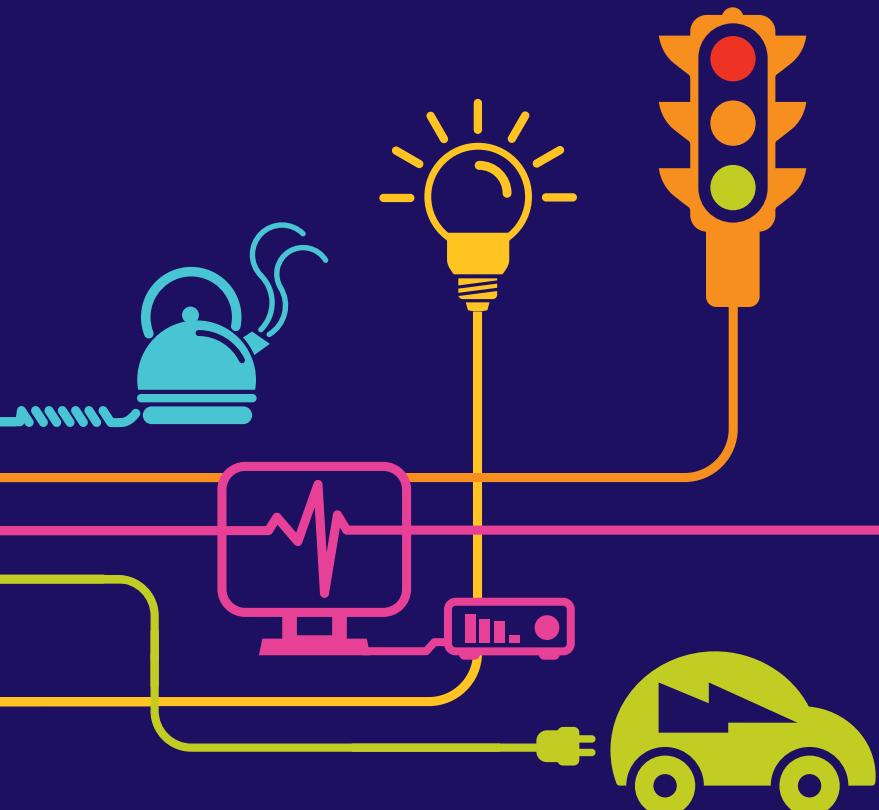


5.23.5.2.2A

Environmental Statement Flood Risk Assessment Hinkley Point C Connection Route Appendices G to J

Hinkley Point C Connection Project

*Regulation 5(2)(e) of the Infrastructure Planning
(Applications: Prescribed Forms and Procedure)
Regulations 2009*



Environmental Statement

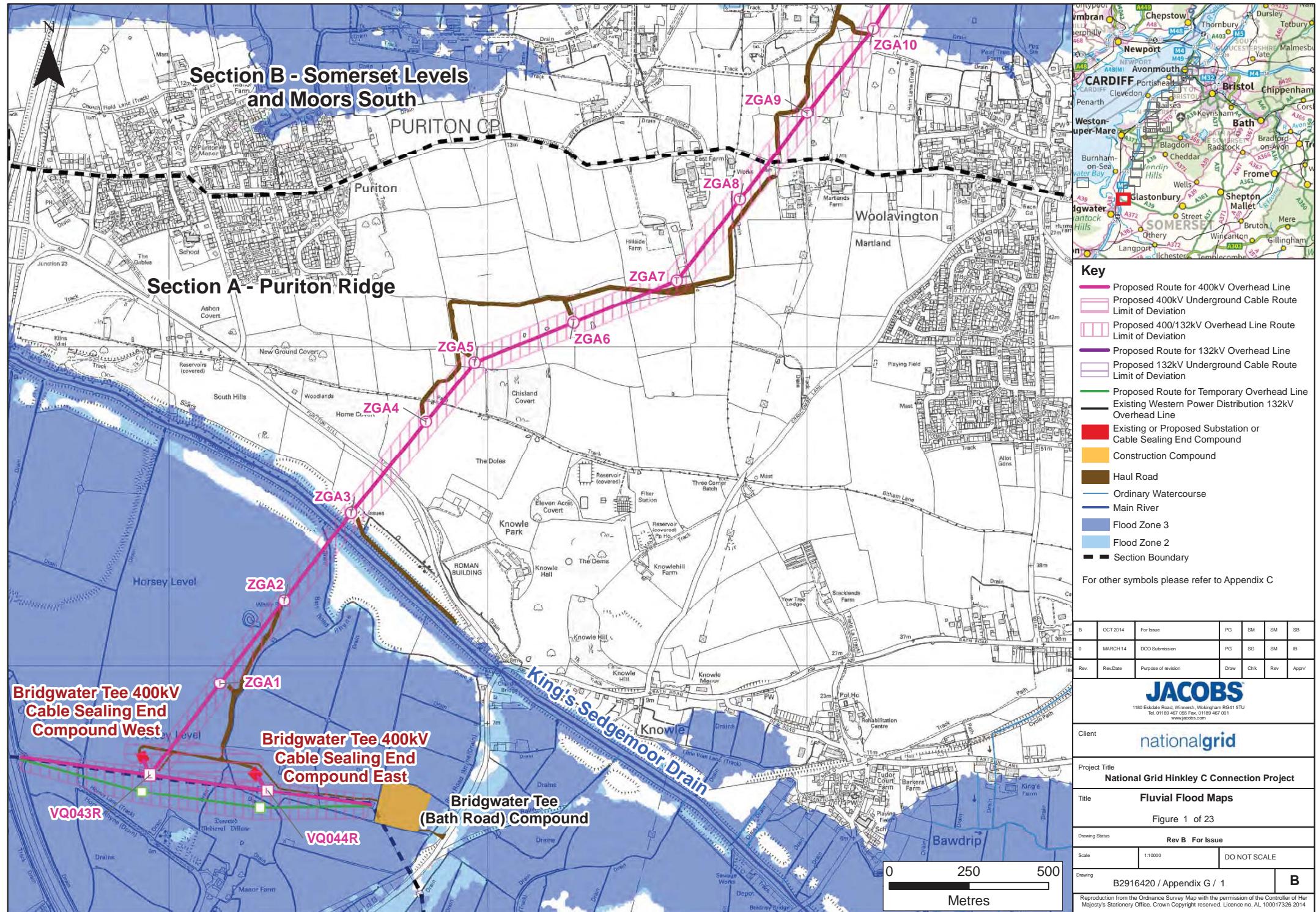
Hinkley Point C Connection Project

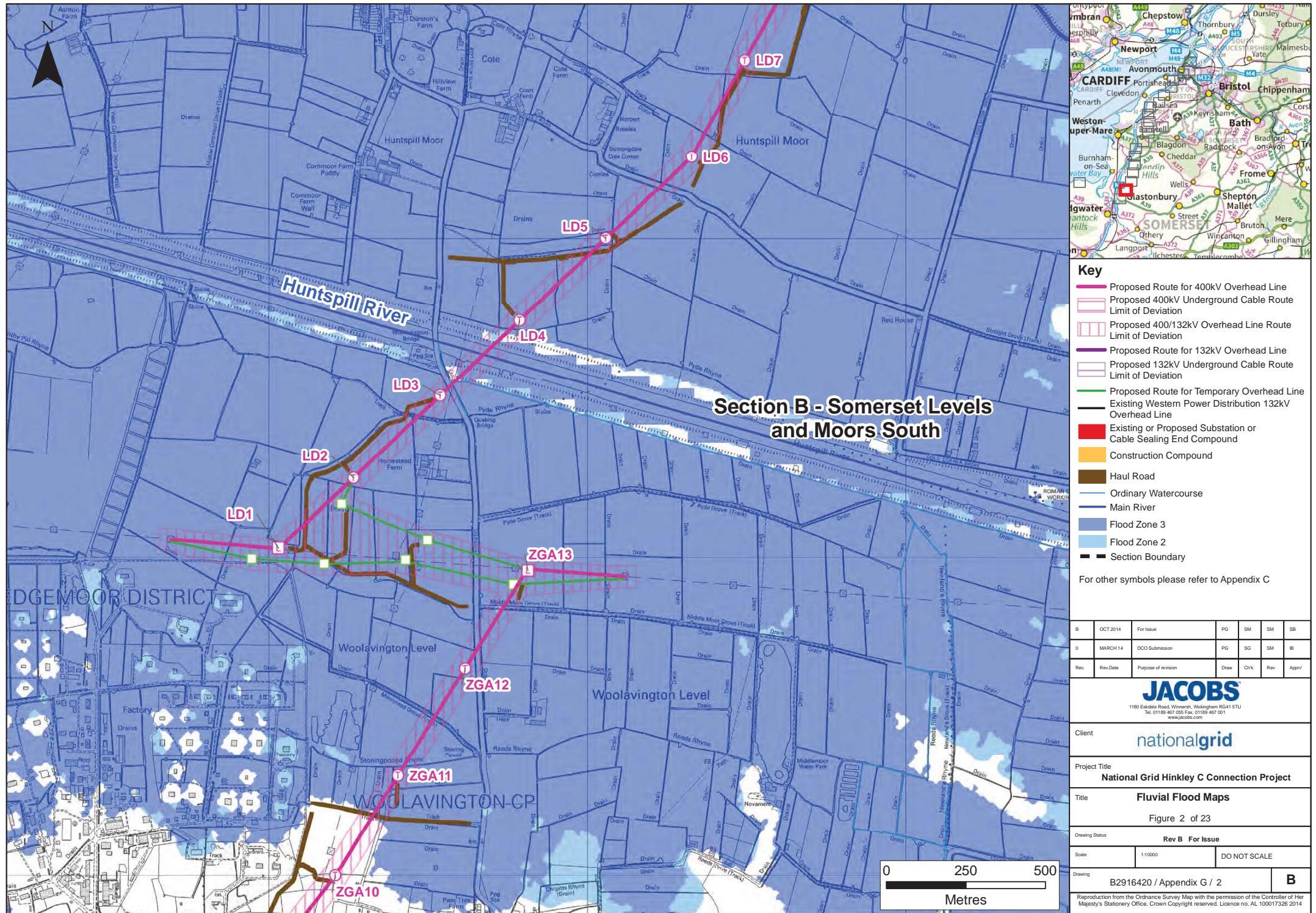
5.23.5.2 – Hinkley Point C Connection Route Flood Risk Assessment – Appendices (orange highlight indicates the contents of this Volume)

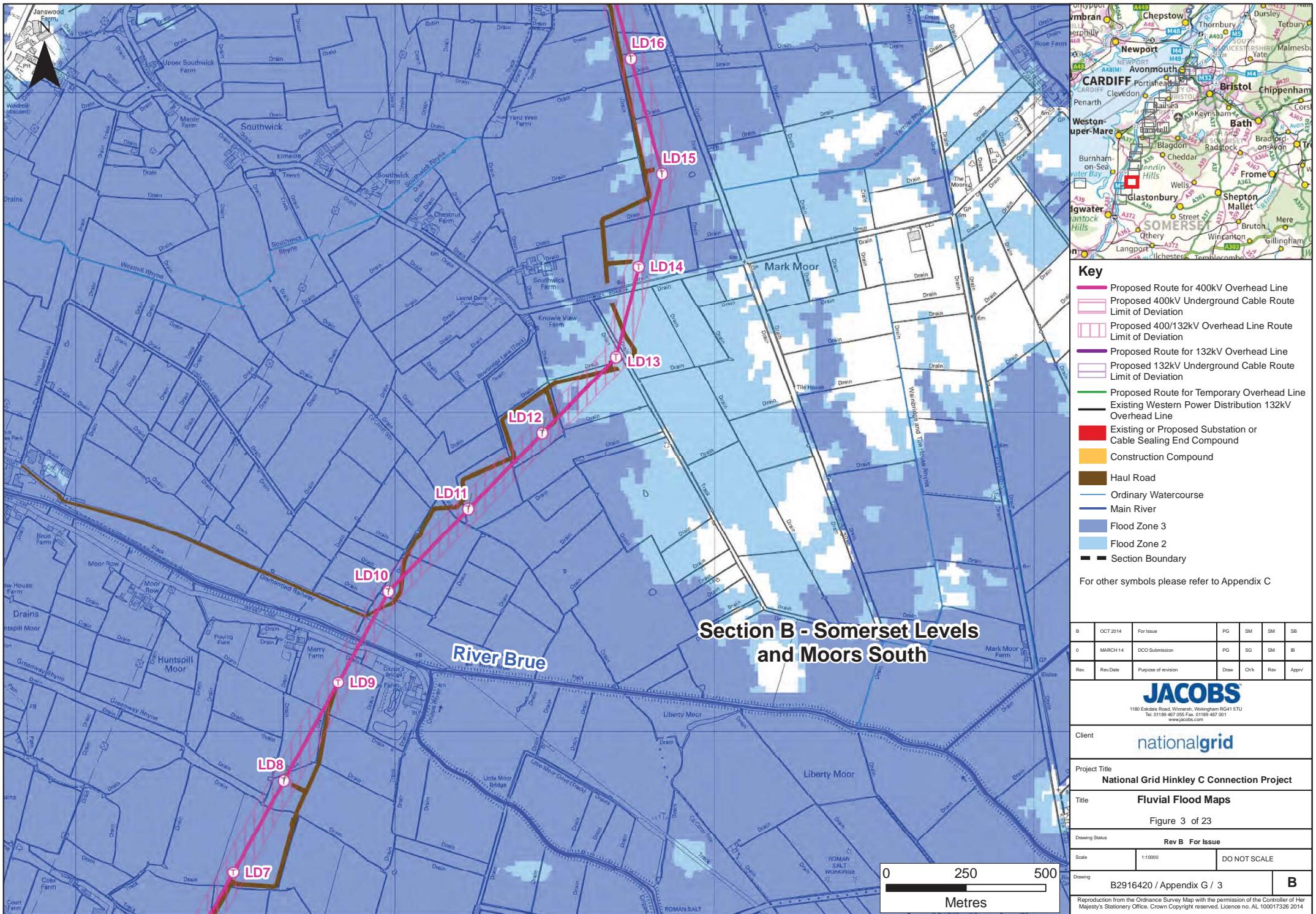
Appendix	Title
Volume 5.23.5.2.1A	
A	Sequential Test Report
B	EN-1 and EN-5 Compliance Tables
C	Route Plans Showing Key Features
D	Proposed Development Operational Phase
E	Design Drawings
F	Proposed Construction Phase Haul Roads and Watercourse Crossings
Volume 5.23.5.2.2A	
G	Fluvial Flood Maps
H	Updated Flood Maps for Surface Water
I	National Flood Risk Assessment Flood Modelling Extents
J	Technical Note on Haul Road, Construction Compound and Stockpile Flood Risk

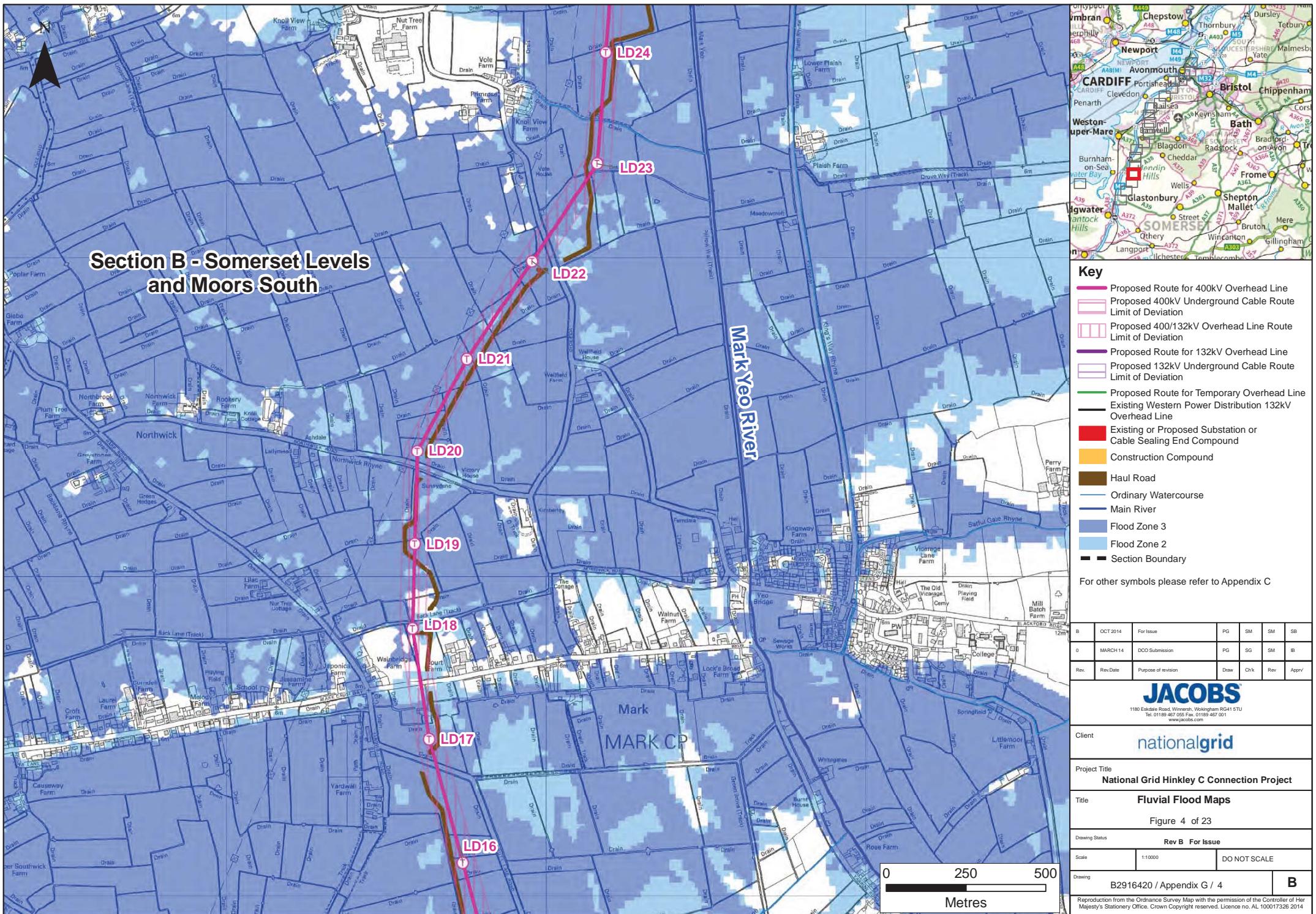
Document Control			
Document Properties			
Organisation	National Grid		
Author		Various, Jacobs	
Approved By		Andy Debney, Jacobs	
Title		Environmental Statement – Hinkley Point C Connection Route FRA - Appendices	
Document Reference		Volume 5.23.5.2.2A	
Date	Version	Status	Description/Changes
09/05/14	A	Superseded	Final version for DCO submission
19/01/15	B	Live	Updated version for submission to PINS

