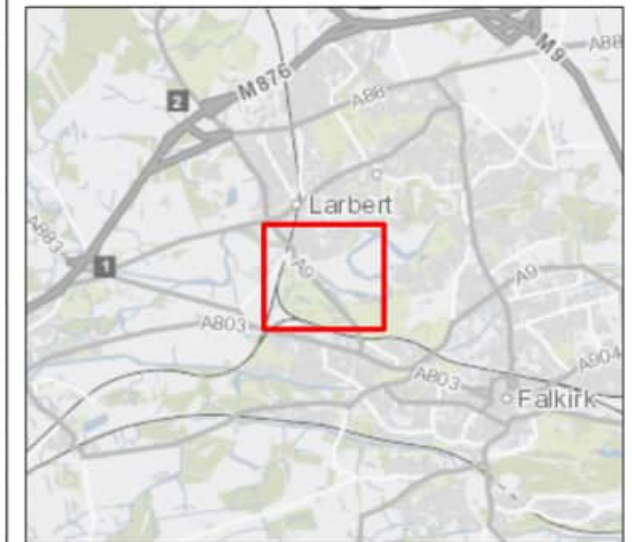
FIGURE B10.8b



Legend

Direct Defences

- - - Embankment
- - - Flood Wall
- - - Ground Rising
- - - Cell
- Working Area
- Site Compounds
- In-Water Working Area



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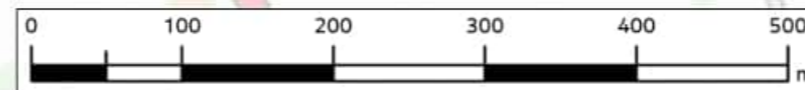
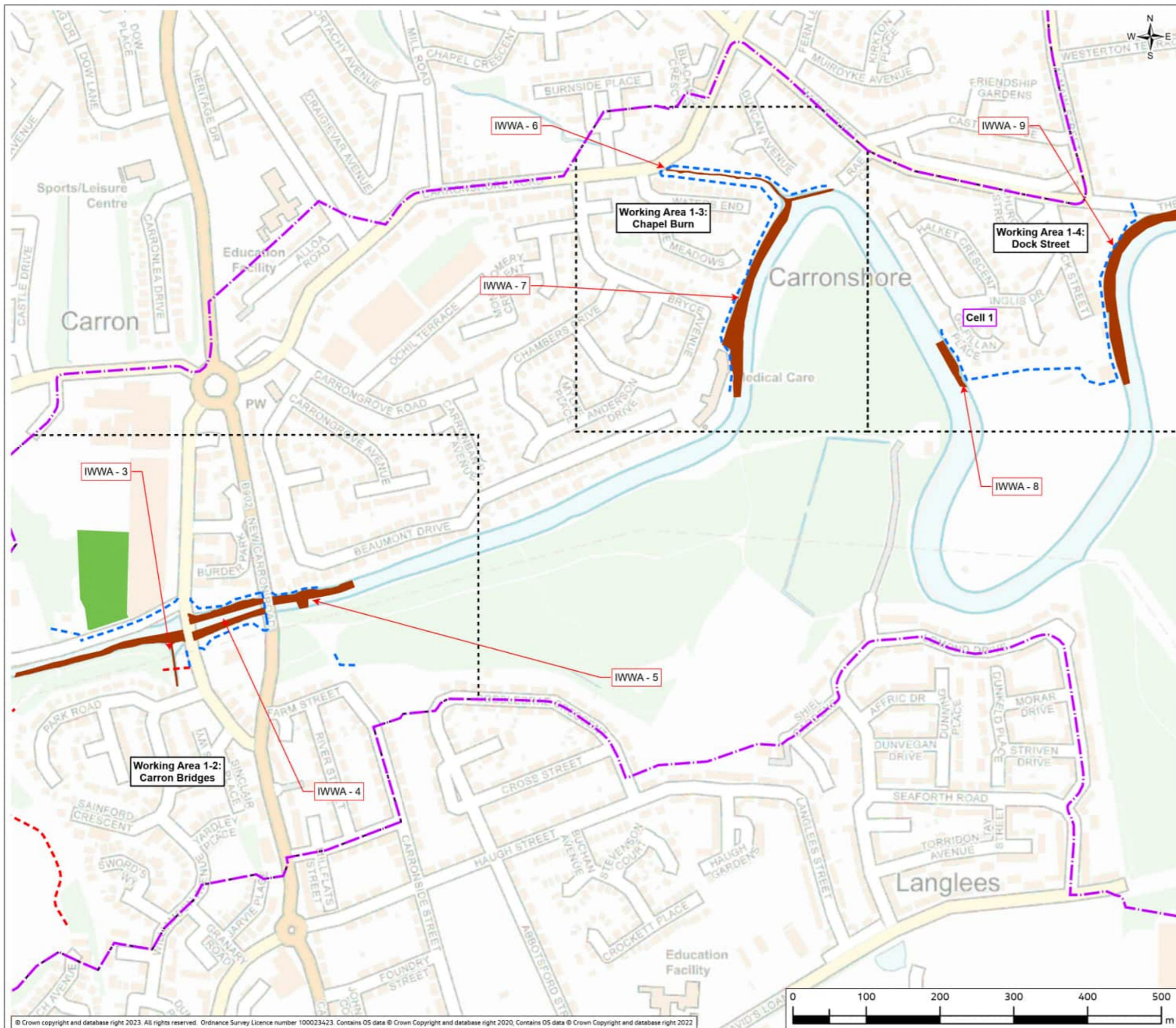


FIGURE B10.8c



Legend

Direct Defences

- - - Embankment
- - - Flood Wall
- - - Ground Rising
- Cell
- Working Area
- Site Compounds
- In-Water Working Area



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Drawing No.	FIGURE B10.8c

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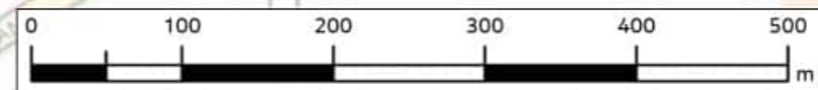
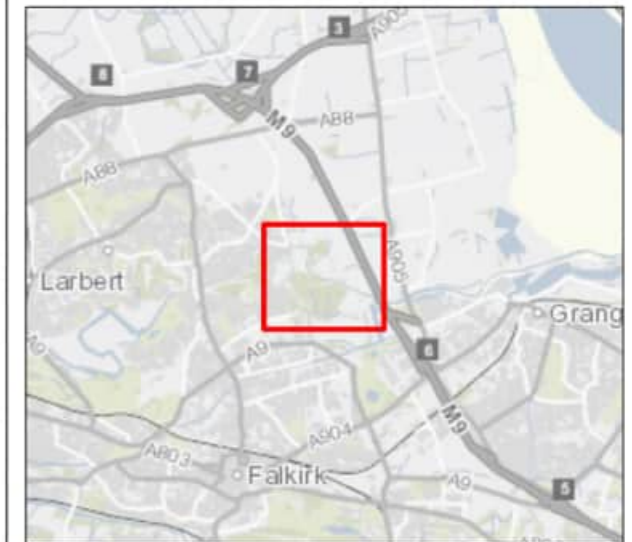


FIGURE B10.8d

Legend

Direct Defences

- - - Embankment
- - - Flood Wall
- - - Ground Rising
- Cell
- Working Area
- Site Compounds
- In-Water Working Area