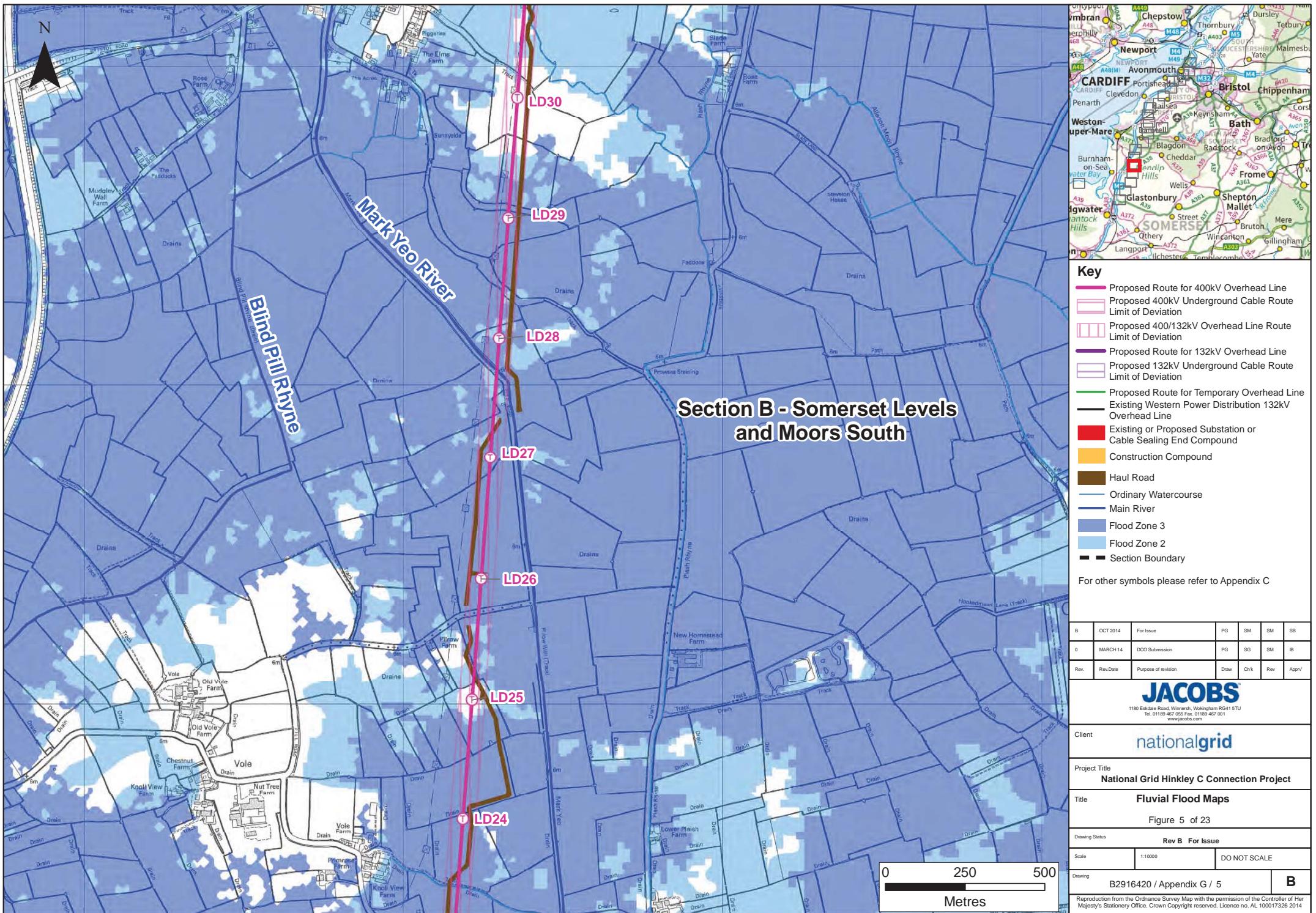
Appendix G – Fluvial Flood Maps

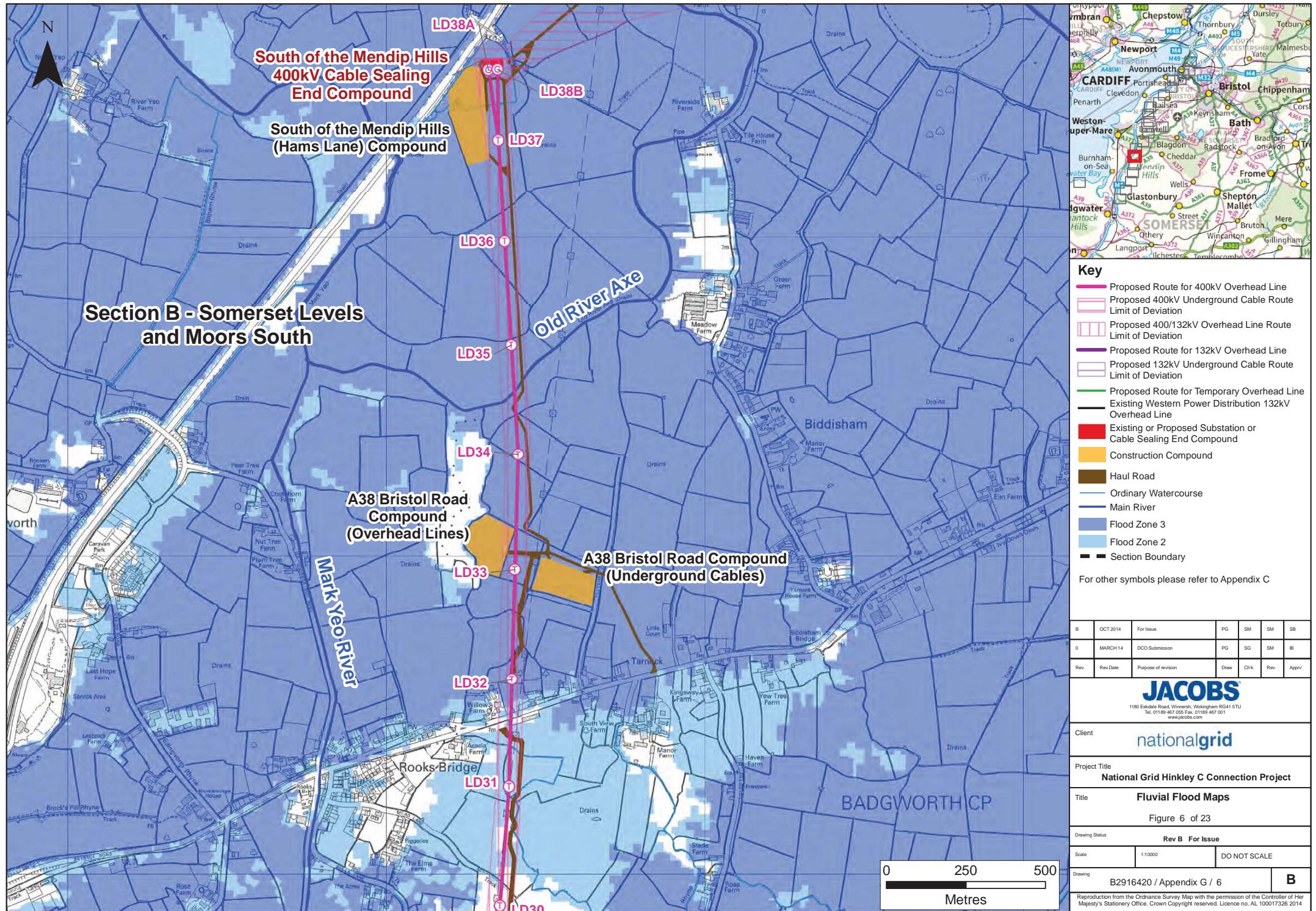


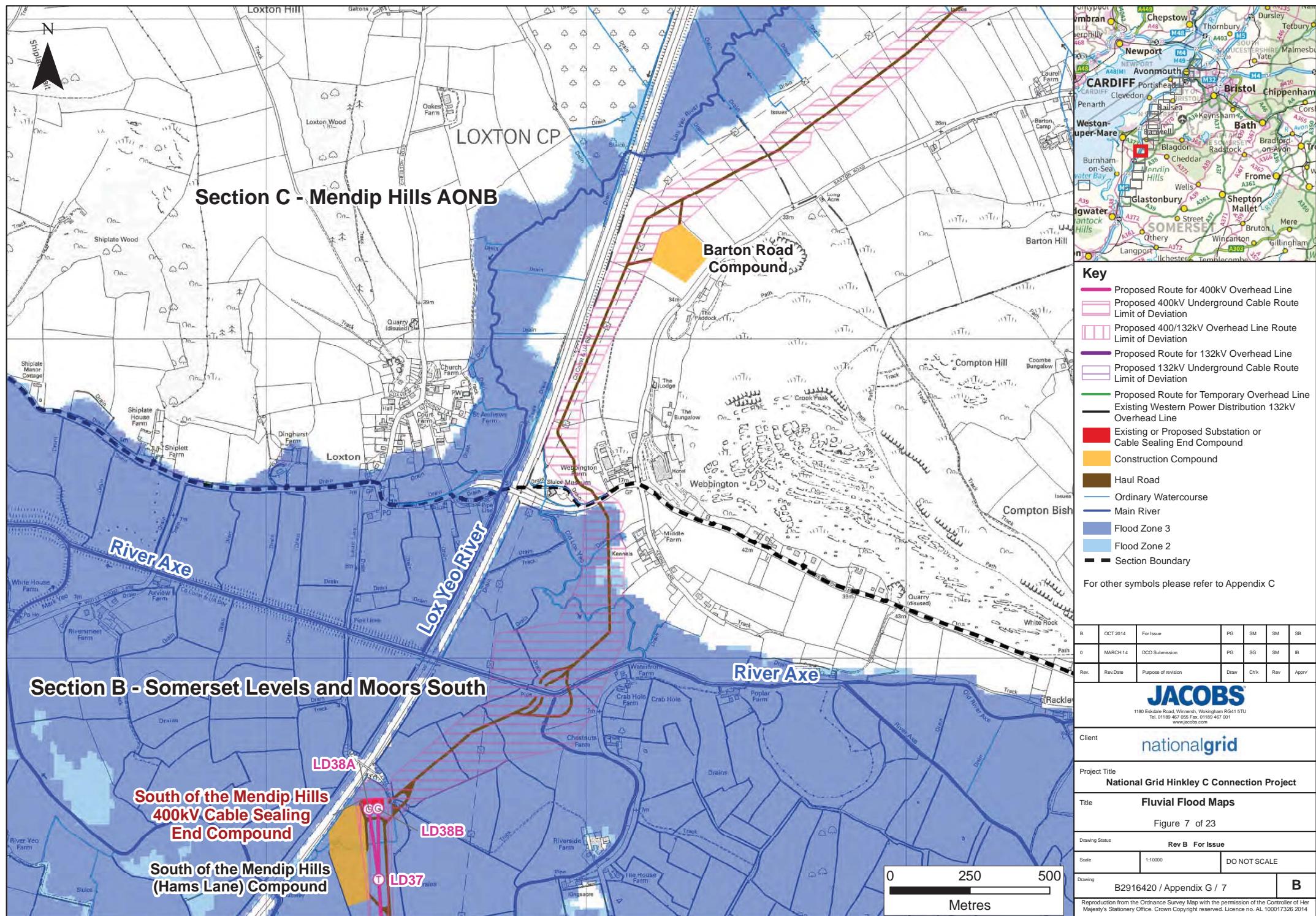


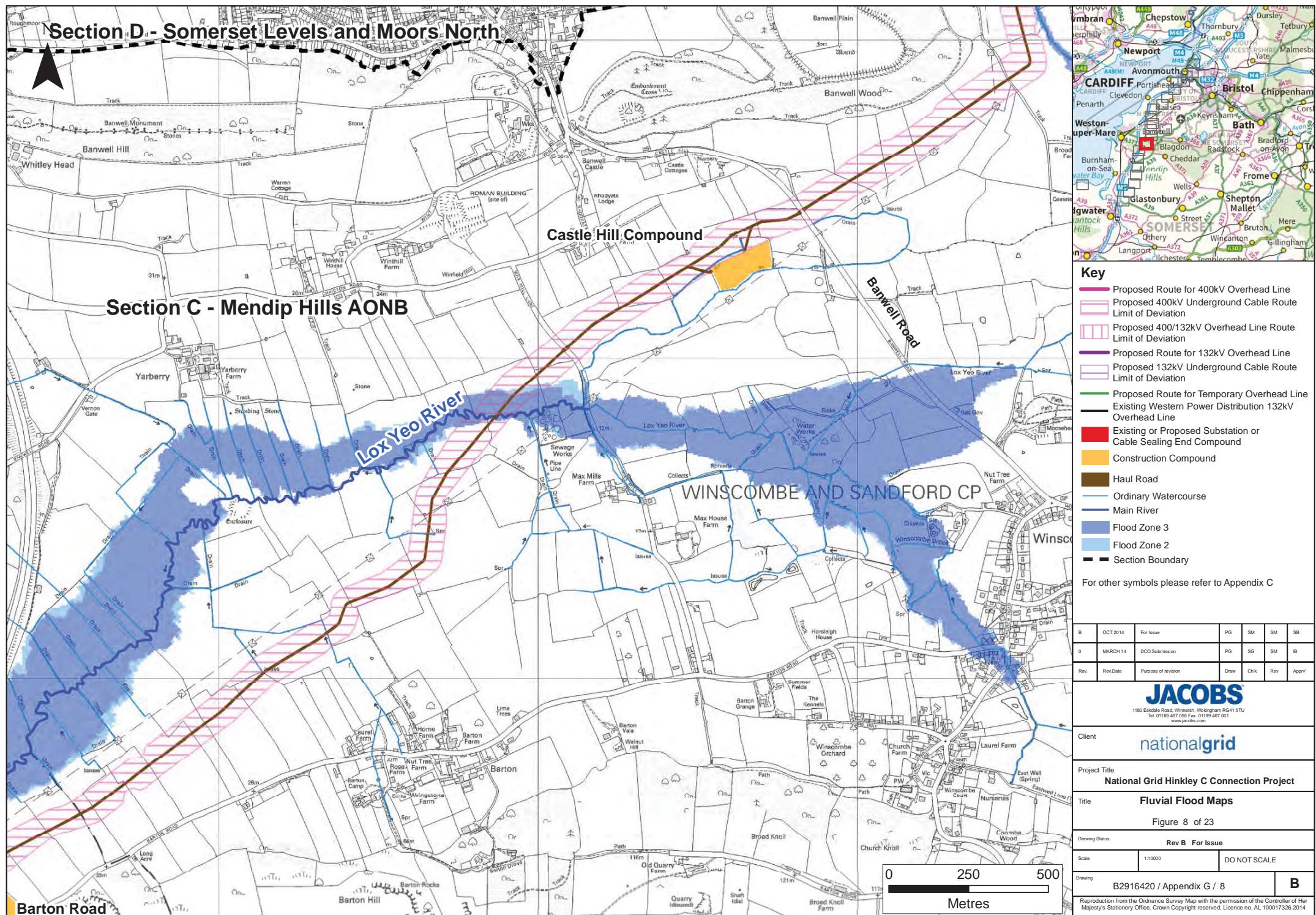


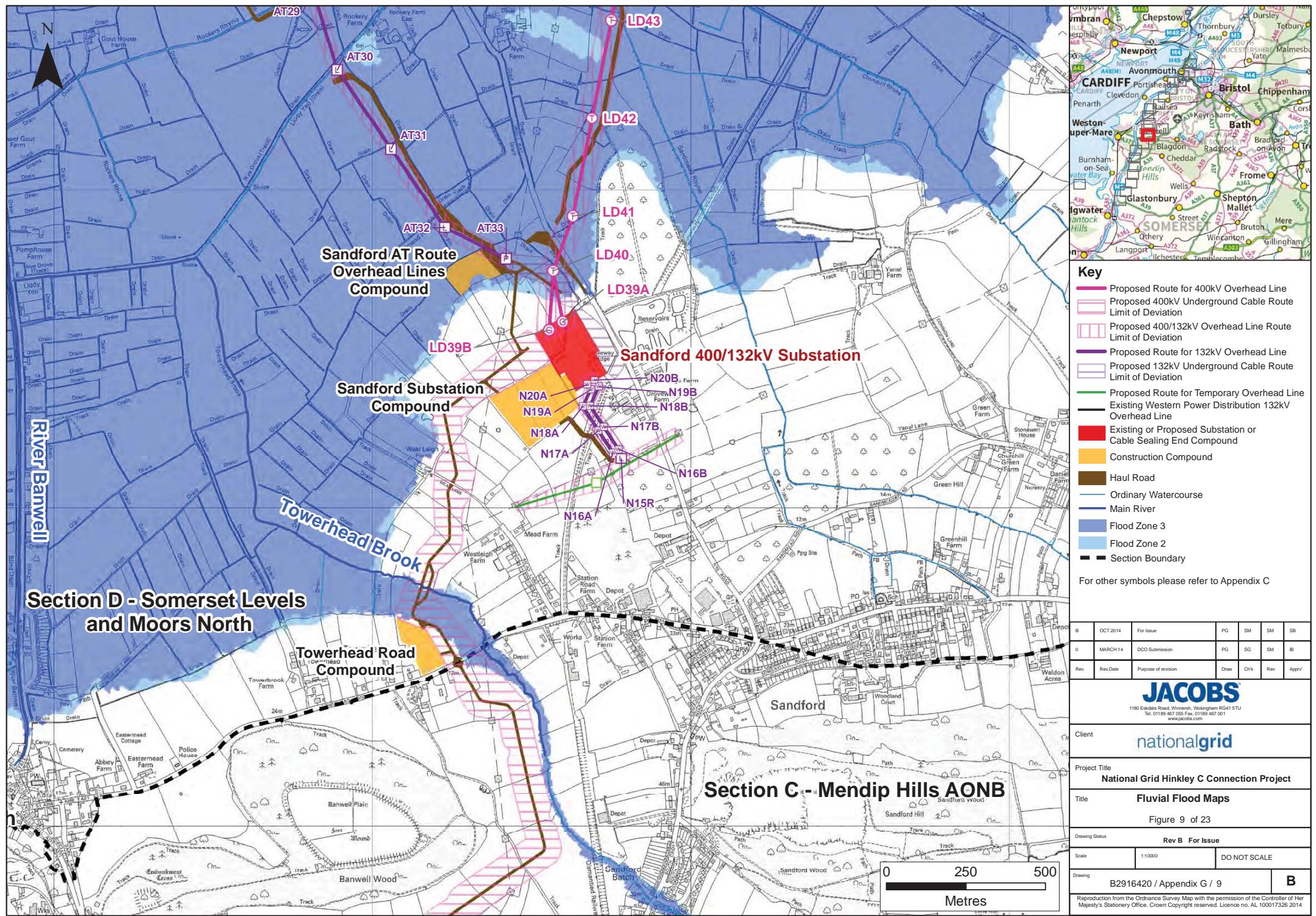


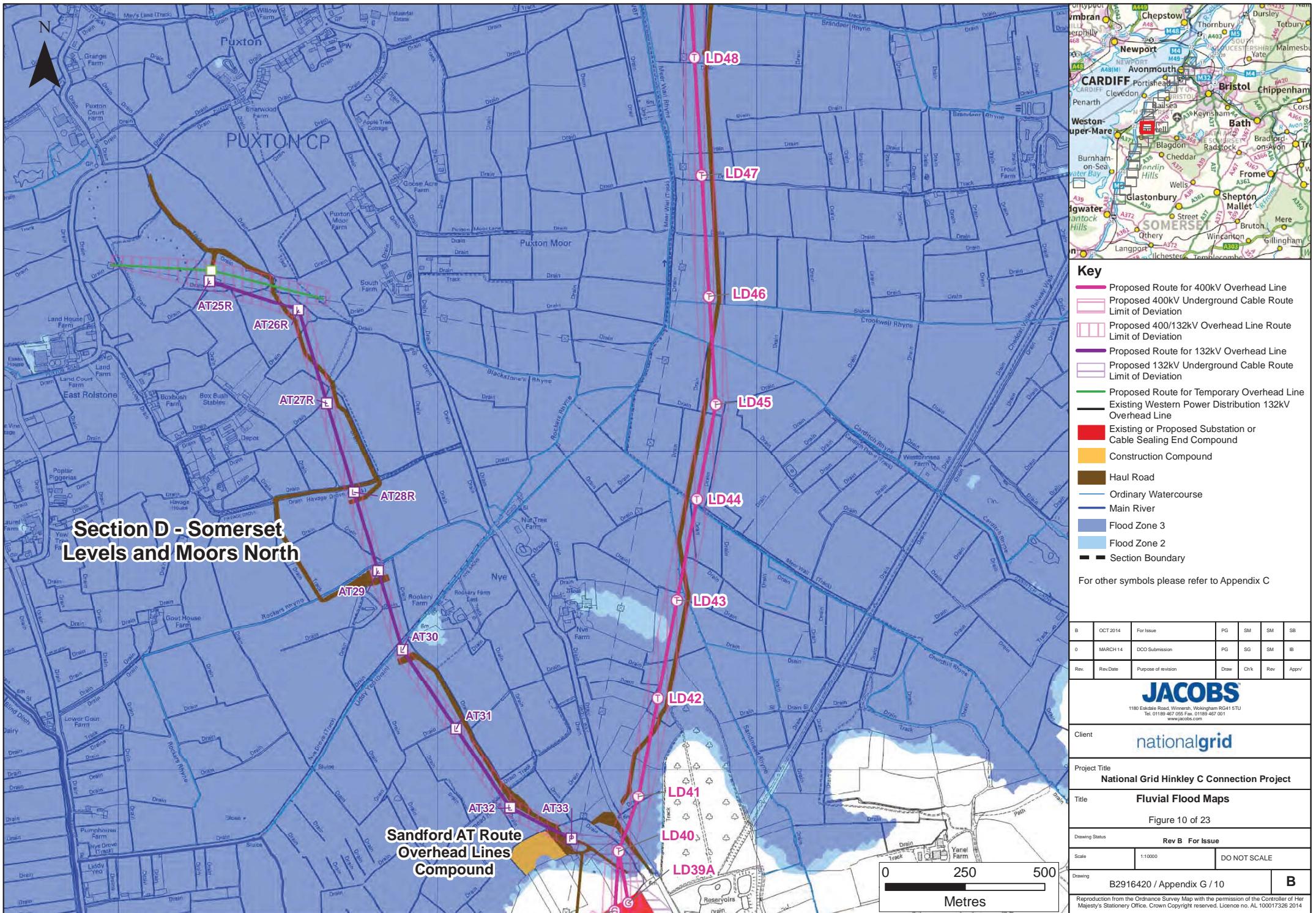


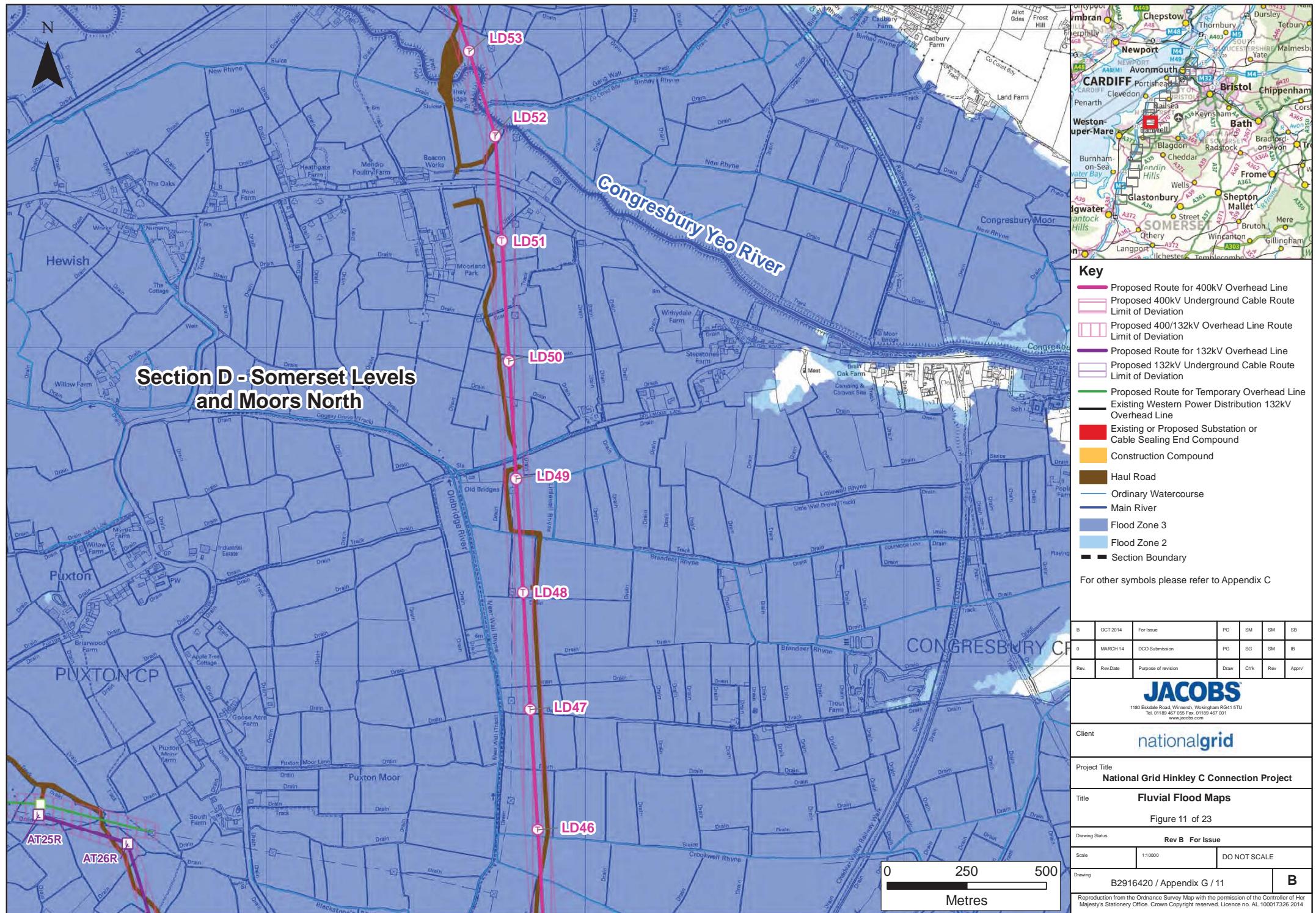


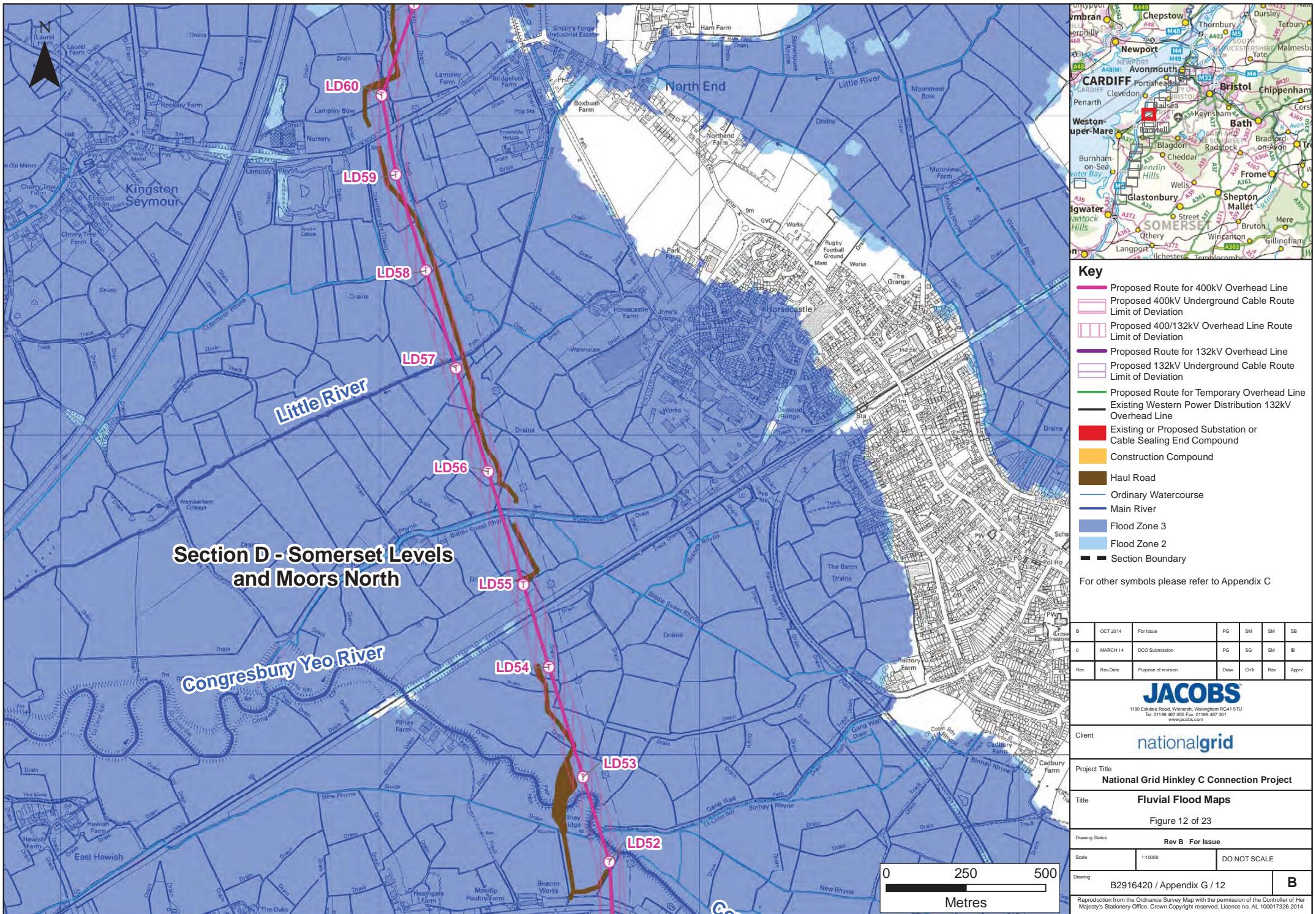


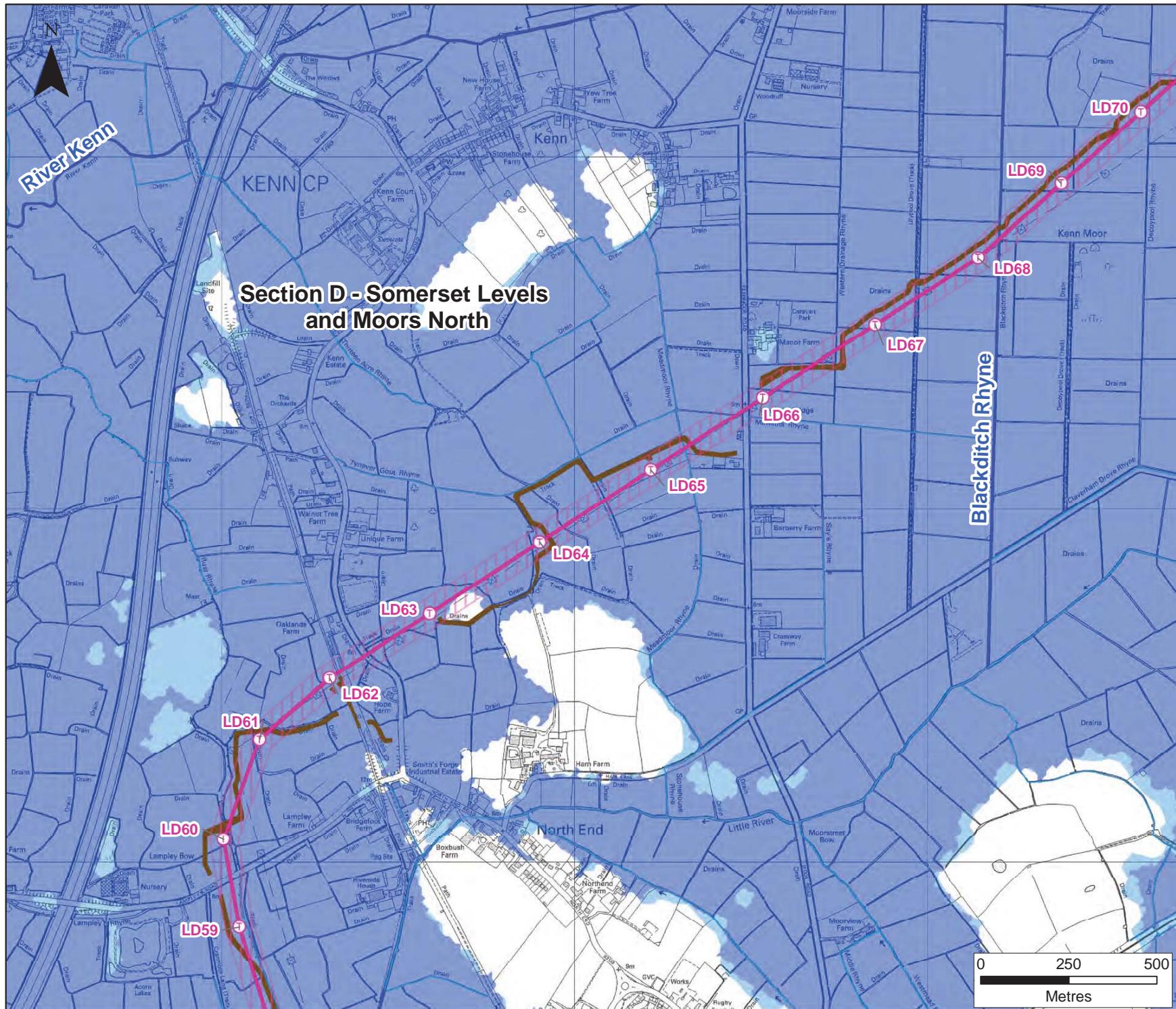












B	OCT 2014	For Issue	PG	SM	SM	SB
0	MARCH 14	DDO Submission	PG	SG	SM	IB
Rev.	Rev.Date	Purpose of revision	Draw	Chk	Rev	Apprv

JACOBS
1180 Eskdale Road, Wimborne, Wimborne BH21 5TU
Tel. 01189 467 005 Fax. 01189 467 001
www.jacobs.com

Client nationalgrid

Project Title National Grid Hinkley C Connection Project

Title Fluvial Flood Maps

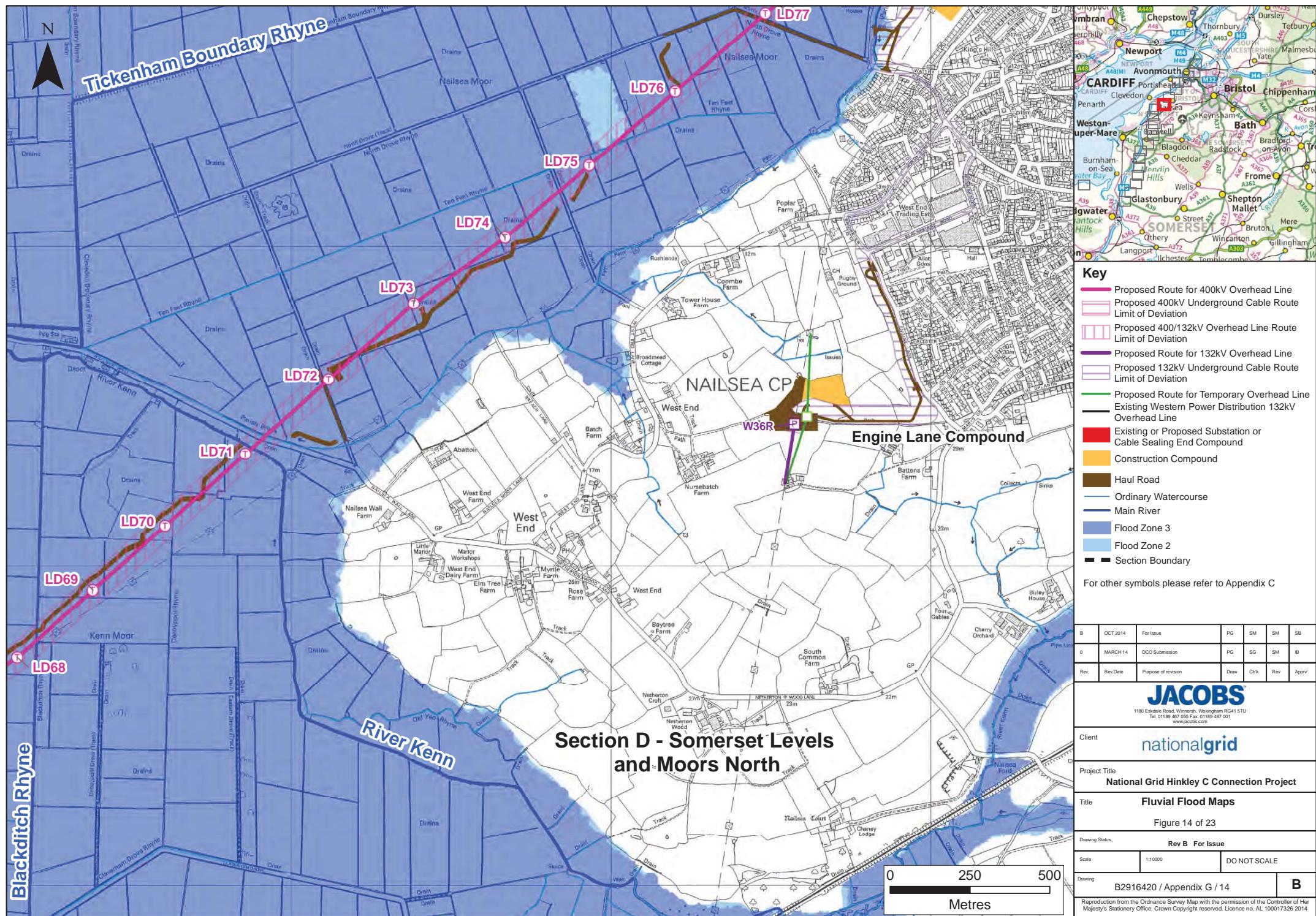
Figure 13 of 23

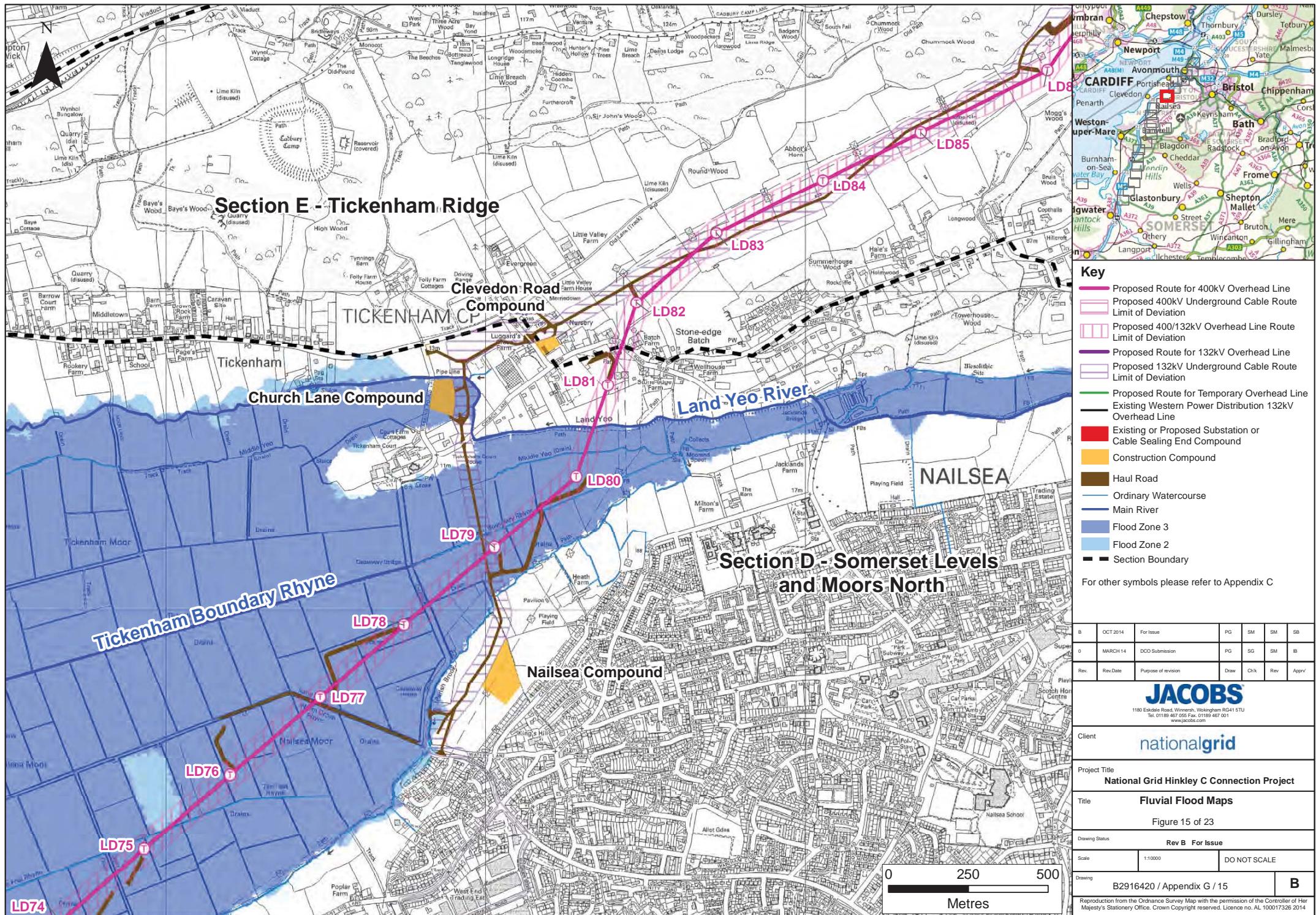
Drawing Status Rev B For Issue

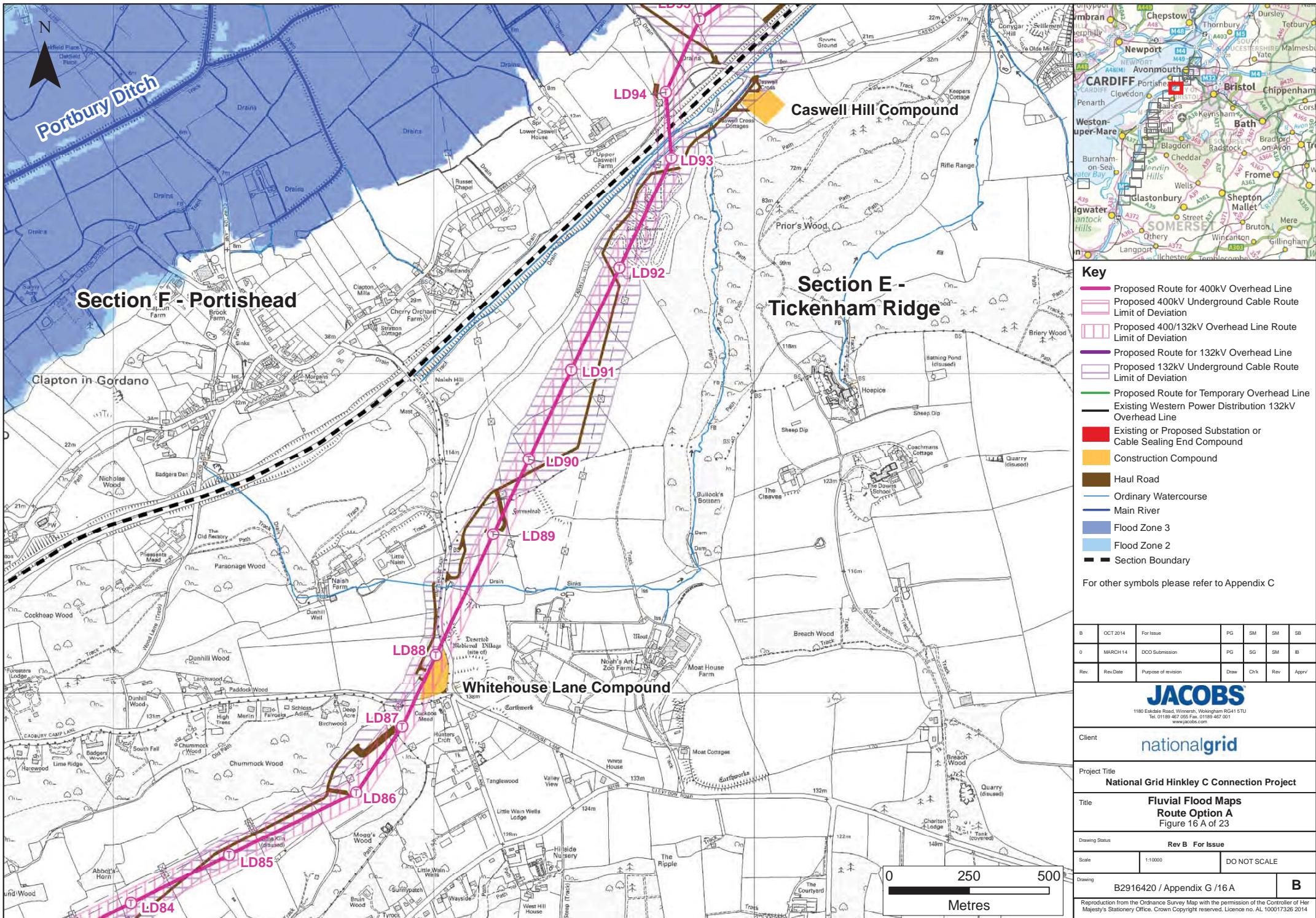
Scale 1:10000 DO NOT SCALE

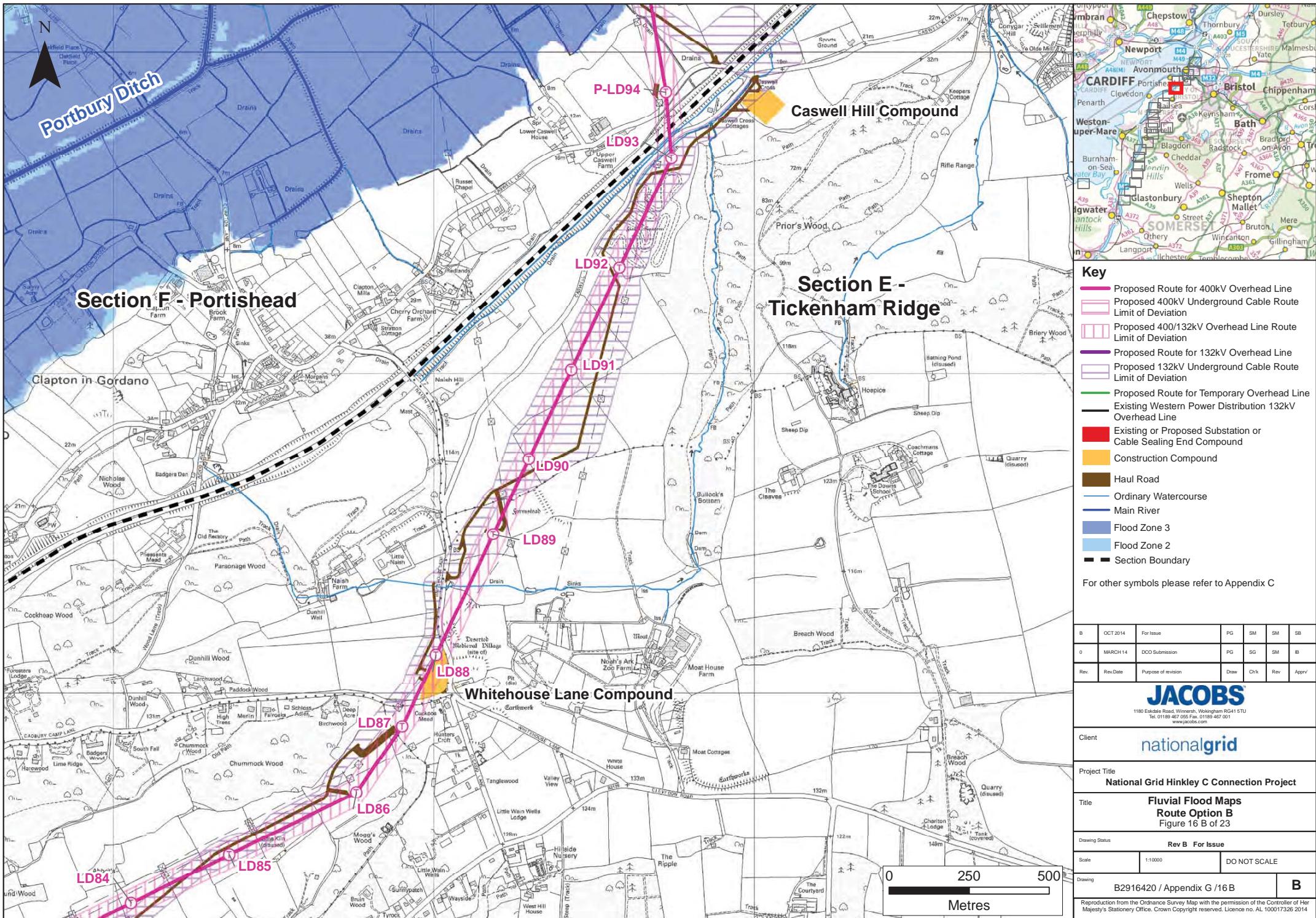
Drawing B2916420 / Appendix G / 13 B

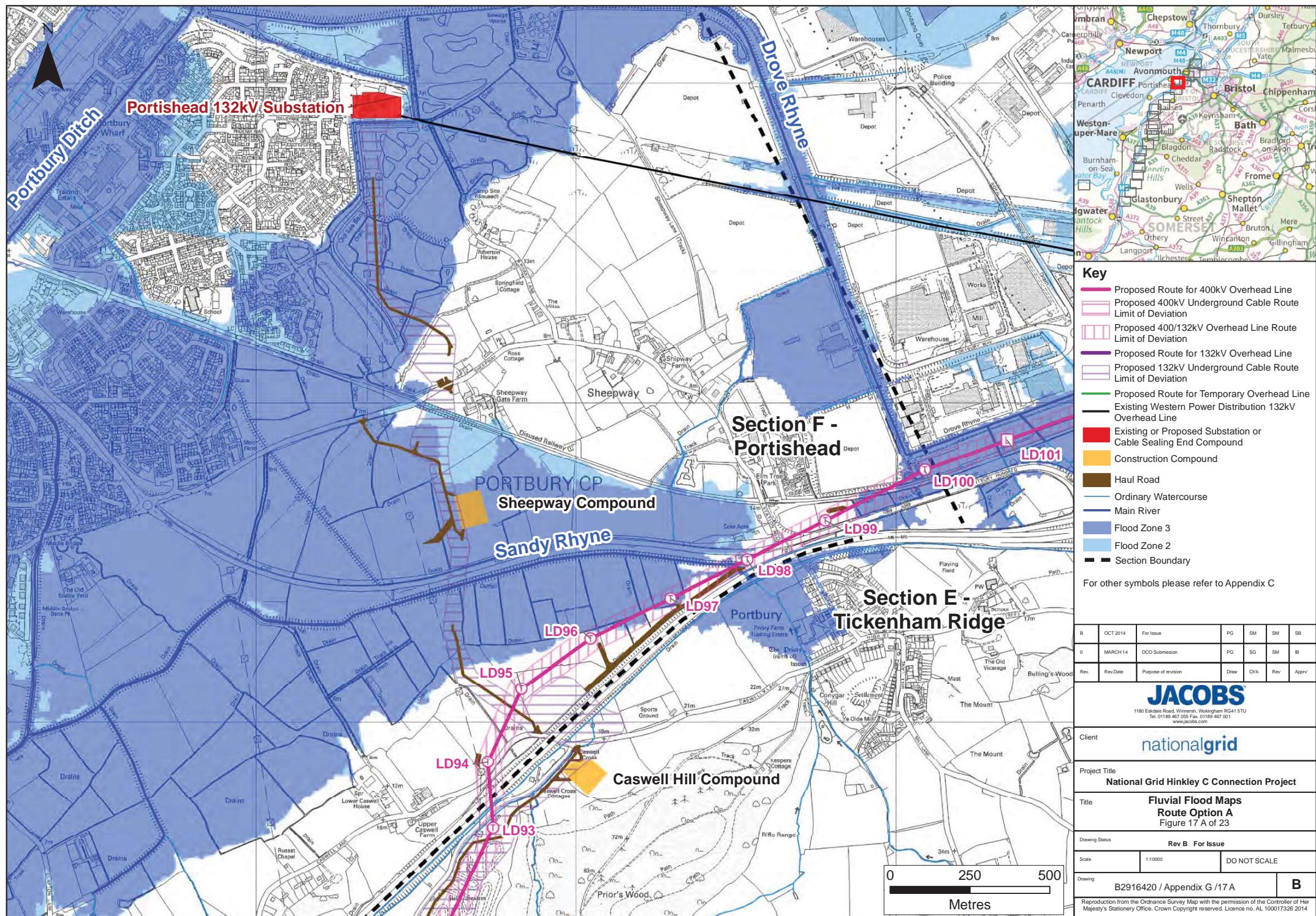
Reproduction from the Ordnance Survey Map with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright reserved. Licence no. AL100017326 2014

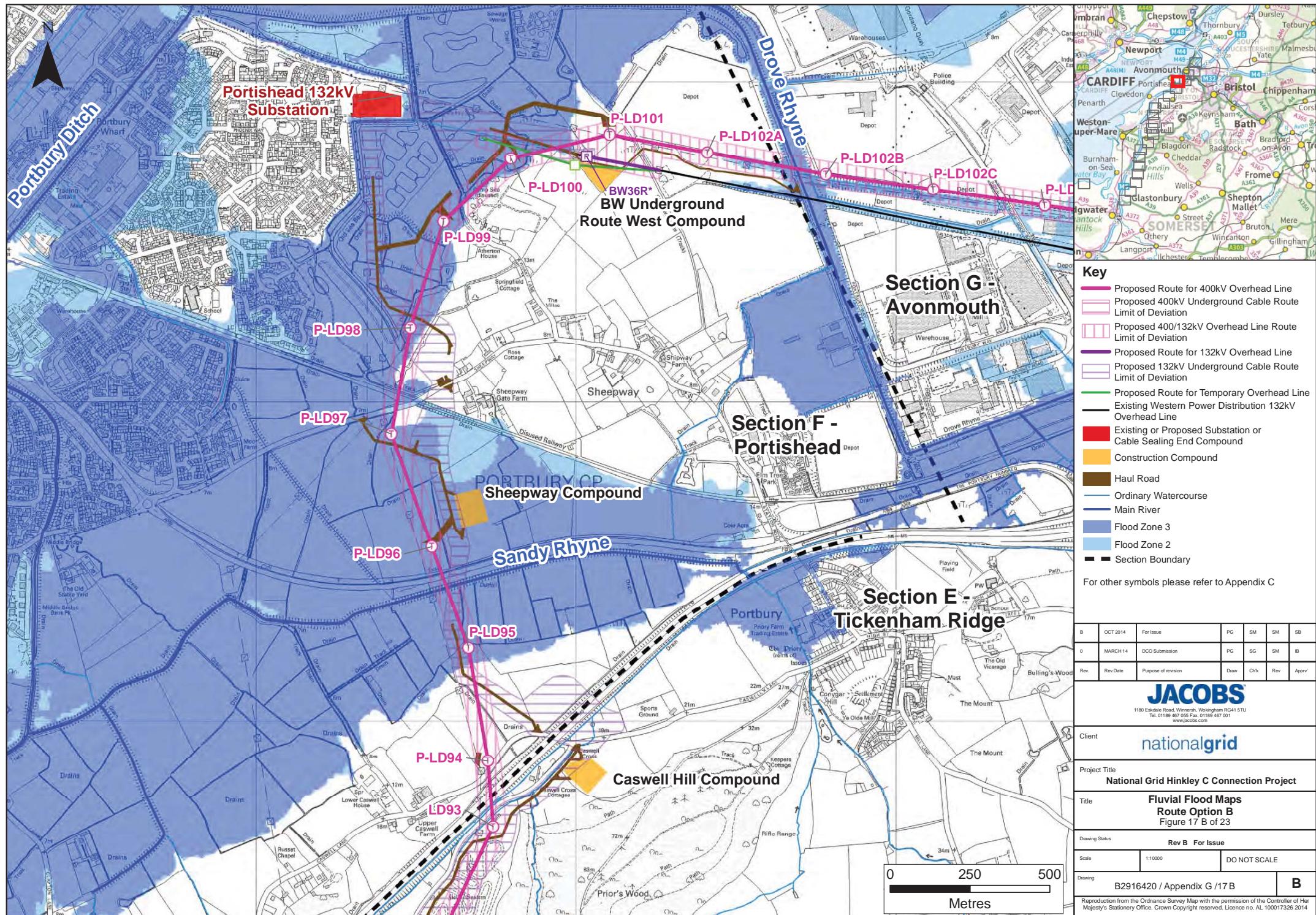


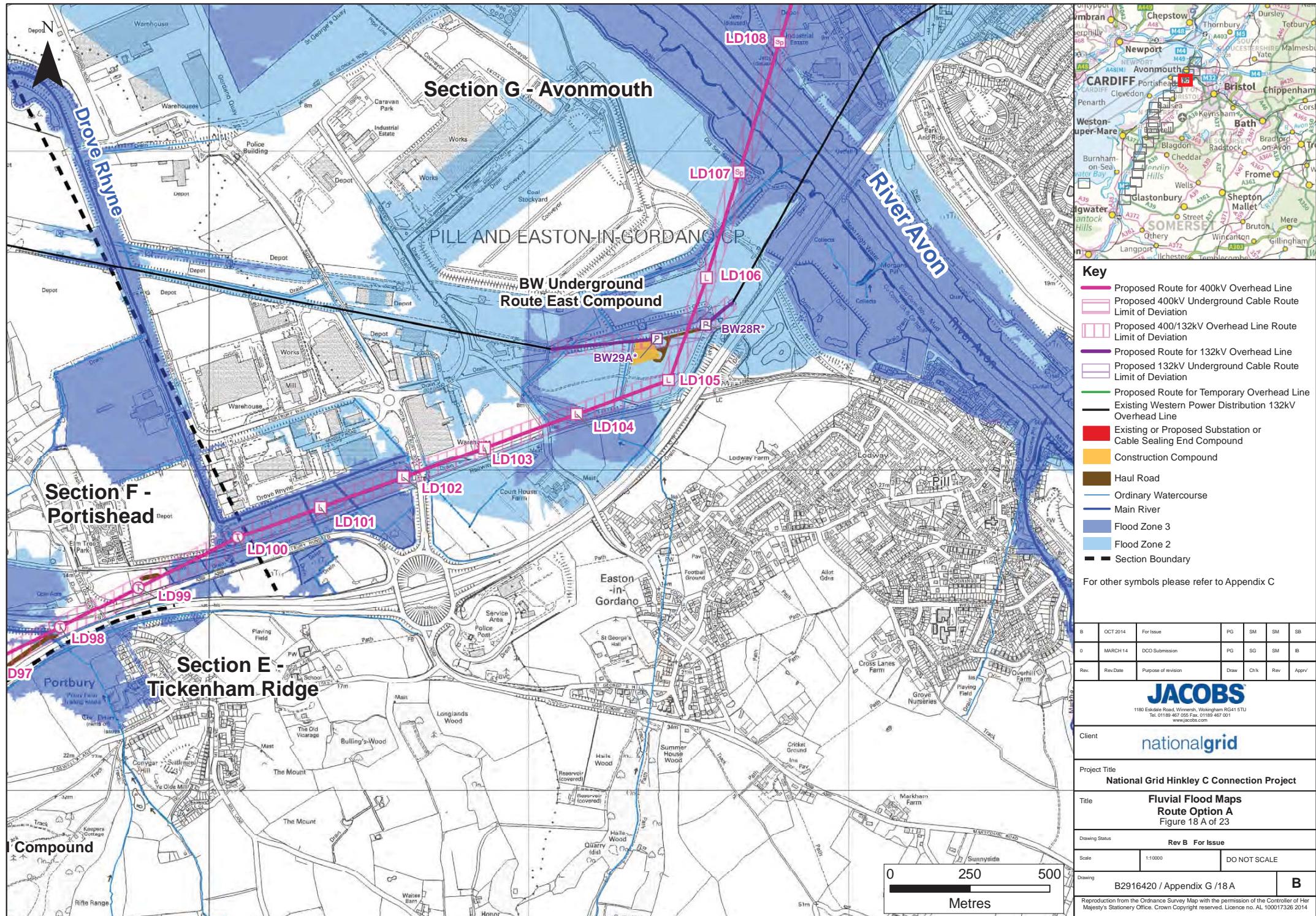


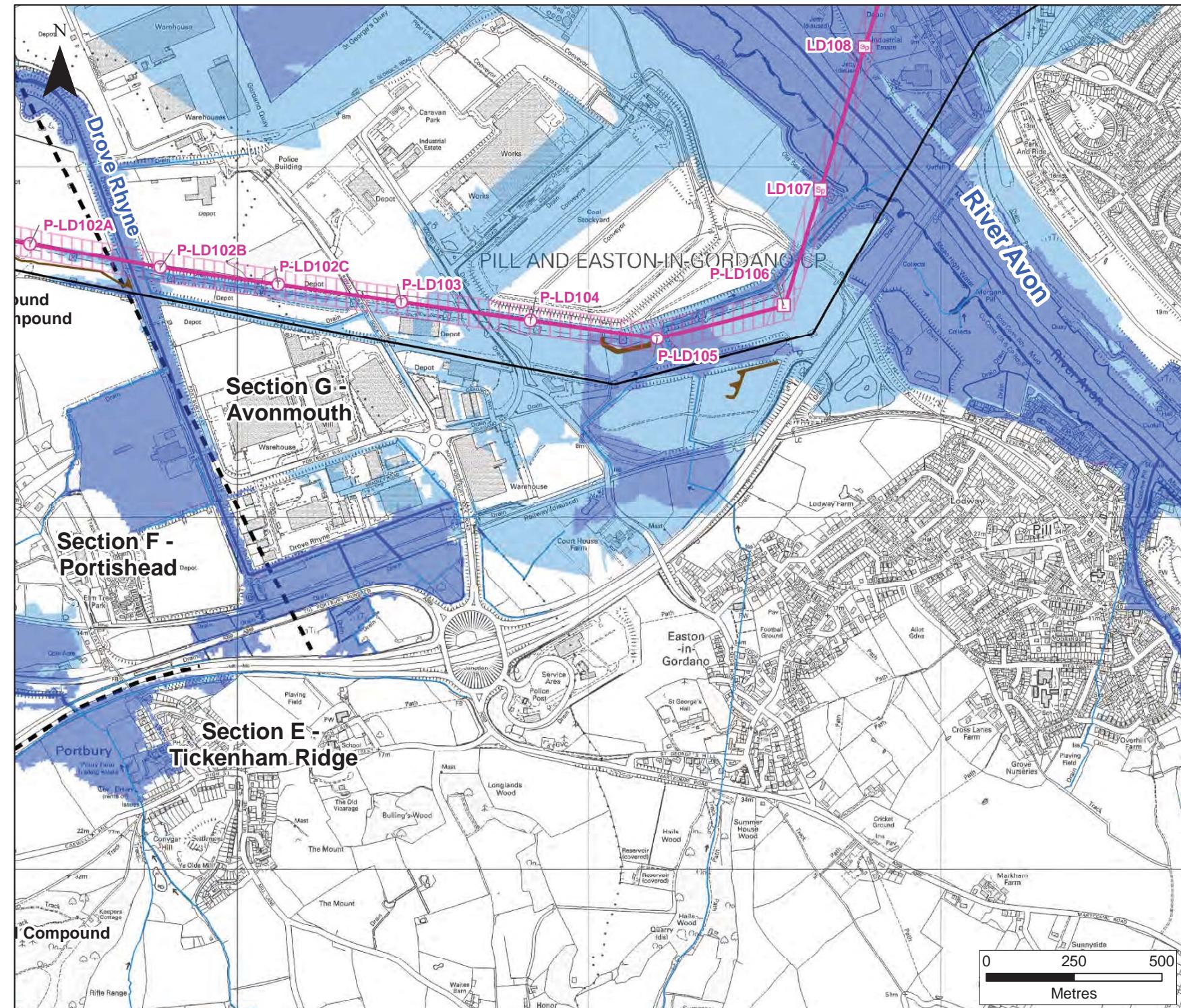












Key

- Proposed Route for 400kV Overhead Line
- Proposed 400kV Underground Cable Route
- Limit of Deviation
- Proposed 400/132kV Overhead Line Route
- Limit of Deviation
- Proposed Route for 132kV Overhead Line
- Proposed 132kV Underground Cable Route
- Limit of Deviation
- Proposed Route for Temporary Overhead Line
- Existing Western Power Distribution 132kV Overhead Line
- Existing or Proposed Substation or Cable Sealing End Compound
- Construction Compound
- Haul Road
- Ordinary Watercourse
- Main River
- Flood Zone 3
- Flood Zone 2
- Section Boundary

For other symbols please refer to Appendix C

B	OCT 2014	For Issue	PG	SM	SM	SB
0	MARCH 14	DCO Submission	PG	SG	SM	IB

JACOBS

10 Eskdale Road, Winnersh, Wokingham RG41 5TU

www.ijerpi.org

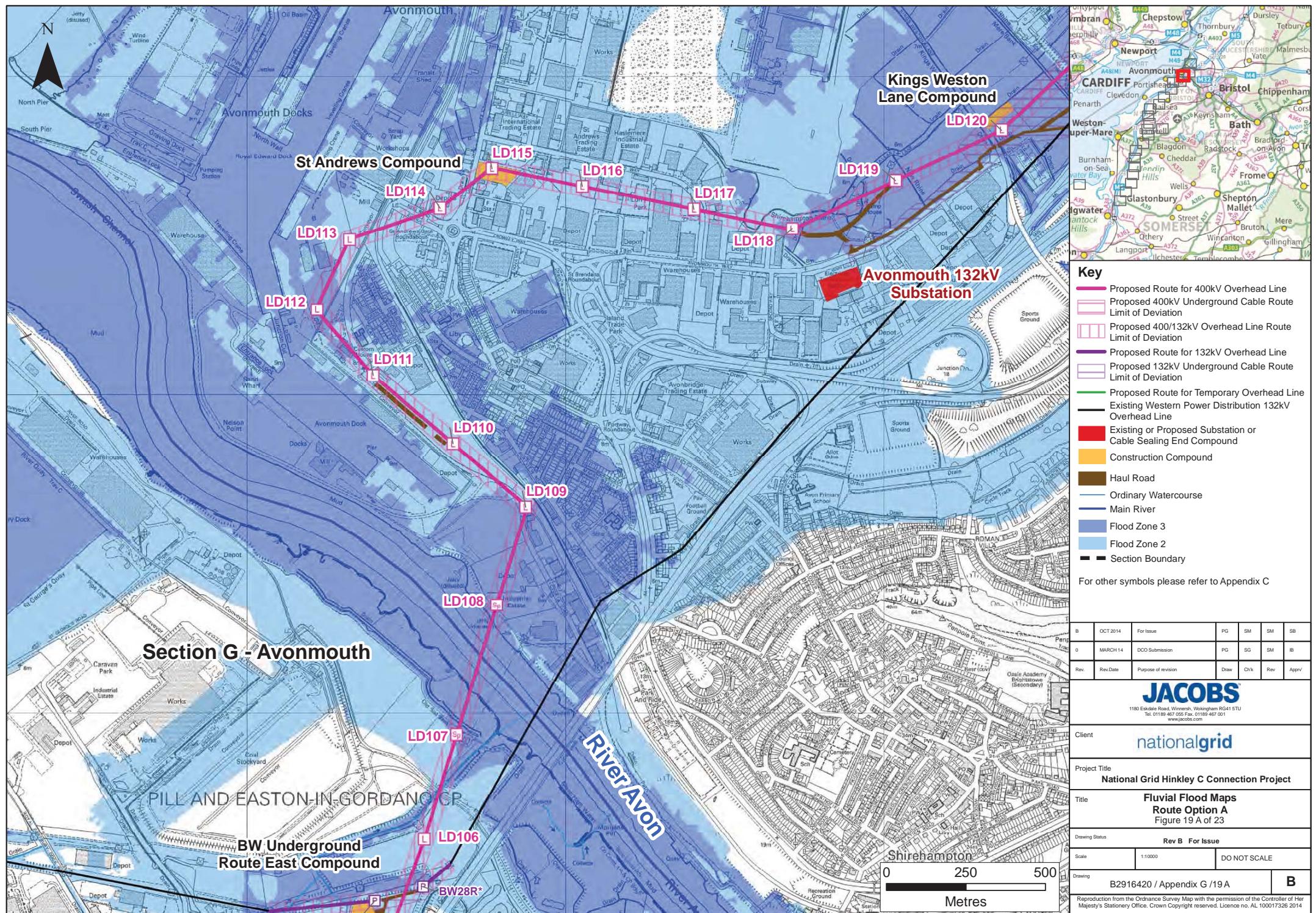
Project Title
National Grid Hinkley C Connection Project

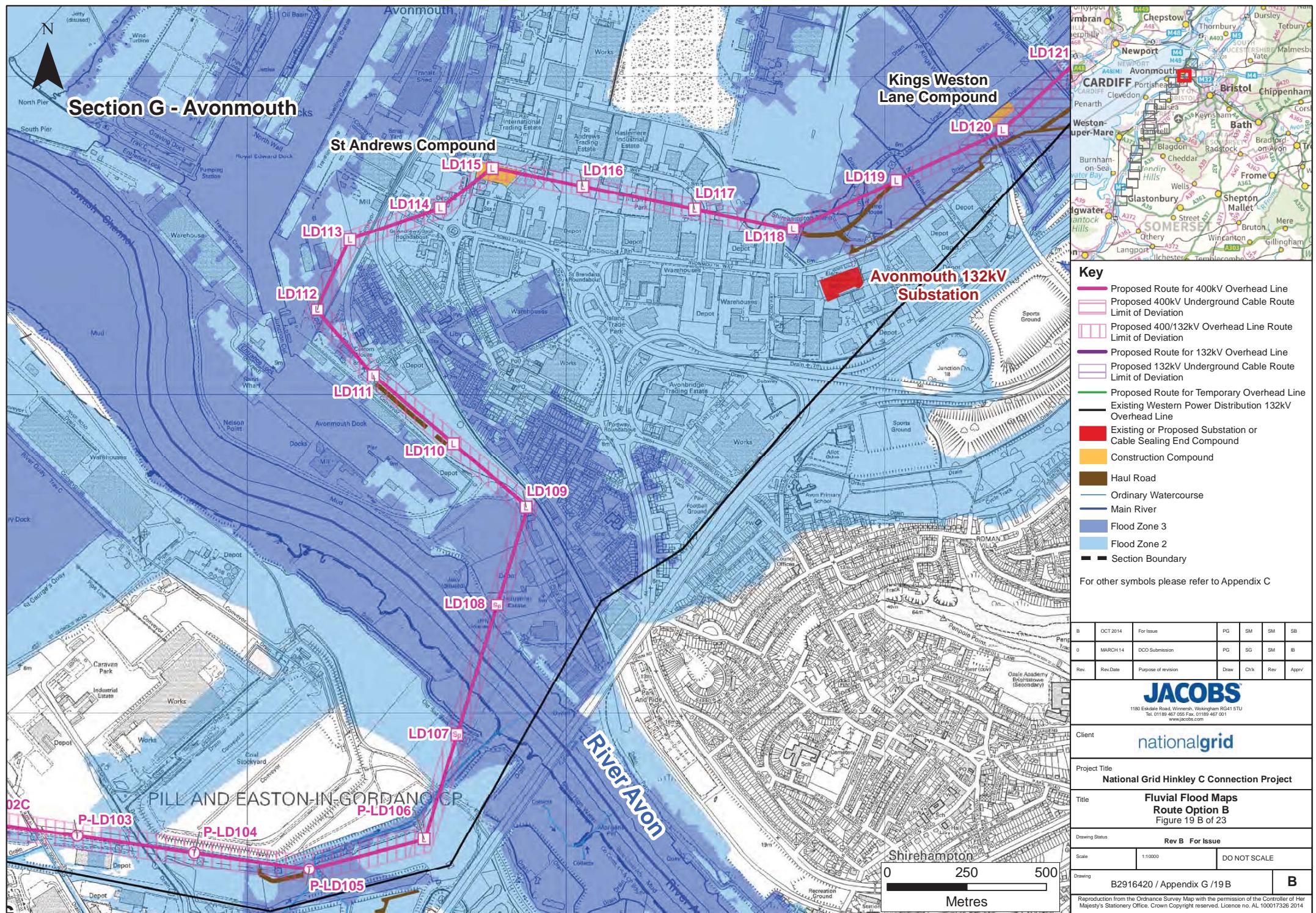
**Fluvial Flood Maps
Route Option B
Figure 18 B of 23**

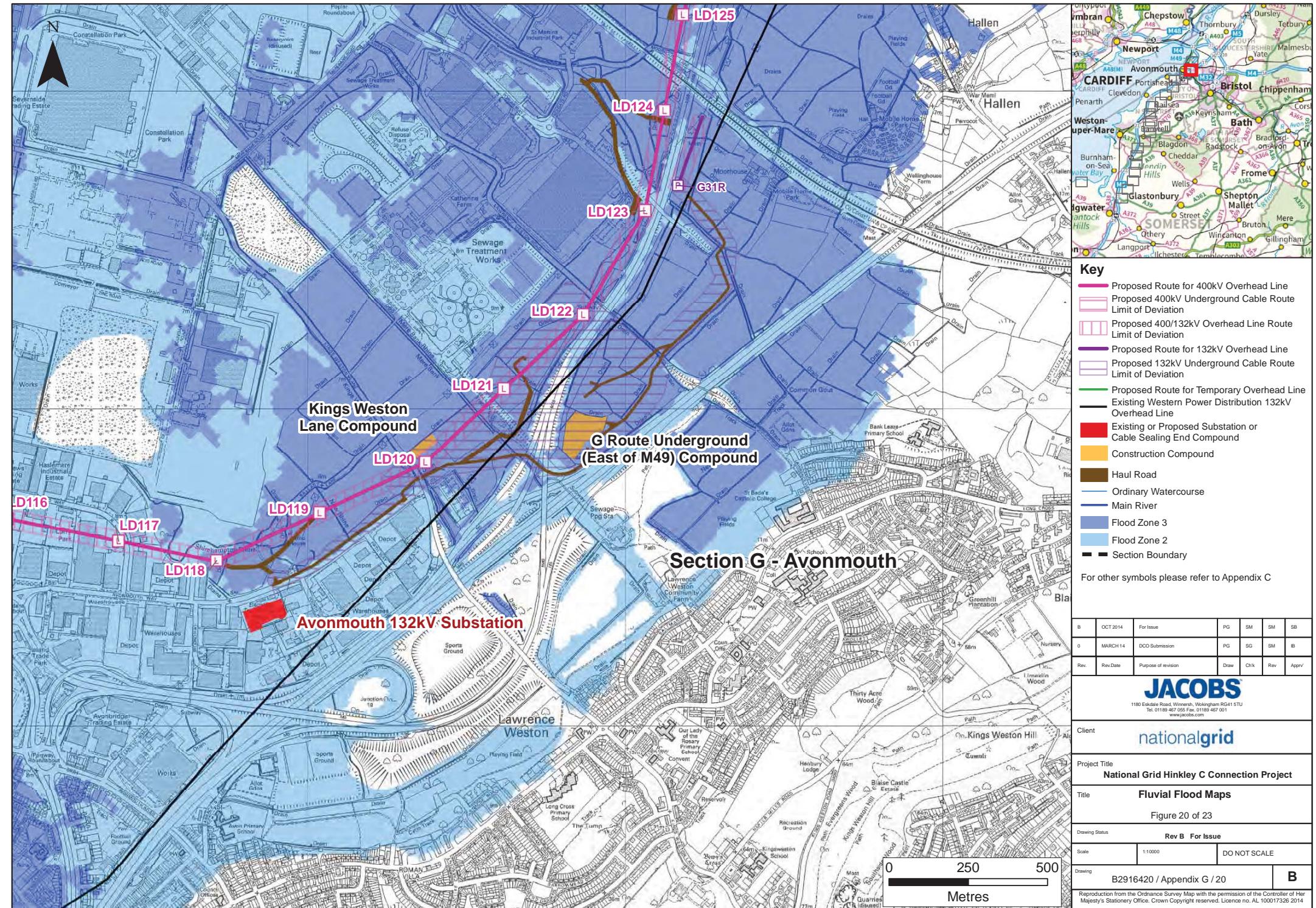
Rev B For Issue

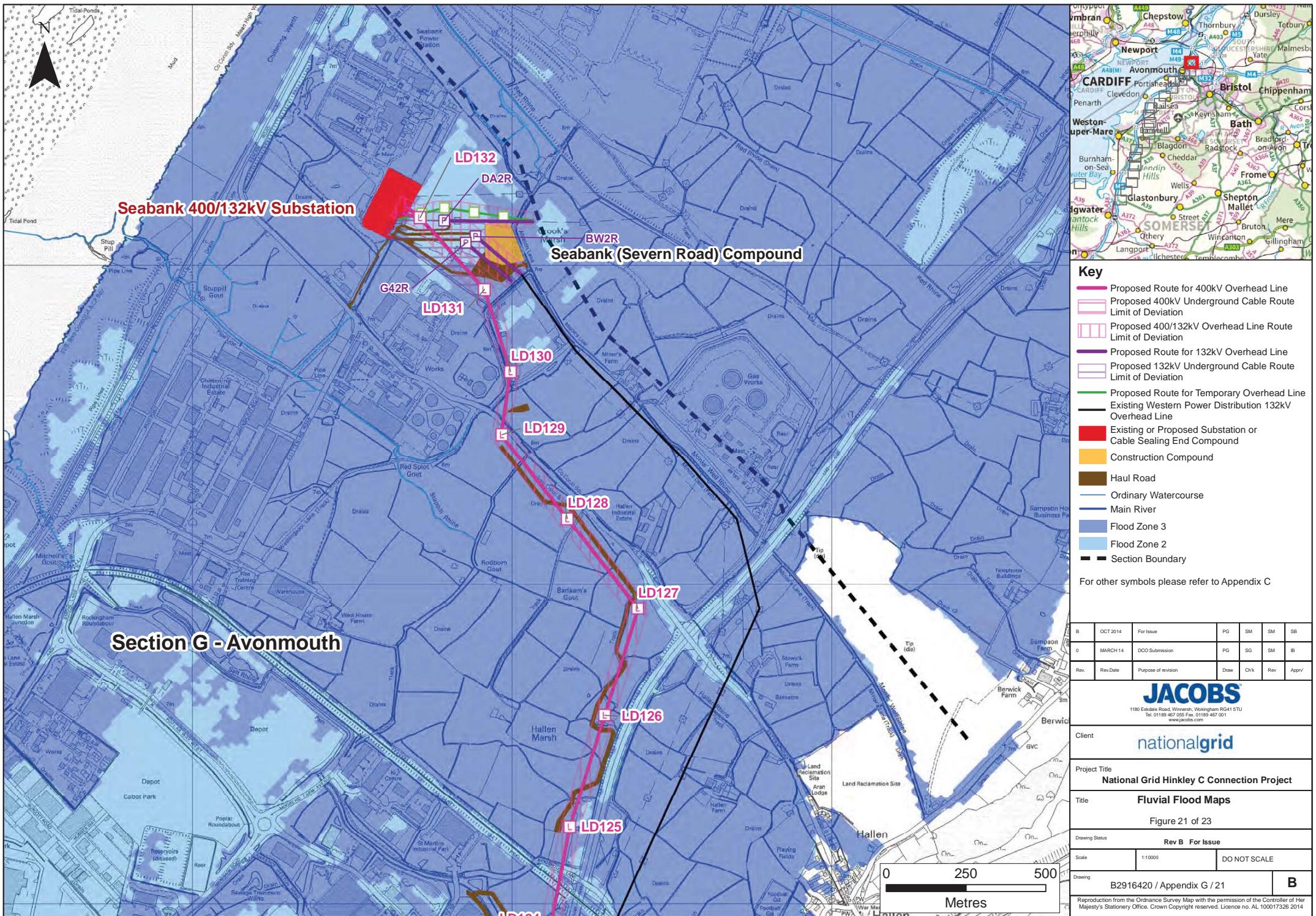
rawing B2916420 / Appendix G /18 B B

Reproduction from the Ordnance Survey Map with the permission of the Controller of Her Majesty's Stationery Office. Crown Copyright reserved. Licence no. AL 100017326 2014

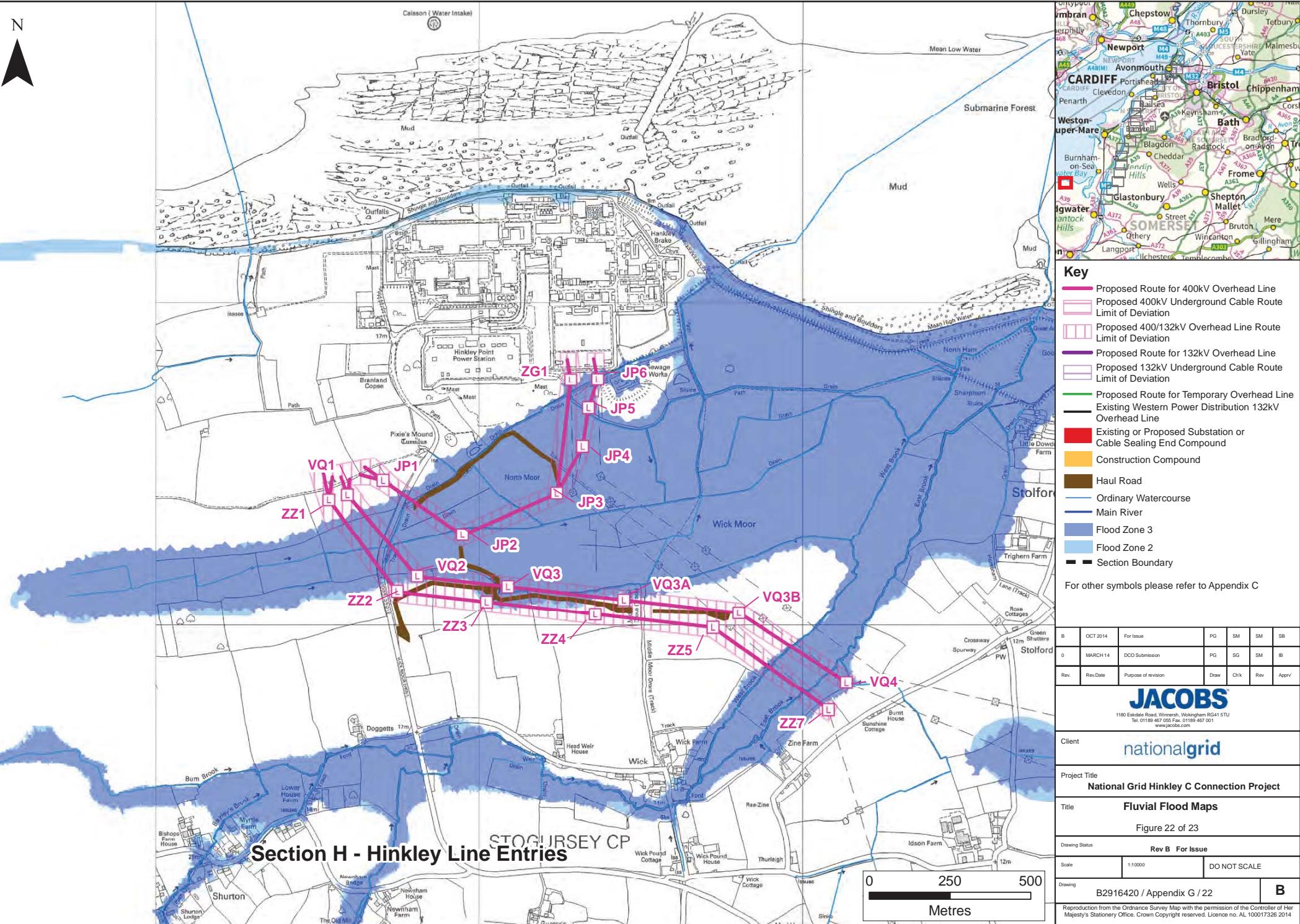


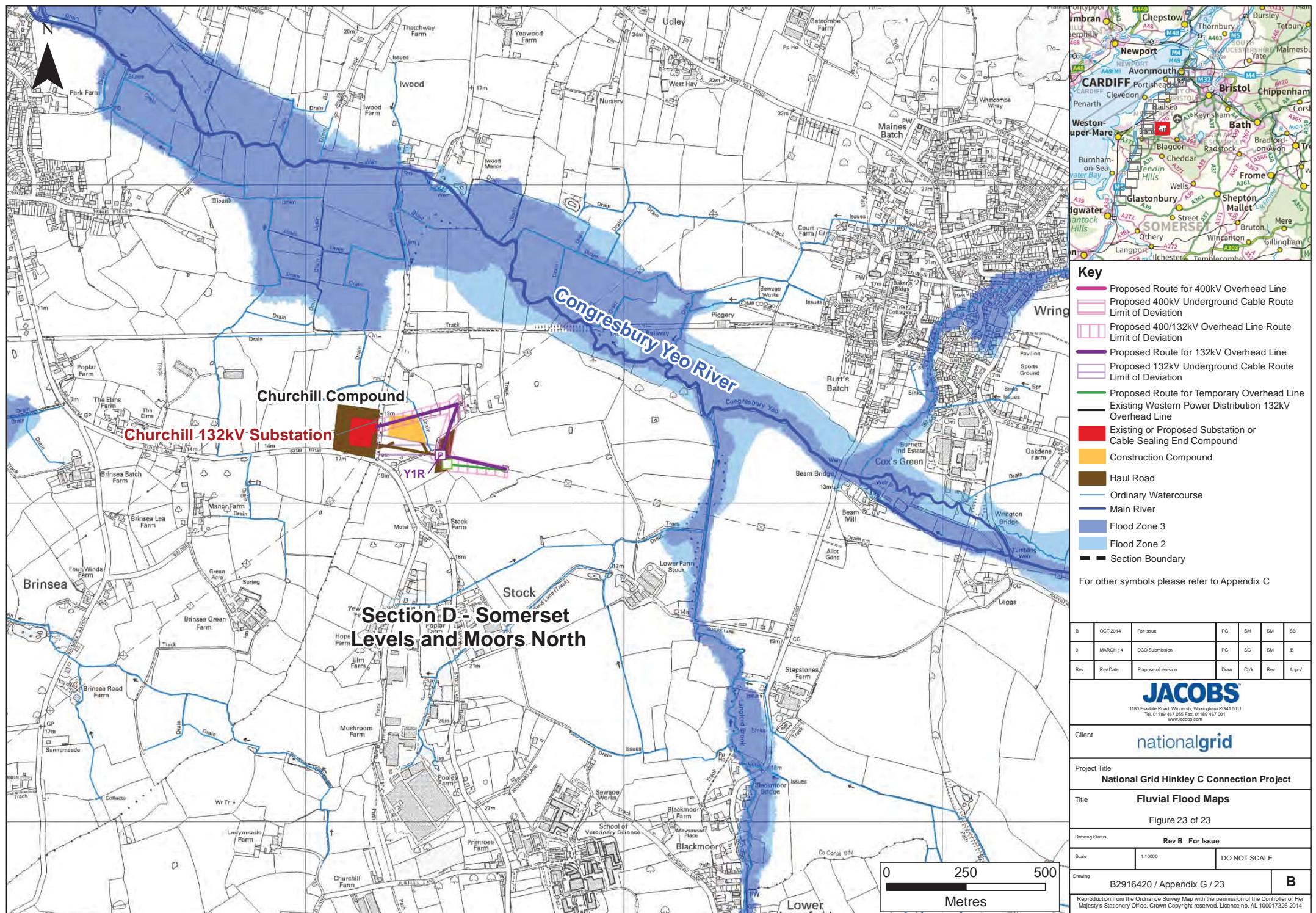




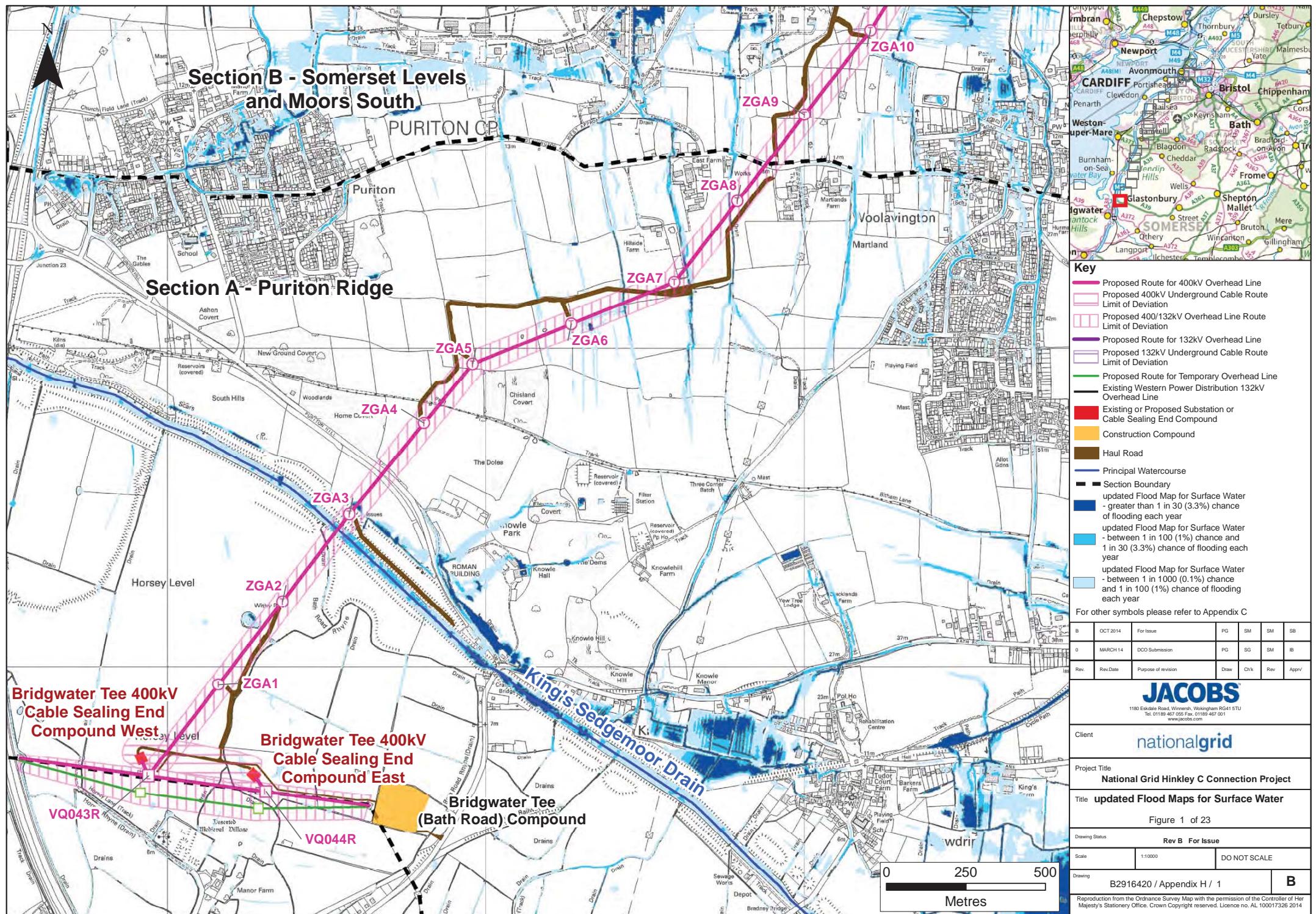


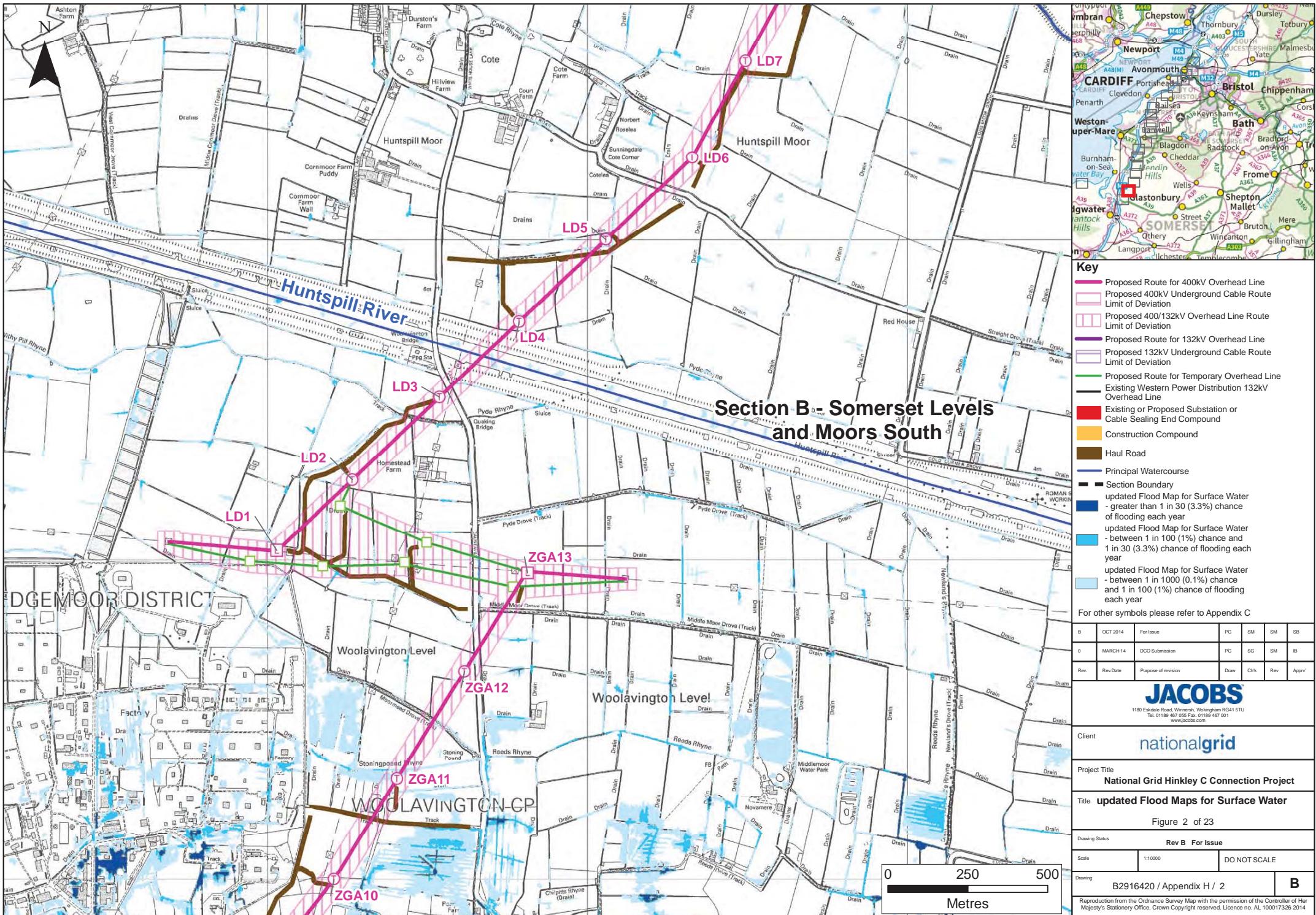
N

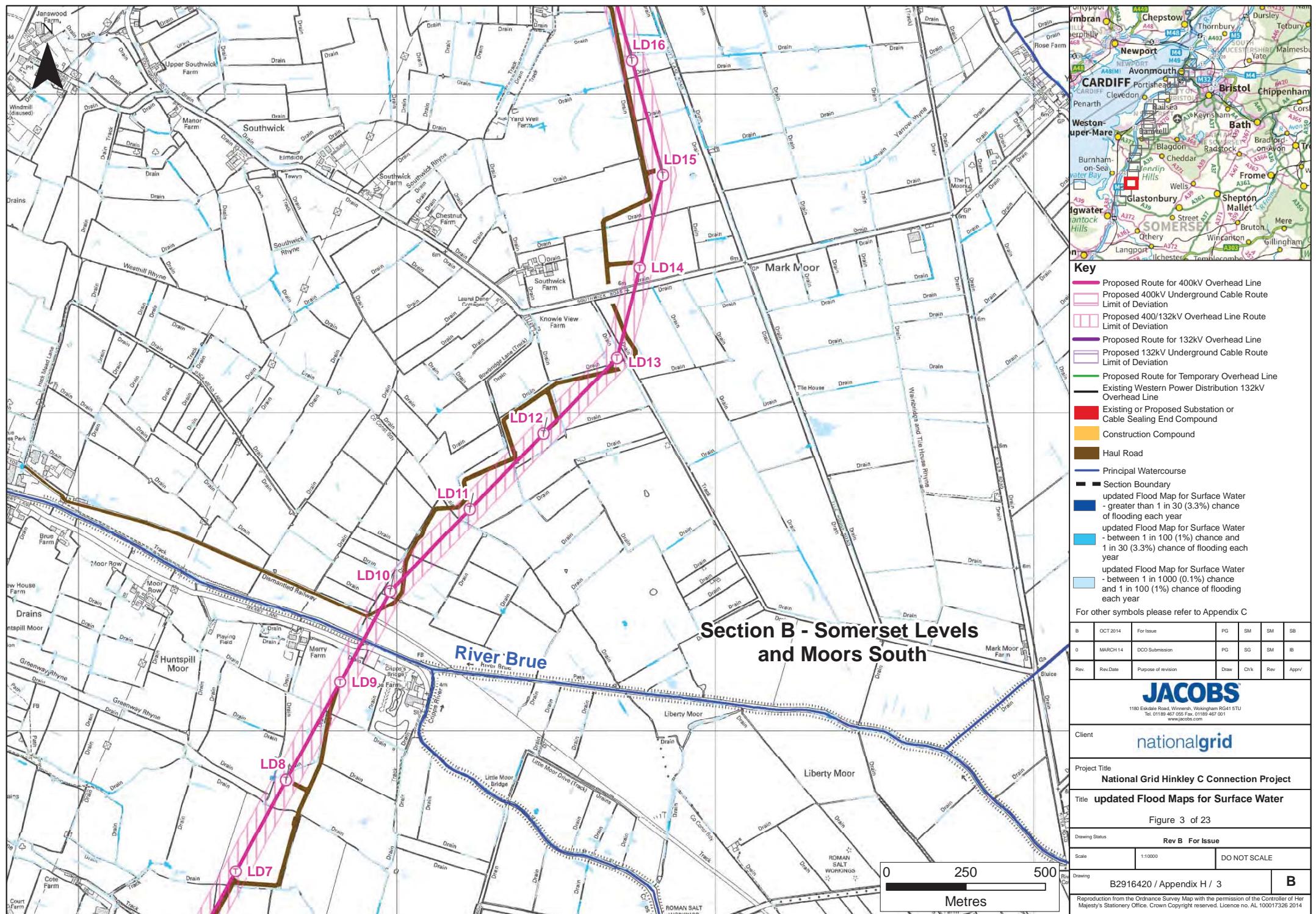


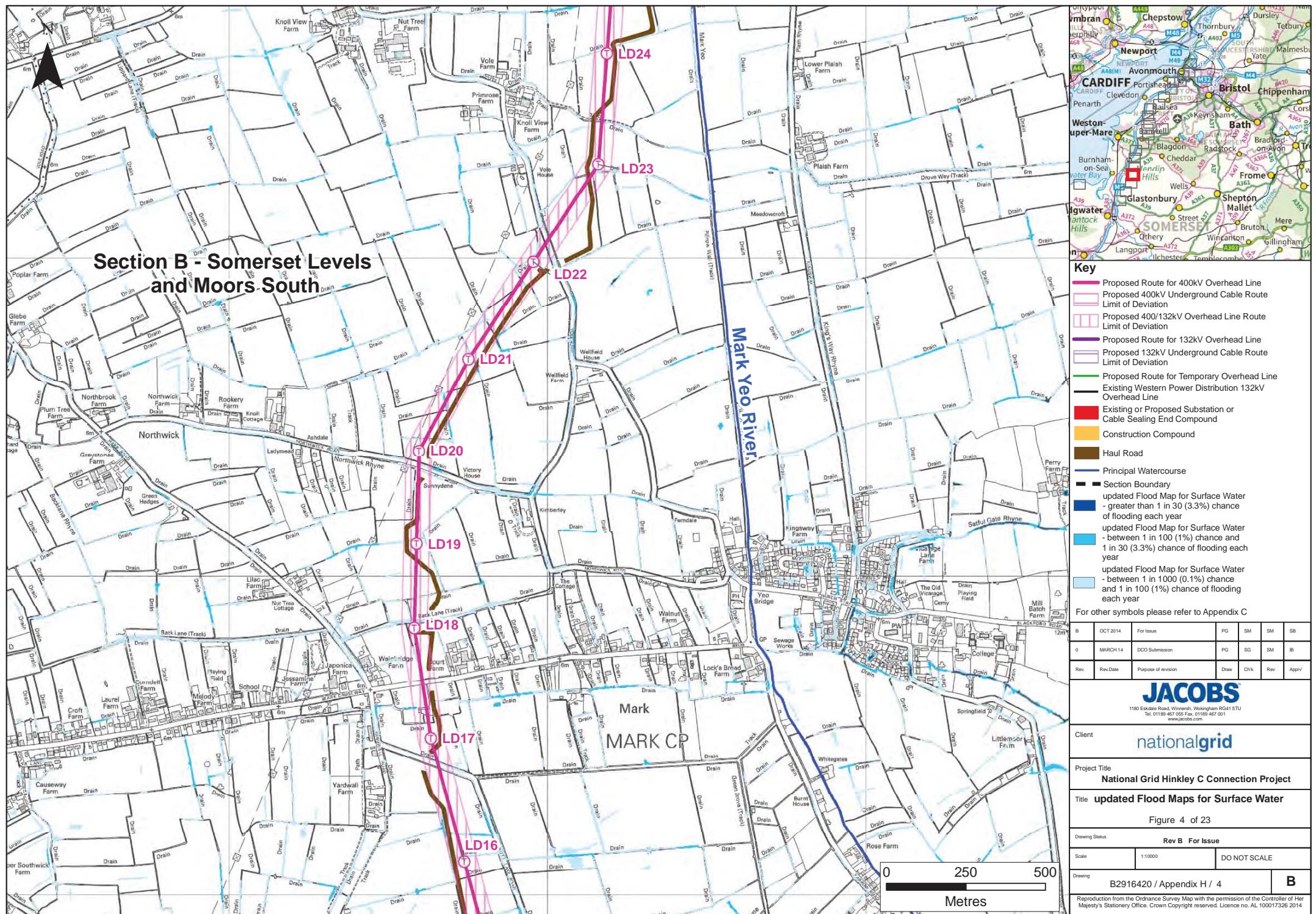


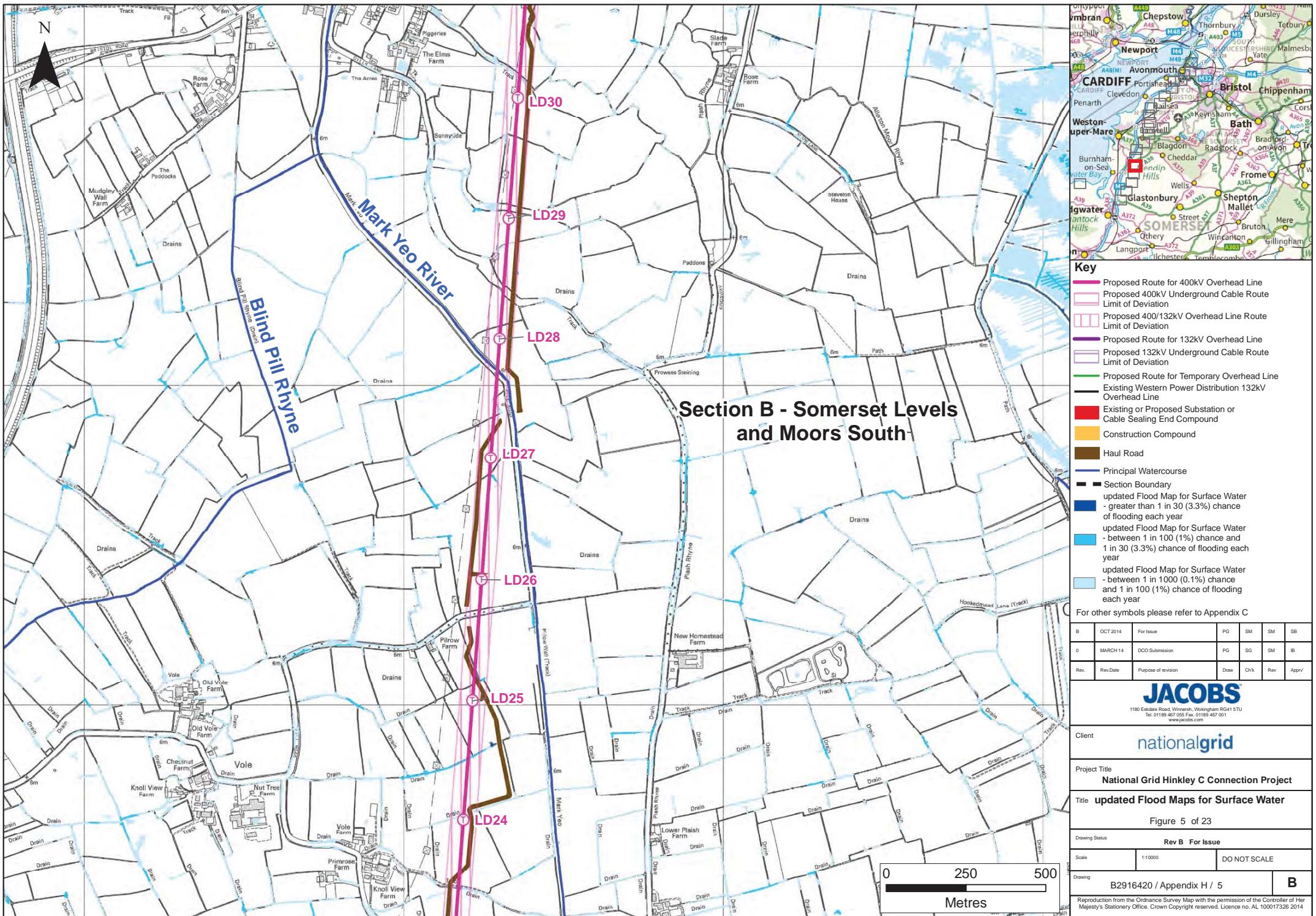
Appendix H – Updated Flood Maps for Surface Water