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Scale @ A3	1:5,000	DO NOT SCALE
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Drawing No.	FIGURE B10.8d
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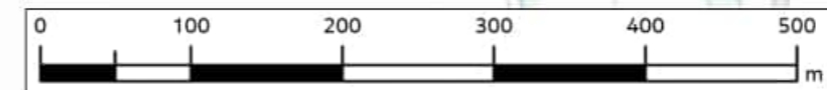
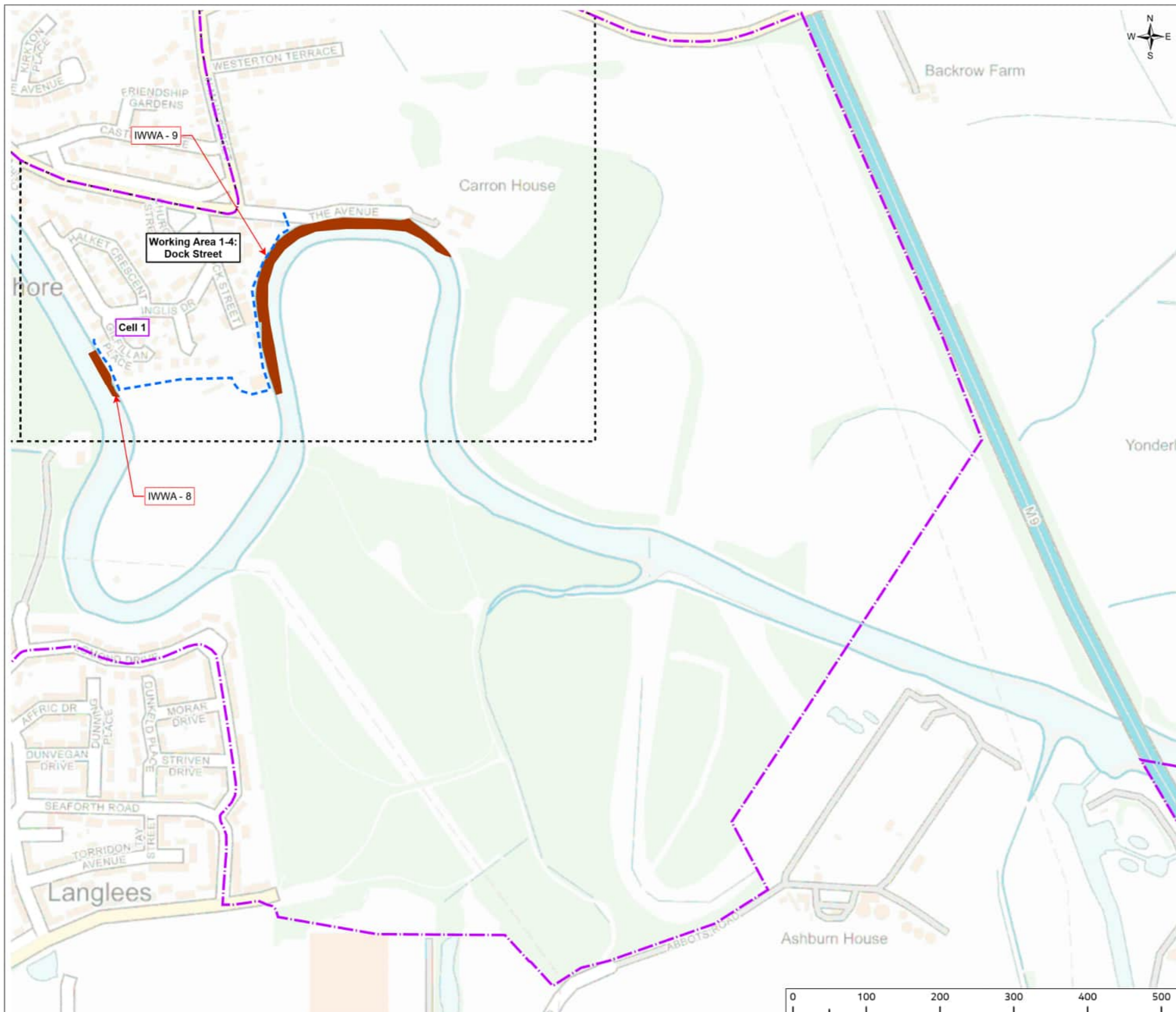
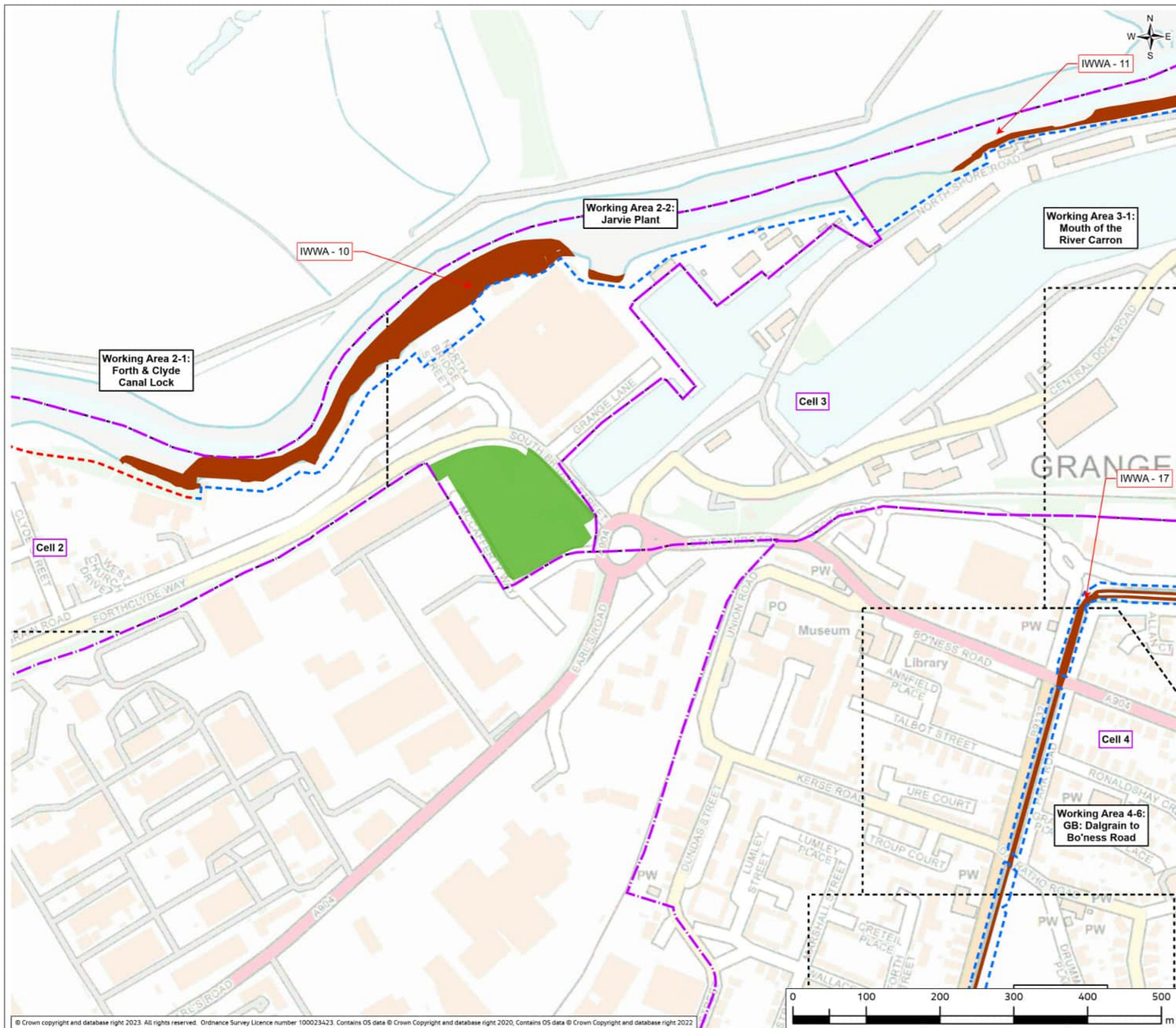


FIGURE B10.8e



Legend

Direct Defences

- - - Embankment
- - - Flood Wall
- - - Ground Rising
- Cell
- Working Area
- Site Compounds
- In-Water Working Area



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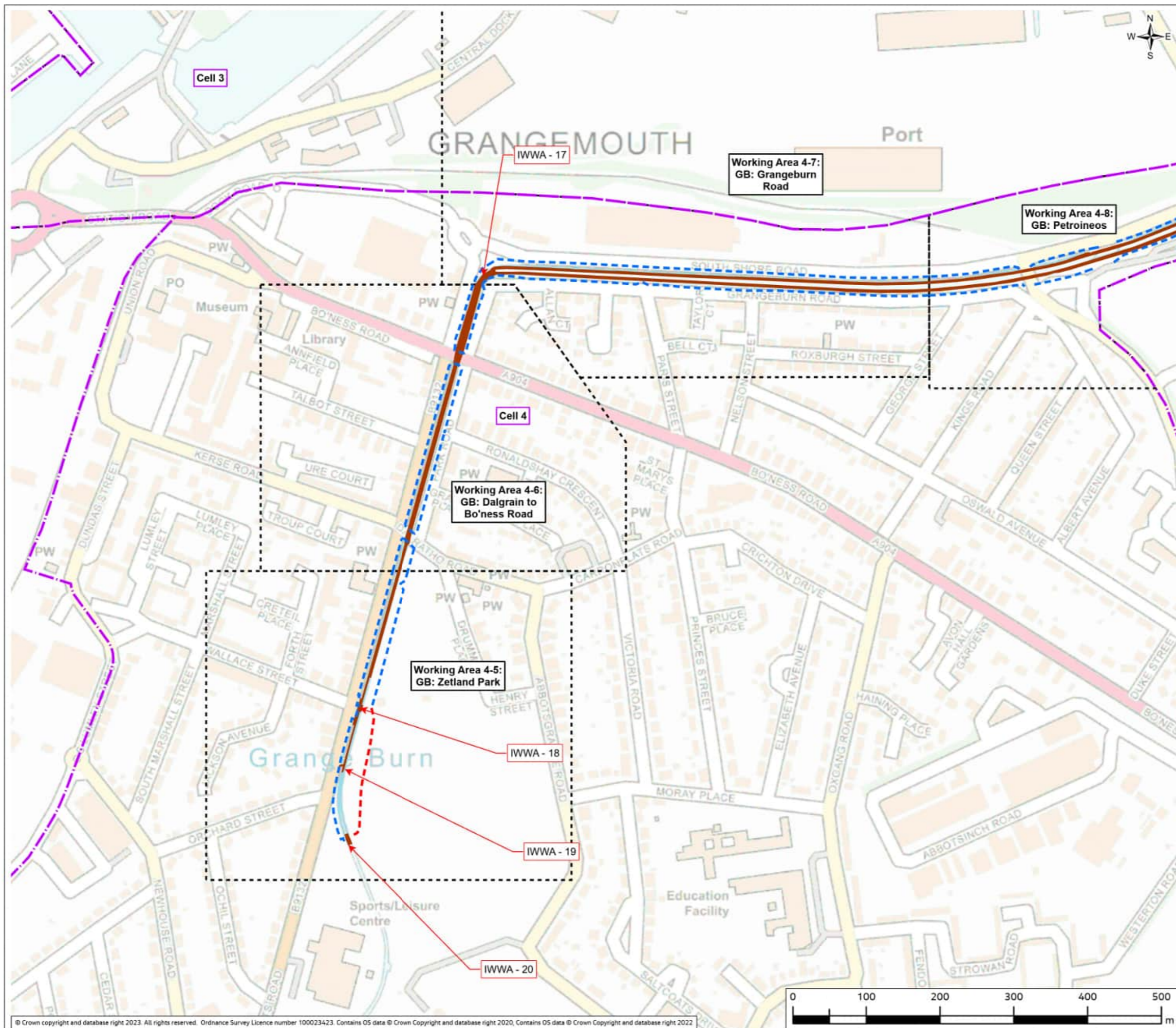
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Drawing No.	FIGURE B10.8e
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FIGURE B10.8f



Legend

Direct Defences

- - - Embankment
- - - Flood Wall
- - - Ground Rising
- Cell
- Working Area
- Site Compounds
- In-Water Working Area



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Scale @ A3	1:5,000	DO NOT SCALE
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Drawing No.	FIGURE B10.8f
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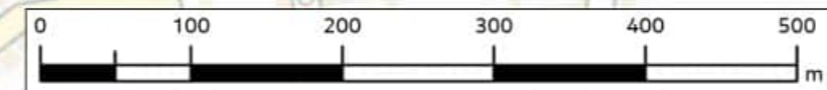
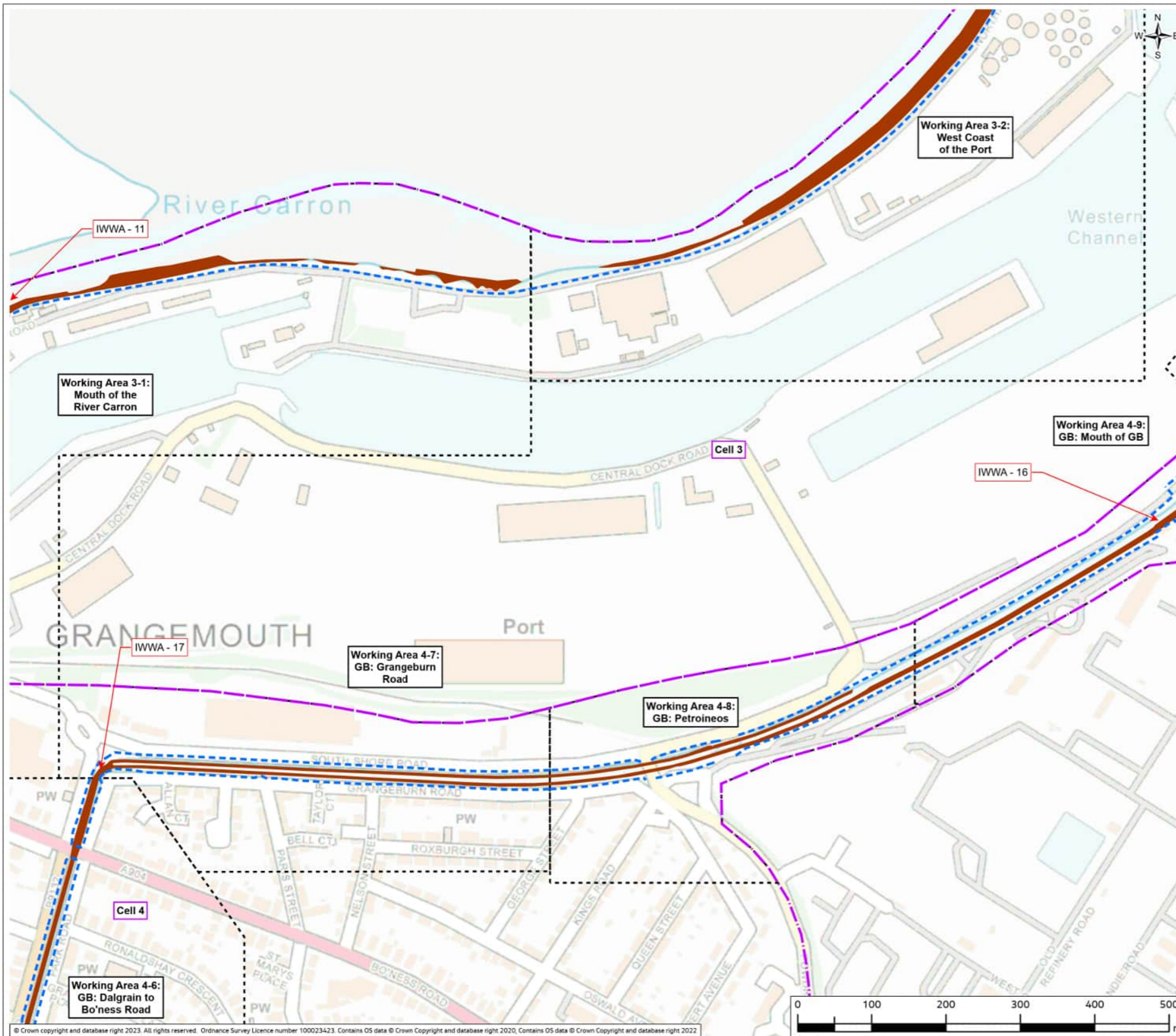