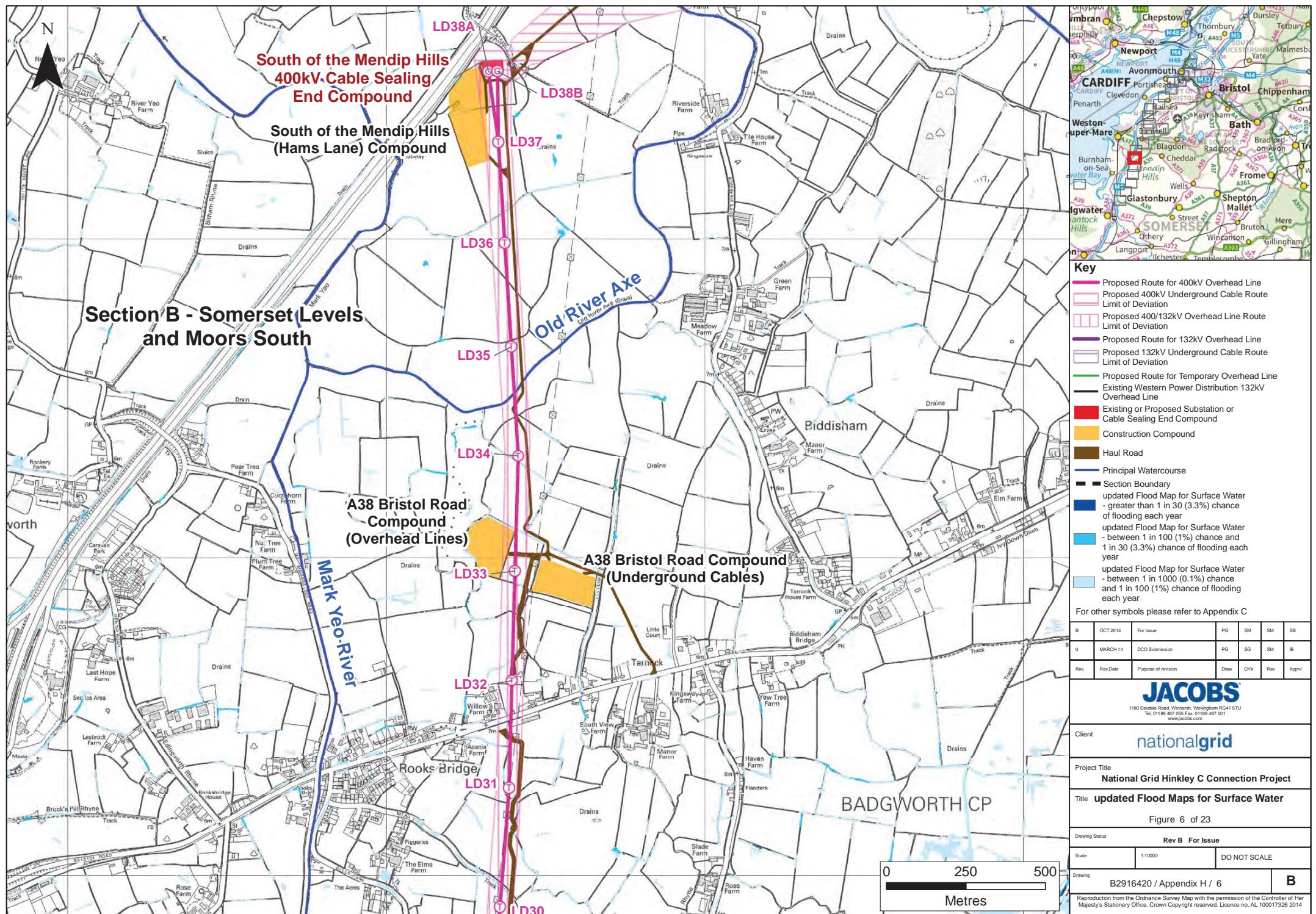


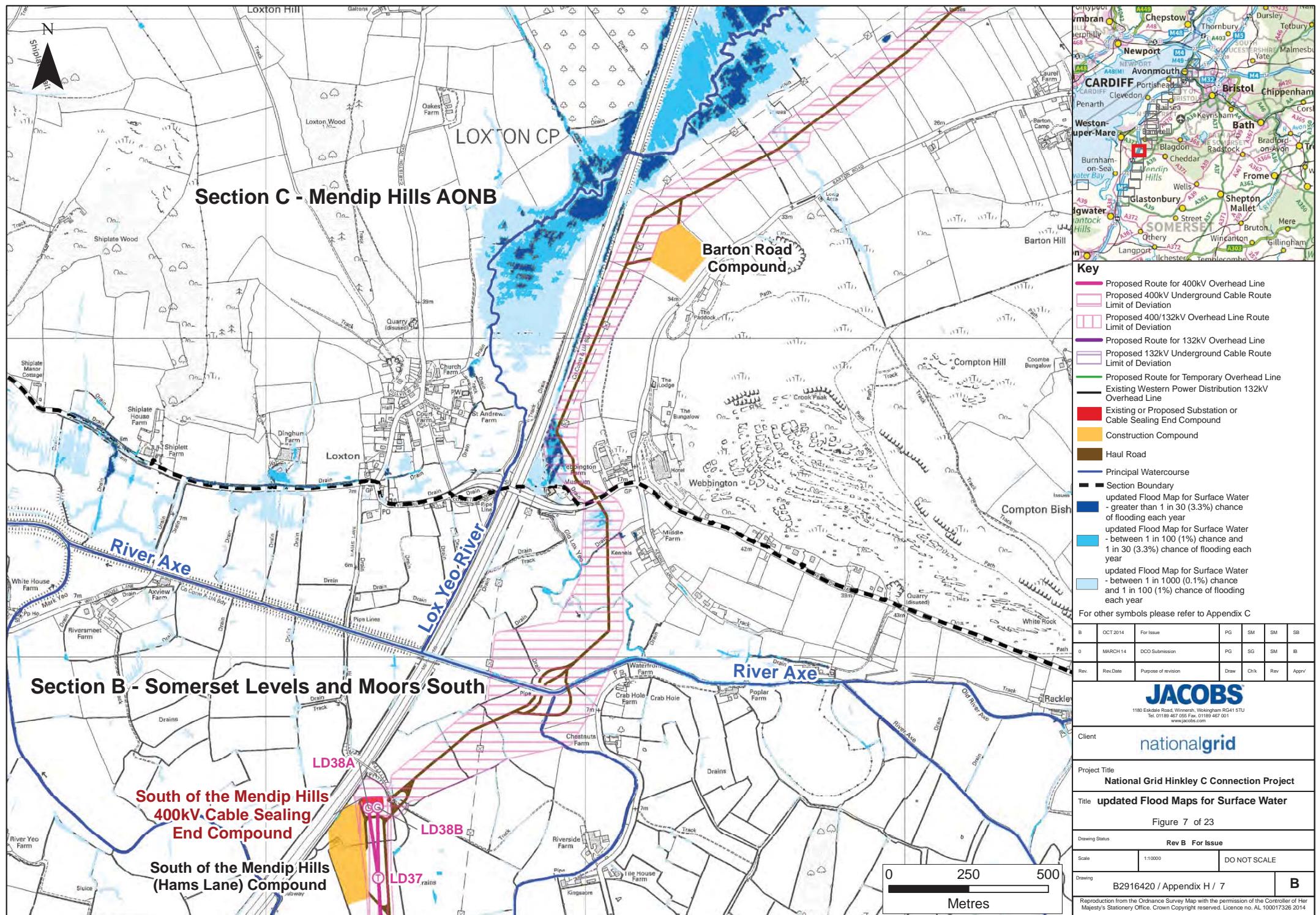


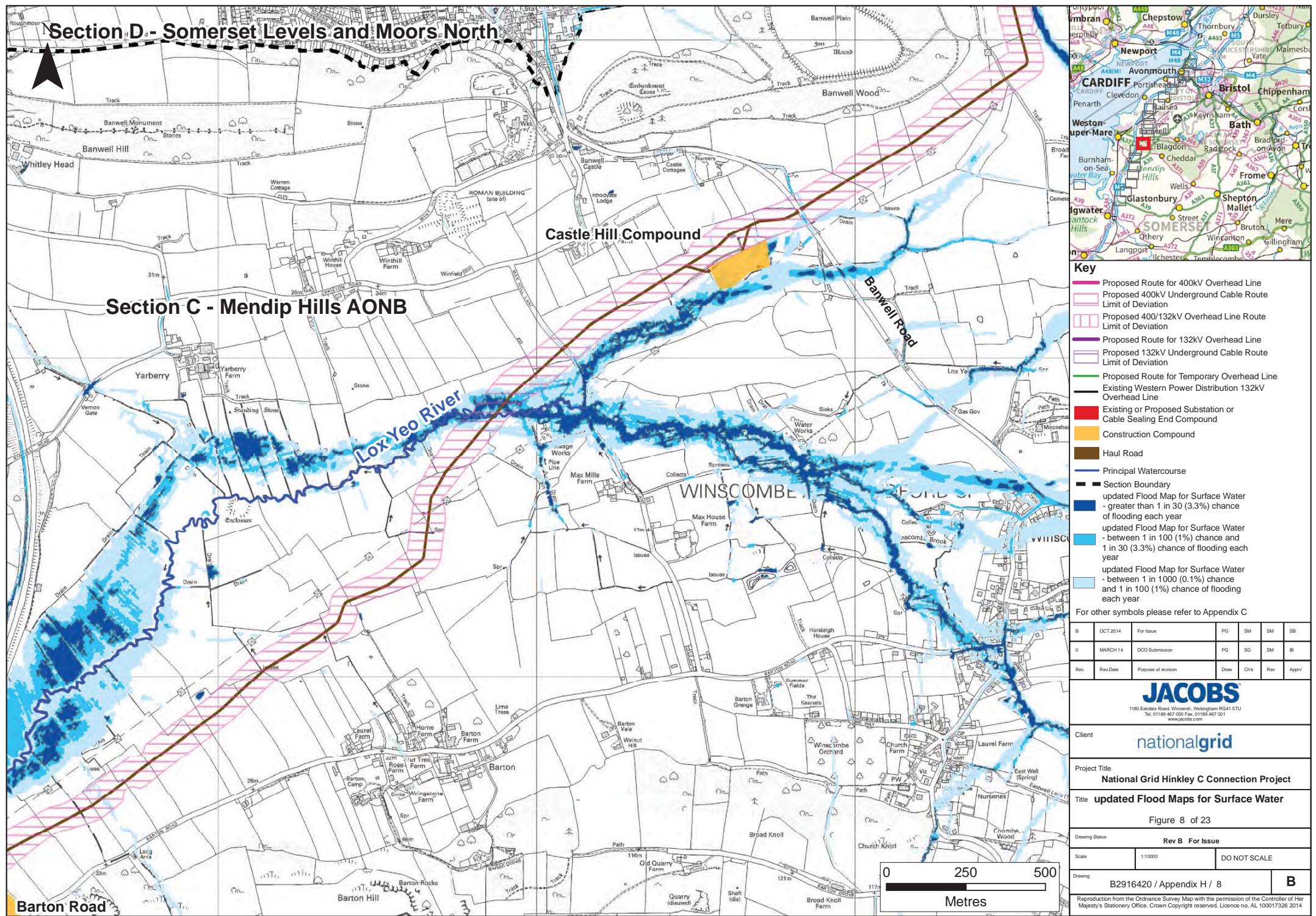


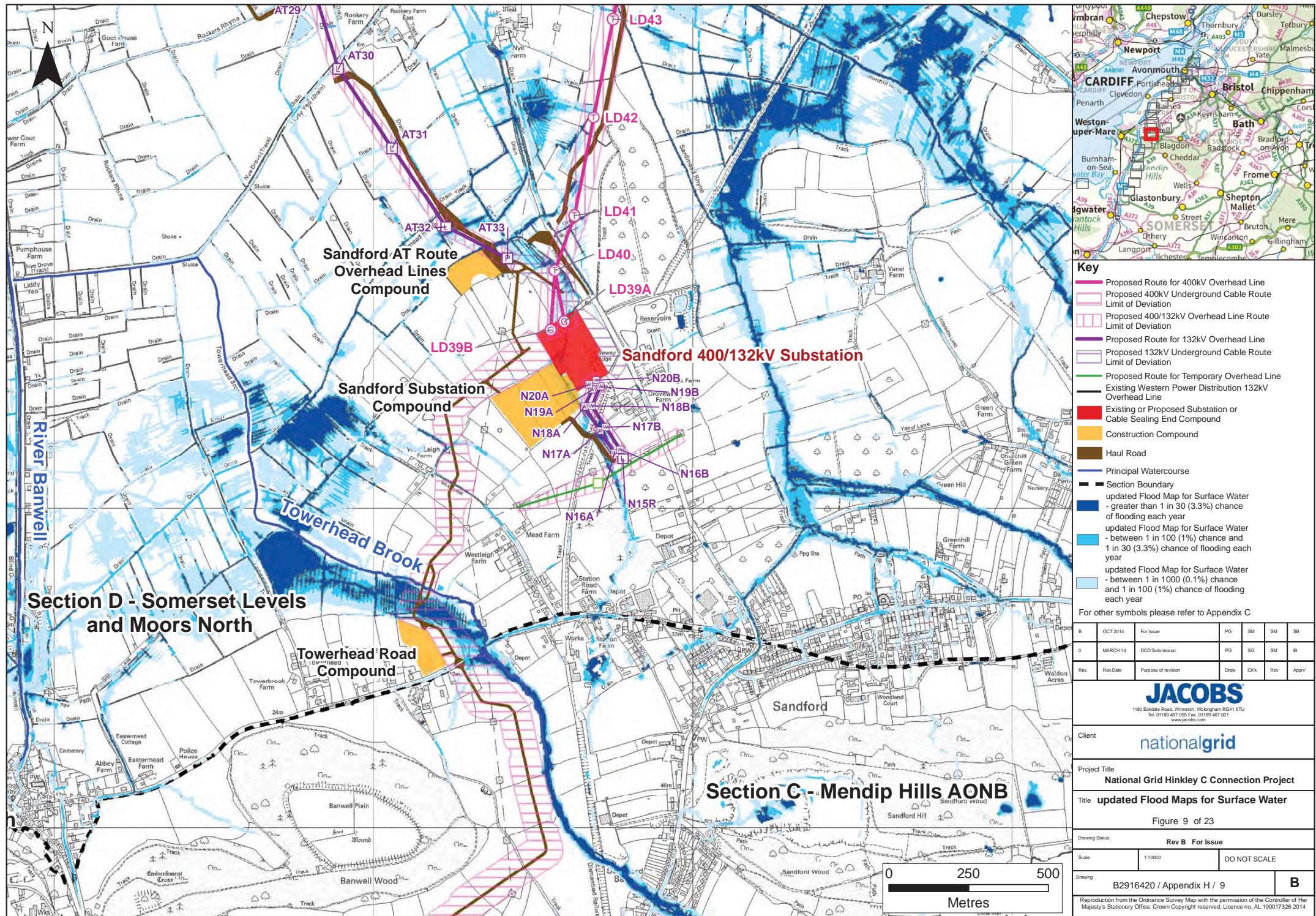


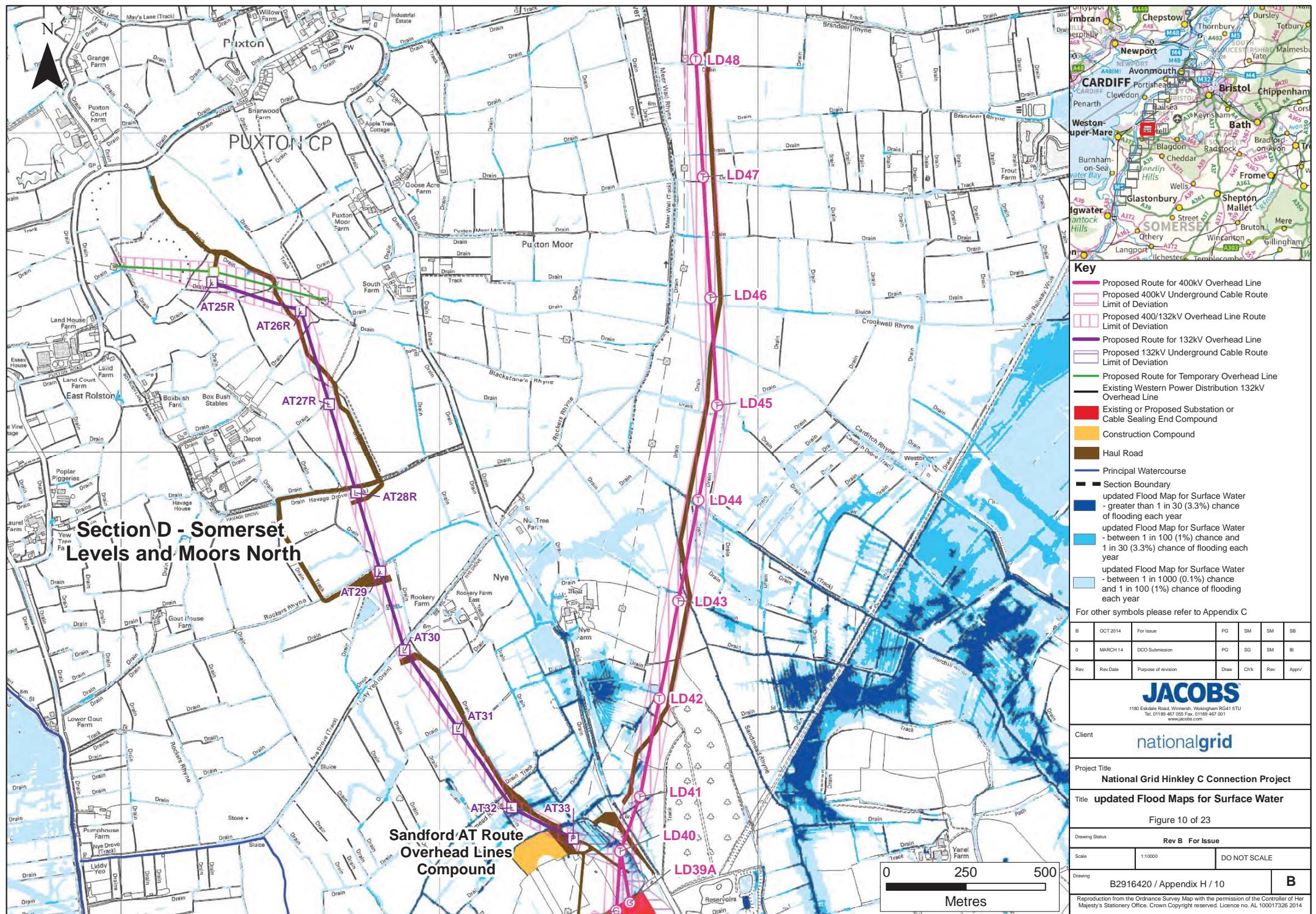


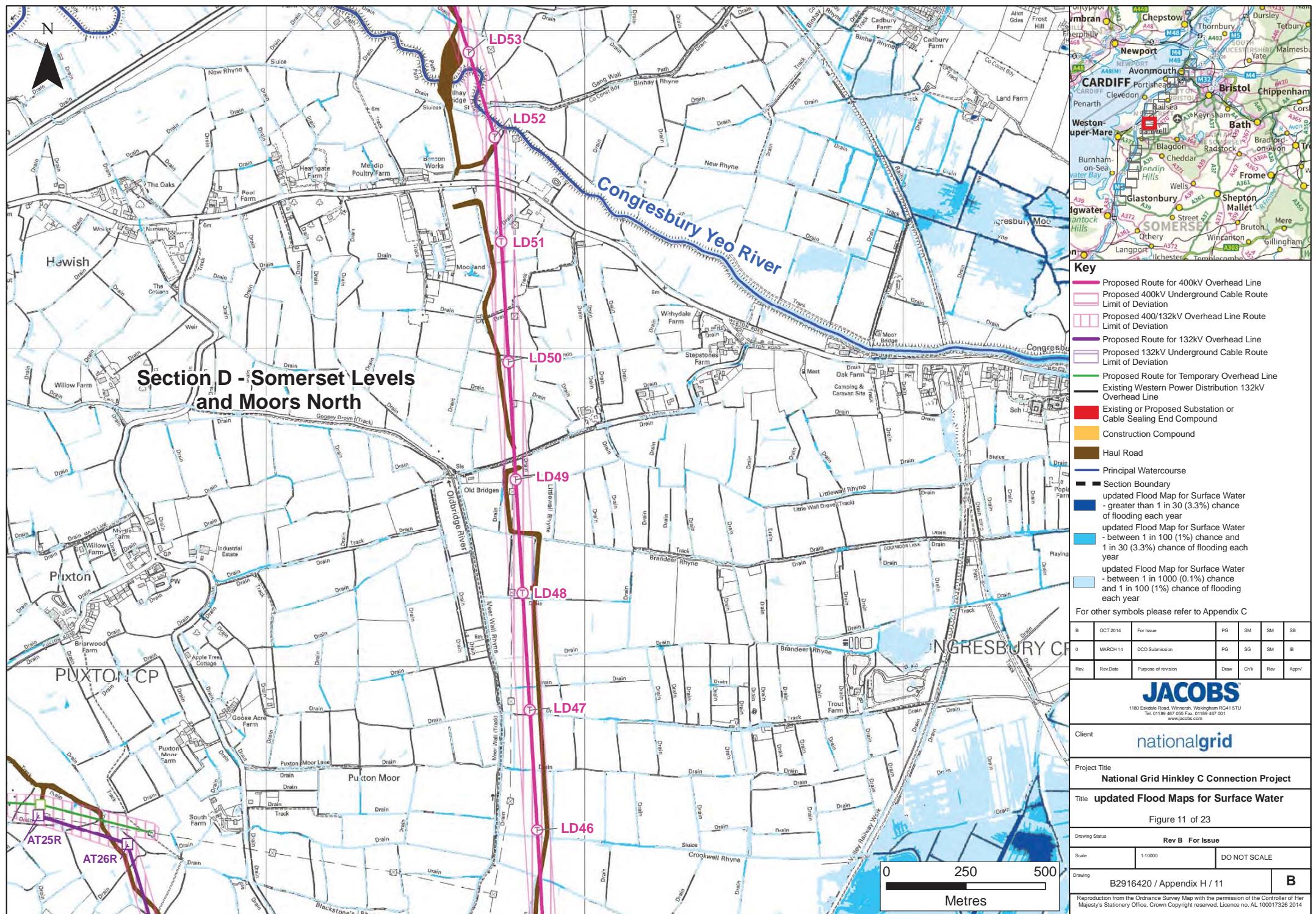


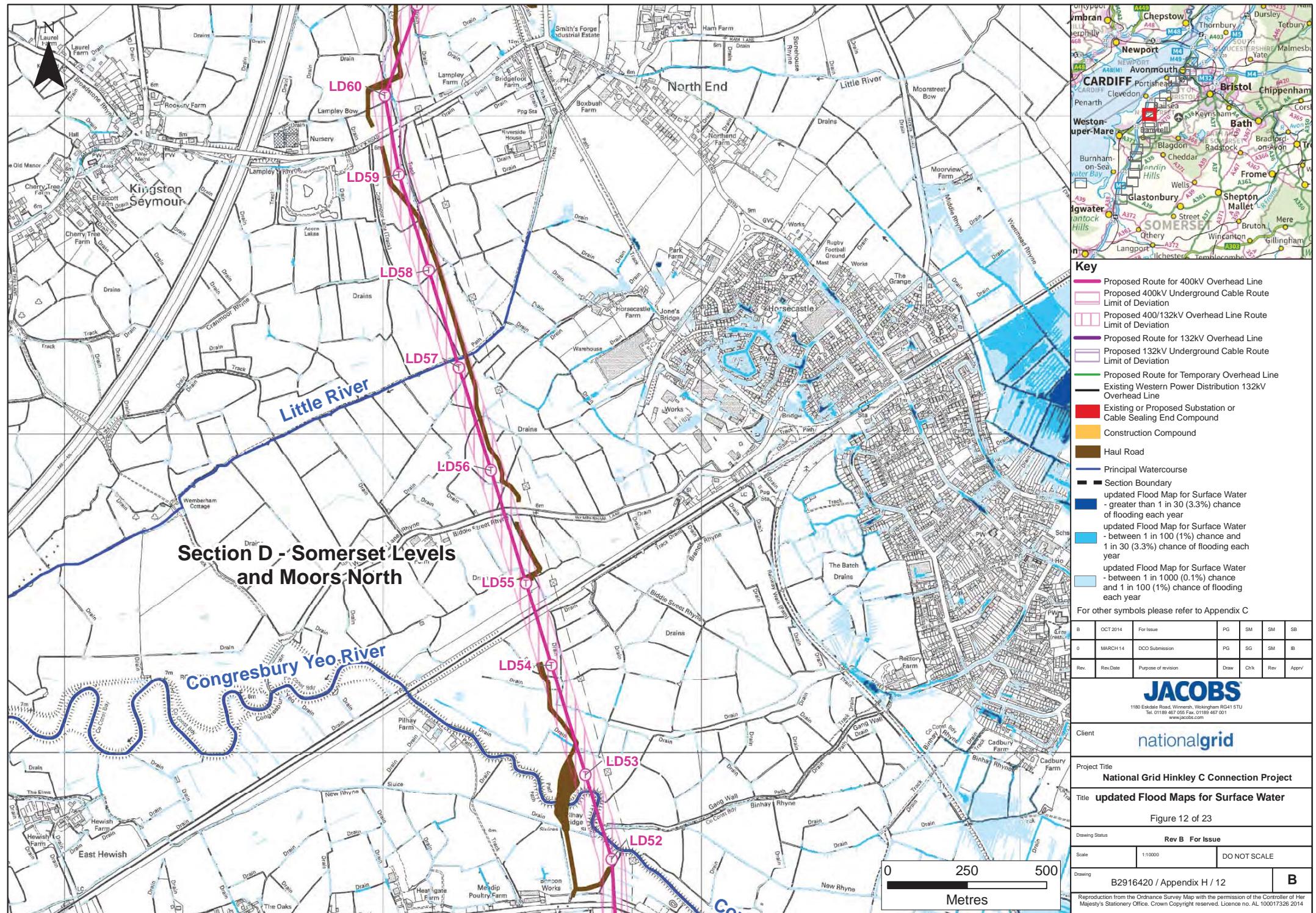


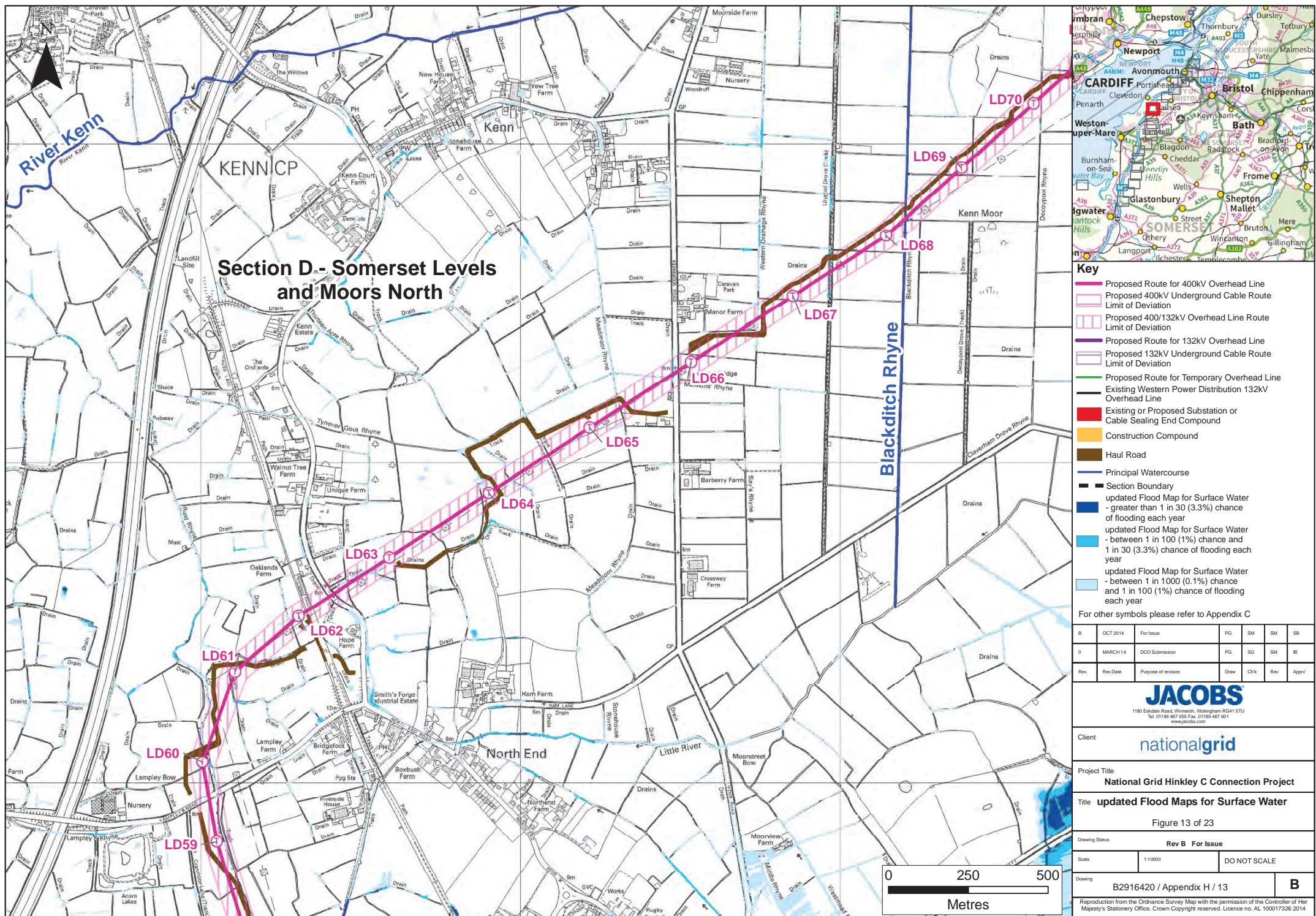


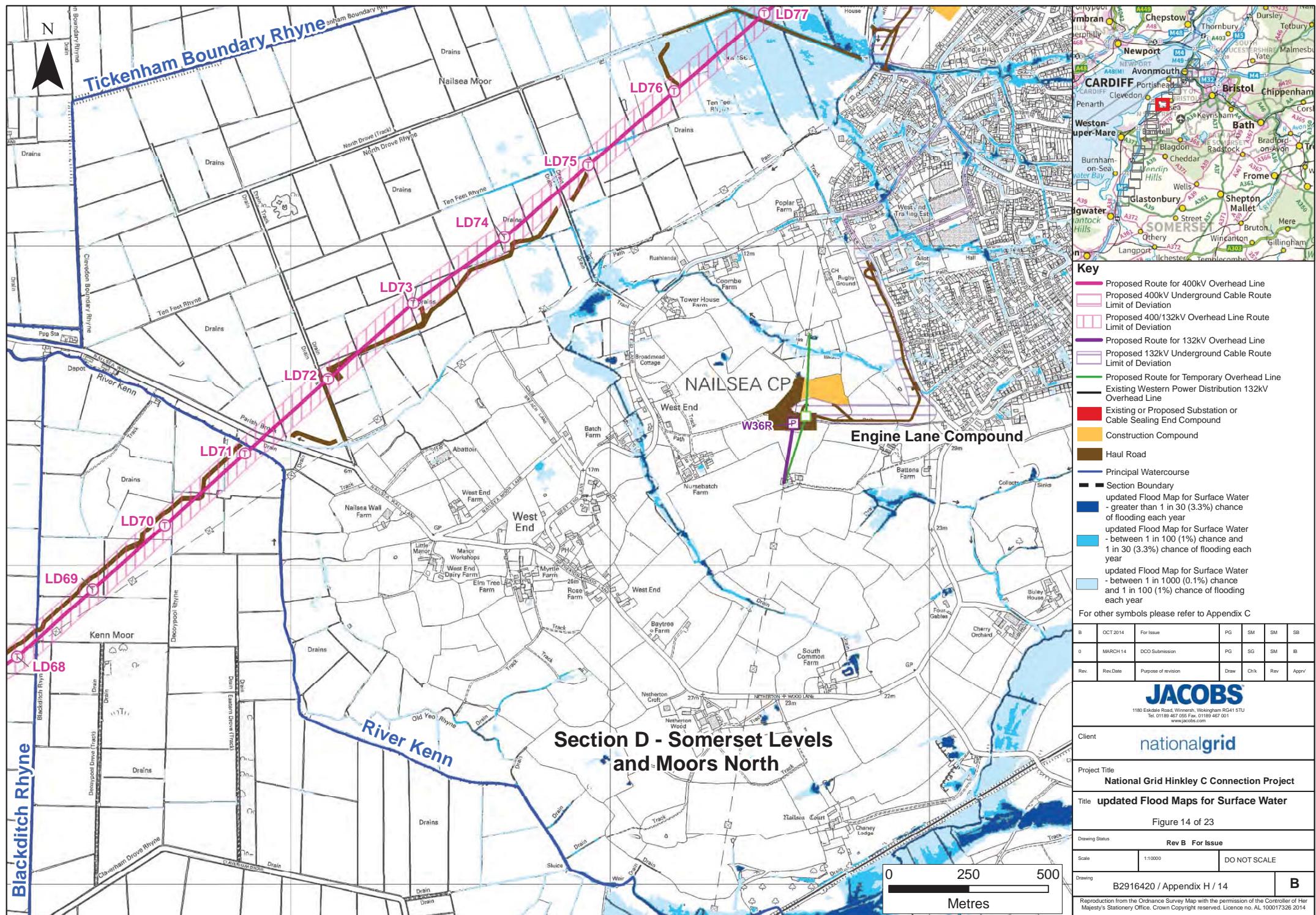


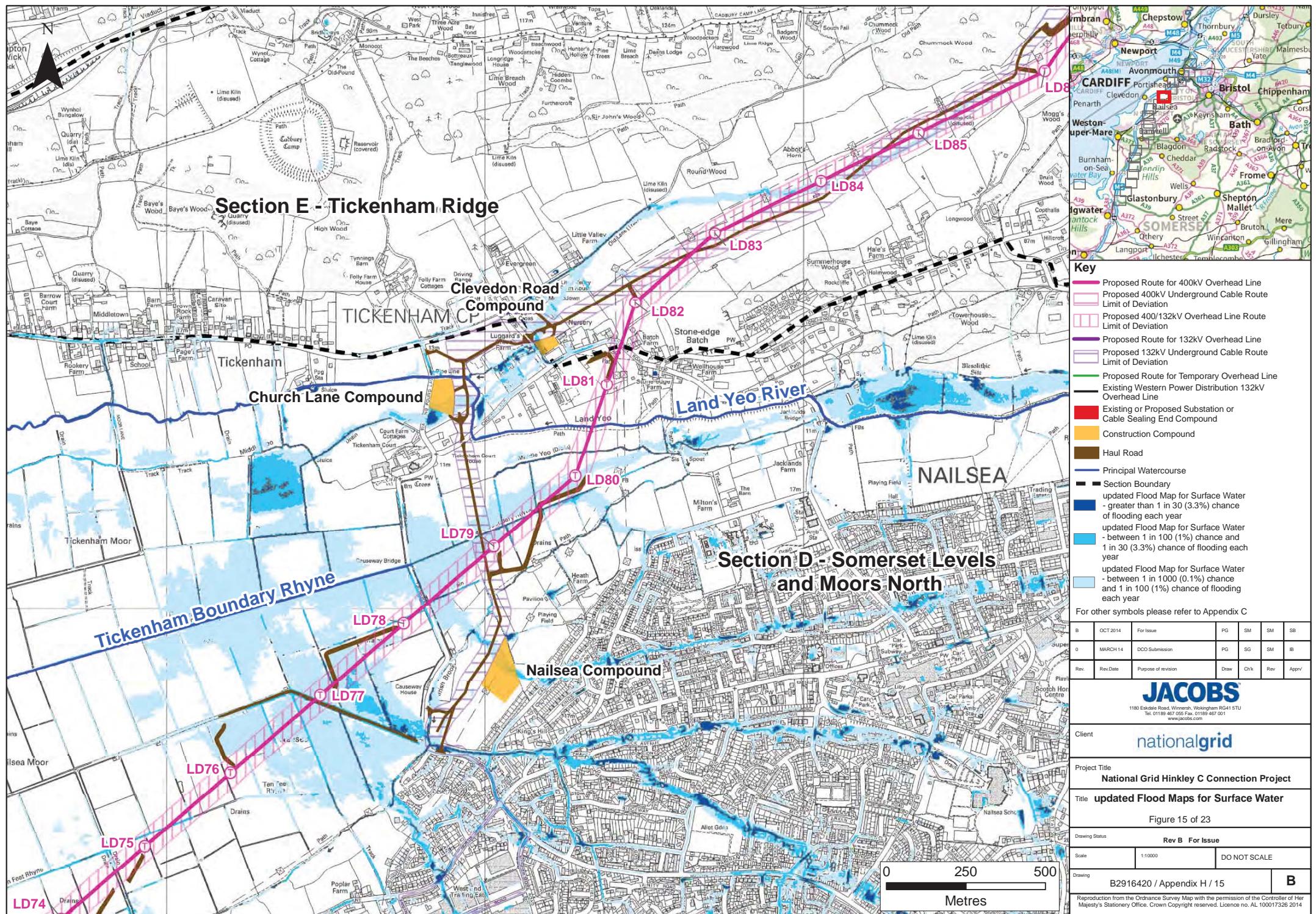


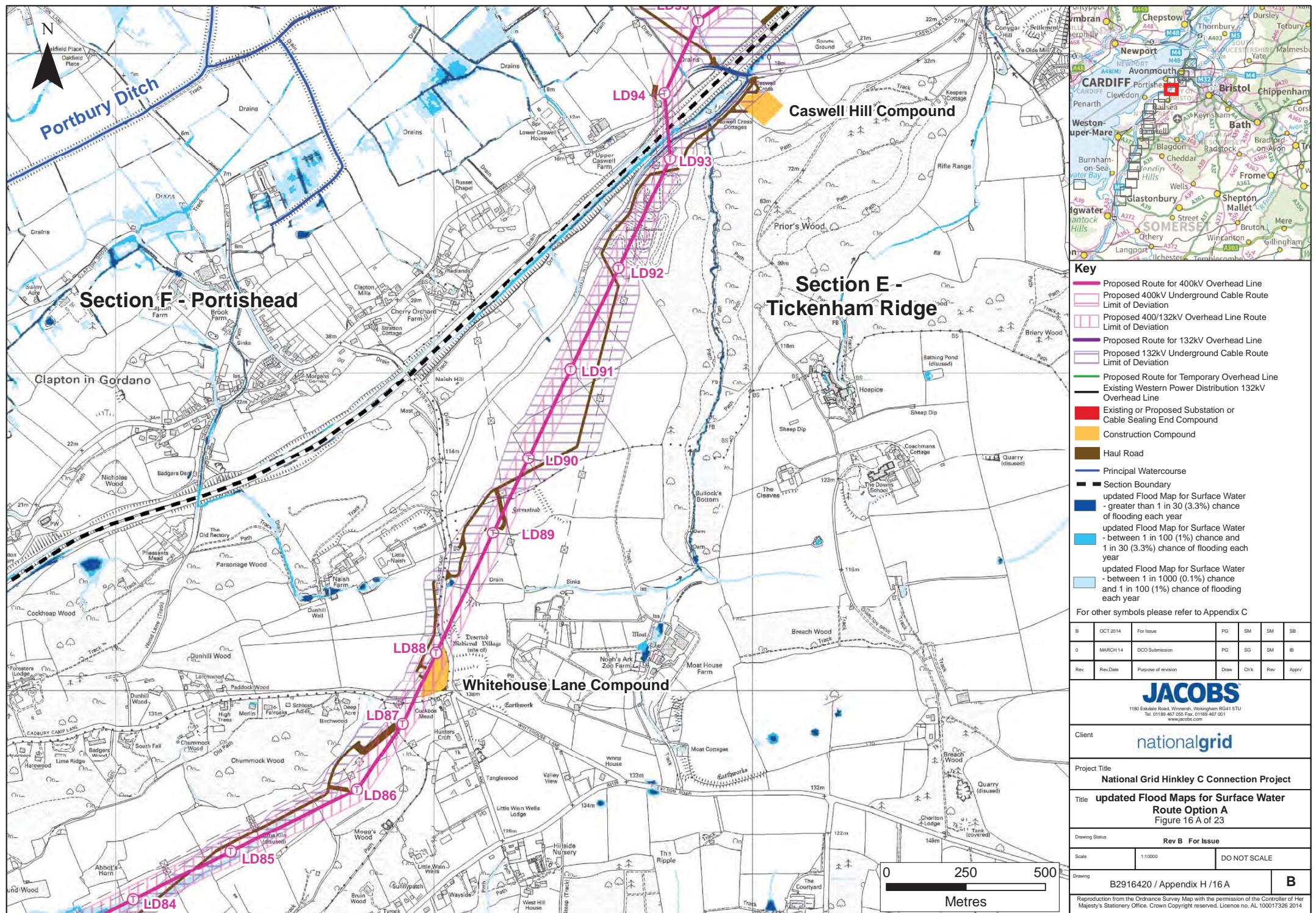


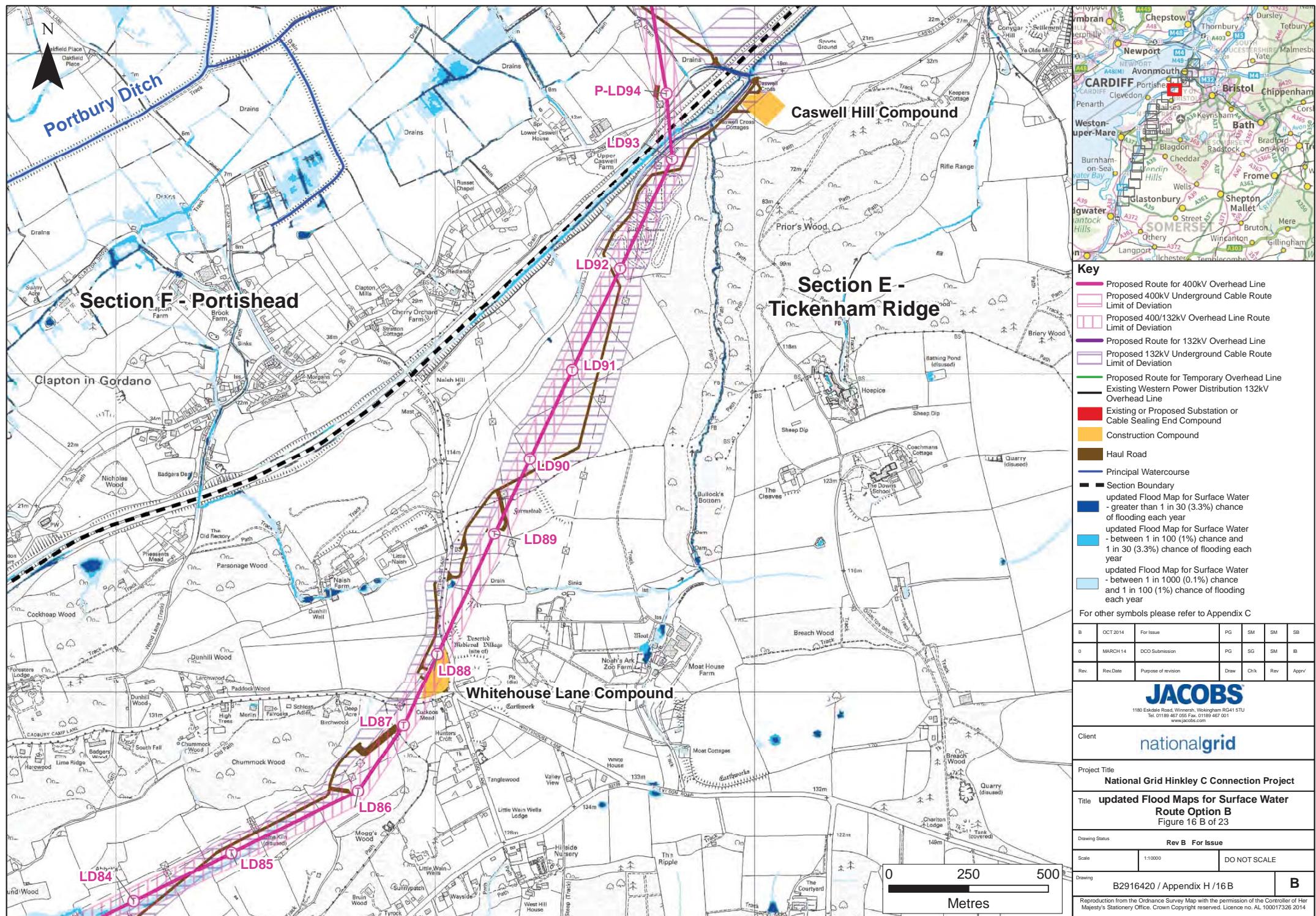


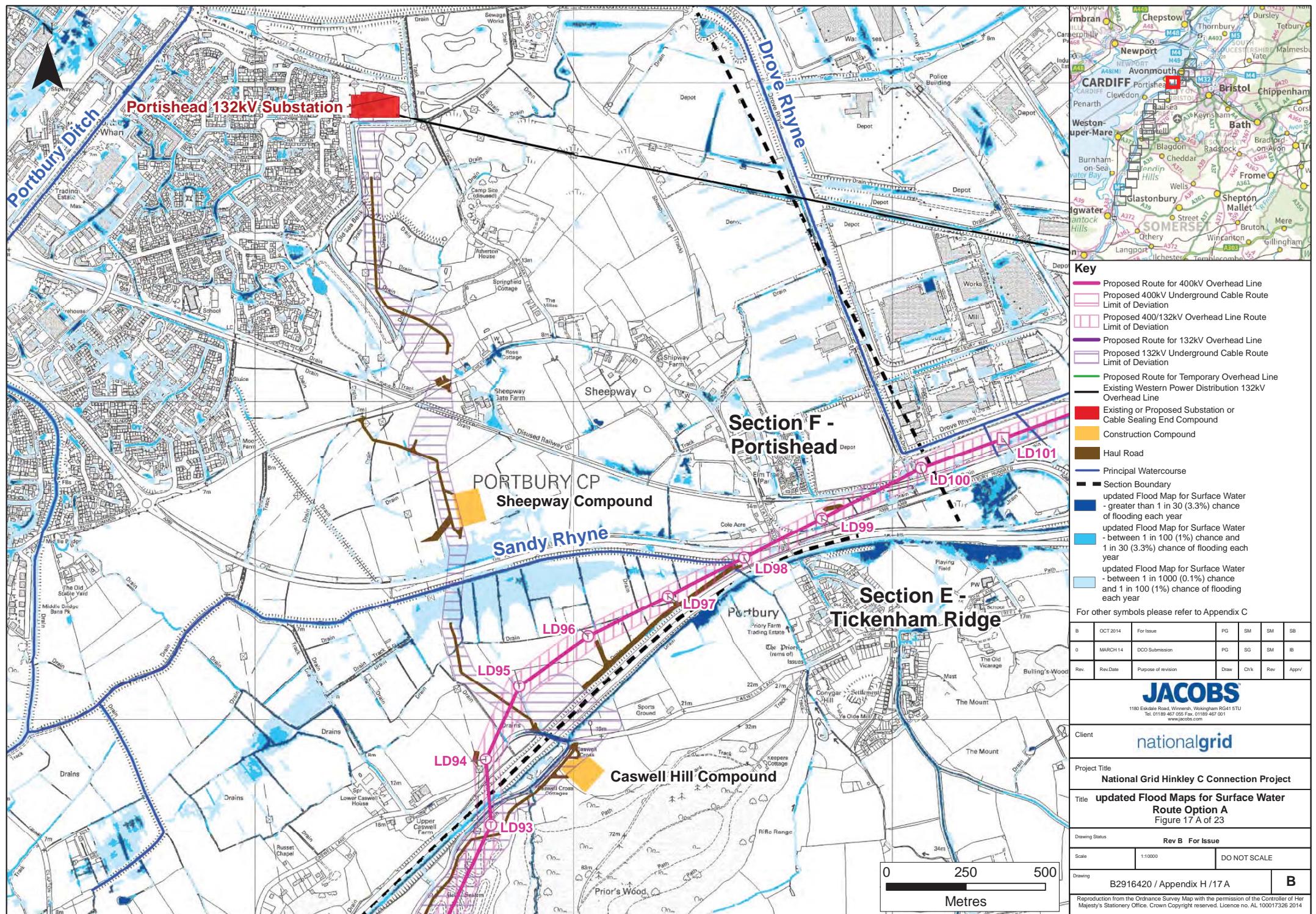


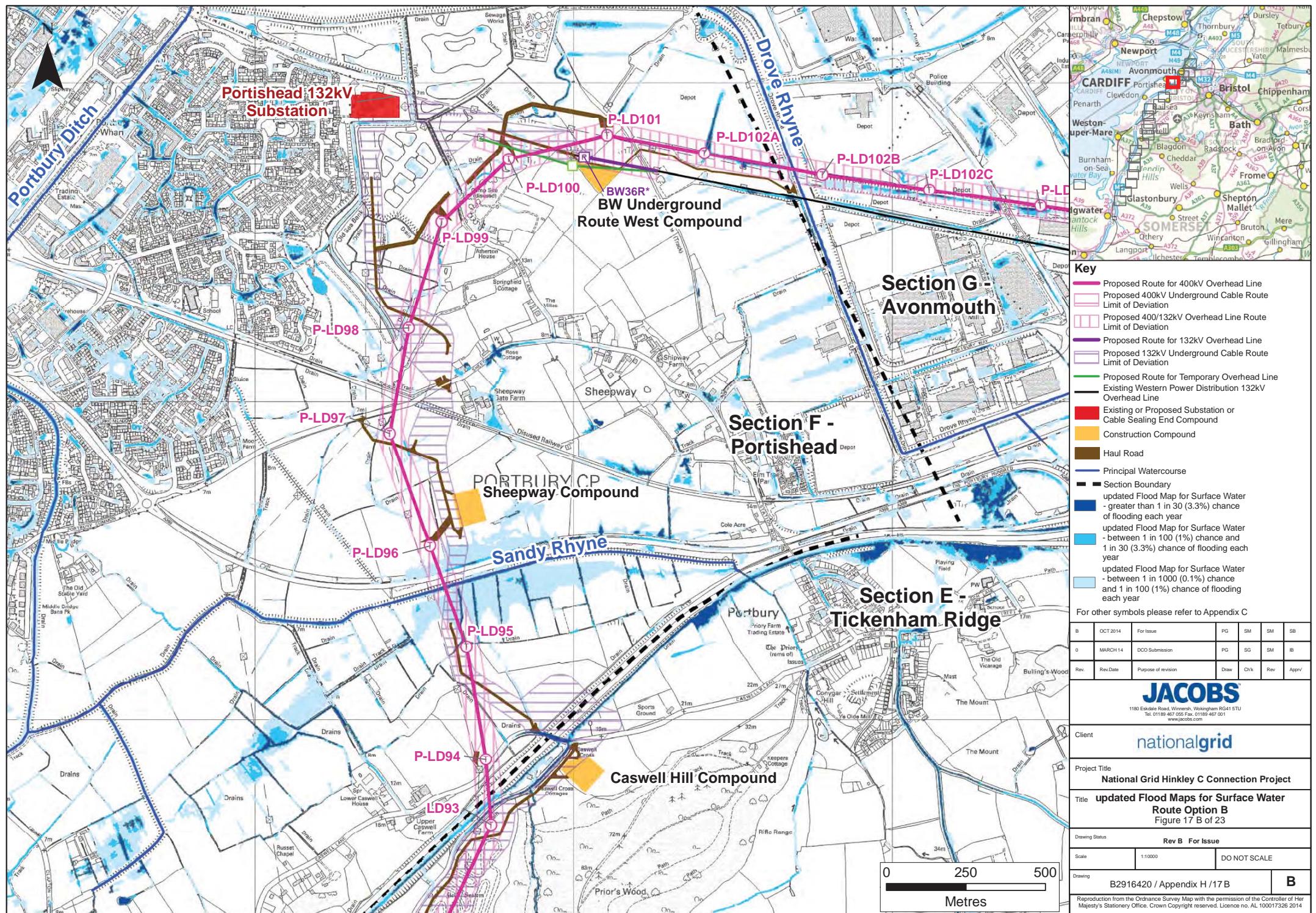


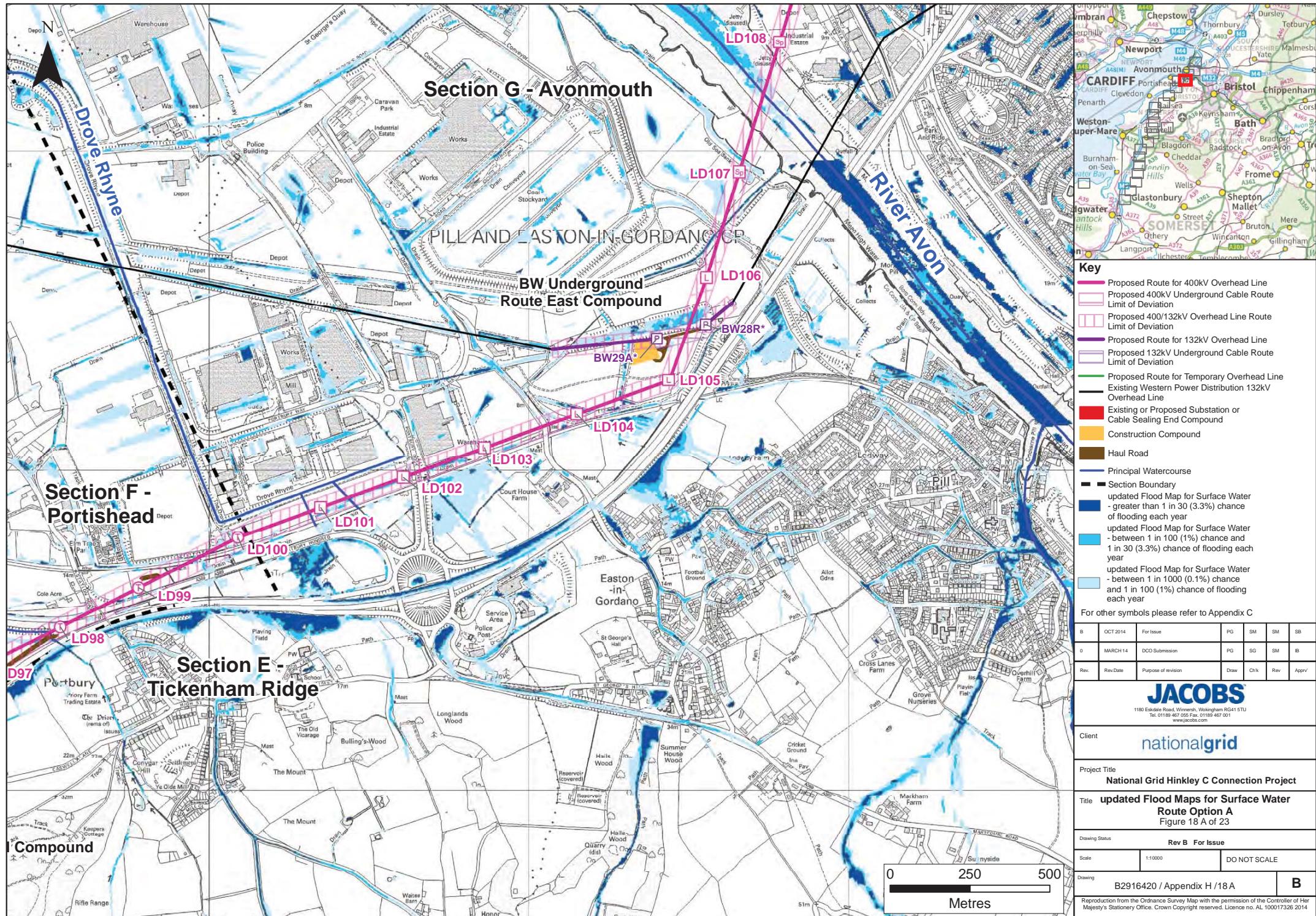


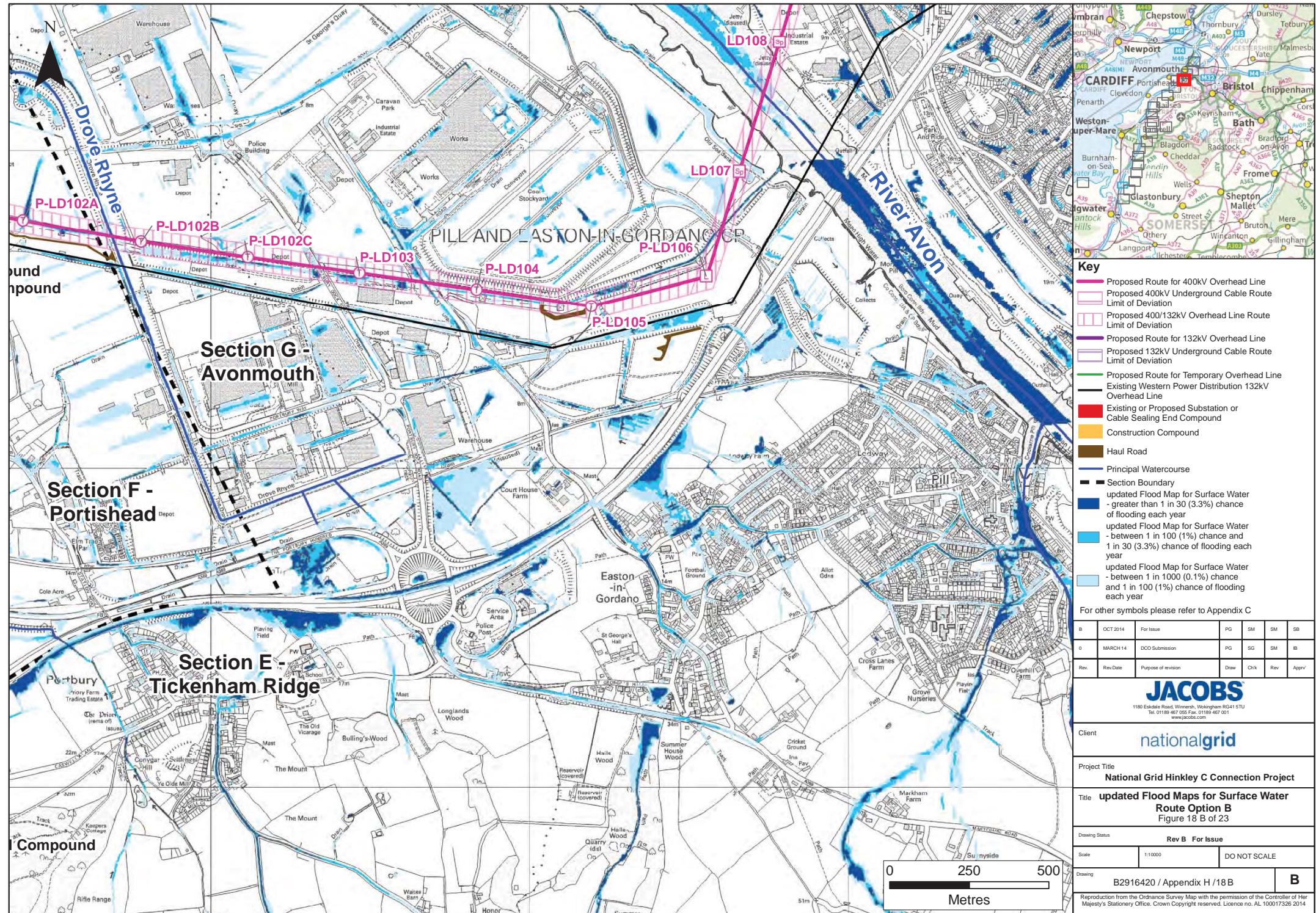


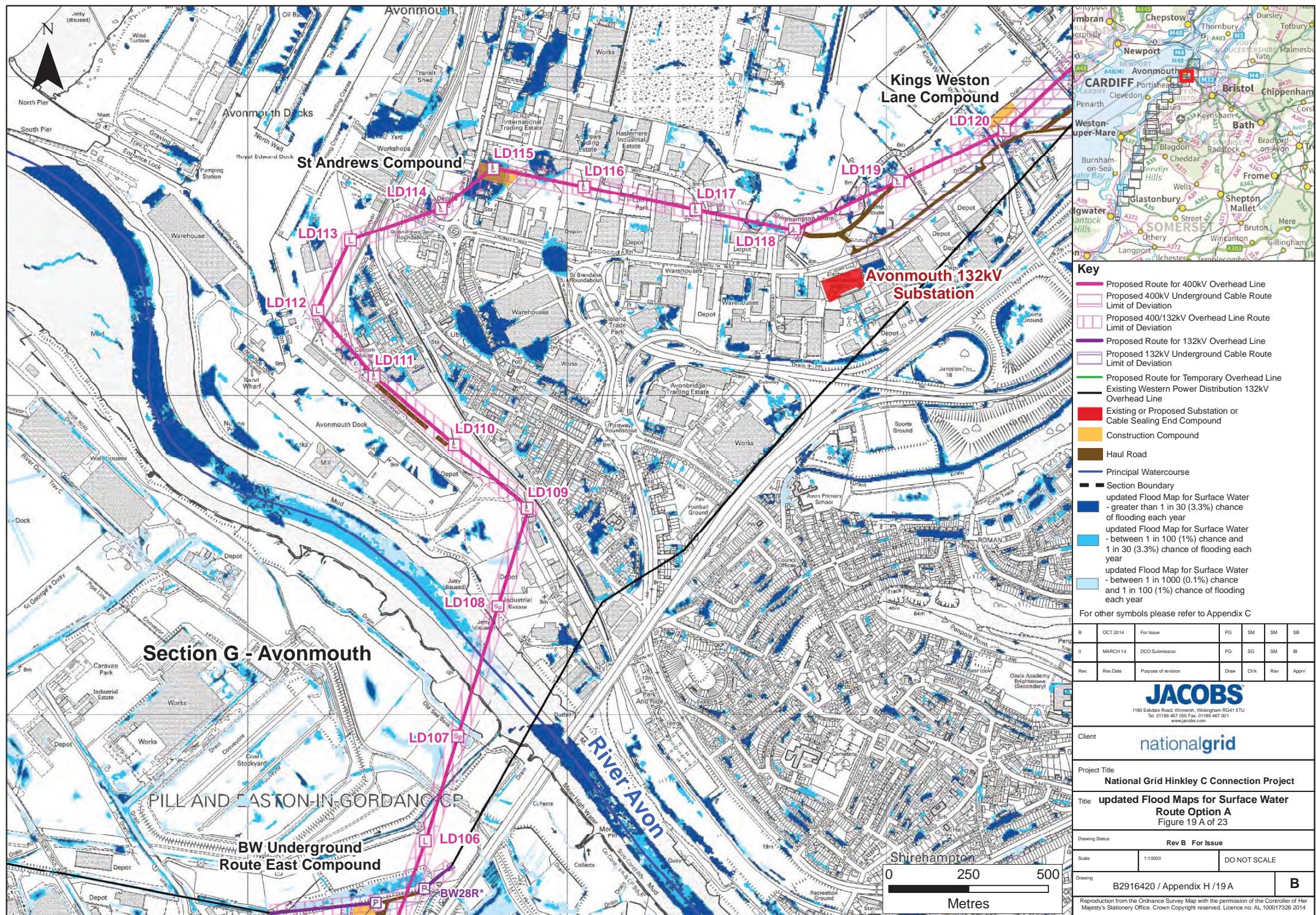


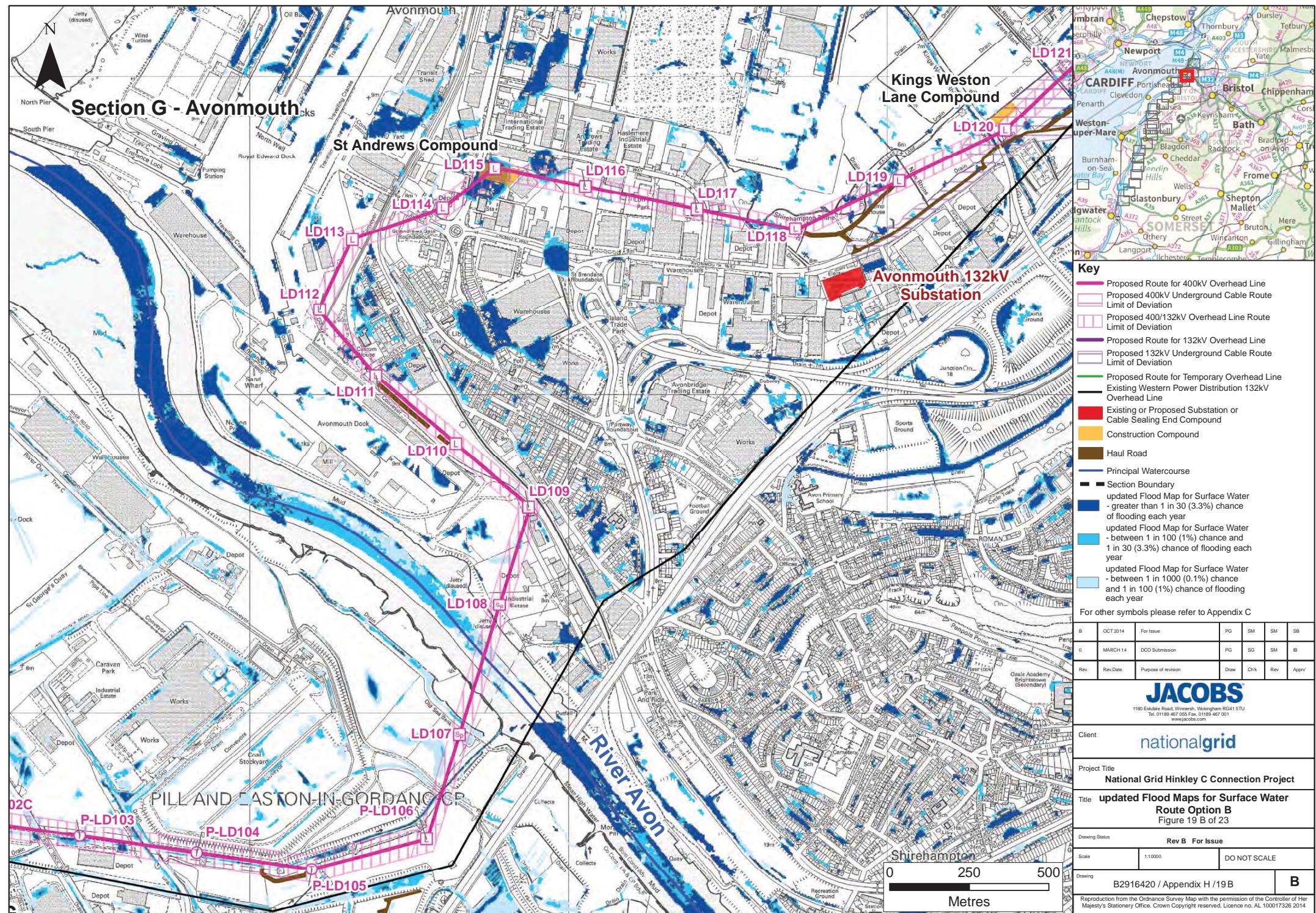


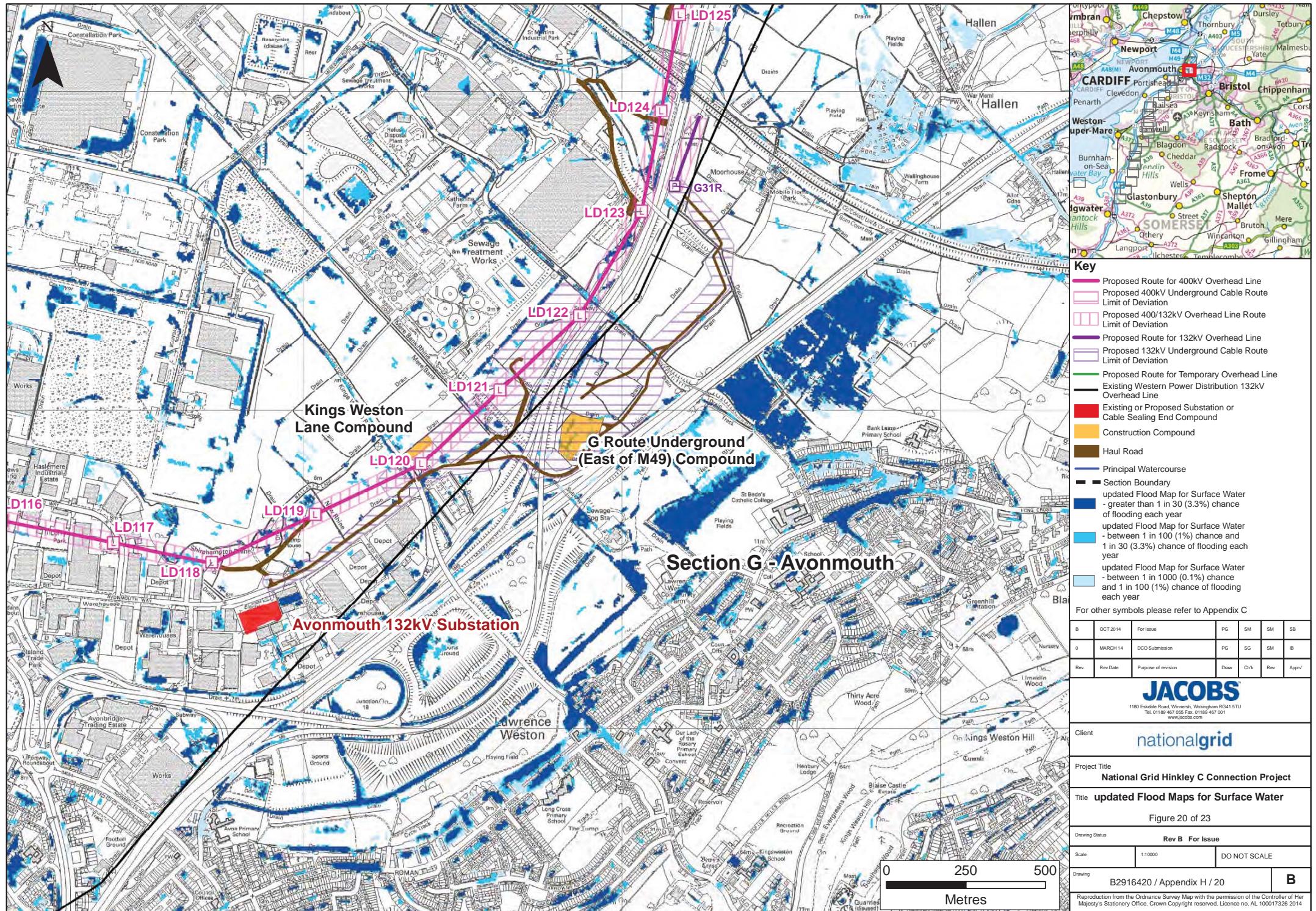


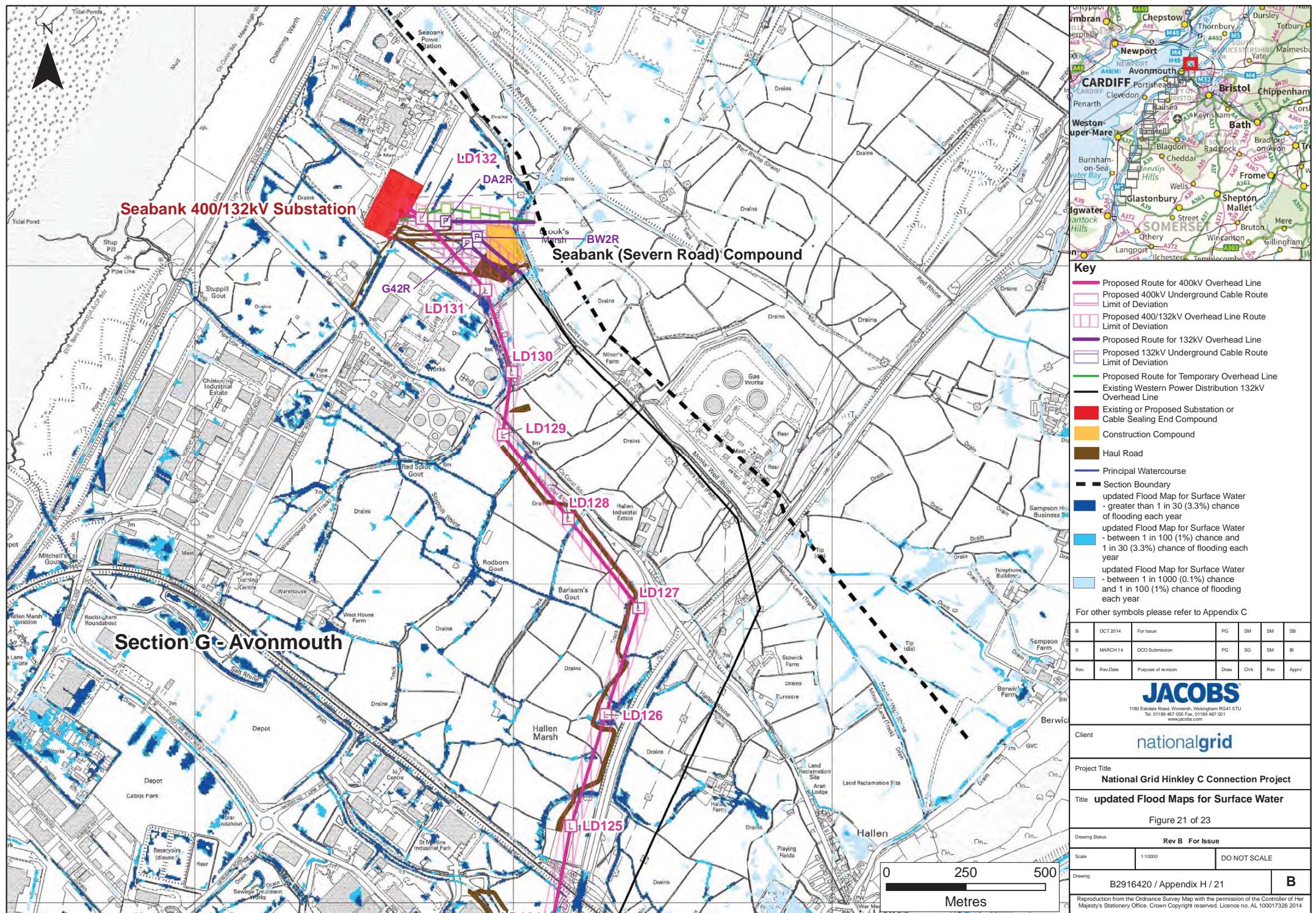


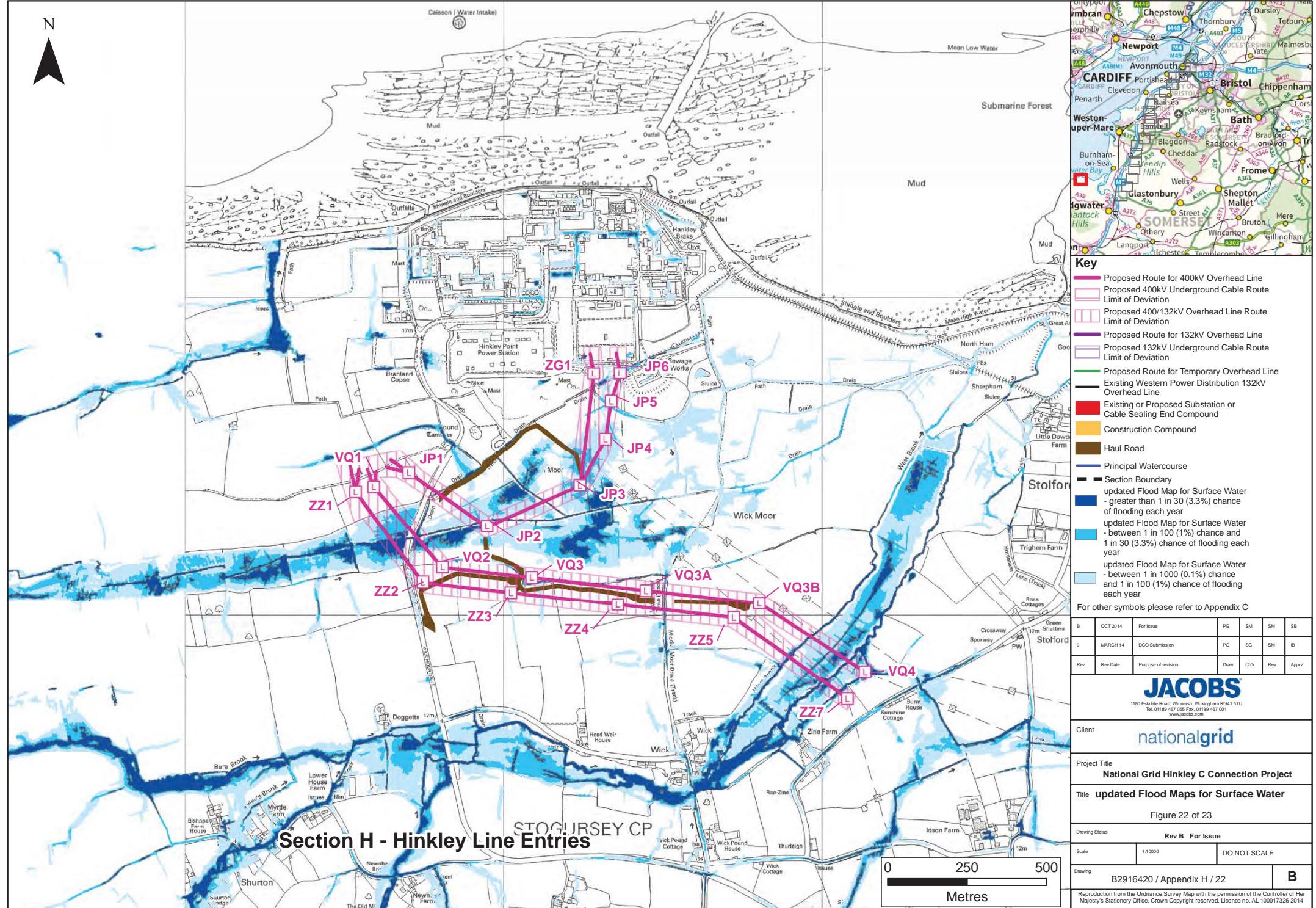


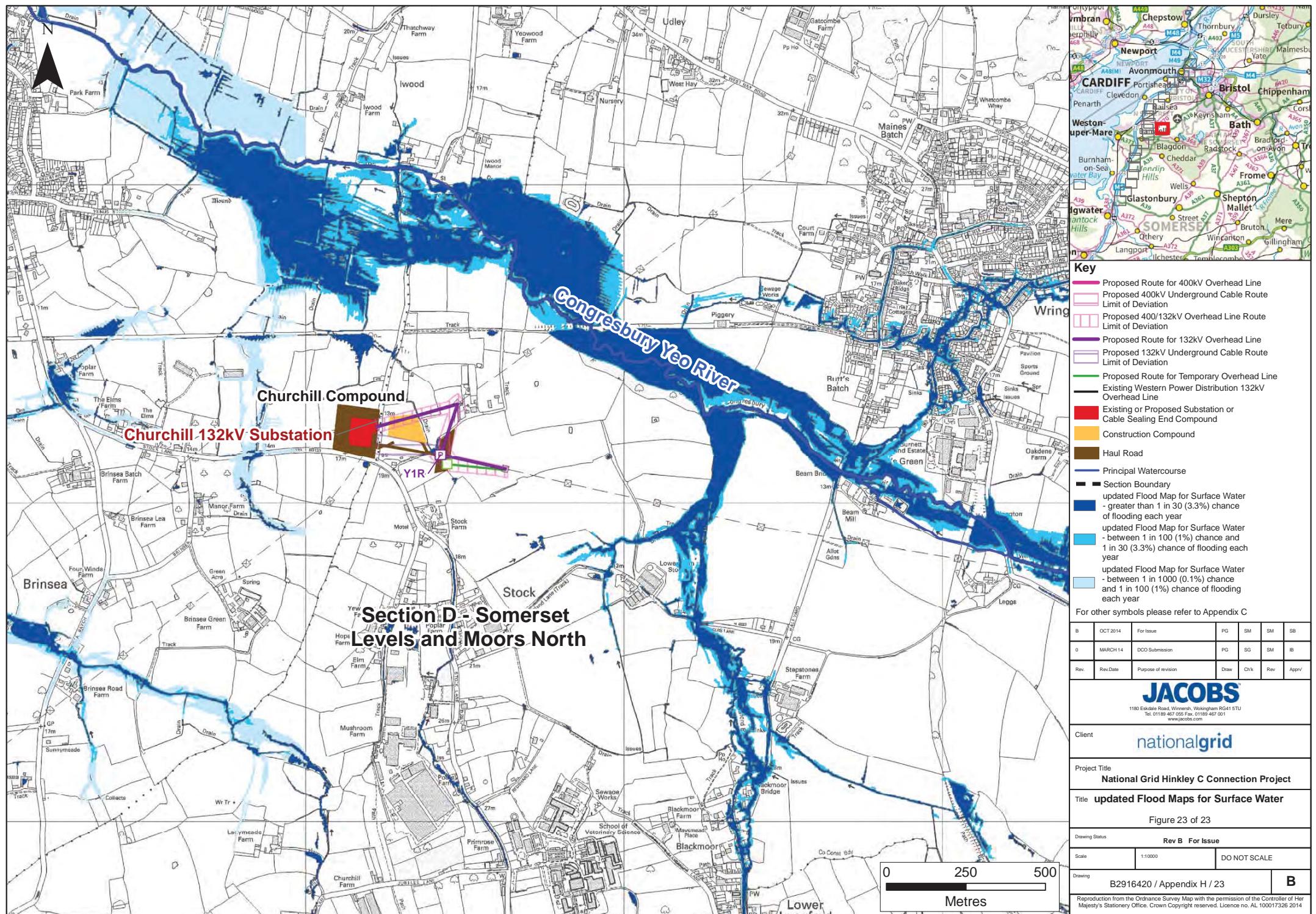




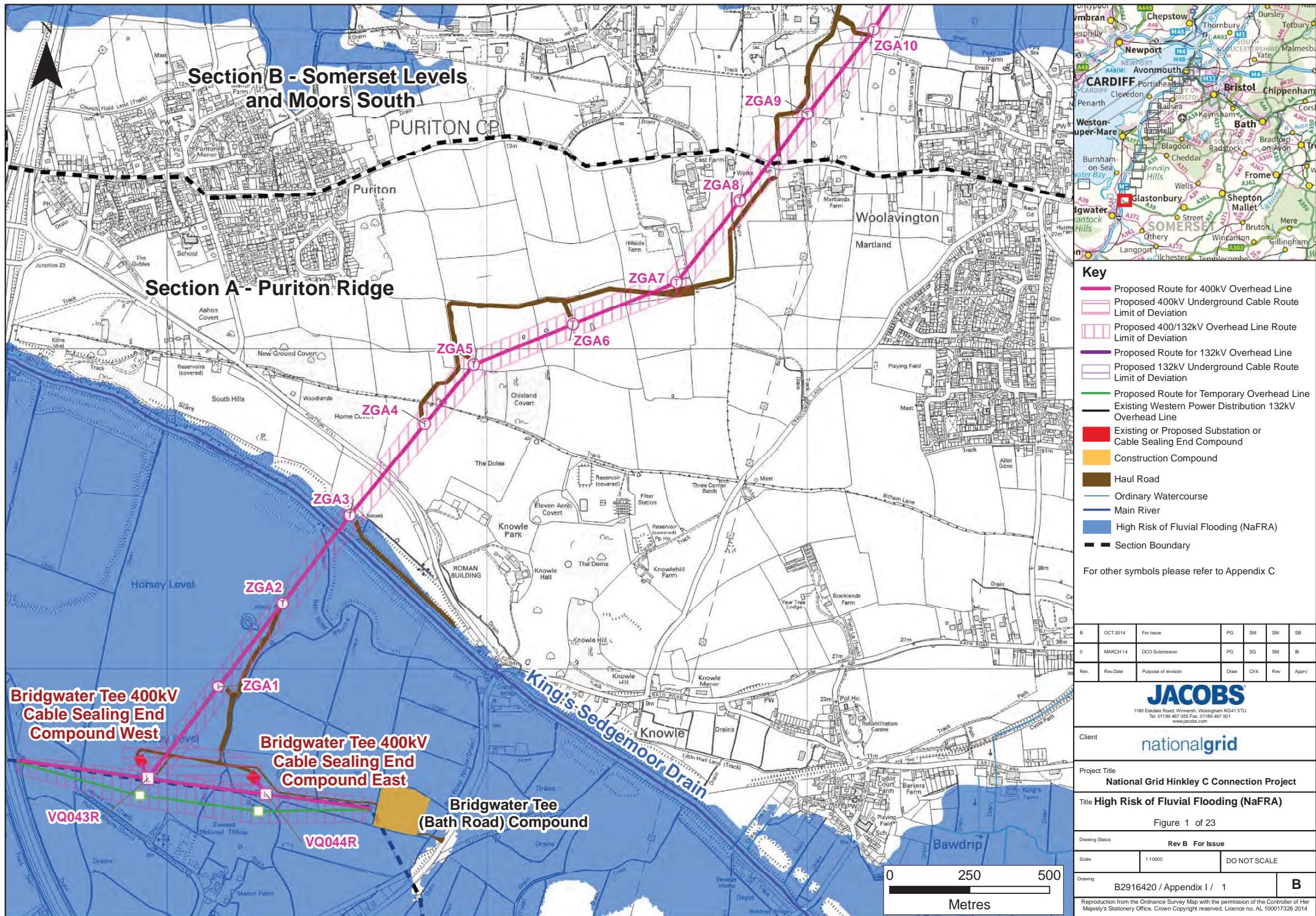


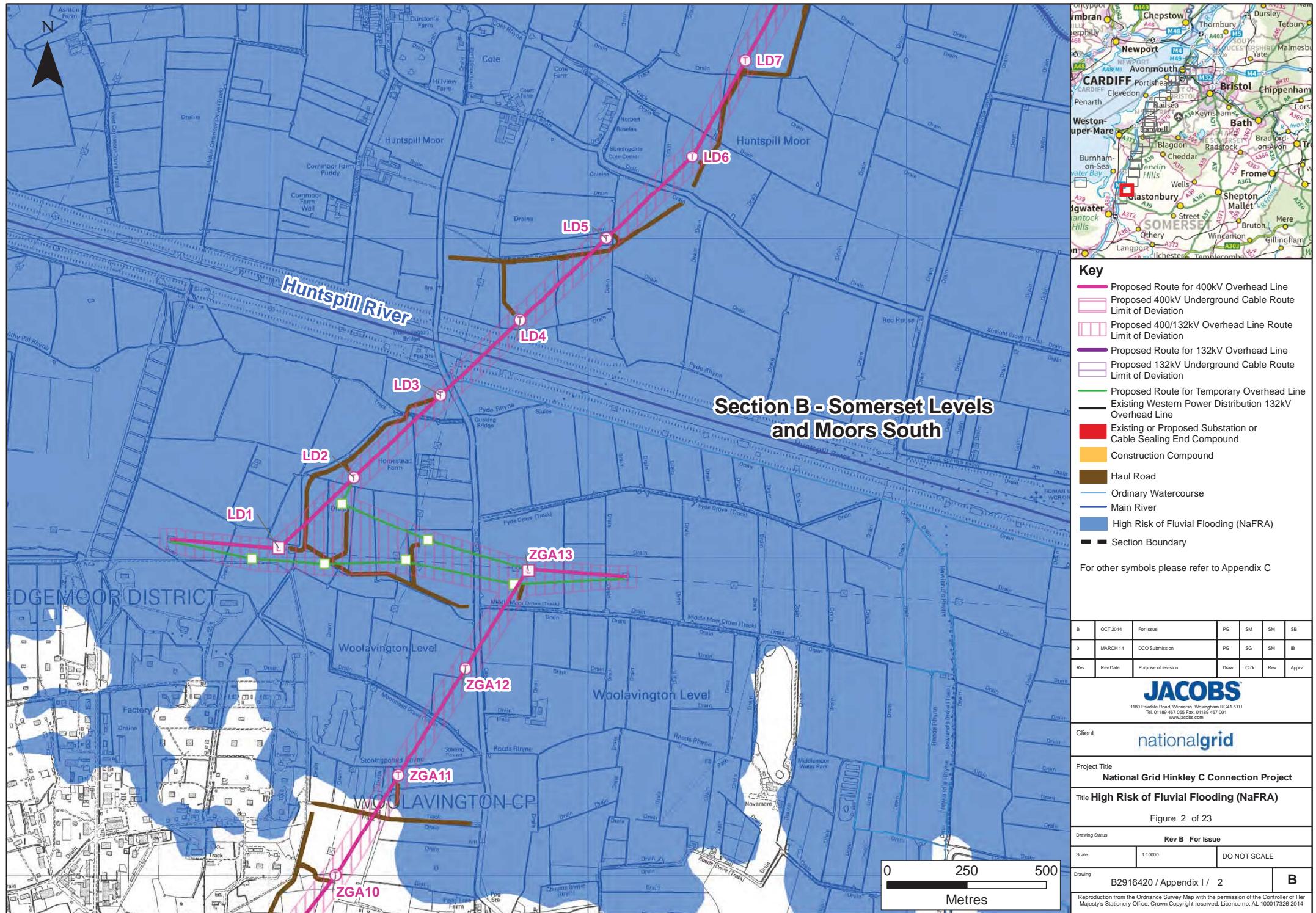


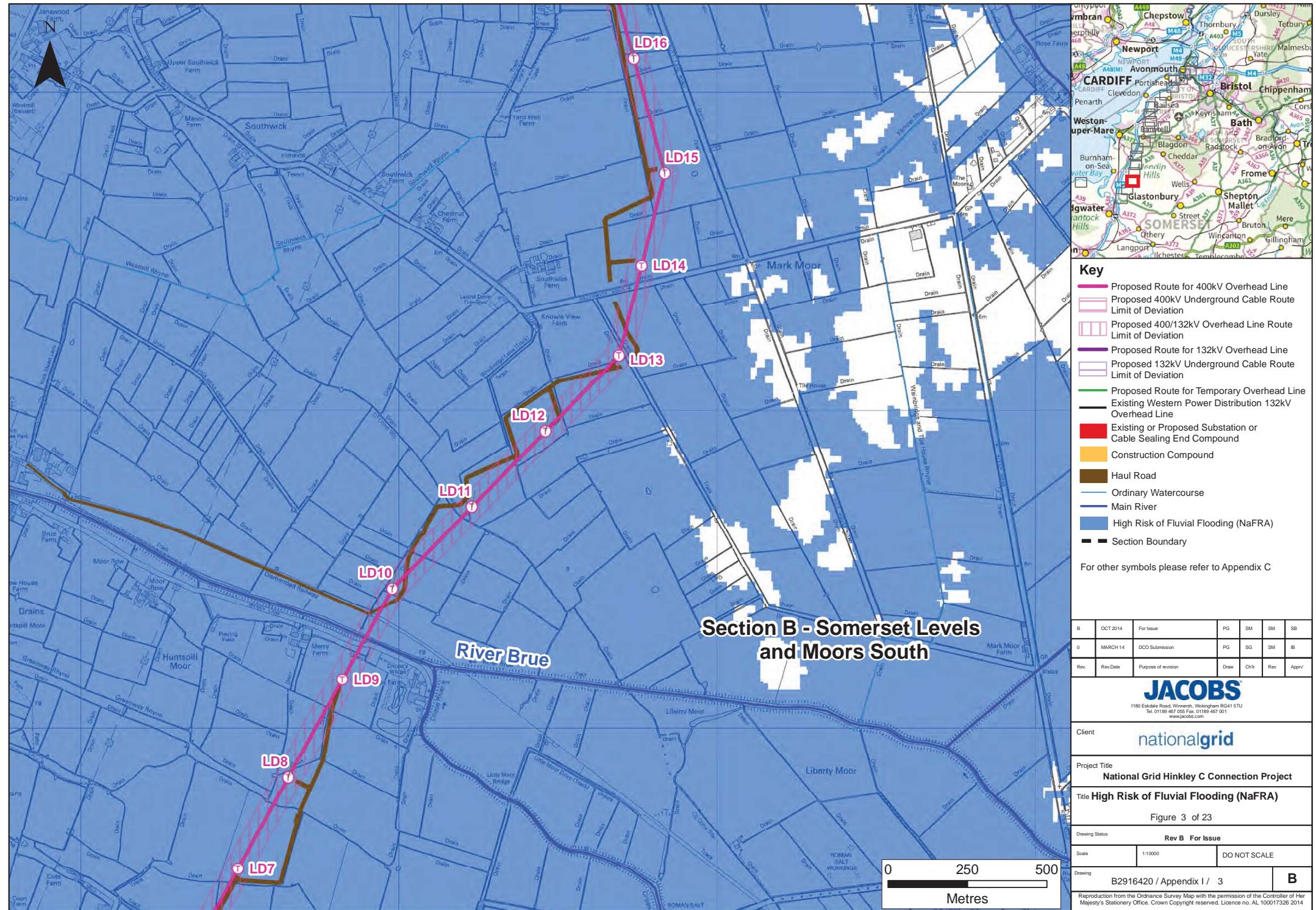


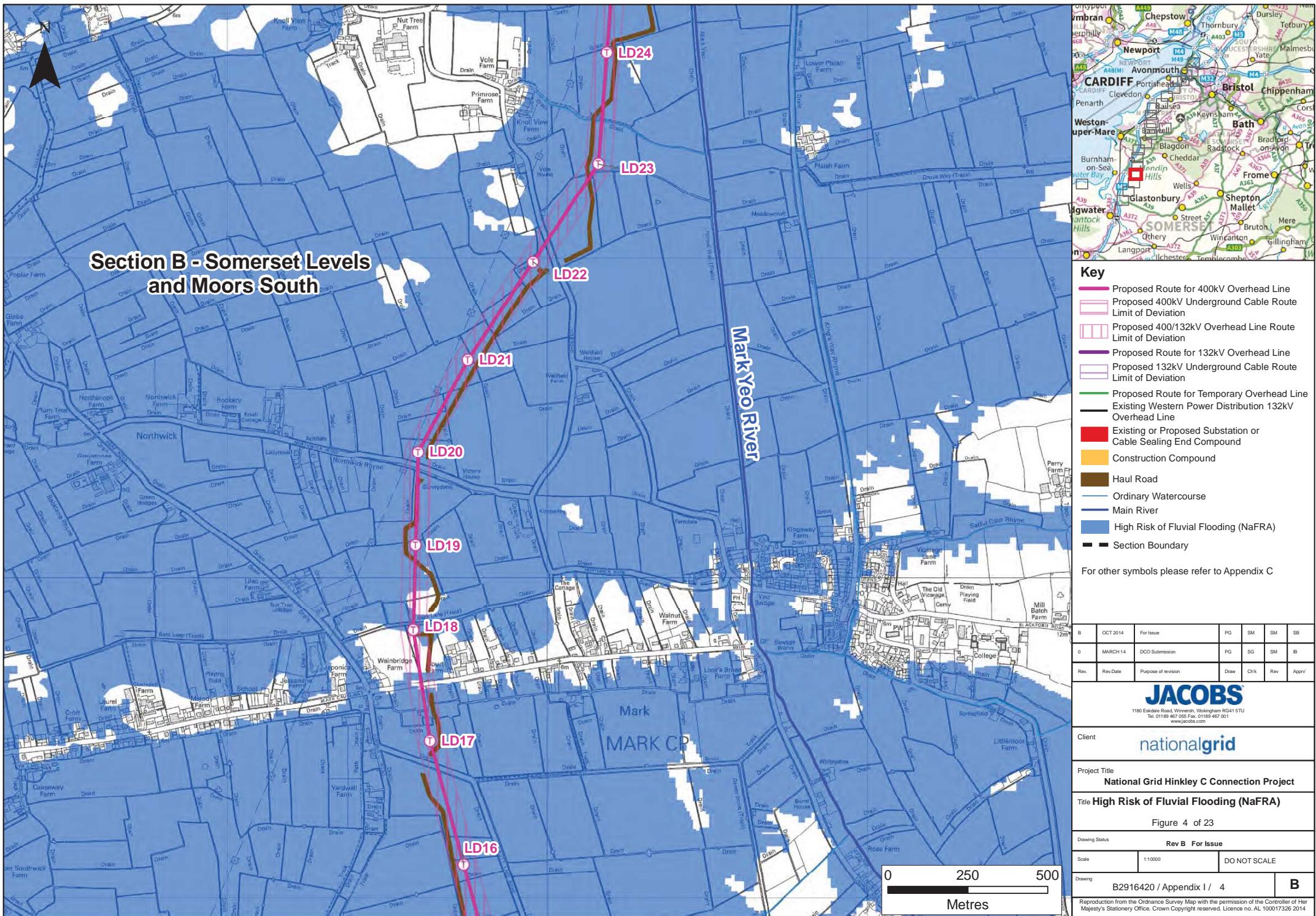


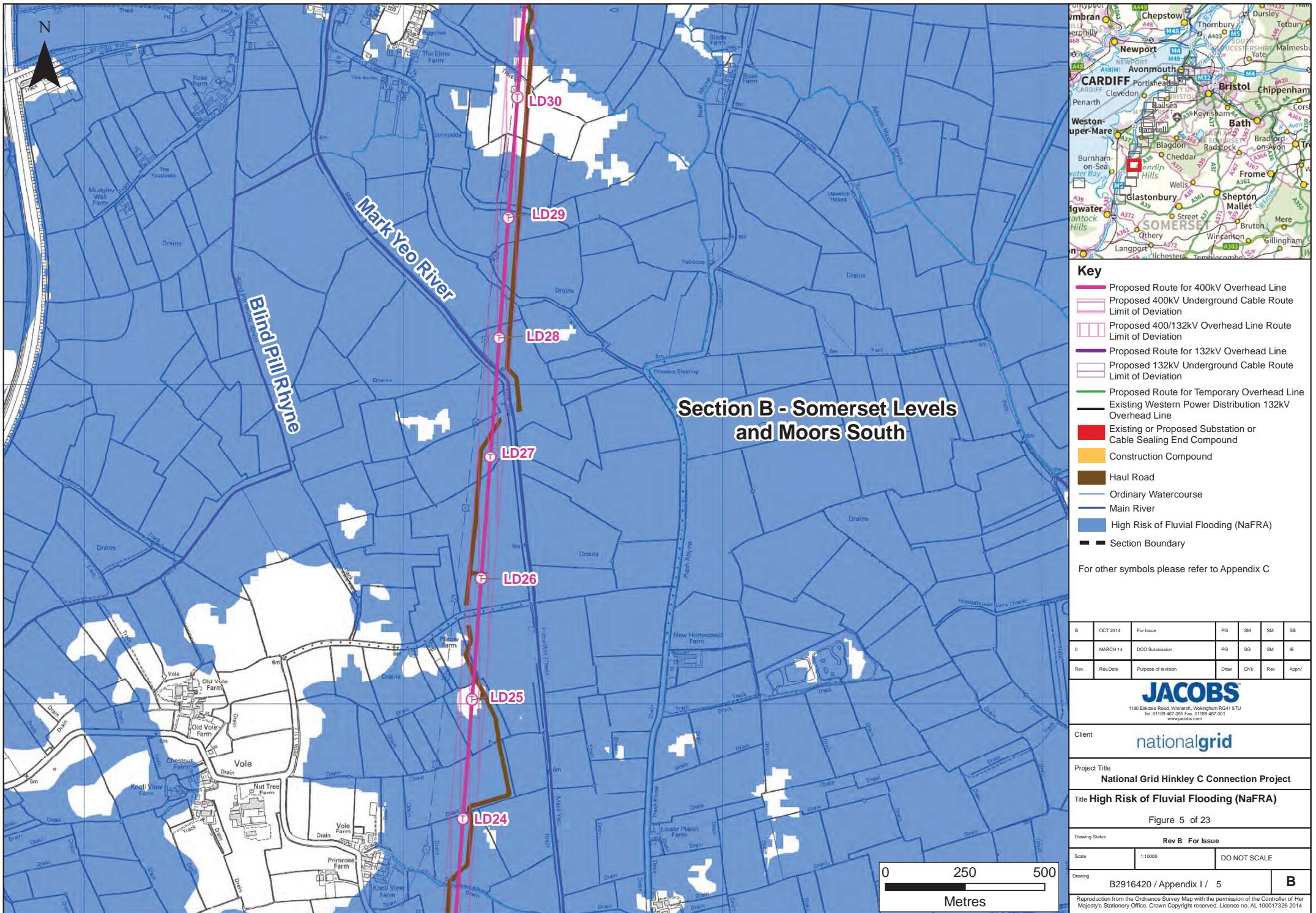
Appendix I – National Flood Risk Assessment Flood Modelling Extents