FIGURE B10.8g



Legend

Direct Defences

- - - Embankment
- - - Flood Wall
- - - Ground Rising
- - - Cell
- Working Area
- Site Compounds
- In-Water Working Area



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Drawing No.	FIGURE B10.8g
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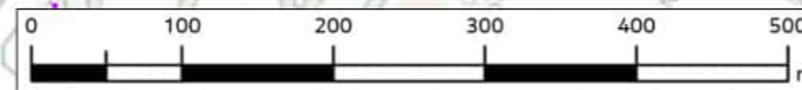
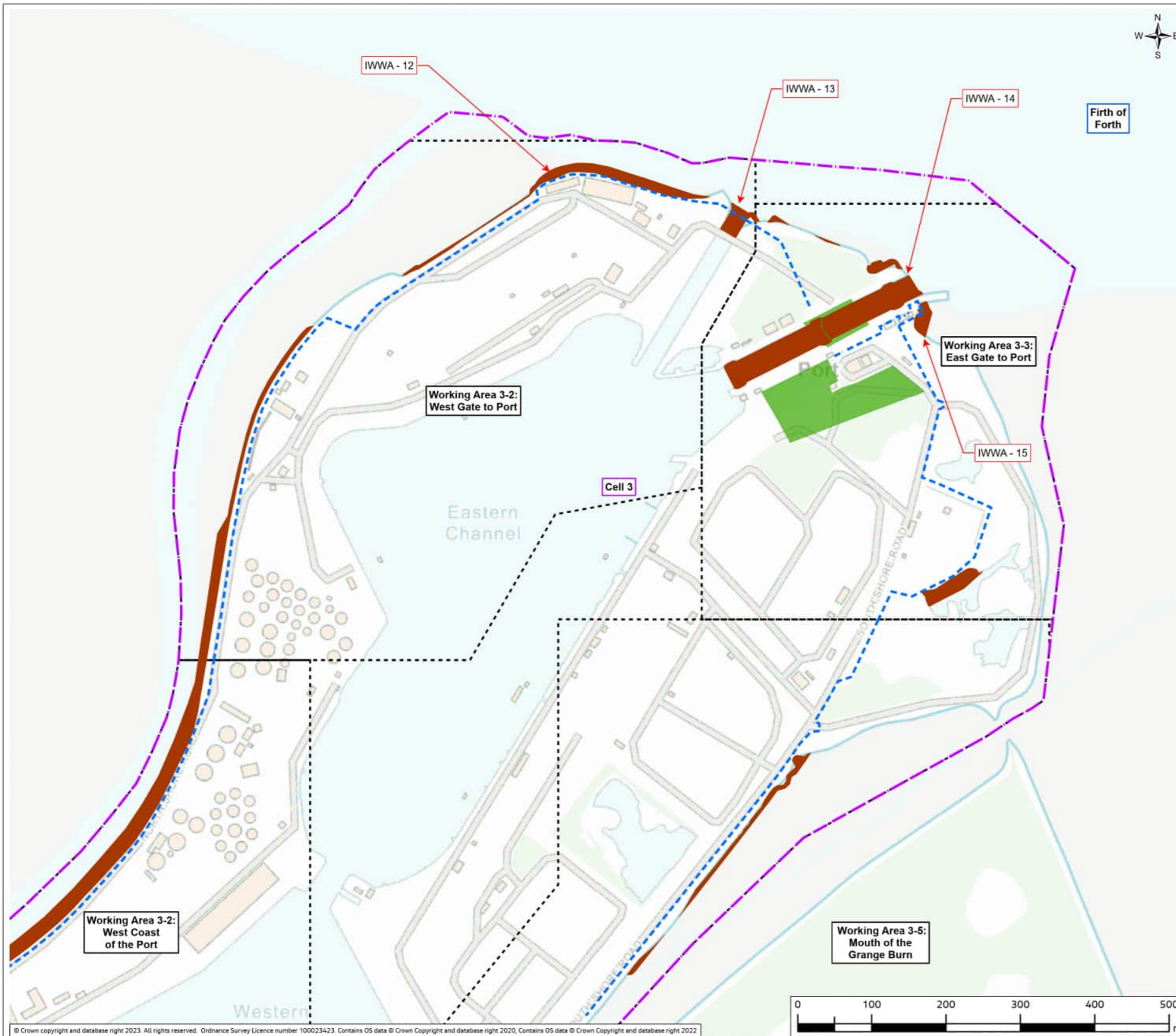


FIGURE B10.8h



Firth of Forth

Legend

Direct Defences

- - - Embankment
- - - Flood Wall
- - - Ground Rising
- Cell
- Working Area
- Site Compounds
- In-Water Working Area



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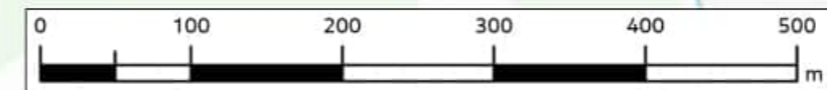
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Drawing No.	FIGURE B10.8h
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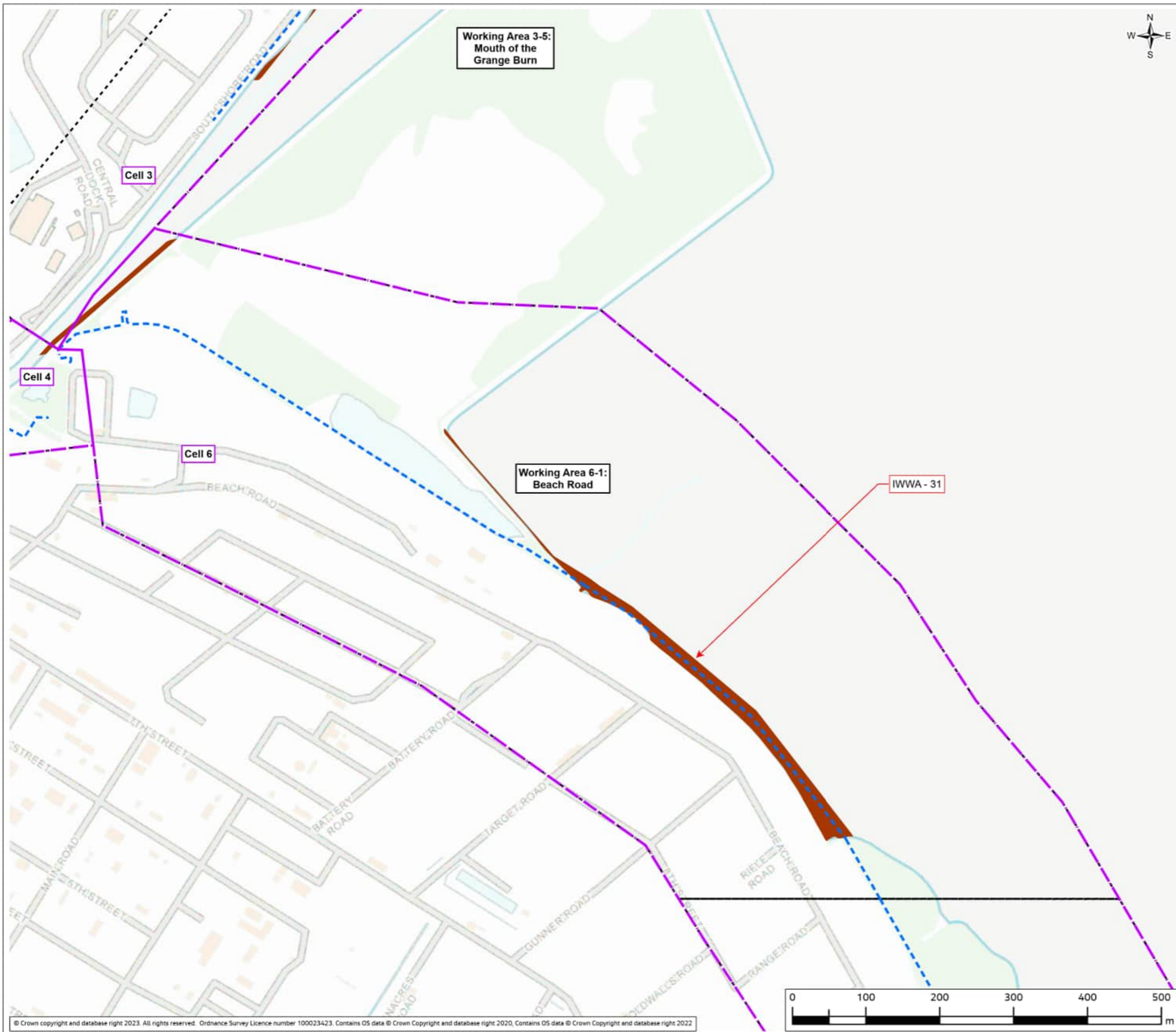