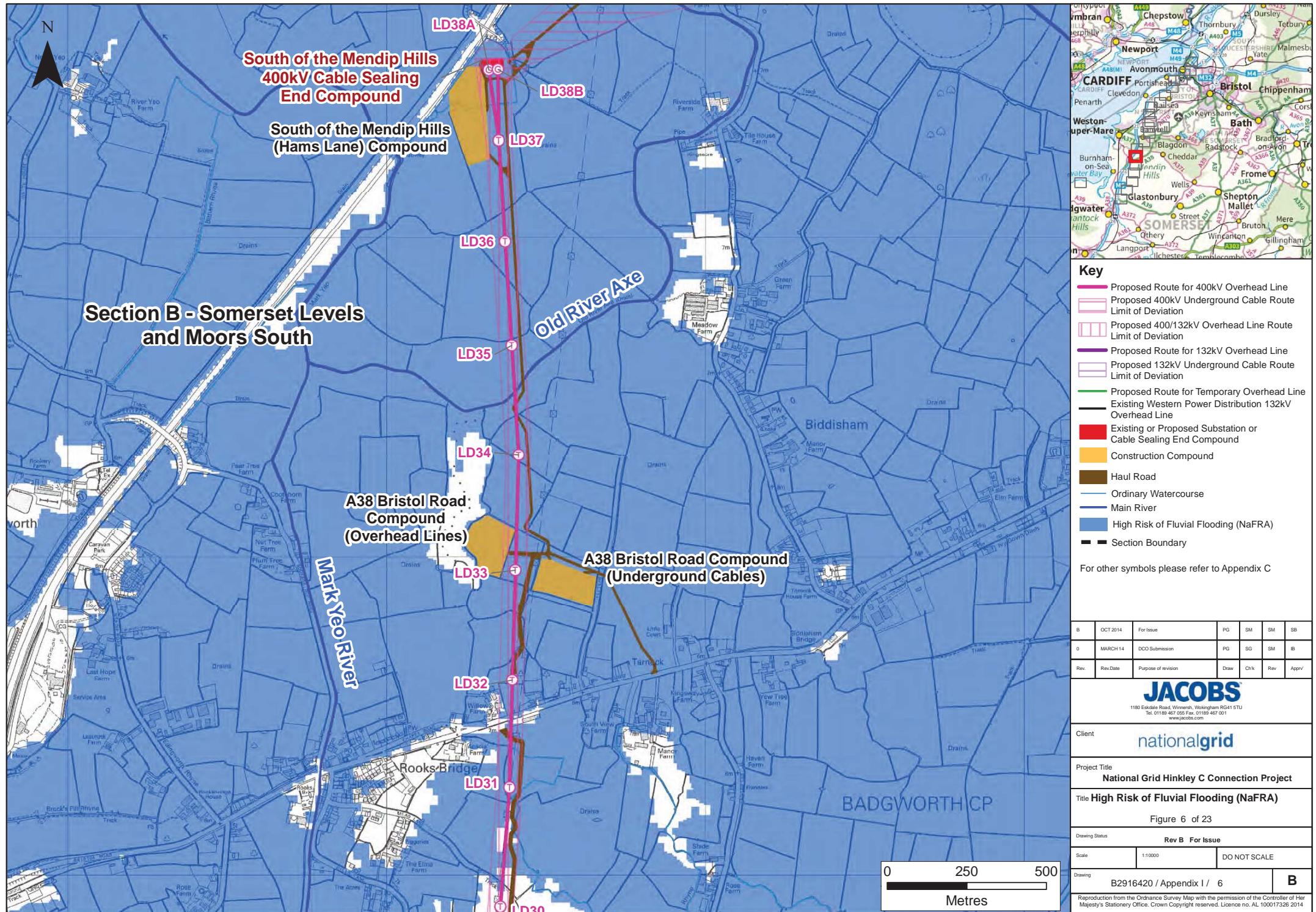


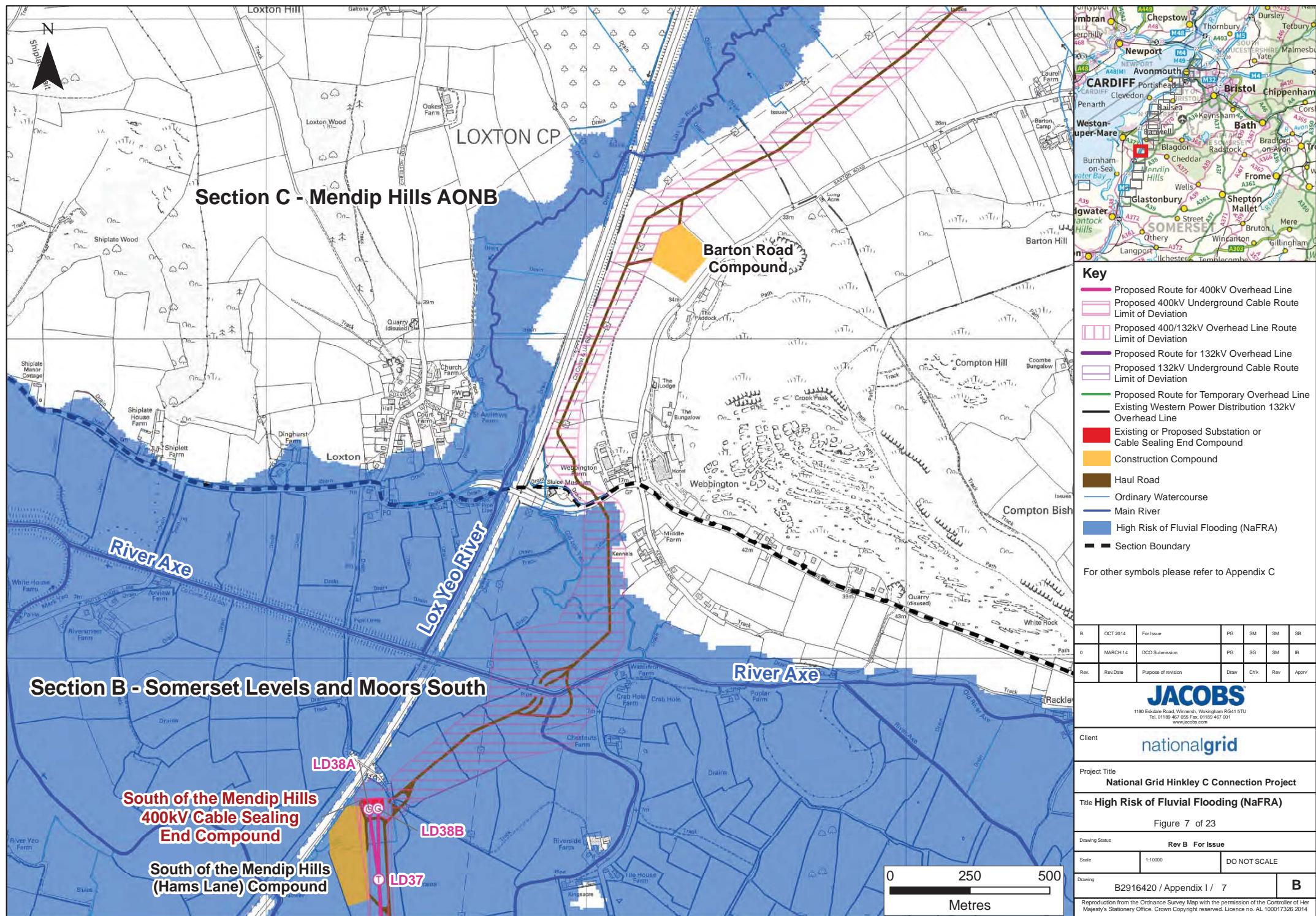


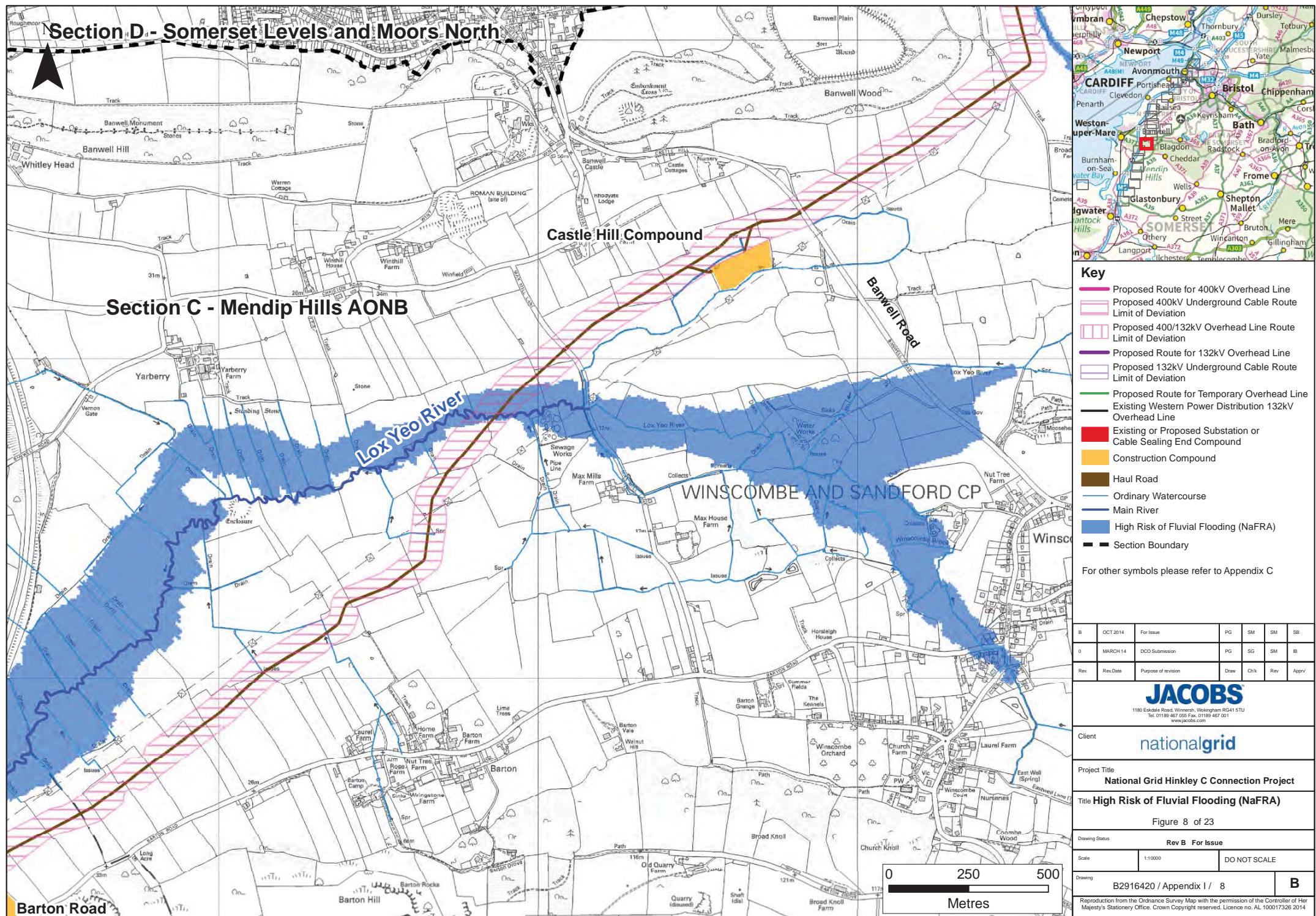


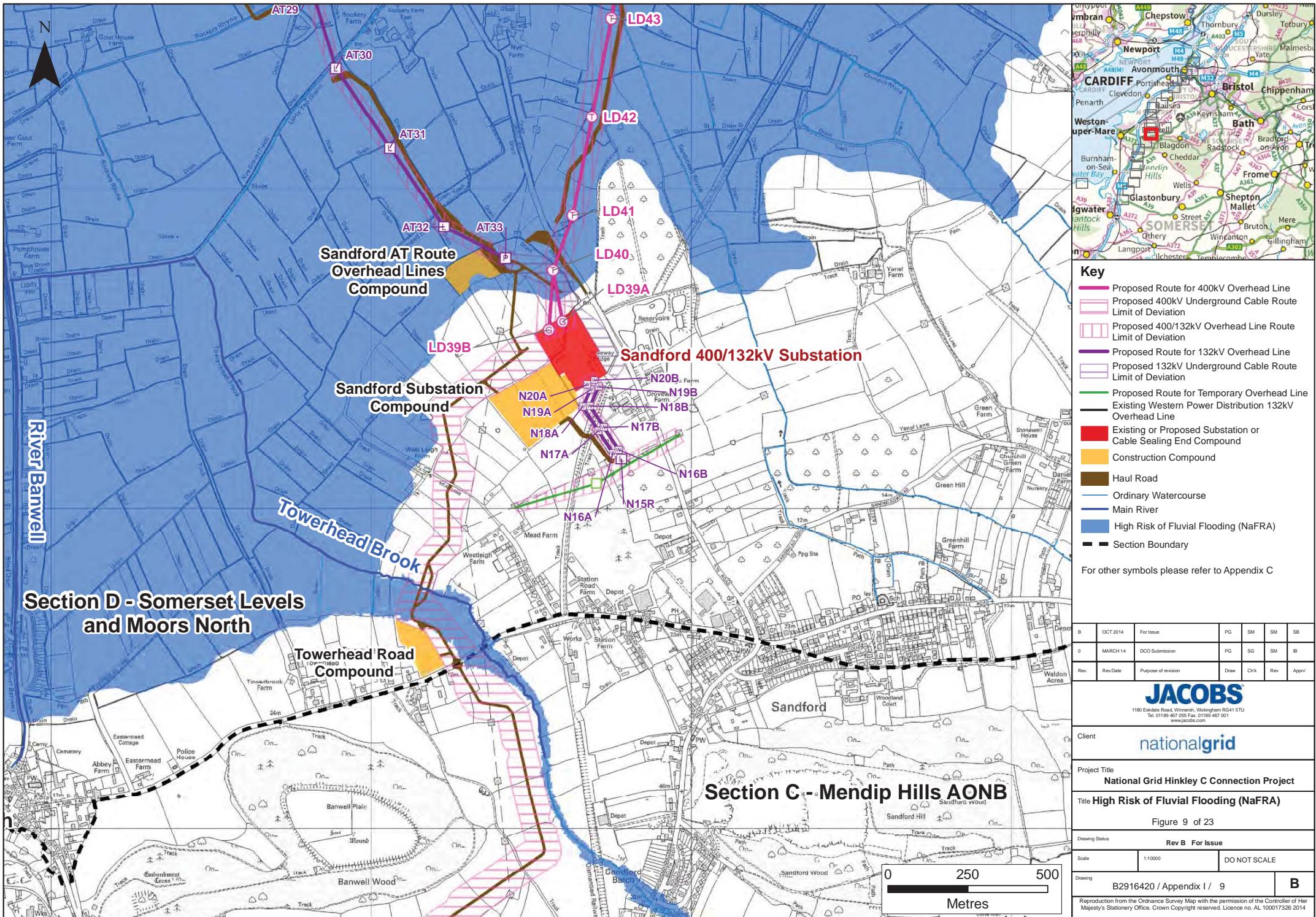


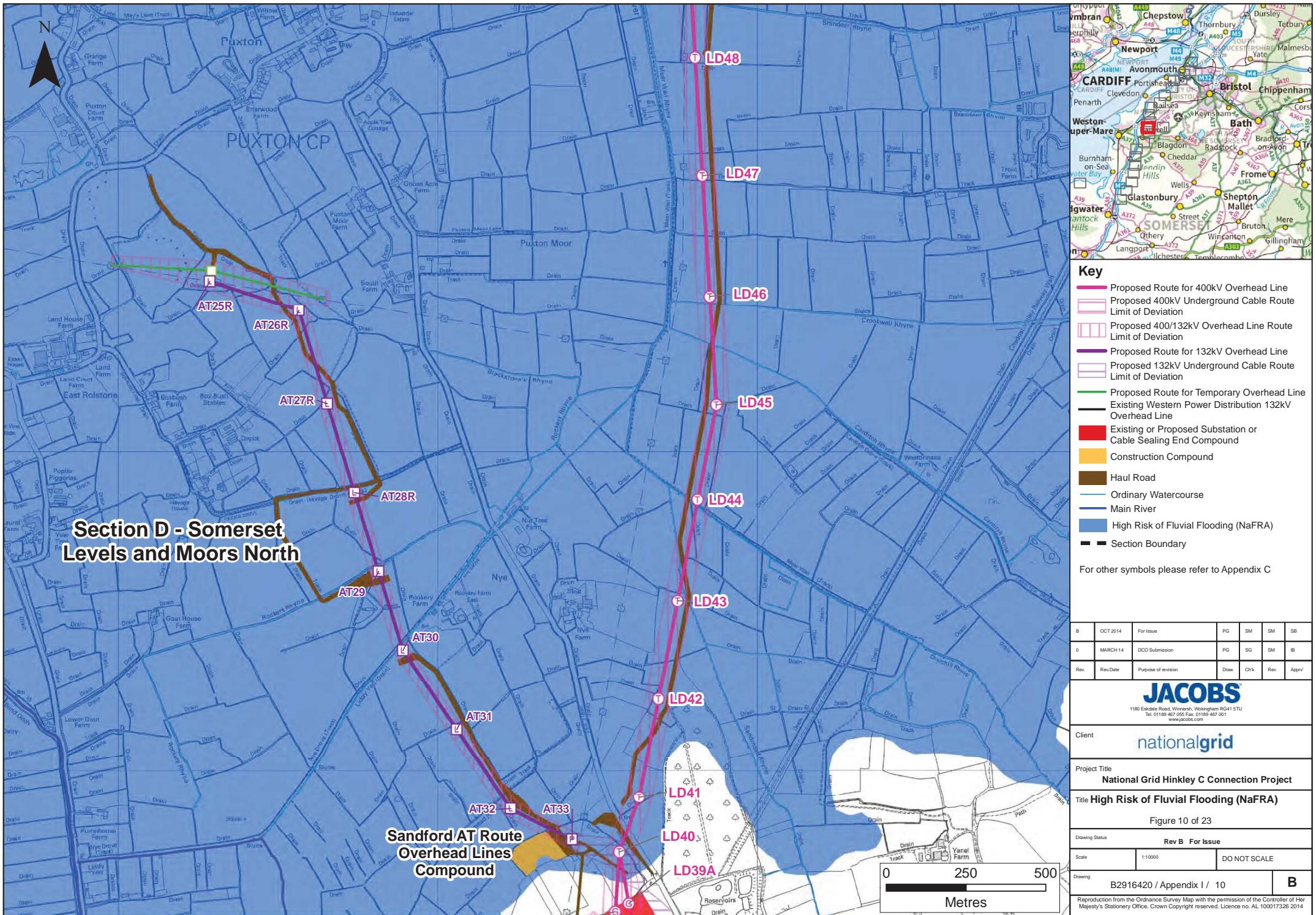


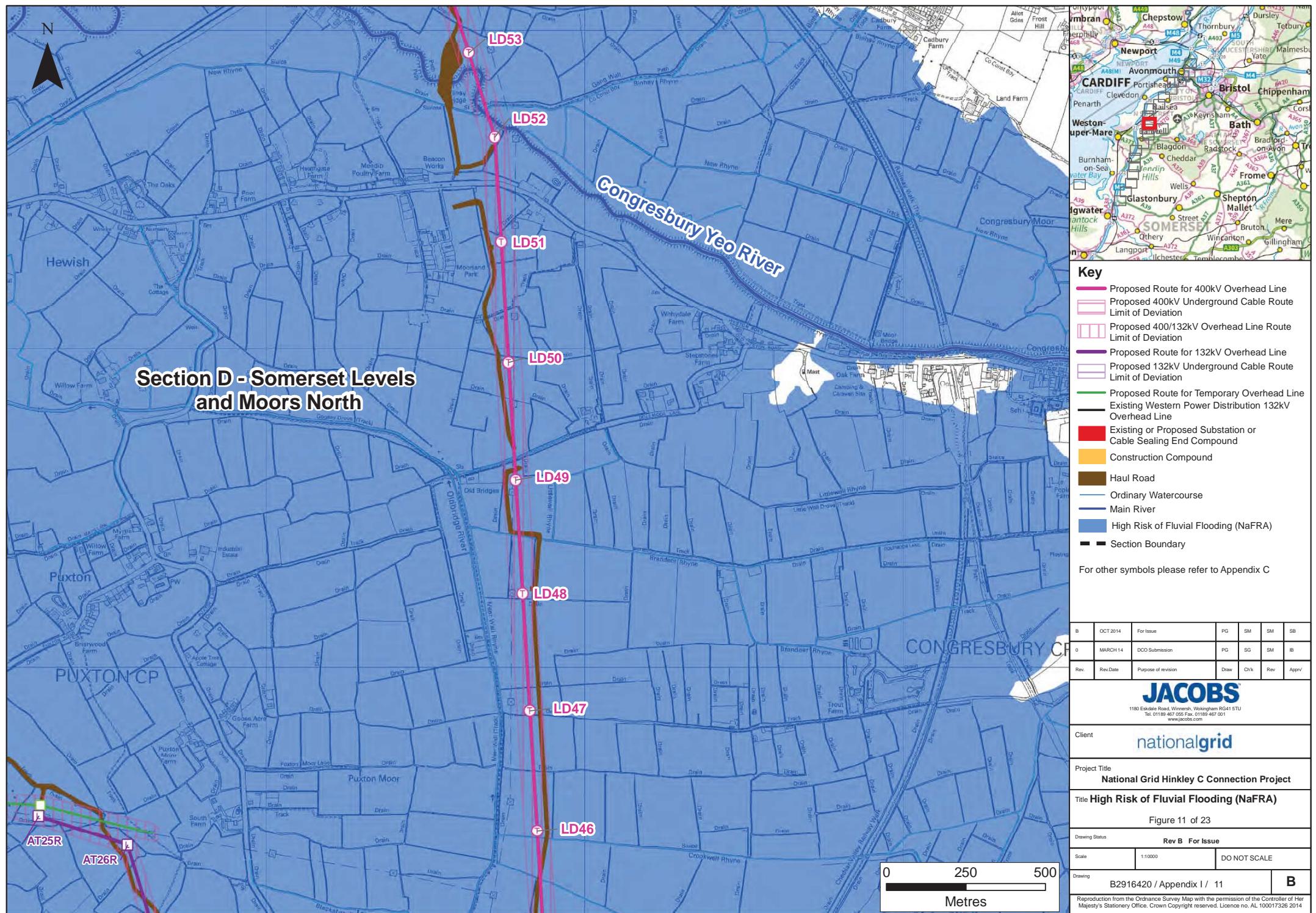


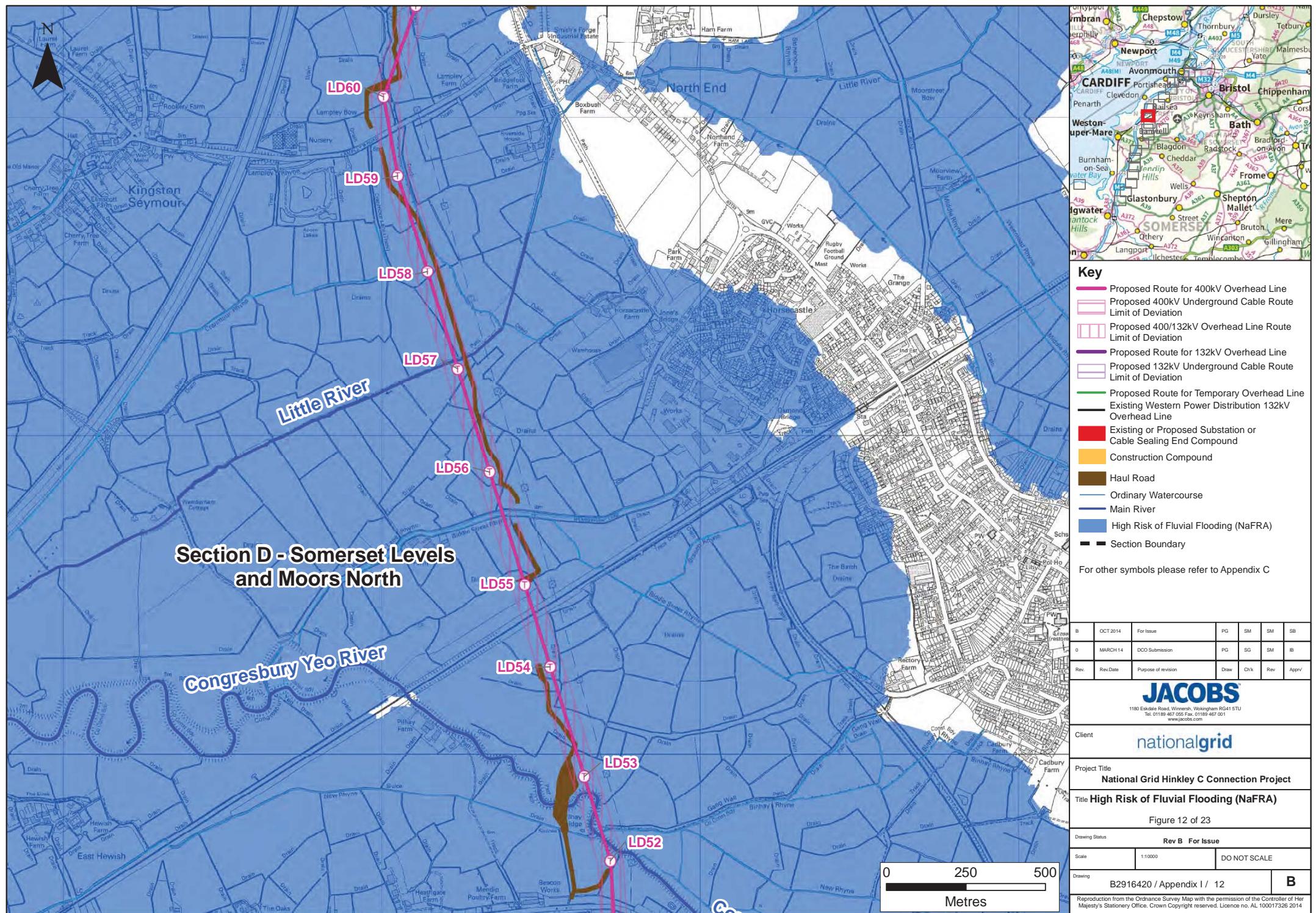


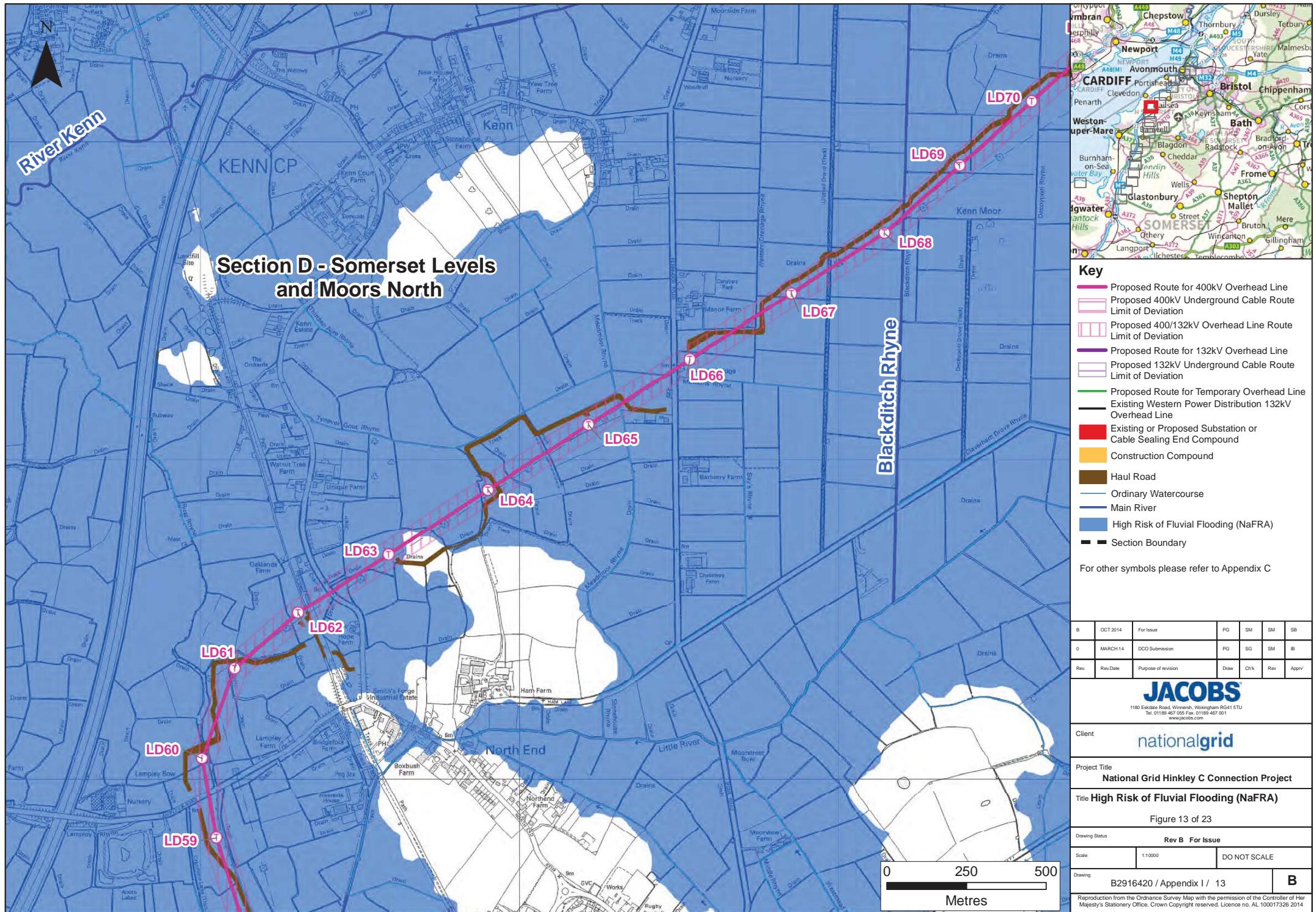


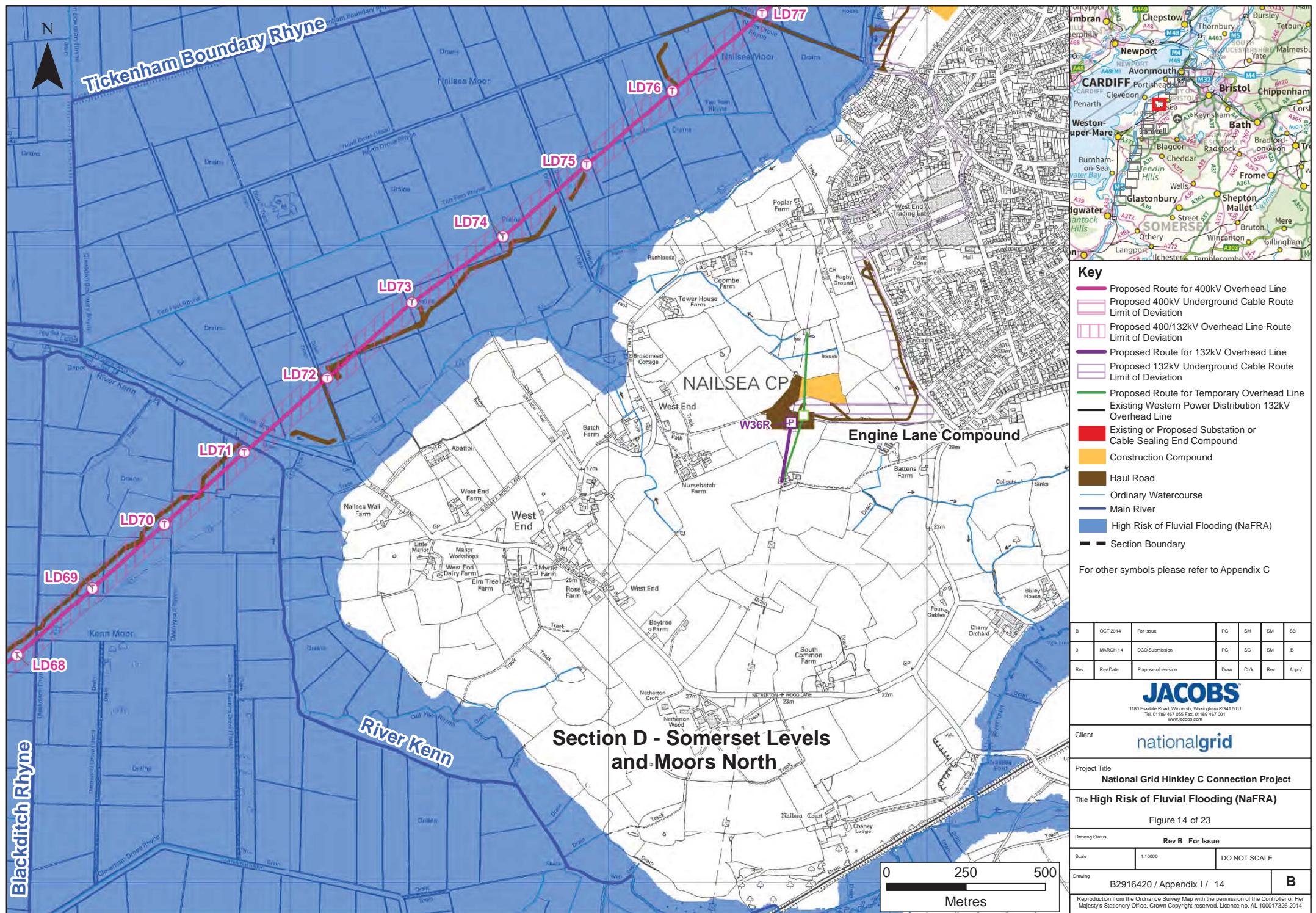


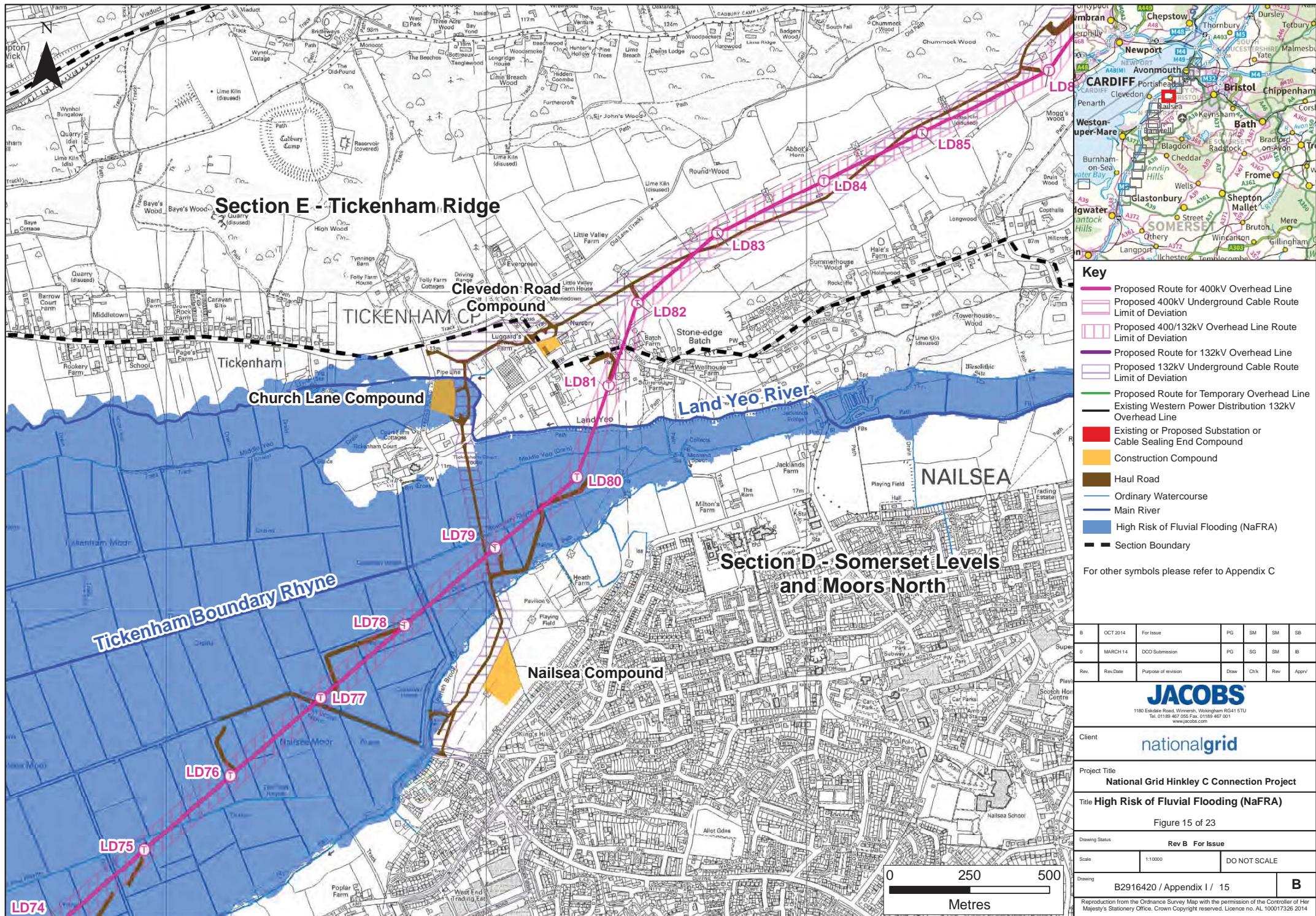


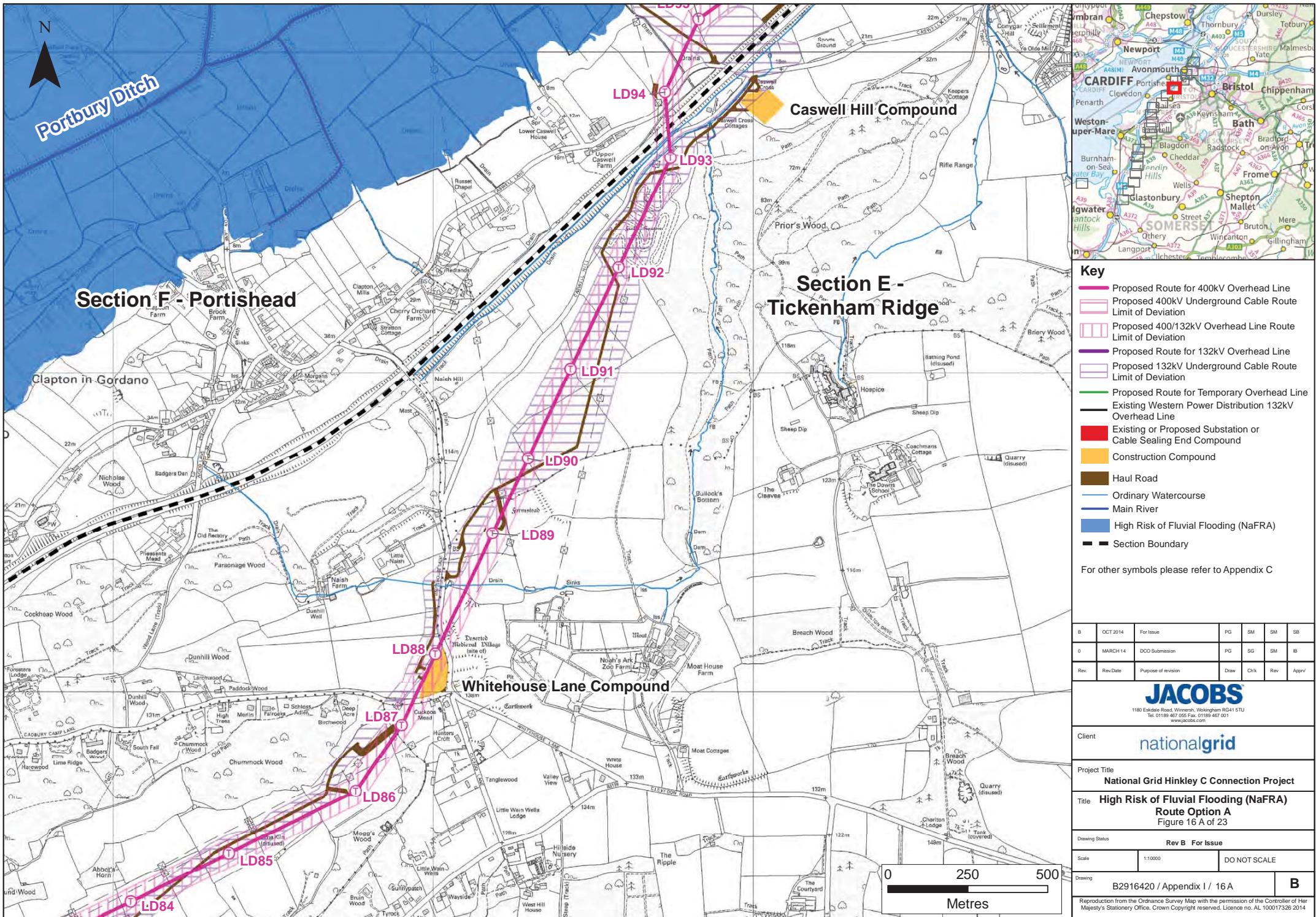


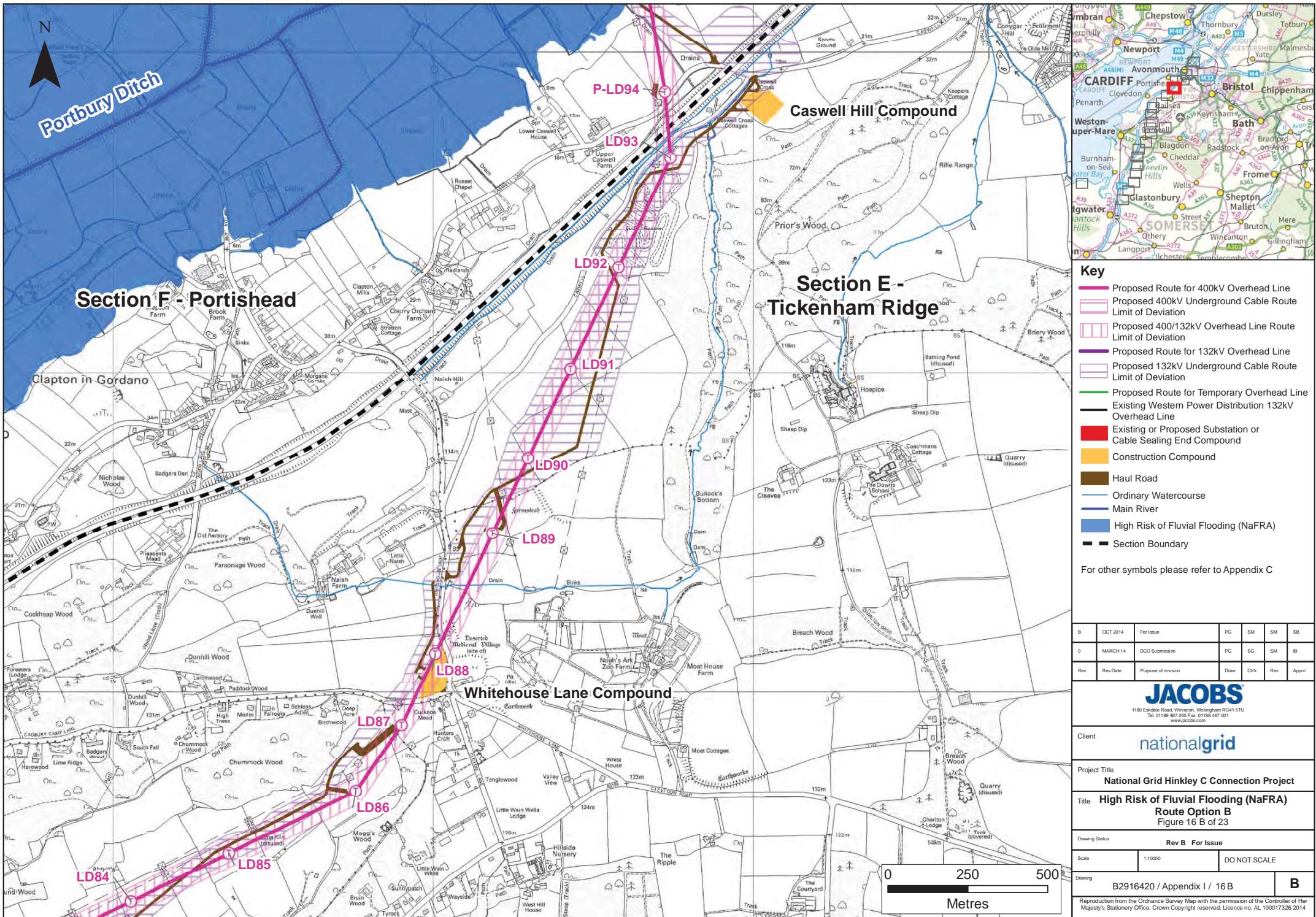


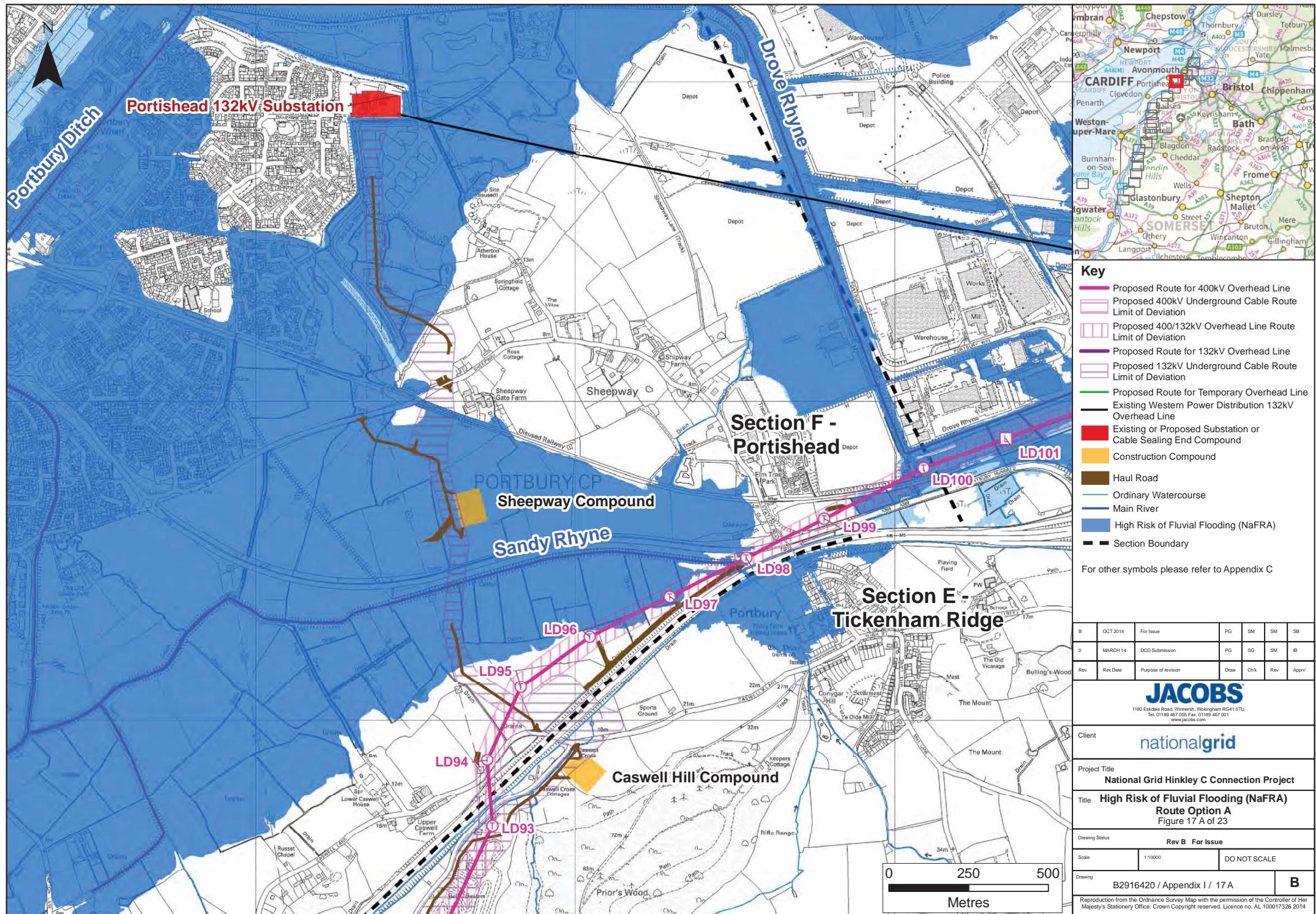


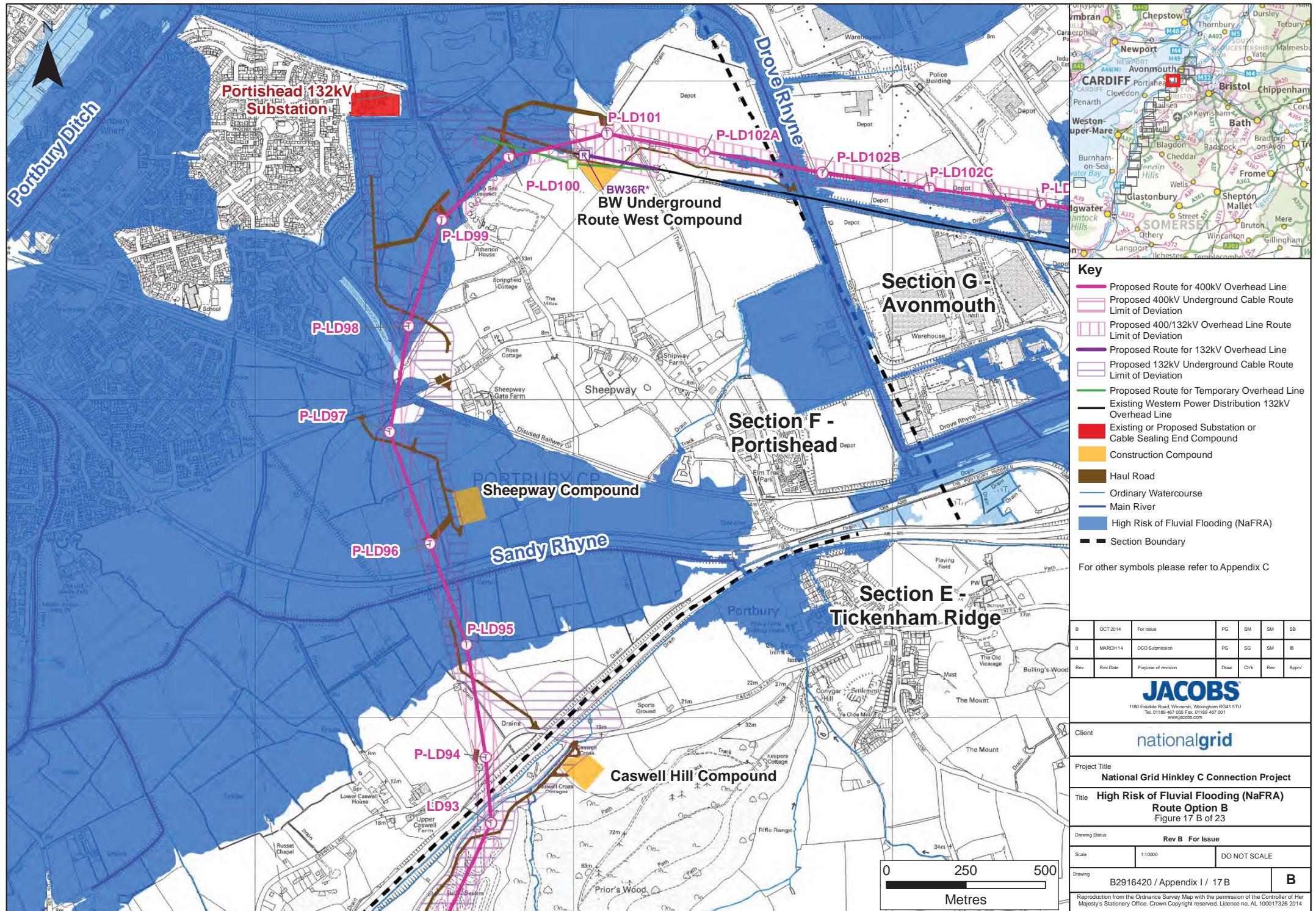


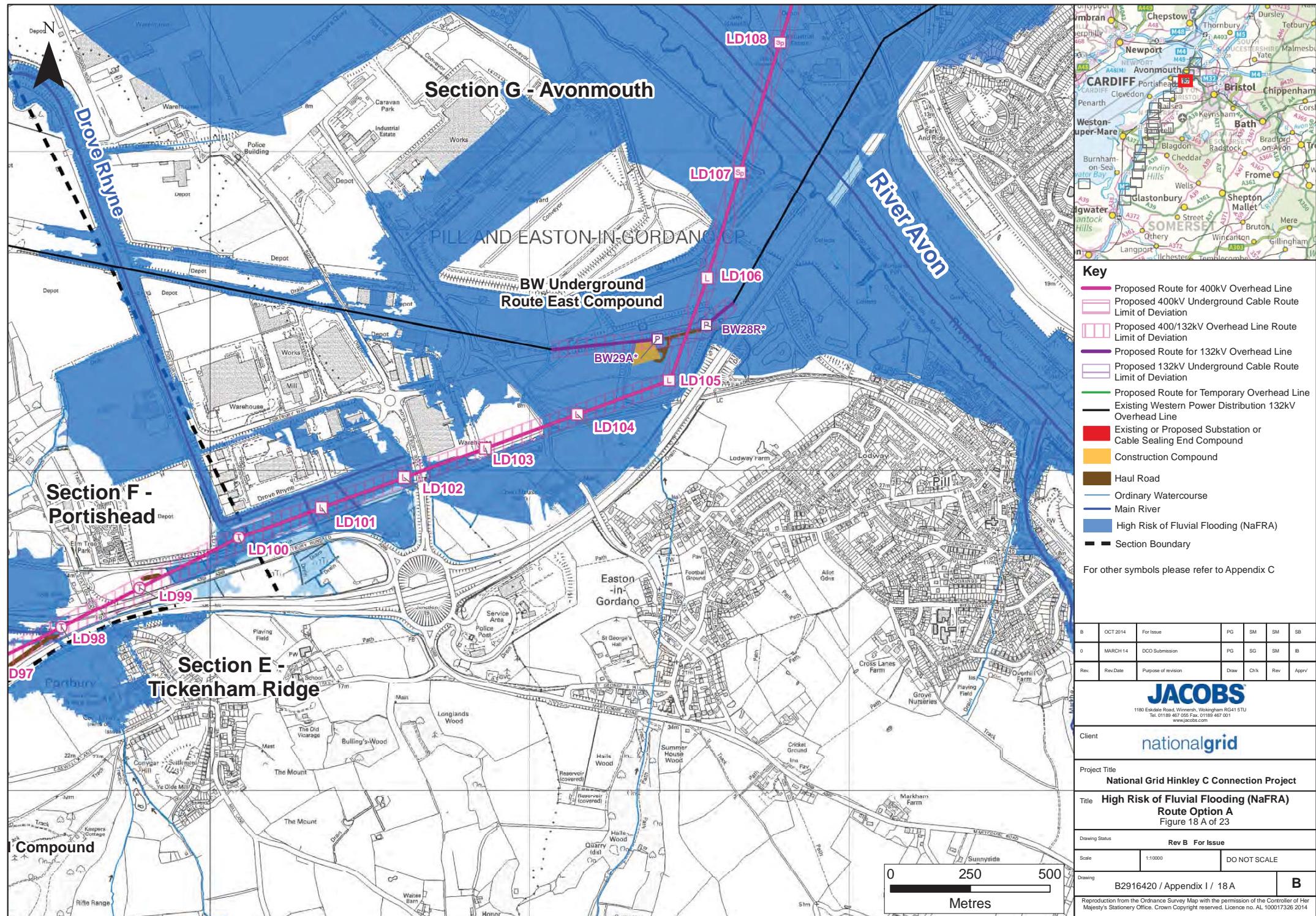


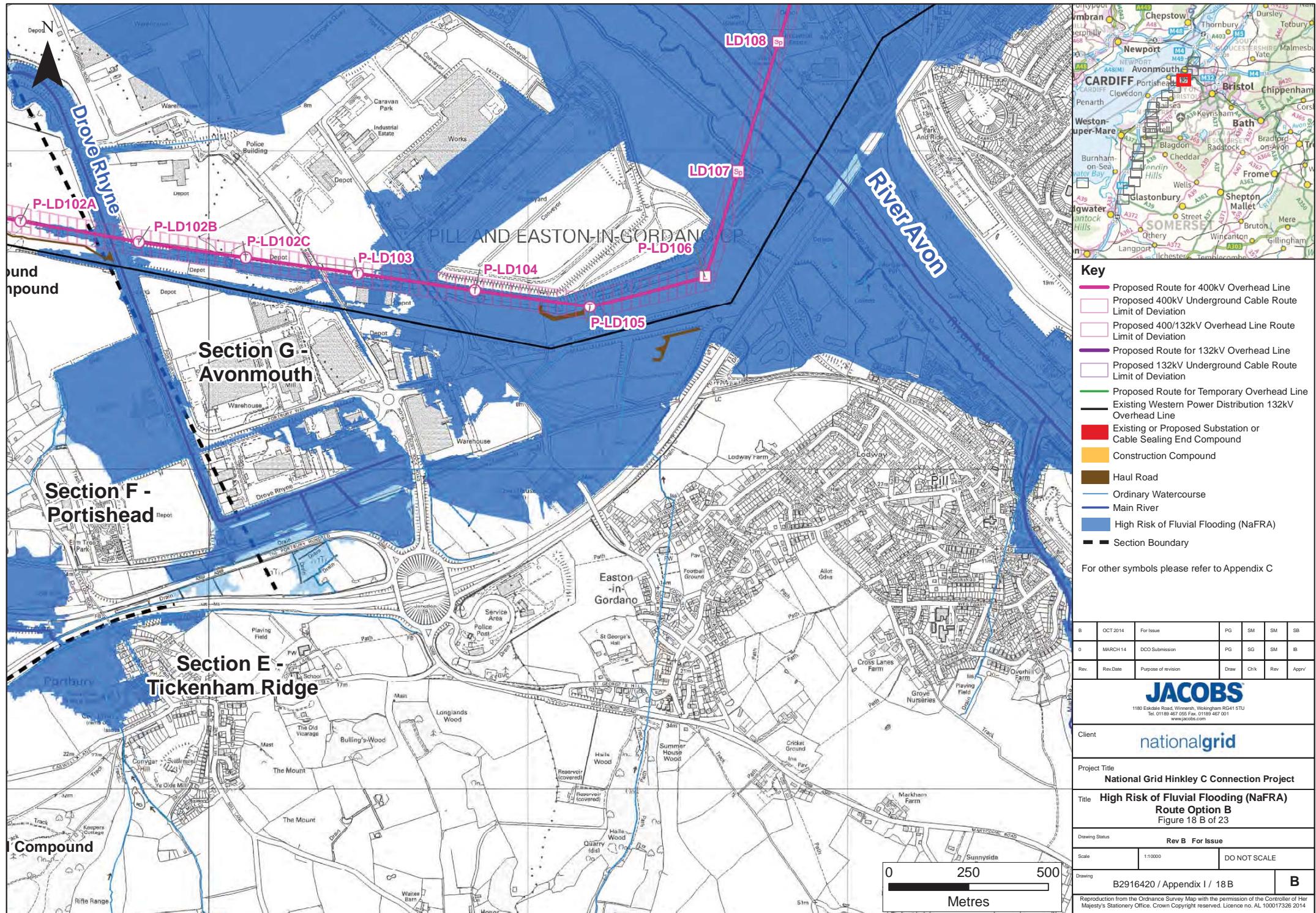


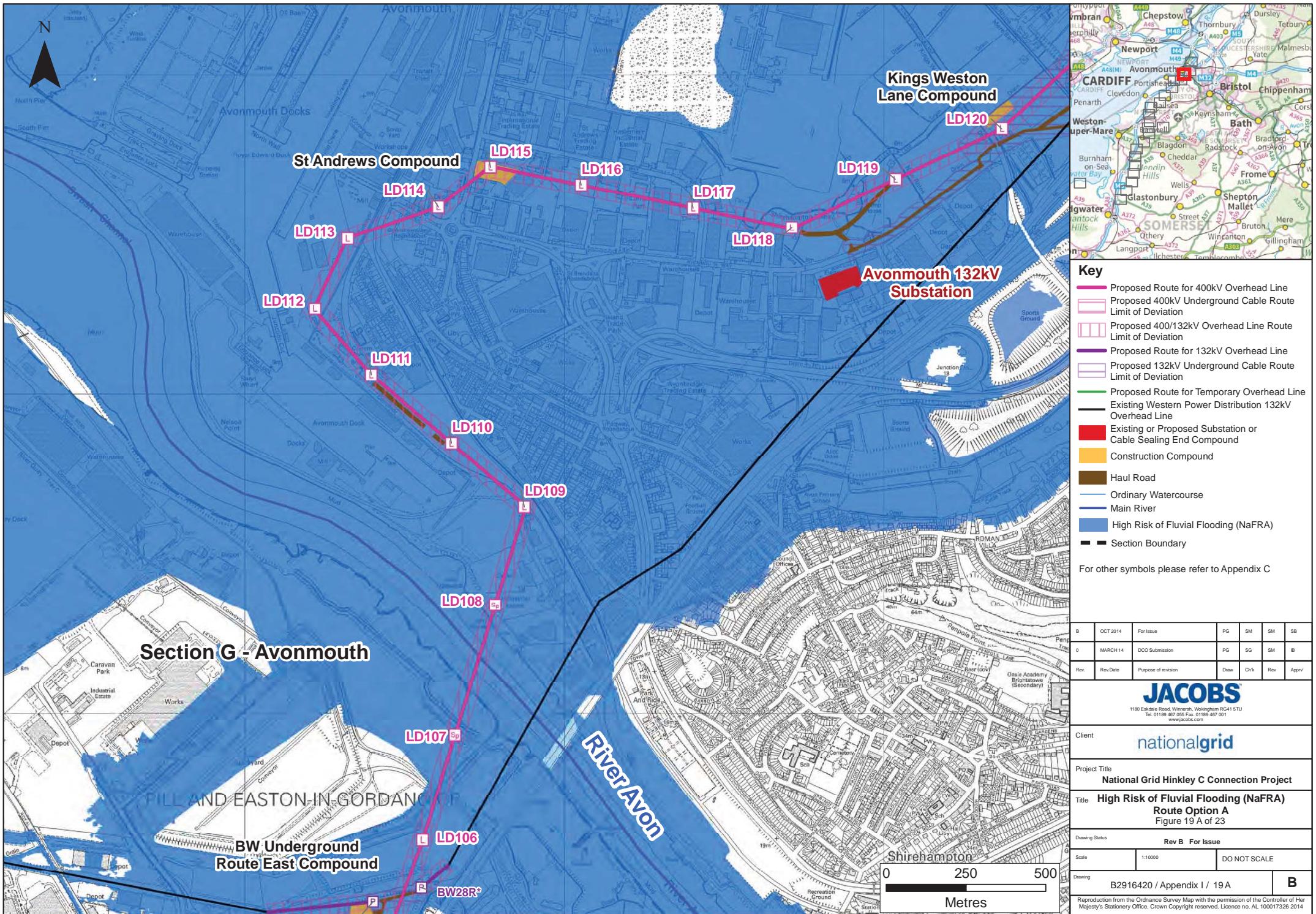


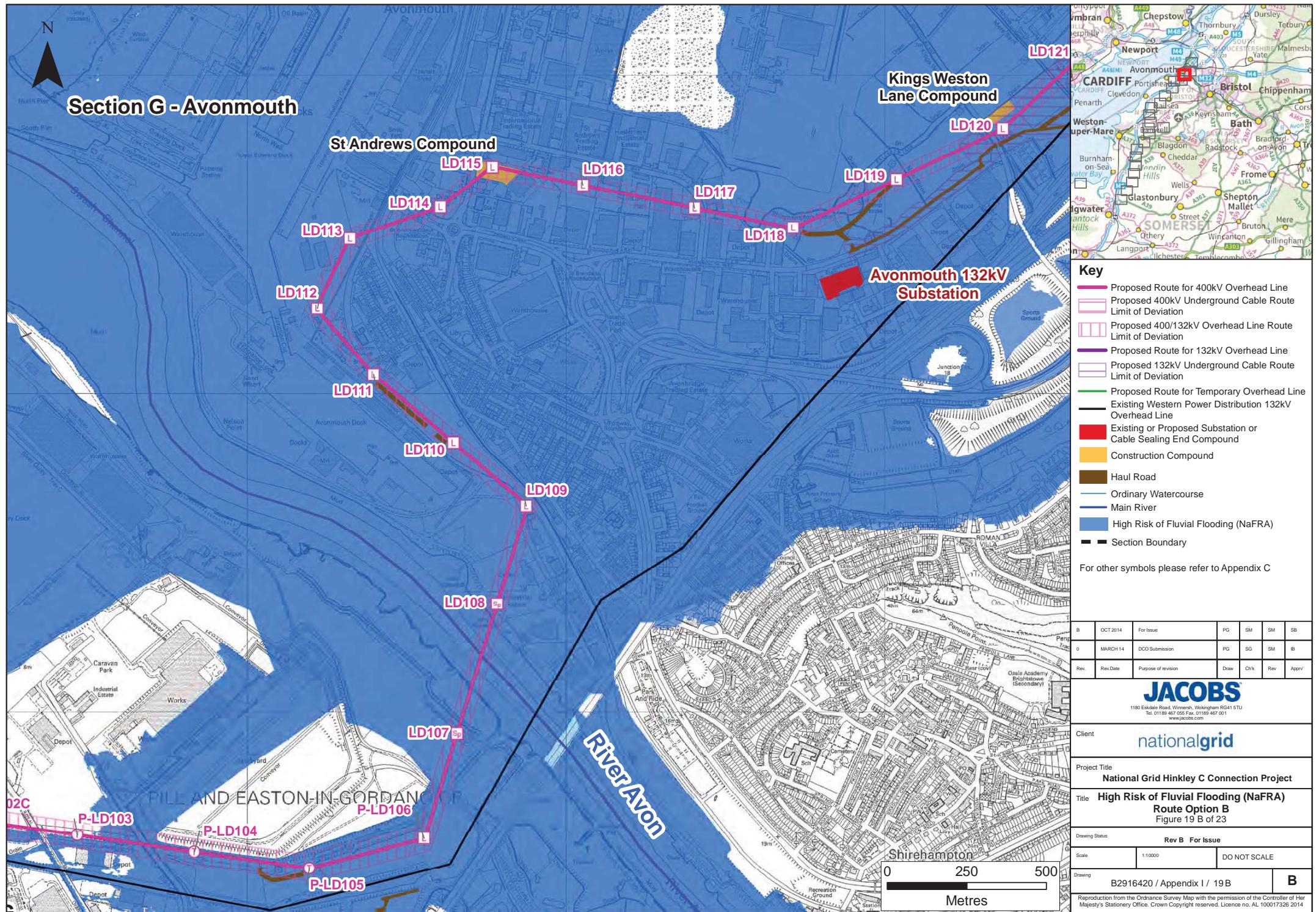


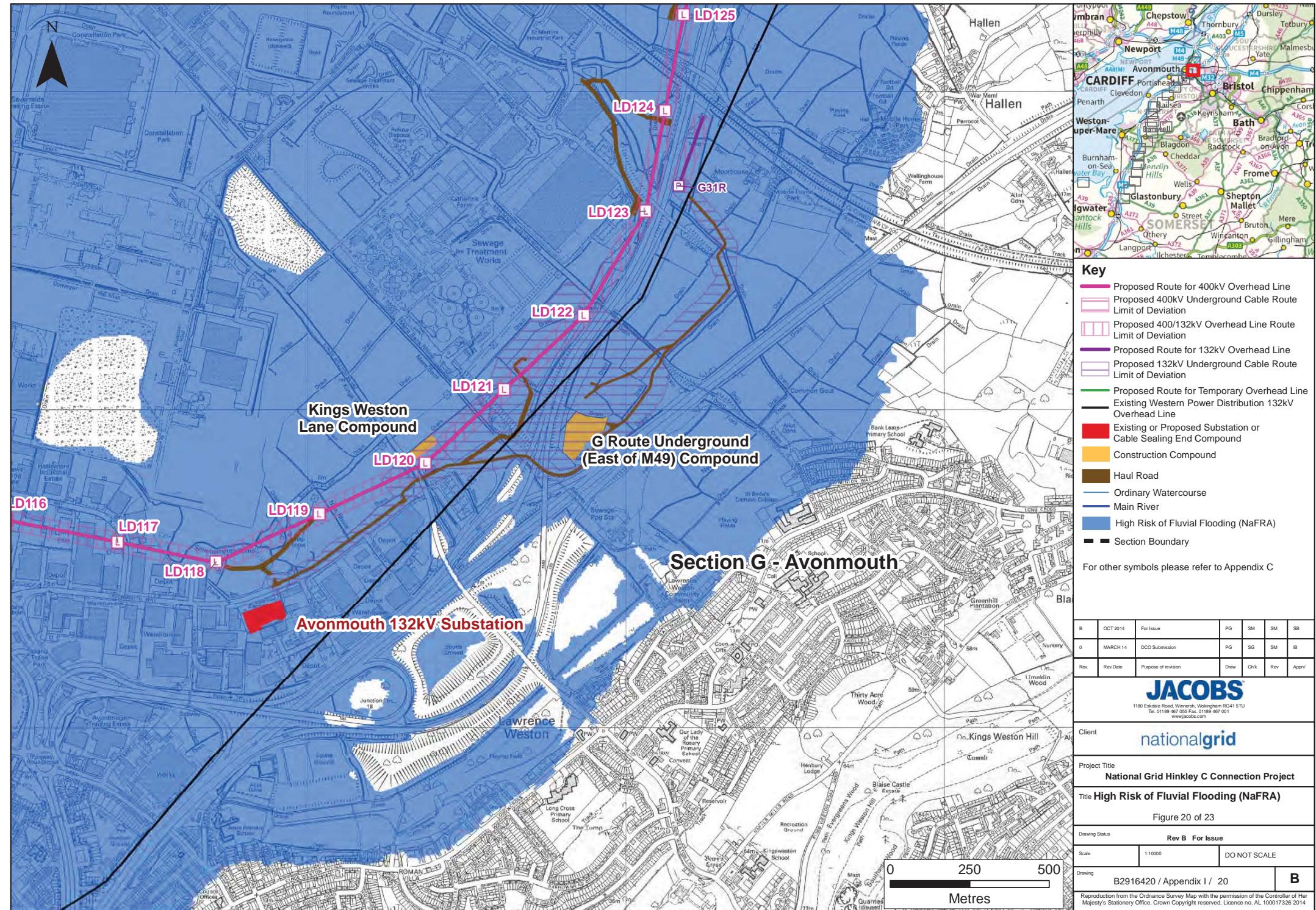


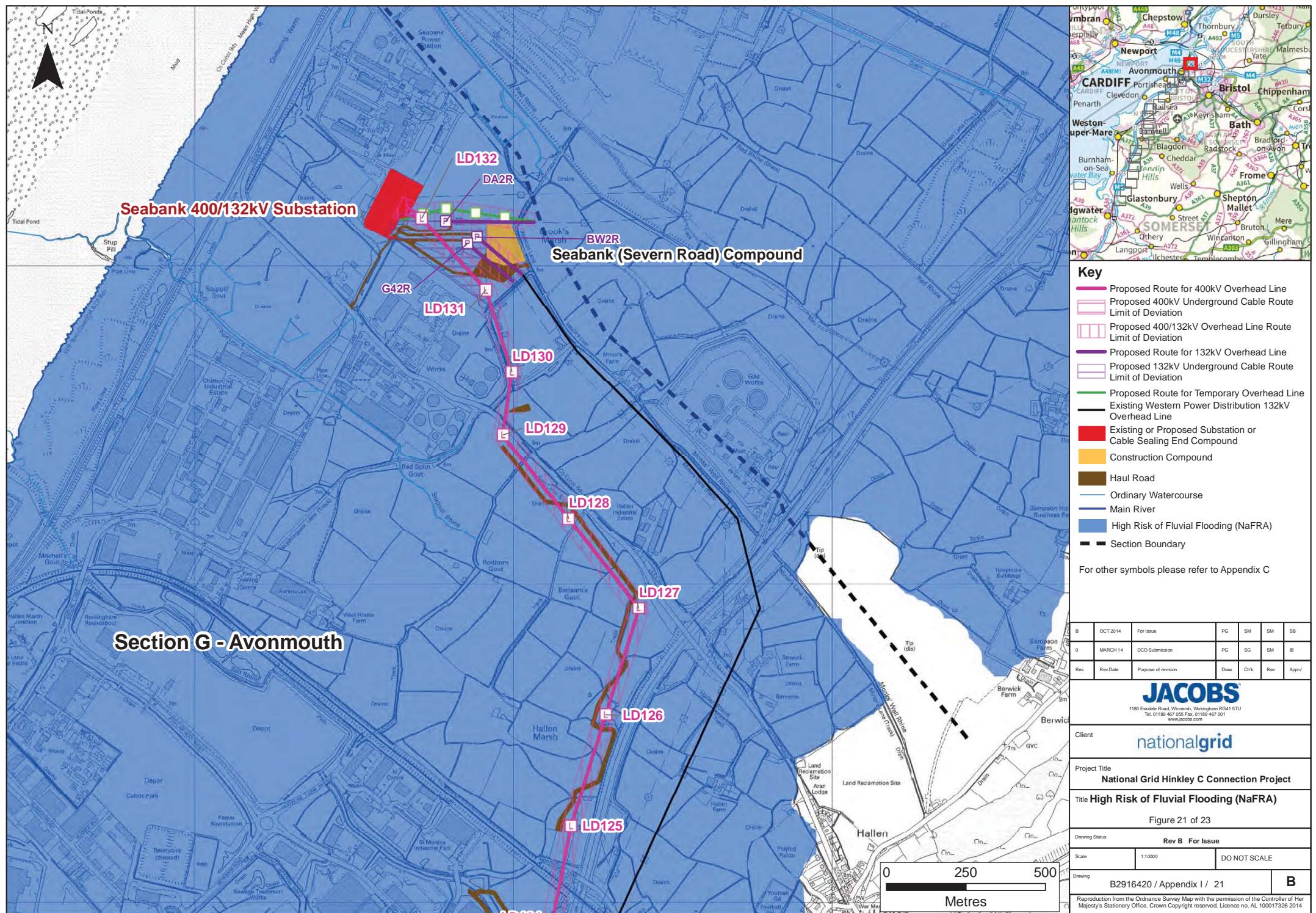


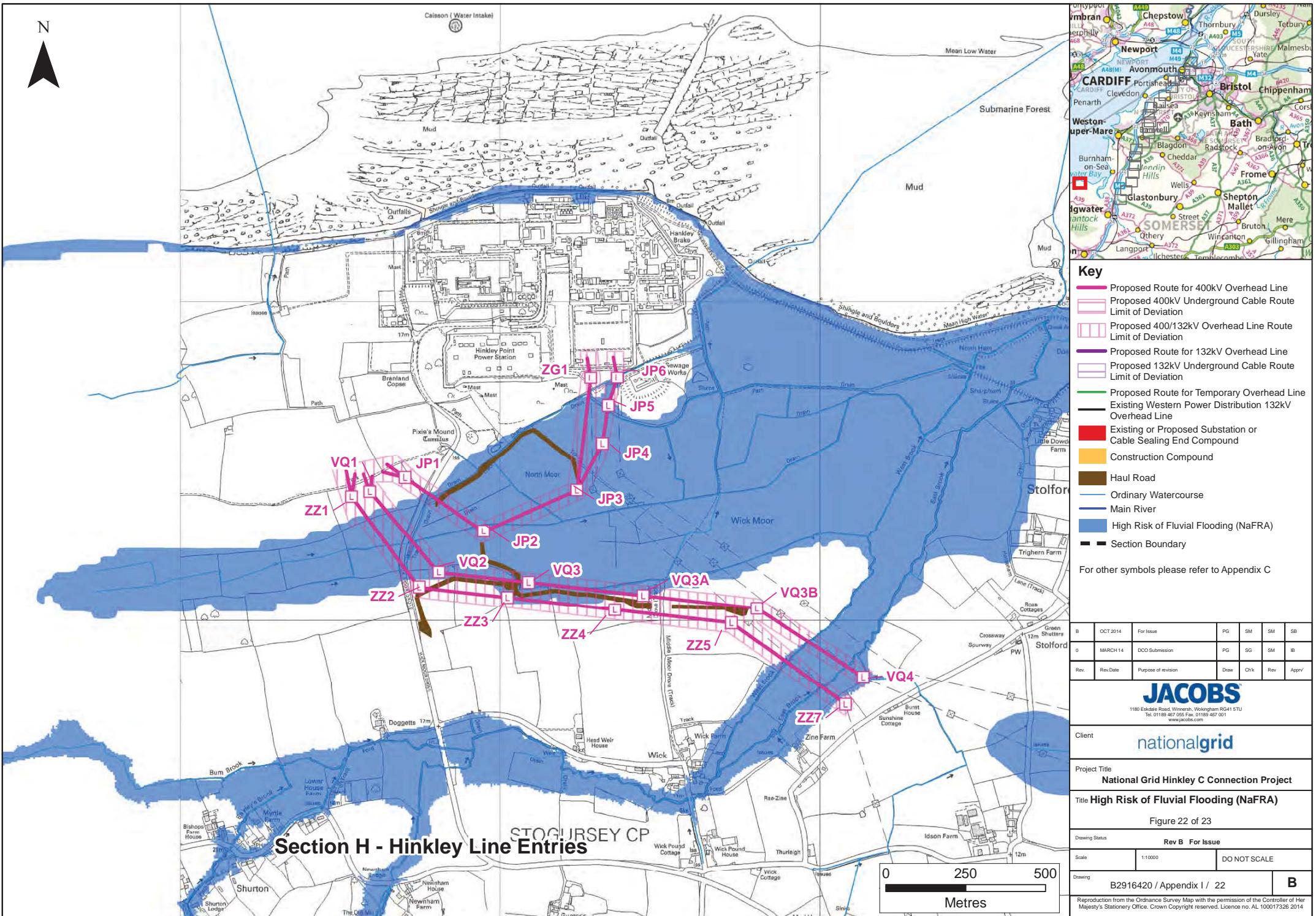


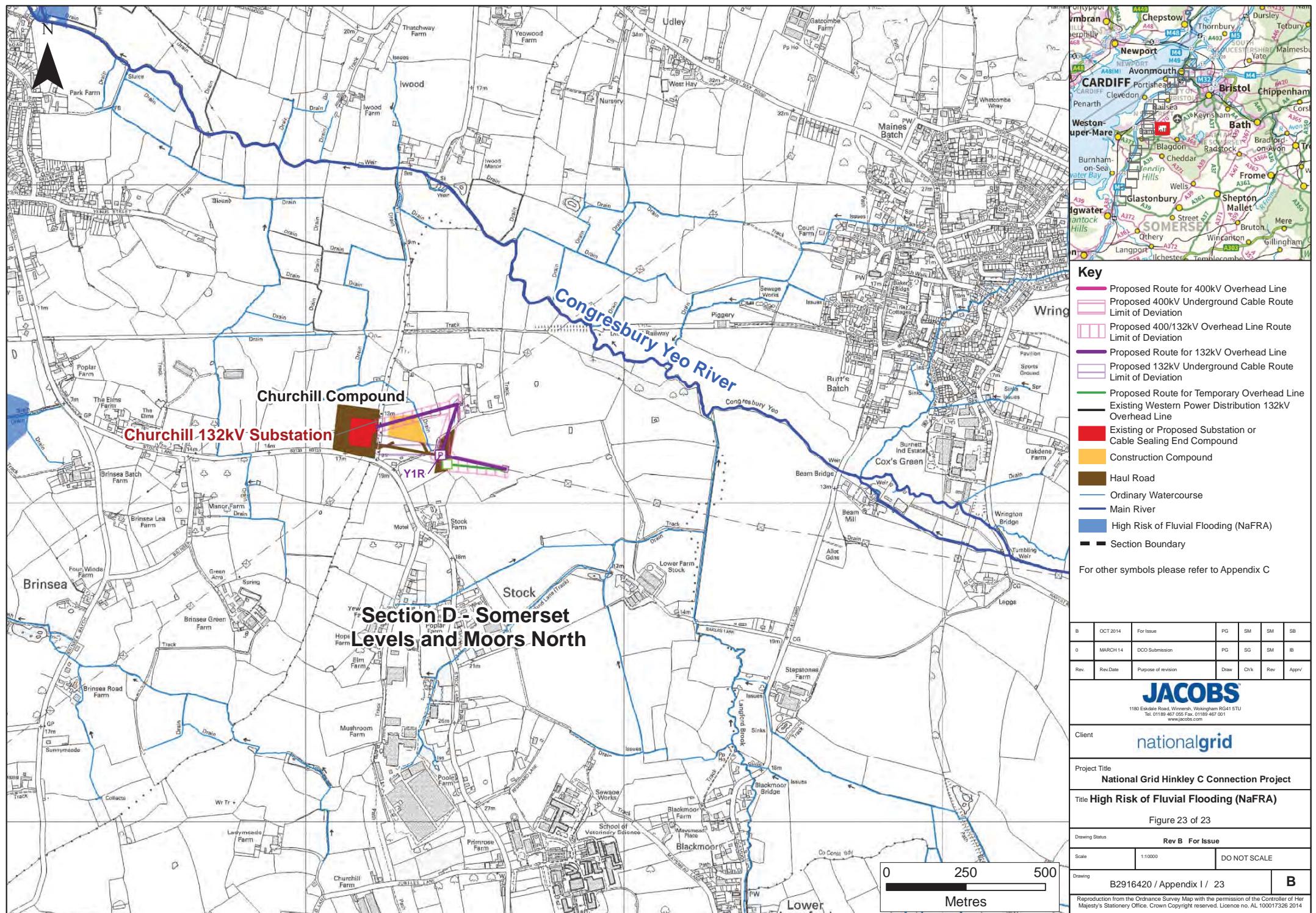












Appendix J – Technical Note on Haul Road,
Construction Compound and Stockpile Flood Risk
Impact

Introduction

An assessment of the flood risk associated with the Proposed Development of the Hinkley Point C Connection Project is detailed in **Volume 5.23.5.1A** Hinkley Point C Connection Route Flood Risk Assessment.

This Technical Note provides further detail on two primary potential impacts that have been considered. These are:

- the impact that the storage of spoil from excavations associated with the construction of the haul road and temporary works (construction) compounds would have on the loss of floodplain storage; and
- the impact that the construction of the elevated haul road would have on reducing floodplain connectivity.

With respect to each of these potential impacts, **Volume 5.23.5.1A** shows that:

- the storage of spoil from the excavations for the haul roads and construction compounds in the floodplain would reduce floodplain storage and consequently raise flood levels by less than 5mm; and
- there are potentially five areas where local flood risk may be raised such that it may impact a receptor, due to the raised haul road reducing floodplain connectivity, each of which can be mitigated.

This Technical Note is in response to the Environment Agency's request for further clarification on how the assessments were undertaken for these two aspects, as detailed in its letter to National Grid dated 25 November 2014 (EA Ref: WX/2014/126241/02).

This Technical Note supports the analysis reported in Section 7 of **Volume 5.23.5.1A**, Hinkley Point C Connection Route Flood Risk Assessment. Figures and Tables as supporting documentation that are A3 size are included at the end of this Appendix.

1. Assessment of the Impact of Haul Roads and Compounds on Floodplain Storage and Flood Water Levels

During the construction phase of the Proposed Development, spoil heaps from the construction of haul roads and works compounds would be stored adjacent to where it was excavated. Where haul roads and compounds are located within the floodplain, the storage of spoil would also be in the floodplain. This would reduce the floodplain volume available for flood storage. The Route FRA presents findings of the impact that this may have on flood levels within Flood Zone 3.

The steps taken to calculate the loss of flood storage volume and the impact that this has on floodplain water levels are as follows:

- **Step 1** - Identify the areas lying within Flood Zone 3 within which spoil will be stored and define the Fluvial Flood Zone receptor area that may be impacted;
- **Step 2** - Calculate the volumes of spoil to be stored within Flood Zone 3 assuming three different flood depths, 0.3m, 1m and 1.4m, and the volume of the haul roads and

compounds displacing flood storage due to the finished surface level being up to 0.3m above original ground level; and

- **Step 3** - Estimate the increase in flood level that is a consequence of lost floodplain volume for the three different flood depths, and the proportion of Flood Zone 3 displaced.

Step 1 - Identification and delineation of the receptor area within Flood Zone 3

Overlaying the proposed development route on the Environment Agency Fluvial Flood Zone 3 (1% AEP) allows the potential impact of the haul roads and compounds within each Route Section to be assessed.

The area considered to be impacted is defined by the Flood Zone 3 area within a 1km strip on either side of the centreline of the proposed overhead line and cable route. In locations where Flood Zone 3 protrudes into the 1km buffer but is not hydraulically connected to the main Flood Zone 3 area through which the route passes, this is excluded. For example, the Flood Zone 3 area impacted by the haul roads may be hydraulically separate from an adjacent Flood Zone 3 area in an adjacent catchment.

An overview map of the proposed route, with a 1km buffer on each side of the route is shown in **Figure 1** of this Appendix (**Appendix J**).

The area of flood zone that could be influenced by the storage loss is defined by the overlap between the 1km buffer and the Flood Zone 3 outline. Based on GIS data from the overview map shown in Figure 1, the Flood Zone 3 areas within each Route Section are shown in **Table 1**.

Table 1 Defined Flood Zone 3 Areas assumed to be Potentially Impacted

Route Section	Area of floodplain (FZ3) within 1km either side of the route (m²)
A Puriton Ridge	4,730,000
B Somerset Levels and Moors South	27,570,000
C Mendip Hills AONB	1,180,000
D Somerset Levels and Moors North	29,150,000
E Tickenham Ridge	0
F Portishead (Route Option A)	1,560,000
F Portishead (Route Option B)	3,510,000
G Avonmouth	11,230,000
H Hinkley	4,730,000

This approach assumes that the flood zone represents fluvial flooding only as the occupation of the tidal floodplain would make no difference to flood levels. This in itself is a conservative assumption as large parts of the Route Sections are tidally influenced, with Flood Zone 3 representing the flood risk area in the absence of any flood defences. Note that for Route Section F there are two route options shown, A and B. Option A is the preferred proposed route which has a smaller area within Flood Zone 3 that could potentially be impacted.

The Flood Zone 3 areas shown in Table 1 above are used in Step 3.

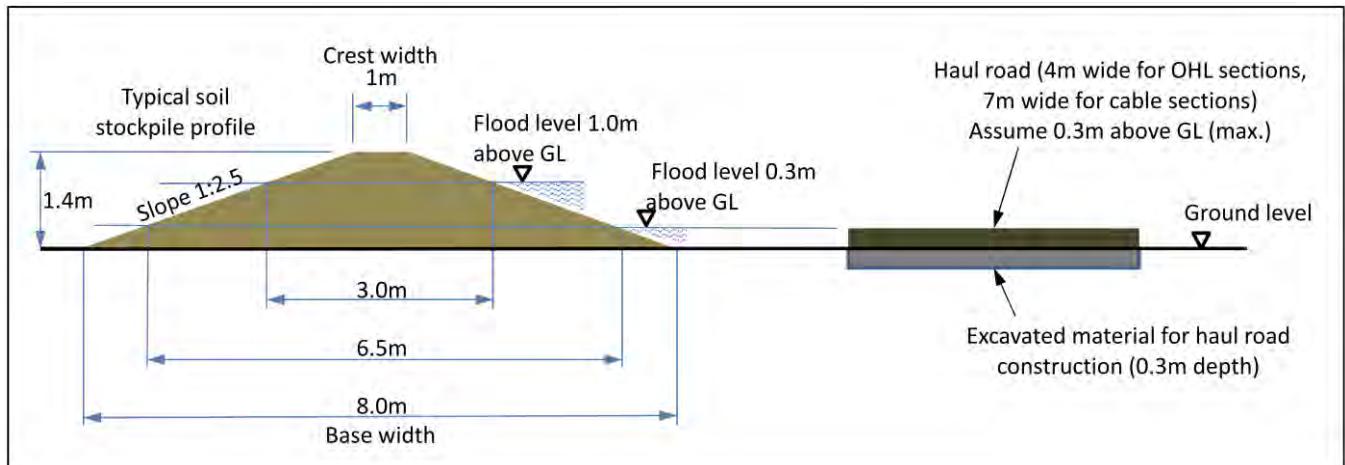
Step 2 - Calculate the volumes of spoil and imported fill for haul road and compound construction to be stored within Flood Zone 3

National Grid proposes two types of haul road: (1) solid construction; and (2) floating road across peat areas. For construction on non-peat substrate, the haul roads would be constructed with hard core. The construction method statements specify that depending on the suitability of the substrate up to 0.3m depth would need to be excavated and stored. To be conservative, it is assumed that, in all cases, 0.3m depth of soil would need to be excavated. For overhead line construction, the width of excavation for the haul road would be approximately 4m. For construction of the haul road associated with the underground cable a width of 7m is typical.

The construction of temporary works compounds would also generate volumes of topsoil for stockpiling which would be located close to the compound sites. The assumed depth of excavation at the compounds is also 0.3m.

Inset 1 shows the geometry of the stockpiles and how the stockpile volume displaces flood storage at different flood depths. For example it can be seen that for a flood depth of 1m above ground level the “top width” of the semi-submerged stockpile would be 3m. The figure also shows the haul road geometry and how the haul road protrudes into the floodplain, thereby displacing Flood Zone 3 flood storage. The principle for the construction compounds is identical, but the plan area varies for each construction compound.

Inset 1 Spoil Heap Geometry



The calculation of the floodplain storage that is lost due to the haul road and compound construction is based on the geometry of the stockpile profile (8m base width, 1m crest width and side slopes of 1:2.5) and is shown in **Table 2**.

Table 2 Stockpile Cross-sectional Area Calculation and Proportion of Cross-section Under Water for Different Flood Depths

Stockpile Dimensions	Flood depth (m)		
	0.3	1	1.4
Base width (m)	8	8	8
Crest width (m)	1	1	1
Height, i.e. flood depth (m)	0.3	1	1.4
Side slope 1:X	2.5	2.5	2.5
"Top" wet width (m)	6.5	3	1