FIGURE B10.8i

- Legend**
- Direct Defences**
 - - - Embankment
 - - - Flood Wall
 - - - Ground Rising
 - Cell
 - - - Working Area
 - Site Compounds
 - In-Water Working Area



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Project: Grangemouth Flood Protection Scheme

Drawing Title: TEMPORARY WORKS

SHEET: 8 OF 11

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Jacobs No: B2386100

Drawing No: FIGURE B10.8i

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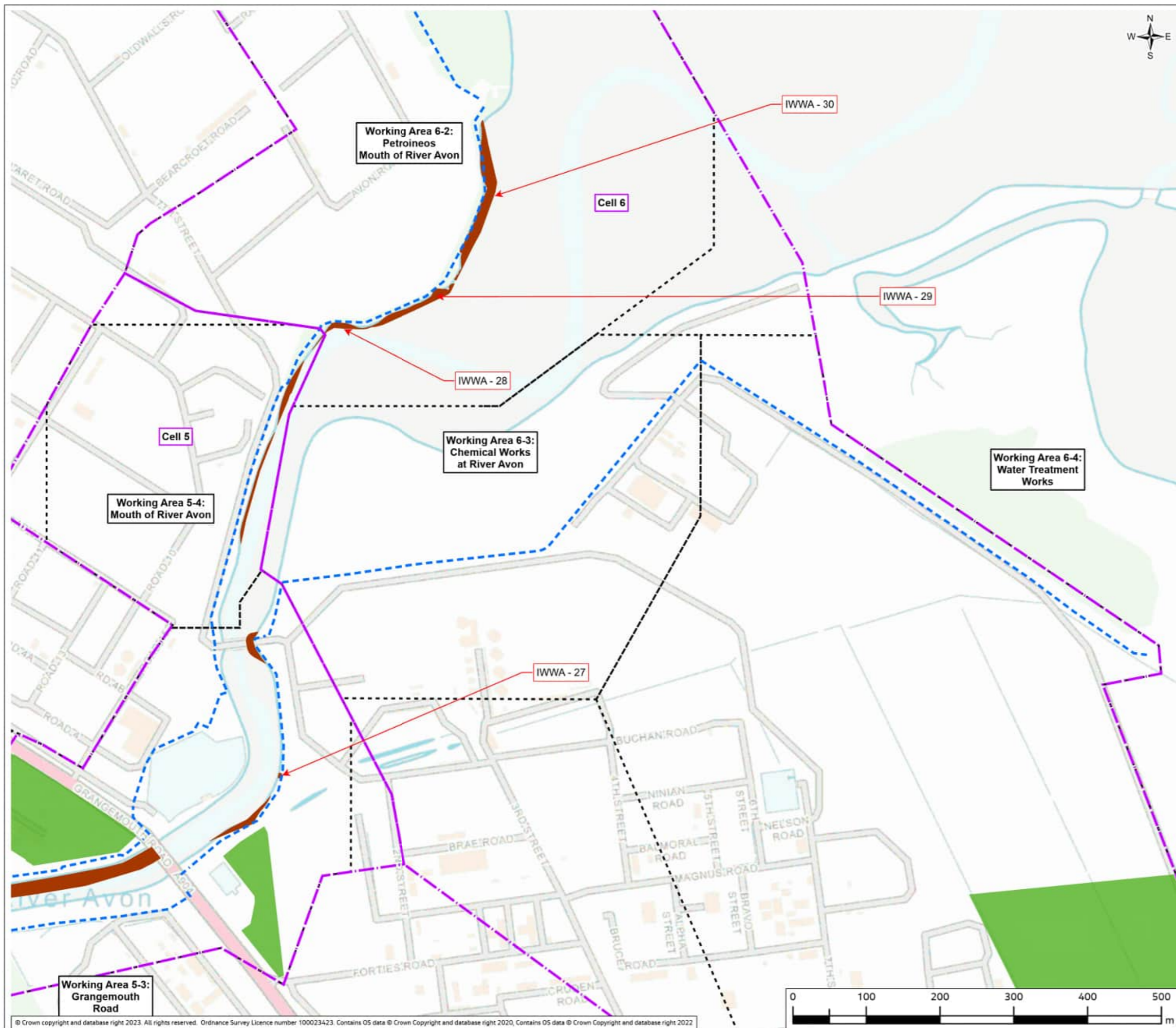
FIGURE B10.8j



Legend

Direct Defences

- - - Embankment
- - - Flood Wall
- - - Ground Rising
- Cell
- Working Area
- Site Compounds
- In-Water Working Area



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Drawing Title	TEMPORARY WORKS
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Drawing No	FIGURE B10.8j
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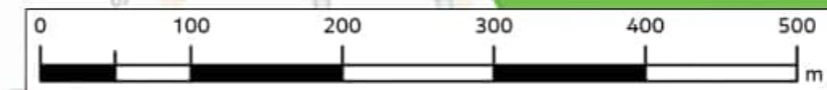
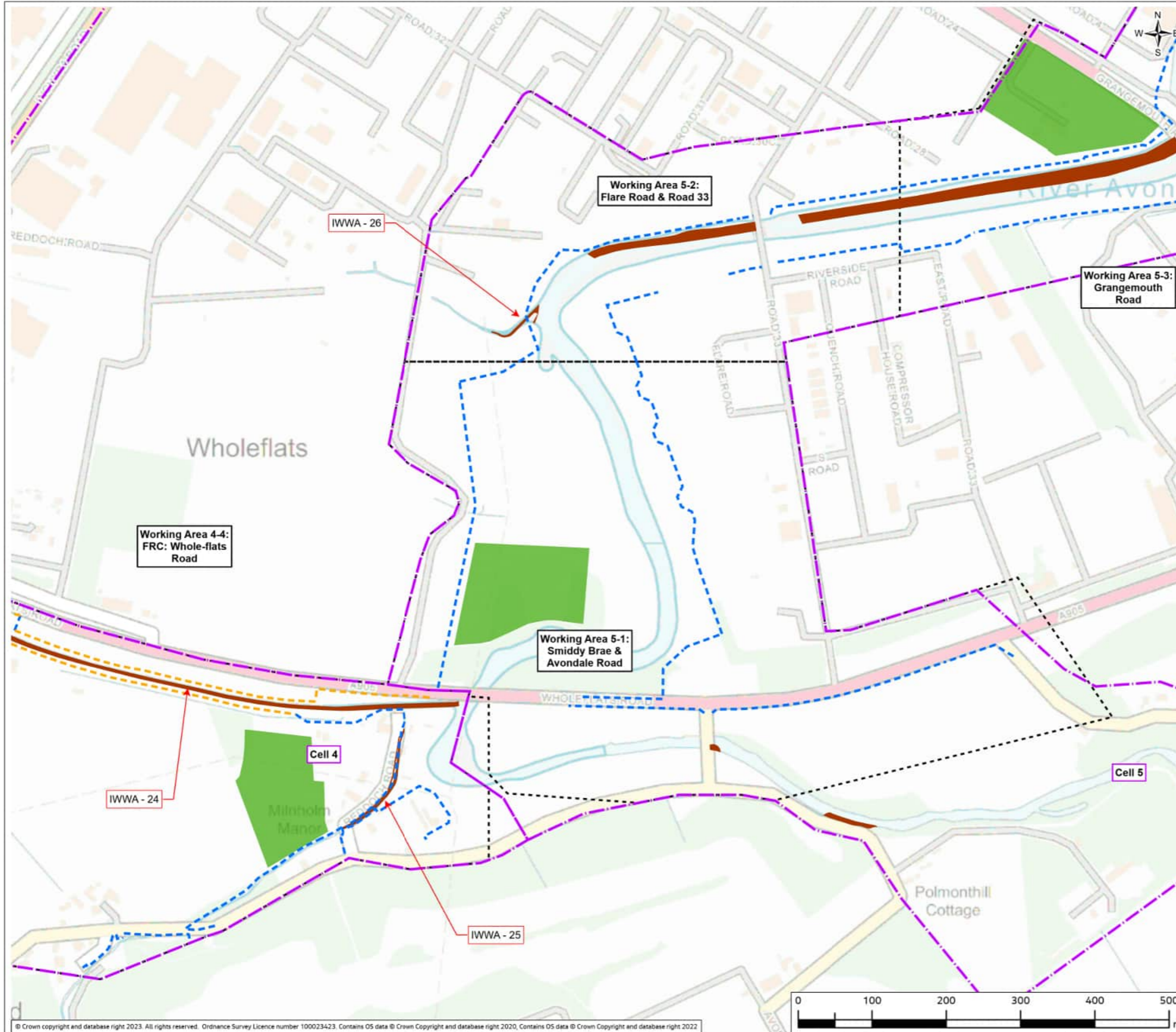


FIGURE B10.8k



Legend

Direct Defences

- - - Embankment
- - - Flood Wall
- - - Ground Rising
- - - Cell
- Working Area
- Site Compounds
- In-Water Working Area



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Drawing No.	FIGURE B10.8k
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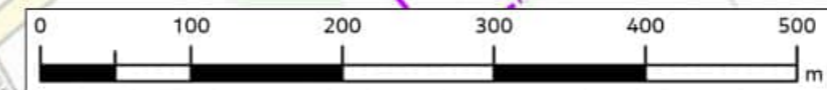


FIGURE B10.8I

Legend

Direct Defences

- - - Embankment
- - - Flood Wall
- - - Ground Rising
- Cell
- Working Area
- Site Compounds
- In-Water Working Area



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Drawing No.	FIGURE B10.8I
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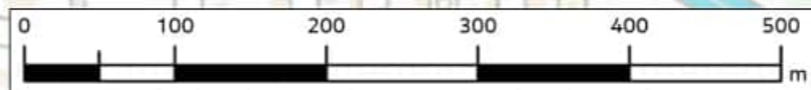
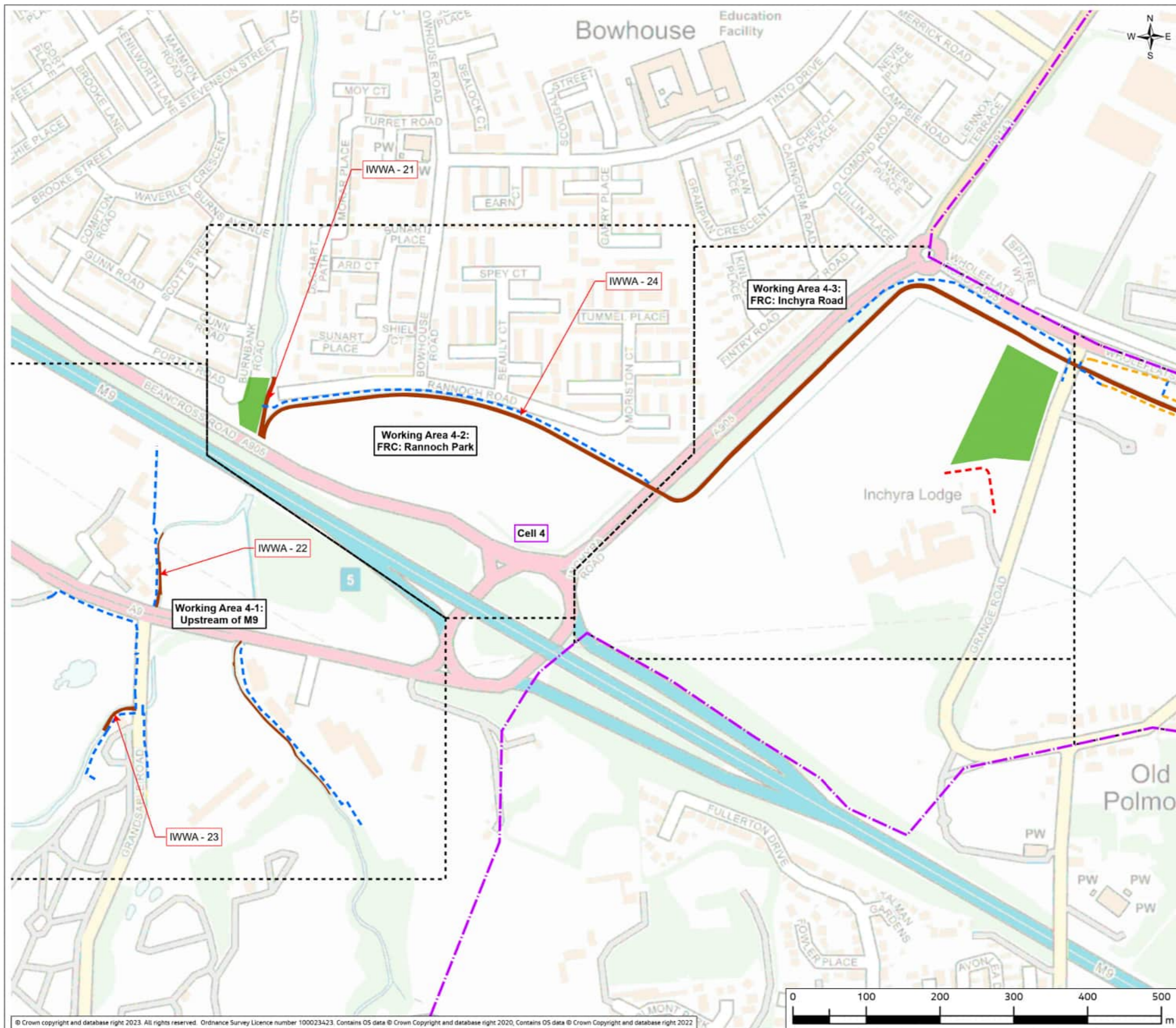
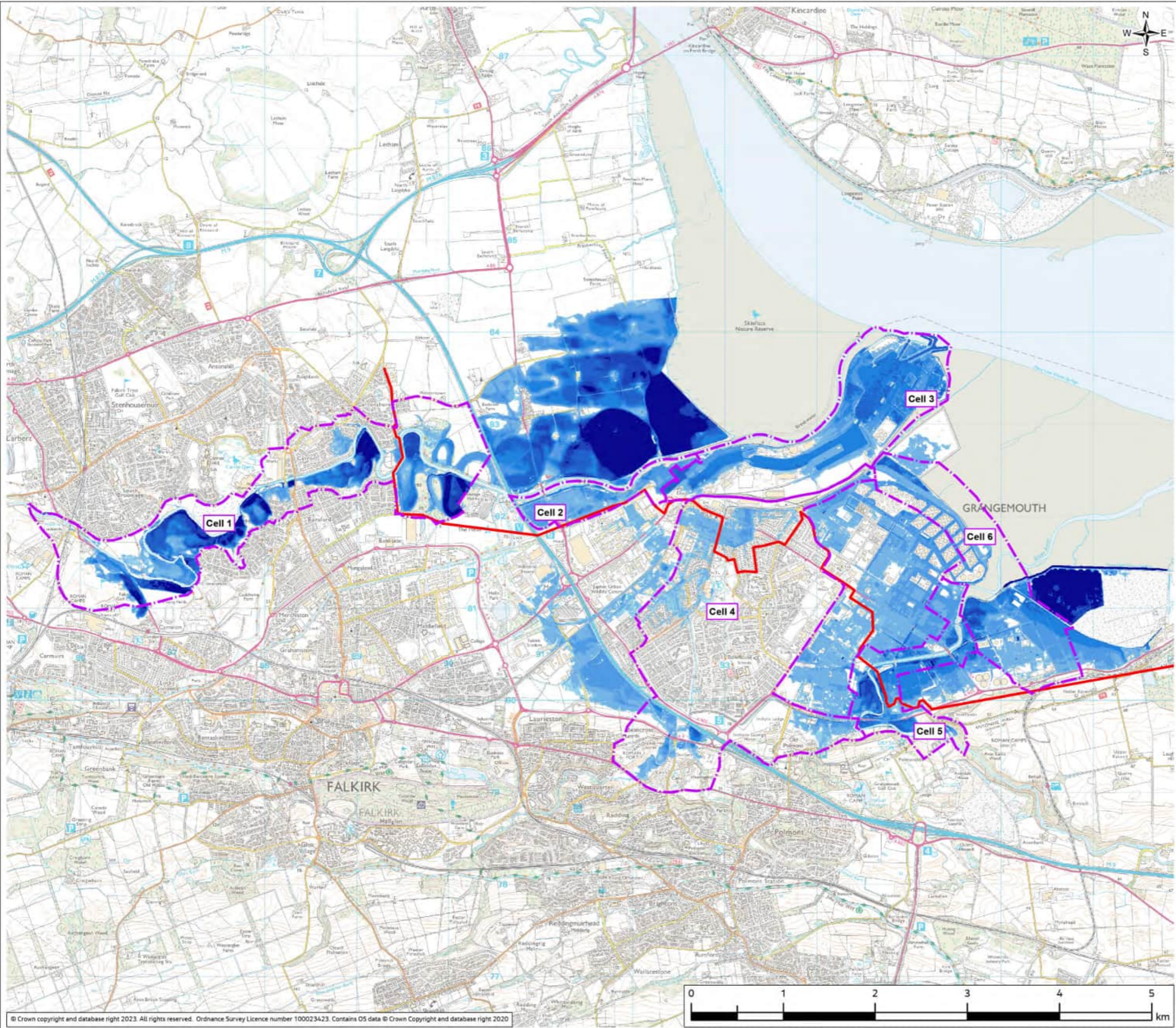


FIGURE B10.9

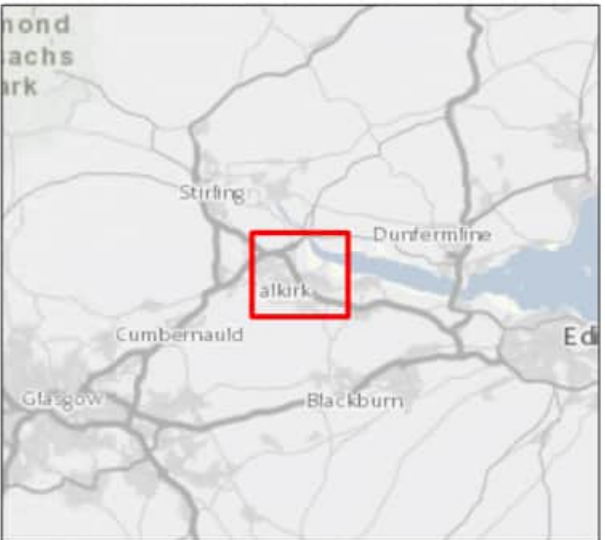


Legend

- Cell
- Fluvial/Tidal Flood Model Boundary

Baseline Peak Flood Depth (0.5% AEP (200-year) event)

- < 0.01 m
- 0.01 - 0.1 m
- 0.1 - 0.5 m
- 0.5 - 1.0 m
- 1.0 - 1.5 m
- 1.5 - 2.0 m
- 2.0 - 2.5 m
- > 2.5 m



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Project **Grangemouth
Flood Protection Scheme**

Drawing Title **MODELLED BASELINE FLUVIAL AND TIDAL (COMBINED)
0.5% AEP (200-YEAR) FLOOD DEPTHS**

SHEET: 1 OF 1

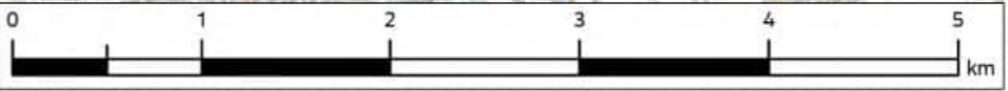
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Scale @ A3 **1:40,000** **DO NOT SCALE**

Jacobs No. **B2386100**

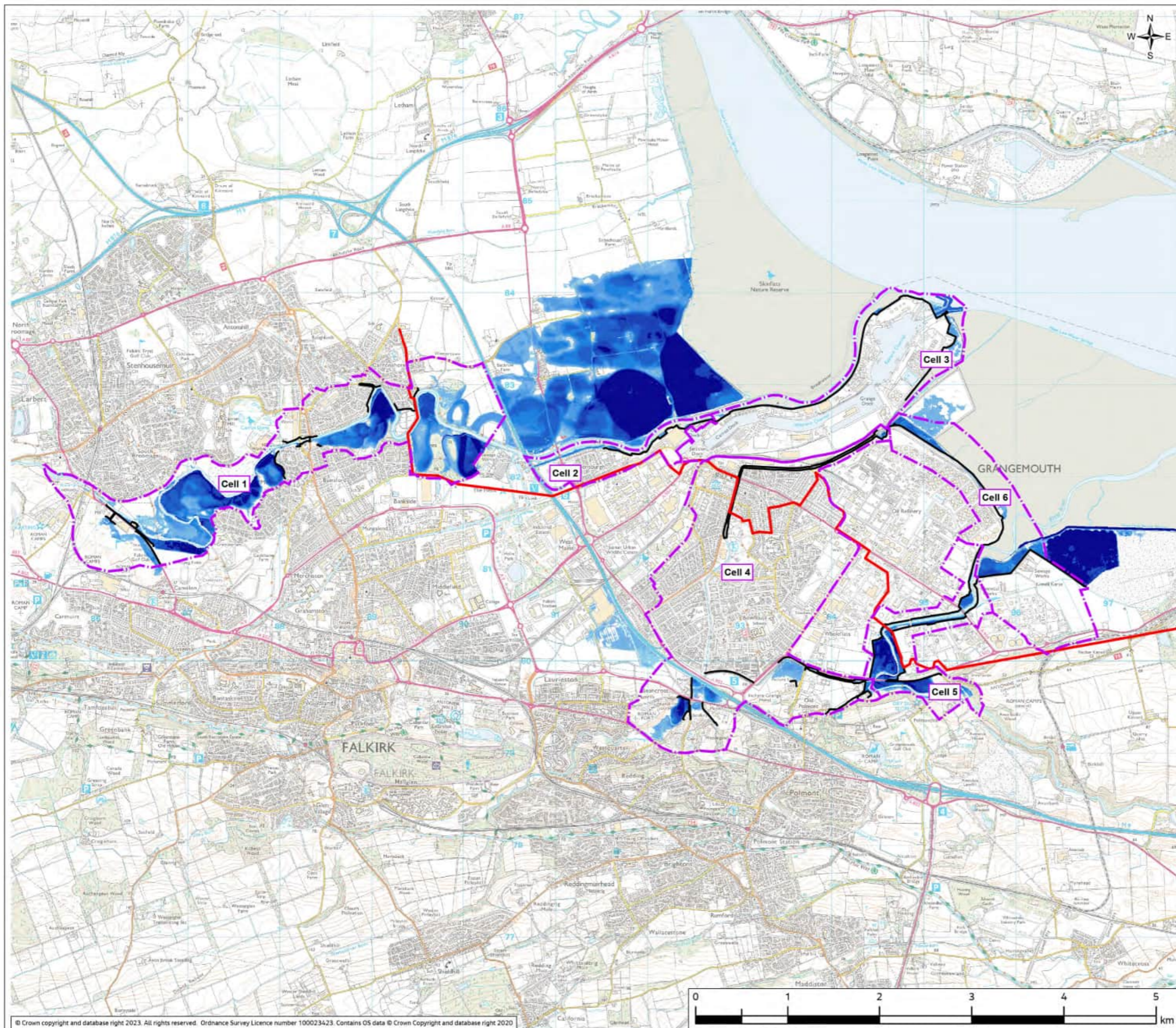
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FIGURE B10.10



Legend

- Cell Cell
- Direct Defences
- Fluvial/Tidal Flood Model Boundary

With-Scheme Peak Flood Depth (0.5% AEP (200-year) event)


- < 0.01 m
- 0.01 - 0.1 m
- 0.1 - 0.5 m
- 0.5 - 1.0 m
- 1.0 - 1.5 m
- 1.5 - 2.0 m
- 2.0 - 2.5 m
- >2.5 m




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Project

Grangemouth
Flood Protection Scheme

Drawing Title

MODELLED WITH-SCHEME FLUVIAL AND TIDAL (COMBINED)
0.5% AEP (200-YEAR) FLOOD DEPTHS

SHEET: 1 OF 1

Drawing Status SB-SUITABLE FOR STATUTORY CONSENT

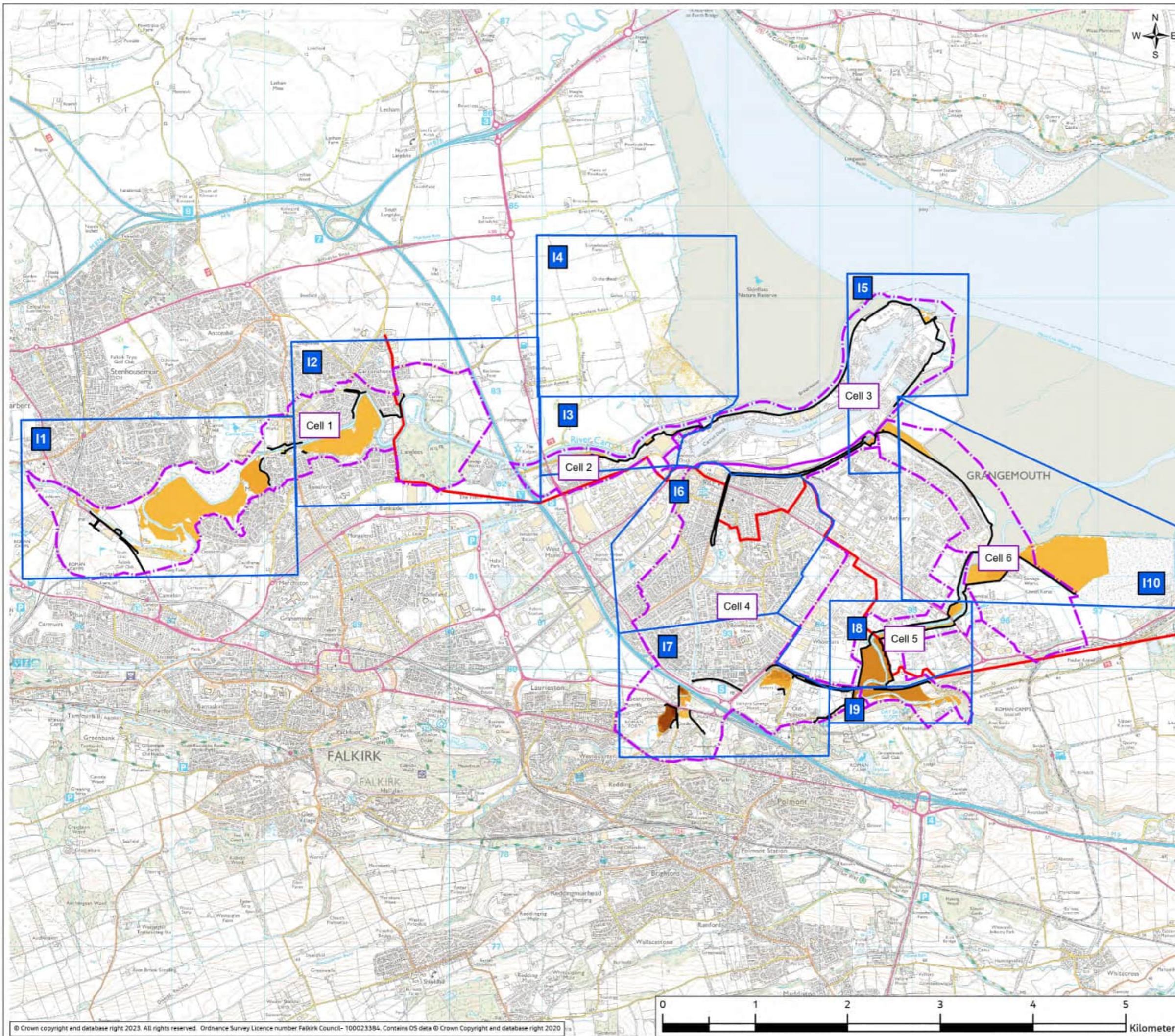
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Drawing No. FIGURE B10.10

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FIGURE B10.11a



Legend

- Cell
- Direct Defences
- Flood Description IDs
- Fluvial/Tidal Flood Model Boundary

With-scheme Peak Flood Increase (0.5% AEP (200-year) event)

- 0 - 0.01 m
- 0.01 - 0.1 m
- 0.1 - 0.5 m
- 0.5 - 1.0 m
- 1.0 - 1.5 m
- 1.5 - 2.0 m
- 2.0 - 2.5 m
- >2.5 m



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Project

Grangemouth
 Flood Protection Scheme

Drawing Title

MODELLED DESIGN TIDAL AND FLUVIAL
 (COMBINED) 0.5% AEP (200-YEAR) INCREASE

SHEET: 1 OF 1

Drawing Status

S8-SUITABLE FOR STATUTORY CONSENT

Scale @ A3 1:40,000 DO NOT SCALE

Jacobs No. B2386100

Client No.

Drawing No. FIGURE B10.11a

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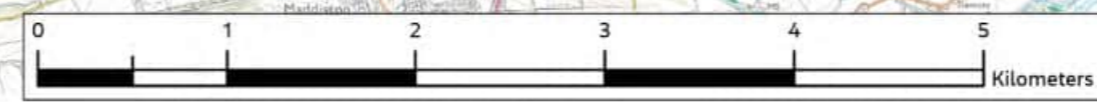
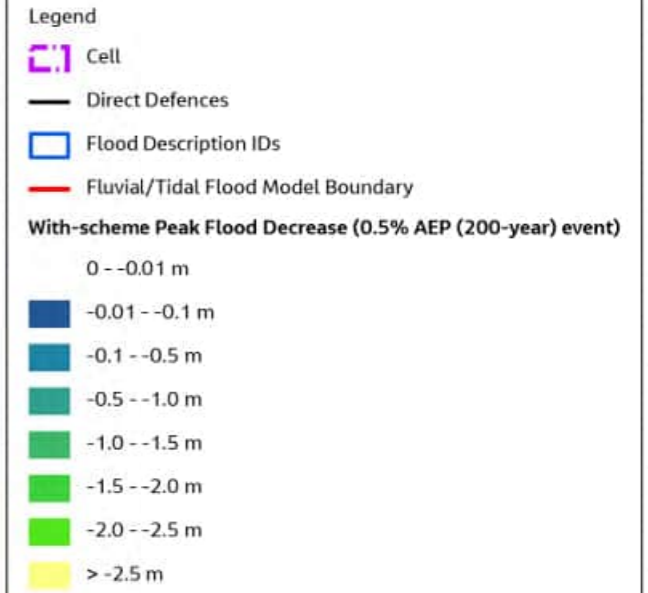


FIGURE B10.11b



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Project	Grangemouth Flood Protection Scheme
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Drawing Title	MODELLED DESIGN TIDAL AND FLUVIAL (COMBINED) 0.5% AEP (200-YEAR) DECREASE SHEET: 1 OF 1
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Drawing Status	SB-SUITABLE FOR STATUTORY CONSENT
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Drawing No.	FIGURE B10.11b
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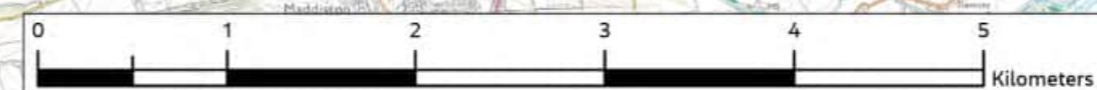
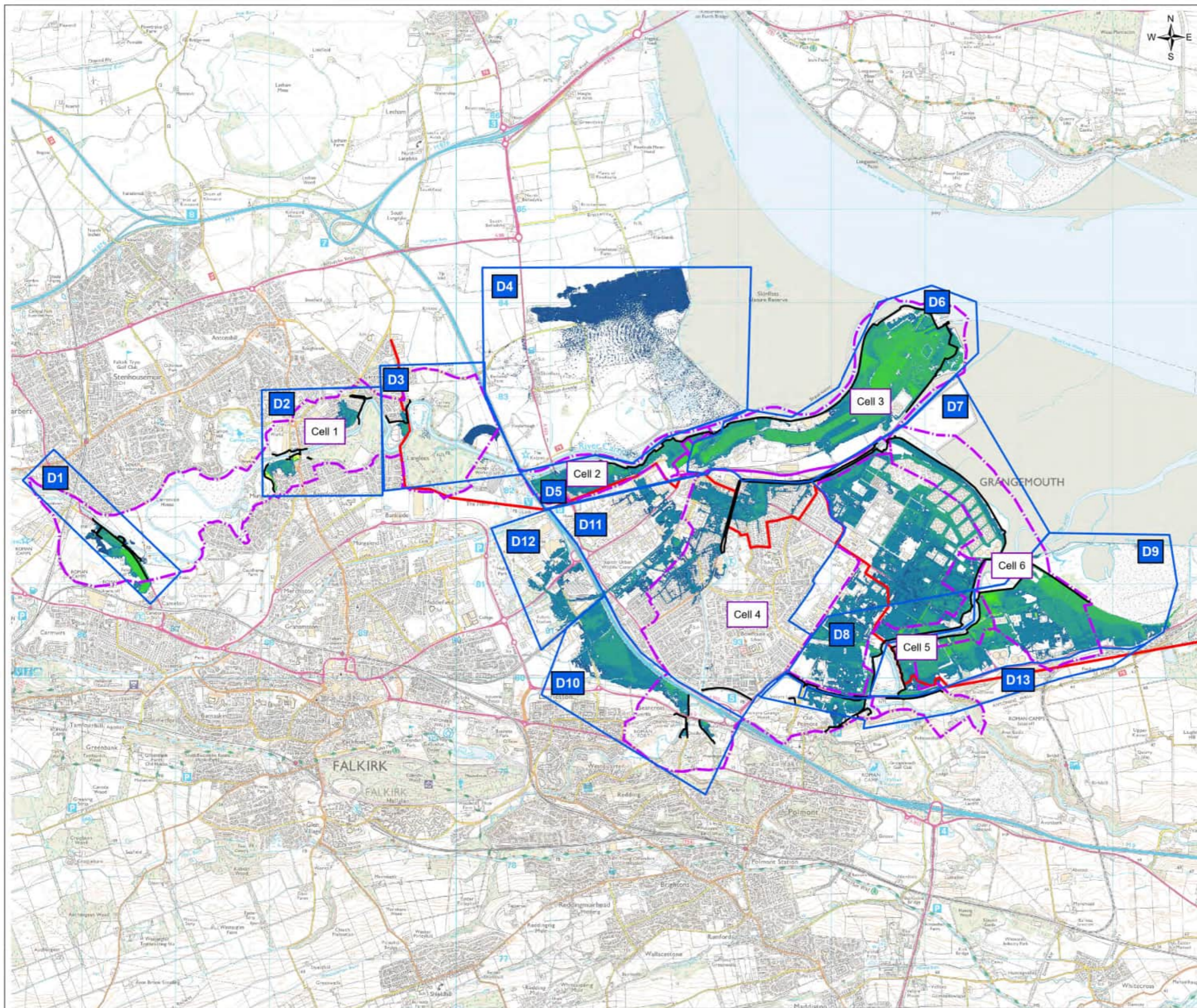
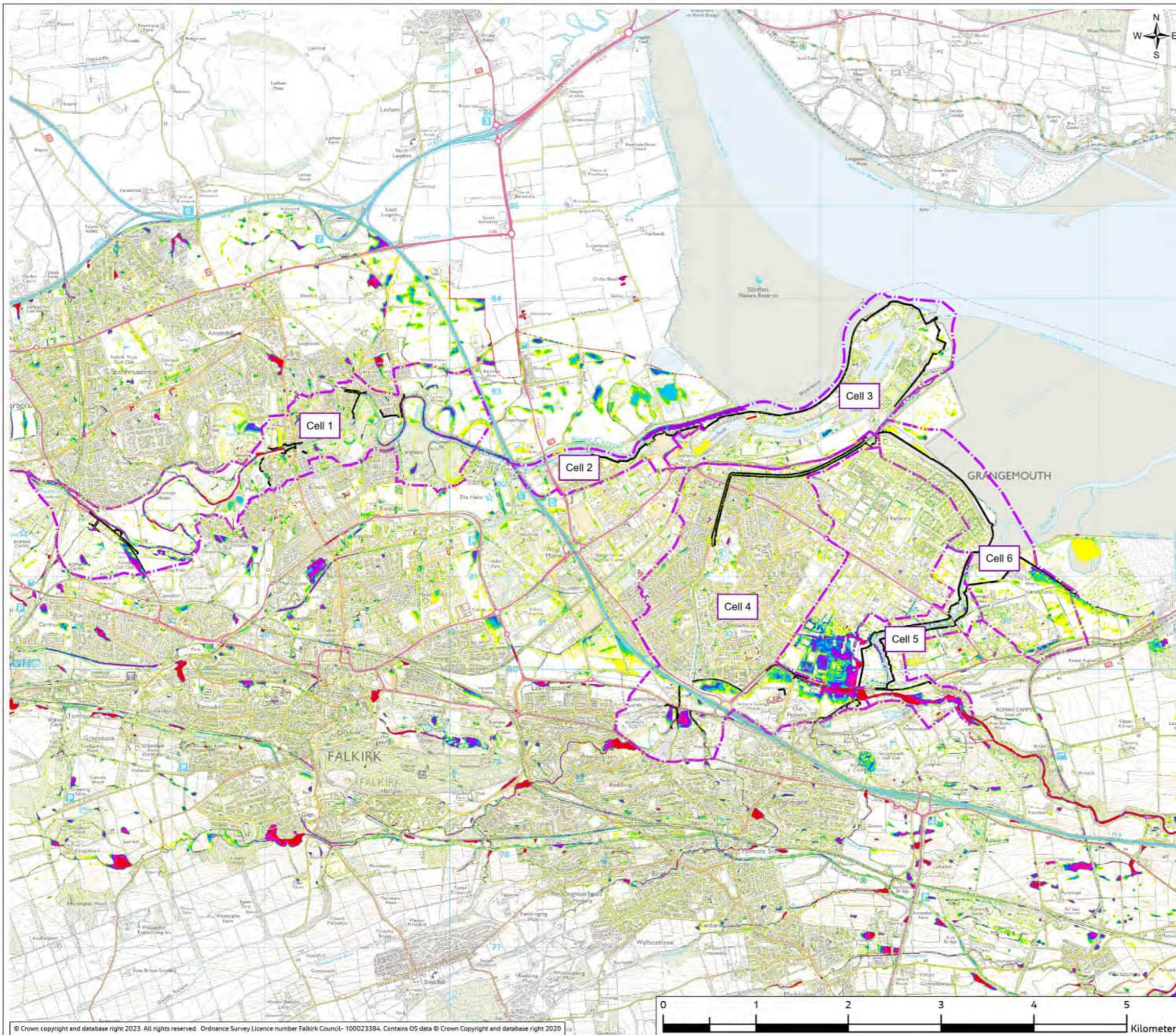


FIGURE B10.12



Legend

Cell

Direct Defences

6 hr 200 yr rainfall depths with defences

0 - 0.1

0.1 - 0.2

0.2 - 0.3

0.3 - 0.4

0.4 - 0.5

0.5 - 0.75

0.75 - 1

>1



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Drawing Title	MODELLED PLUVIAL FLOOD DEPTH 0.5% AEP (200-YEAR)	SHEET: 1 OF 1
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Drawing No.	FIGURE B10.12
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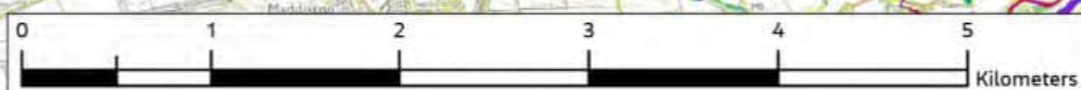
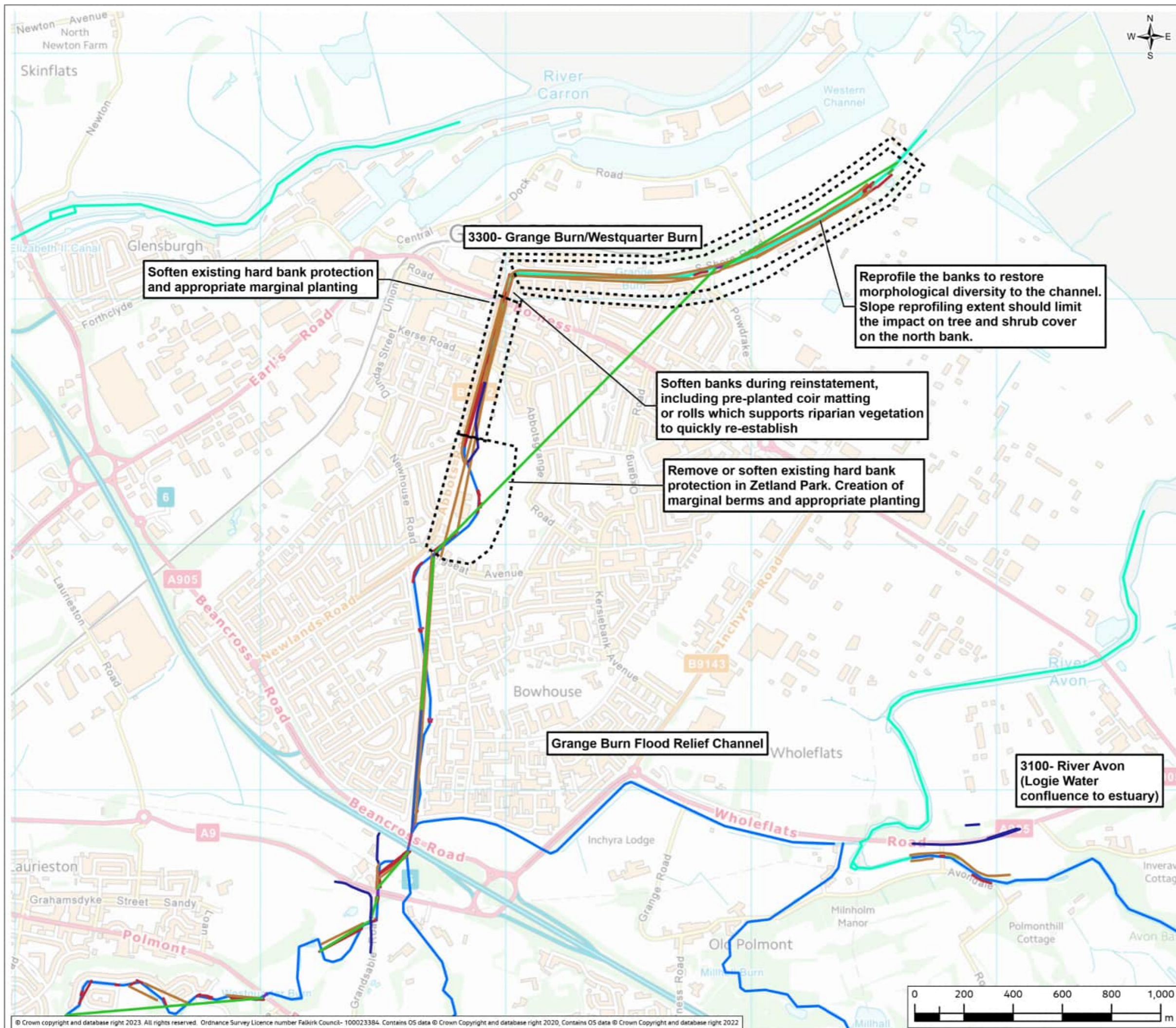