Cross-sectional area <u>under</u> water for given flood depth (m ²)	2.175	5.5	6.3
Cross-sectional area <u>above</u> water for given flood depth (m ²)	4.125	0.8	0
Cross-sectional area check (m ²):	6.3	6.3	6.3
Proportion of total stockpile under water for given flood depth	0.35	0.87	1.00

Based on the geometry of the stockpiles, and the haul road and compound areas / lengths, the Flood Zone 3 storage losses due to the presence of haul roads and construction compounds in Flood Zone 3 is shown as a spreadsheet output in **Table 3** (towards the end of this Appendix). The calculations are shown for the three flood depths considered: 0.3m, 1.0m and 1.4m. These flood depths are nominal and do not relate to specifically predicted flood risk.

In these calculations it is assumed that the floodplain has vertical edges and any loss of volume results in an increase in flood depth and no increase in flooded area.

The Flood Zone 3 storage volume loss calculations due to the haul roads and construction compounds (shown in Table 3) are used in Step 3.

Step 3 - Estimate the Increase in Flood Level that is a Consequence of Lost Floodplain Storage Volume

Having evaluated the area of Flood Zone 3 potentially impacted by the loss of storage volume in Step 1, and the total storage volume displaced for the three different flood depths in Step 2, the increase in estimated flood level across the Flood Zone 3 floodplain is given by:

$$\text{Increase in flood depth} = \text{Total storage loss in FZ3} / \text{Area of FZ3 impacted}$$

The calculations for the estimated increase in flood depth within Flood Zone 3 are shown as a spreadsheet output in **Table 4** (towards the end of this Appendix). The calculations are shown for the three flood depths considered: 0.3m, 1.0m and 1.4m. The calculations also show the breakdown of the impact due to the haul roads and the construction compounds.

The calculations in **Table 4** show that for all Route Sections, the maximum increase in water level is less than 5mm. The biggest percentage loss of Flood Zone 3 floodplain is for Route

Section F (Option B). For this Route Section there is approximately a 1% loss of storage at 0.3m flood depth, and a 0.3% loss at 1.4m flood depth.

Conclusion

It is seen from the assessment that the impact of the haul road and compound construction on loss of floodplain storage is minimal, resulting in an increase in flood levels of less than 5mm for all Route Sections.

2. Assessment of the Haul Road Impact on Floodplain Connectivity

In principle, structures located in the floodplain, such as culverts and elevated roads, have the potential to cause compartments to form with poor connection between them and the rest of the floodplain. This loss of connectivity can raise flood levels locally due to backing up of water upstream of hydraulic restrictions.

For the Proposed Development, compartmentalisation of the floodplain could arise from the construction of haul roads and their associated spoil heaps, and from the loss of conveyance in watercourses by sedimentation and culverting. National Grid proposes mitigation measures to ensure floodplain connectivity is retained. These measures are detailed in the Route FRA in **Tables 7-1, 7-2 and 7-3 of Volume 5.23.5.1A** and include:

- appropriate sizing of culverts;
- appropriate spacing of spoil stockpiles with breaks aligned to flow paths;
- seeding of spoil stockpiles to prevent sediment runoff; and
- construction of haul roads as close to ground level as feasible (50-100mm above ground level in most non-peat areas).

National Grid proposes to construct approximately 67-70km of haul roads (depending on whether Option A or Option B is followed through Route Section F) of which up to around 46km (for Route Option B) would lie within Flood Zone 3. The haul road would be constructed as close to ground level as possible (minimum of 50mm and typically up to 100mm above existing ground level) but may be up to 0.3m above ground level, most notably in areas of peat substrate. To assess the impact this may have on floodplain connectivity, a conservative approach has been adopted by assuming that the haul road is raised 0.3m above the existing terrain throughout the route.

The haul road may impede floodplain flow locally until water depths rise sufficiently to flow over the low point of the haul road, or around the end of it in those locations where the haul road is only connected to other roads at one end. Therefore the maximum depth of any retained water would be restricted to the height of the haul road above lowest pre-existing ground level, i.e. 0.3m above ground level.

To determine potential areas where ponding behind the haul road may occur and impact upon a receptor (building or road), GIS has been used to overlay the haul road and the Environment Agency surface water flood map (1 in 30 (3.3%) AEP) on a digital terrain model (based on LiDAR data). The surface water flood map was used as this shows clearly the flow paths and therefore the areas most vulnerable to ponding in the event that the haul road “cuts off” the natural flow route. Where the haul road was found to be in close proximity to a receptor, it was assigned a crest level at its lowest point of 0.3m above the natural ground

level. This allowed a ground elevation contour to be defined which would represent the area in which water backing up behind the haul road could extend.

There are anticipated to be localised areas where the haul road may impede drainage and cause ponding on the “up gradient” side of the haul road on agricultural land. Five areas were identified and reported on in which ponding behind the haul road could impact a building or road unless further mitigation is considered. Section 7.8.2 of **Volume 5.23.5.1A** identifies these locations where haul roads may cause local compartmentalisation of the floodplain. In all cases, mitigation measures have been identified.

Details of each location are provided in **Figures 2 to 6** of this Appendix (**Appendix J**). The commentary for each location considered is below.

Location 1 - Route Section B at Old River Axe crossing

Route Section B at Old River Axe crossing (NGR 3374 1535) shown in **Figure 2**. The haul road crosses the Old River Axe where it is embanked and at a higher elevation than the surrounding moors. The temporary crossing of the Old River Axe would be with a bridge designed to minimise any hydraulic restriction in the River. The configuration of the haul road would allow any spill from the watercourse to follow its natural route to the low lying moor. Surface water and overland flows in the area would be able to cross the haul road through the numerous culvert crossings indicated on **Figure 2**. There are no properties or roads in the vicinity of the Old River Axe crossing.

Location 2 - Route Section D near Nailsea Compound

Route Section D in the vicinity of the Nailsea Compound (NGR 3457 1705) is shown in **Figure 3**. This location has several haul roads and a compound in close proximity to Nailsea and in an area shown as at risk from the 1 in 30 (3.3%) AEP surface water flood event. Nailsea is located on ground elevated approximately 2m above Nailsea Moor, over which the haul roads cross. This height difference is sufficient to protect the settlement from any ponding caused by the haul roads. However, the 1 in 30 (3.3%) AEP surface water flood extent is shown to cross the Causeway, an access road between Nailsea and the B3130 and Tickenham. Whilst the haul road is proposed to run parallel to the North Drove Rhyne on an existing track (The Drove) there is the potential to increase the depth and frequency of flooding in this location potentially impacting on the Causeway. This will be mitigated through the design of the haul road watercourse crossings to be provided, for example, C-LD76-CR01, 02 and 03 (**Figure 3**). The haul road located to the east of Parish Brook, is effectively upstream of Parish Brook in terms of surface water flow paths, see **Figure 3**. There is the potential here for the haul road and the Nailsea Compound to act as a barrier to surface water flows from Nailsea into the Parish Brook, as seen from the two primary surface water flow paths along Watery Lane and crossing Causeway View (**Figure 3**). The potential risk that this presents would be mitigated through the watercourse crossings W-ROUTE-CR01, 03 and 04.