FIGURE B10.13



- Legend**
- Mitigation Areas
 - Morphological Pressure (from SEPA dataset)**
 - Bed Reinforcement
 - Hard Bank Protection
 - Soft Bank Protection
 - Culvert
 - Flow Deflector
 - Embankment
 - High Impact Realignment
 - Impoundment
 - Low Impact Realignment
 - Bridge/Pipe Peir
 - Setback
 - Embankment/Floodwall
 - Waterbody Type**
 - Inland River
 - Tidal River



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Project
 Grangemouth
 Flood Protection Scheme

Drawing Title
 FLUVIAL/ESTUARINE GEOMORPHOLOGY MITIGATION
 SHEET: 1 OF 1

Drawing Status
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Drawing No
 FIGURE B10.13

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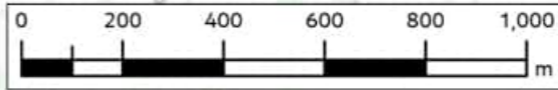
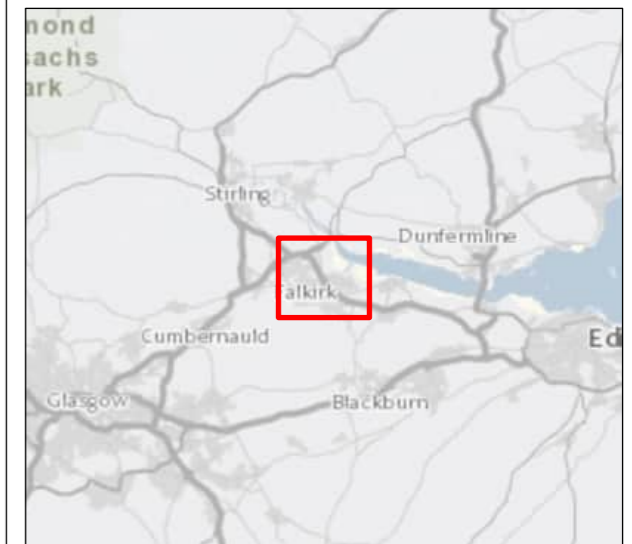
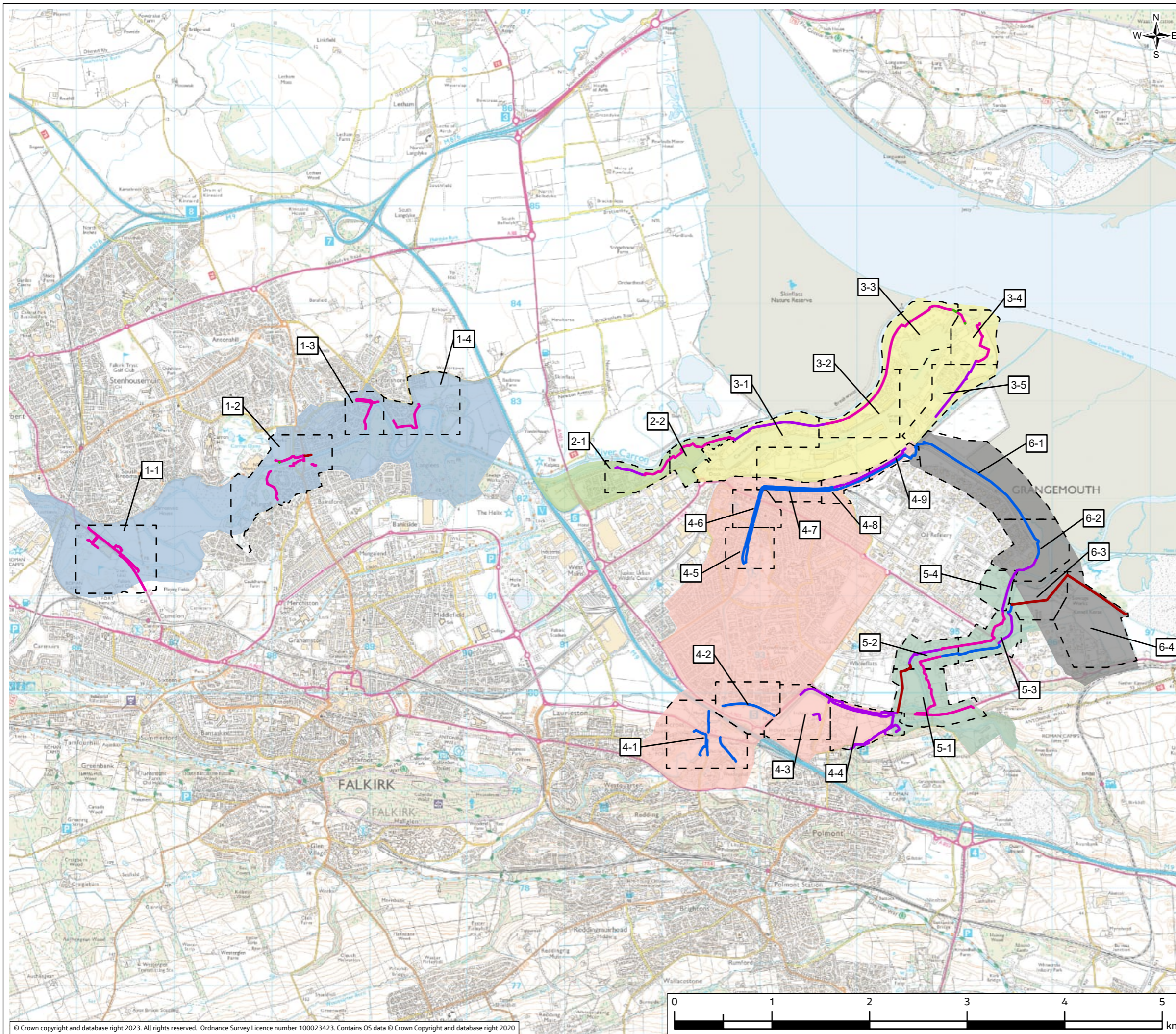


FIGURE B10.14

Legend

Pile Depths Below Ground (m)	Flood Cells
<0	Cell 1
0.1 - 4.2	Cell 2
4.21 - 6.5	Cell 3
6.51 - 11	Cell 4
11.1 - 18.5	Cell 5
	Cell 6
	Working Areas



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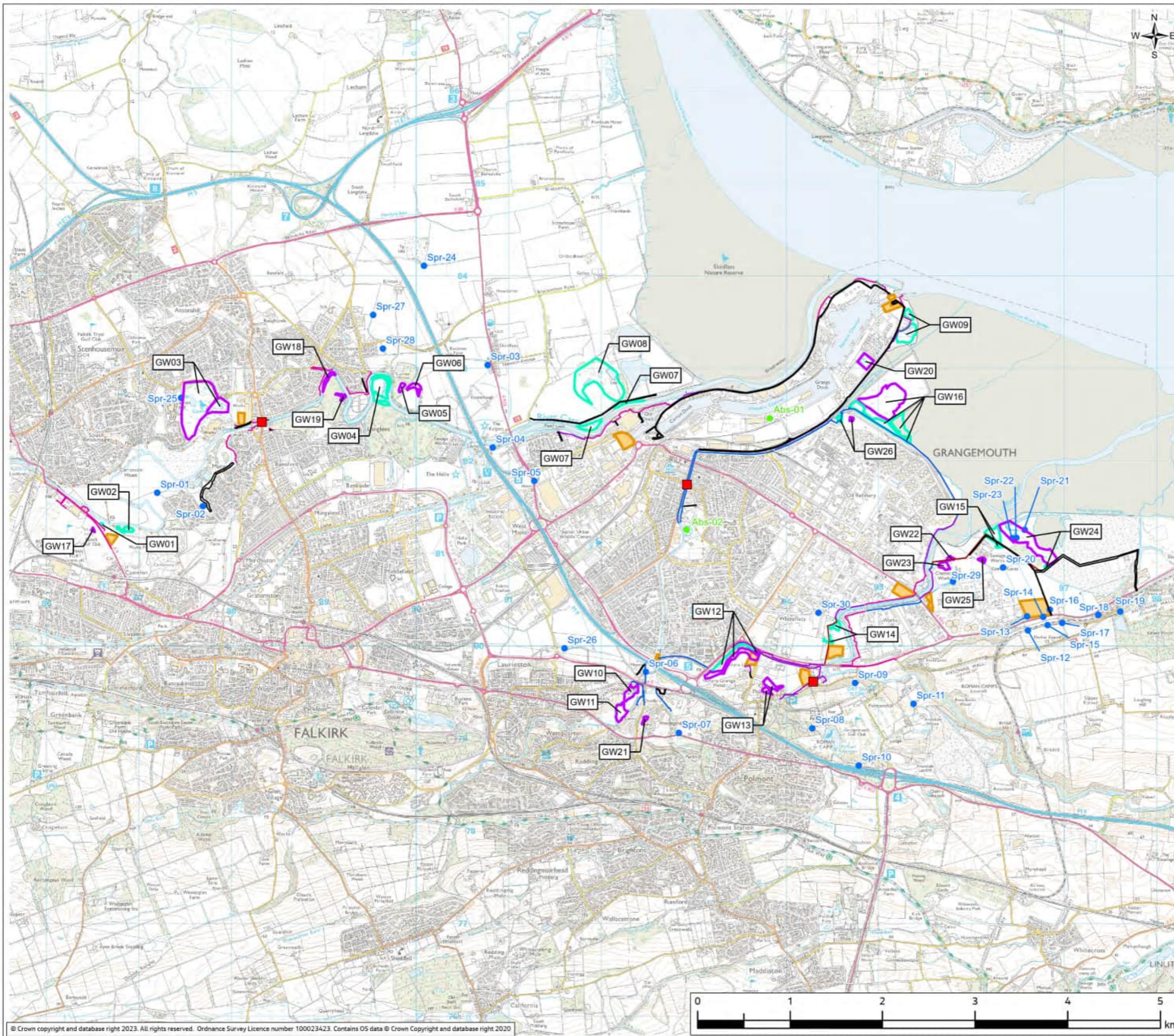
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Drawing No.	FIGURE B10.14
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FIGURE B10.15



Legend

- ▭ Potential GWDE
- ▭ Wetland
- ▭ Site Compounds
- Haul Roads
- New Bridges
- Abstraction point
- Spring

Pile Depths Below Ground

Below Ground (m)

- <0
- 0.1 - 4.2
- 4.21 - 6.5
- 6.51 - 11
- 11.1 - 18.5



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Drawing Title	ABSTRACTIONS AND POTENTIAL GROUNDWATER DEPENDENT TERRESTRIAL ECOSYSTEMS	SHEET: 1 OF 1
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Drawing No.	FIGURE B10.15
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