Location 3 - Route Section D/E at Church Lane and Clevedon Road Compound

Route Section D/E at Church Lane and Clevedon Road Compound area (NGR: 3459 1717) is shown in **Figure 4**. This area was investigated because of the close proximity to properties and roads and the presence of a 1 in 30 (3.3%) AEP surface water flood event outline. Close

inspection of the levels indicates that the terrain is dropping from east to west and that the haul road only crosses the flow path where it is the Land Yeo watercourse. An appropriately sized bridge (soffit 600mm above the 1 in 100 (1%) AEP flood event) at the Land Yeo crossing should mitigate the flood risk in this location.

Location 4 - Route Section G at Kings Weston Lane Compound

Route Section G at Kings Weston Lane Compound (NGR: 3533 1787) is shown in **Figure 5**. Two haul roads meet at Kings Weston Lane. There is the potential for the haul roads (which are perpendicular to Kings Weston Lane) to interrupt the 1 in 30 (3.3%) AEP surface water flood event flow path from the south side of the haul road entering the nearby drains and progressing into the Kings Weston Rhyne. Without mitigation the haul road could cause ponding to start earlier than previously in a 1 in 30 (3.3%) AEP event and to occur in less severe events. The proposed watercourse crossings G-ROUTE-CR04, 05 and 06 (**Figure 5**) would mitigate this risk, but the haul road level at this location should also be as close as possible to ground level to minimise the impact.

Location 5 - Route Section H at Hinkley

Route Section H at Hinkley (NGR: 3209 1454) is shown in **Figure 6**. There is the potential for the haul road, which is perpendicular to the surface water flow path, to block the surface water flow path and its discharge into the local drainage network. However, the surface water flow path enters a drain which runs alongside the haul road, subsequently connecting to other watercourses that form part of the land drainage network. No specific additional mitigation is required beyond the mitigation measures for haul road construction adjacent to and over watercourses.

Conclusion

It is seen from the analysis that there are locations where the potential compartmentalisation of the floodplain by the haul road could lead to an increased flood risk. Those areas identified with some potential for increased risk can be mitigated through appropriate measures such as ensuring connectivity through the drainage network (which is the case for all proposed watercourse crossings along the route) and ensuring the elevation of the haul road above ground level is minimised.

TABLES AND FIGURES

Table 3 Floodplain Storage Losses due to Haul Roads and Construction Compounds in Flood Zone 3

Table 4 Floodplain Water level Increase due to Haul Roads and Construction Compounds in Flood Zone 3

Figure 1 Floodplain Receptor Areas

Figure 2-6 Areas Potentially Impacted by Floodplain Compartmentalisation

Figure 2 Old River Axe (Section B)

Figure 3 Nailsea (Section D)

Figure 4 Section D/E Boundary

Figure 5 Kings Weston Lane (Section G)

Figure 6 Hinkley (Section H)

Table 3
FLOODPLAIN STORAGE LOSSES DUE TO HAUL ROADS AND CONSTRUCTION COMPOUNDS IN FLOOD ZONE 3

For >1.4m flood depth: All Haul Road / Construction Compound and 100% of soil stockpiles would be below flood level i.e. lost flood storage

For 1.0m flood depth: All Haul Road / Construction Compound and 87% of soil stockpiles would be below flood level i.e. lost flood storage

For 0.3m flood depth: All Haul Road / Construction Compound and 35% of soil stockpiles would be below flood level i.e. lost flood storage

1. Total Potential Floodplain Storage Loss from Haul Roads: Excavation Volume + Haul Road Volume

Section	Haul Road Length			FZ3 Haul Road length for Cable and OHL		Haul Road Excavation Volume in FZ3 (0.3m excavation depth)		Haul Road Protrusion into in FZ3 (0.3m above G/L)		Proportion of stockpile for haul roads within FZ3 that would be under water for given flood depth			Total potential storage loss in FZ3 (m ³)
	Total Length (km)	Length Outside Flood Zone 3 (km)	Length Inside Flood Zone 3 (km)	FZ3 Haul Road length for Cable (km)	FZ3 Haul Road length for OHL (km)	Excavation in Cable areas (7m wide road) (m ³)	Excavation in OHL areas (4m wide road) (m ³)	Construction in Cable areas (7m wide road) (m ³)	Construction in OHL areas (4m wide) (m ³)	1.00	0.87	0.35	
A	3.8	2.0	1.8	0.6	1.2	1,184	1,443	1,184	1,443	5,253	4,919.40	3,533	5,253
B	19.4	3.2	16.2	1.9	14.2	4,065	17,058	4,065	17,058	42,245	39,562	28,415	42,245
C	6.3	6.2	0.1	0.1	0.0	223	-	223	-	446	417	300	446
D	22.9	4.8	18.1	1.2	16.8	2,595	20,209	2,595	20,209	45,607	42,712	30,676	45,607
E	4.9	4.9	0.0	0.0	0.0	-	-	-	-	-	-	-	-
F(A)	0.8	0.7	0.1	0.1	0.0	168	-	168	-	336	315	226	336
F(B)	4.0	1.4	2.5	2.3	0.3	4,803	308	4,803	308	10,222	9,573	6,875	10,222
G	7.5	1.4	6.1	3.4	2.6	7,208	3,166	7,208	3,166	20,748	19,430	13,955	20,748
H	1.9	0.8	1.2	0.0	1.2	-	1,400	-	1,400	2,799	2,622	1,883	2,799
Total (Option A)	67.4	24.0	43.4	7.4	36.1	15,442	43,275	15,442	43,275	117,433	109,977	78,988	117,433
Total (Option B)	70.6	24.8	45.9	9.6	36.3	20,076	43,583	20,076	43,583	127,319	119,235	85,637	127,319

2. Total Potential Floodplain Storage Loss from Construction Compounds: Excavation Volume + Construction Compound Volume

Route Section	Proportion of stockpile for compounds within FZ3 that would be under water for given flood depth						Total potential storage loss in FZ3 (m ³)
	1.00	0.87	0.35	Storage loss in FZ3 for 1.4m flood depth (m ³)	Storage loss in FZ3 for 1.0m flood depth (m ³)	Storage loss in FZ3 for 0.3m flood depth (m ³)	
	Compound excavation volume in FZ3 (0.3m ex. depth) (m ³)	Compound Protrusion into FZ3 (0.3m above G/L) (m ³)					
A	6,091	6,091	12,183	11,409	8,194	12,183	
B	19,976	19,976	39,952	37,415	26,872	39,952	
C	-	-	-	-	-	-	
D	5,792	5,792	11,584	10,849	7,792	11,584	
E	-	-	-	-	-	-	
F (Option A)	2,670	2,670	5,339	5,000	3,591	5,339	
F (Option B)	2,670	2,670	5,339	5,000	3,591	5,339	
G	8,260	8,260	16,520	15,471	11,112	16,520	
H	-	-	-	-	-	-	
Total (Option A)	42,789	42,789	85,578	80,144	57,561	85,578	
Total (Option B)	42,789	42,789	85,578	80,144	57,561	85,578	

Table 4

FLOODPLAIN WATER LEVEL INCREASE DUE TO HAUL ROAD AND CONSTRUCTION COMPOUNDS IN FLOOD ZONE 3

1. Estimated Increase in Floodplain Water Level due to Loss of Storage from Haul Roads and Construction Compounds

Route Section	Estimated increase in floodplain water level for given flood depth due to Haul Roads (mm)			Estimated increase in floodplain water level for given flood depth due to Compounds (mm)			Estimated increase in floodplain water level for given flood depth due to Haul Roads and Compounds (mm)			Area of floodplain within 1km either side of the route (m ²)
	Flood depth in FZ3 of 1.4m	Flood depth in FZ3 of 1.0m	Flood depth in FZ3 of 0.3m	Flood depth in FZ3 of 1.4m	Flood depth in FZ3 of 1.0m	Flood depth in FZ3 of 0.3m	Flood depth in FZ3 of 1.4m	Flood depth in FZ3 of 1.0m	Flood depth in FZ3 of 0.3m	
A	1.11	1.04	0.75	2.58	2.41	1.73	3.69	3.45	2.48	4,730,000
B	1.53	1.43	1.03	1.45	1.36	0.97	2.98	2.79	2.01	27,570,000
C	0.38	0.35	0.25	0.00	0.00	0.00	0.38	0.35	0.25	1180000
D	1.56	1.47	1.05	0.40	0.37	0.27	1.96	1.84	1.32	29,150,000
E	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
F (Option A)	0.22	0.20	0.14	3.42	3.21	2.30	3.64	3.41	2.45	1,560,000
F (Option B)	2.91	2.73	1.96	1.52	1.42	1.02	4.43	4.15	2.98	3,510,000
G	1.85	1.73	1.24	1.47	1.38	0.99	3.32	3.11	2.23	11,230,000
H	1.45	1.36	0.98	0.00	0.00	0.00	1.45	1.36	0.98	1,930,000

2. Estimated Loss of Floodplain Storage as a proportion of Total Floodplain Storage due to Haul Roads and Construction Compounds

Route Section	Estimated Total Loss of Flood Storage on Floodplain (%) for given flood depth in FZ3 due to Haul Roads and Compounds					
	Floodplain volume at 1.4m depth	Loss of Floodplain storage at 1.4m depth (%)	Floodplain volume at 1.0m depth	Loss of Floodplain storage at 1.0m depth (%)	Floodplain volume at 0.3m depth	Loss of Floodplain storage at 0.3m depth (%)
A	6,622,000	0.26%	4,730,000	0.35%	1,419,000	0.83%
B	38,598,000	0.21%	27,570,000	0.28%	8,271,000	0.67%
C	1,652,000	0.03%	1,180,000	0.04%	354,000	0.08%
D	40,810,000	0.14%	29,150,000	0.18%	8,745,000	0.44%
E	0	0.00%	0	0.00%	0	0.00%
F (Option A)	2,184,000	0.26%	1,560,000	0.34%	468,000	0.82%
F (Option B)	4,914,000	0.32%	3,510,000	0.42%	1,053,000	0.99%
G	15,722,000	0.24%	11,230,000	0.31%	3,369,000	0.74%
H	2,702,000	0.10%	1,930,000	0.14%	579,000	0.33%



