NORTH FALLS

Offshore Wind Farm

Flood Risk Assessment (Clarification regarding flood risk associated with watercourse crossings) - Technical Note

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Contents

Figures

Glossary of Acronyms

D**CO**	Development Consent Order
DTM	Digital Terrain Model
E**S**	Environmental Statement
HDD	Horizontal Directional Drilling
m	Meter
mAOD	Meters Above Ordnance Datum
NFOW	North Falls Offshore Wind Limited
WX	Watercourse crossing

Glossary of Terminology

Fluvial Flooding	When flows within watercourses exceed the capacity of the watercourse causing out of bank flows
Geomorphology	The study of landforms and the processes that shape them
Groundwater	Water stored below the ground in rocks or other geological strata.
Landfall	The location where the offshore export cables come ashore at Kirby Brook.
LiDAR	Light Detection And Ranging is an accurate ground terrain model obtained by aerial survey. The typical vertical accuracy is +/- 150 mm.
Main River	Usually larger rivers and streams. The Environment Agency carries out maintenance, improvement or construction work on Main Rivers to manage flood risk.
Onshore cable route	Onshore route within which the onshore export cables and associated infrastructure would be located.
Onshore export cable	The cables which take the electricity from landfall to the onshore substation. These comprise High Voltage Alternative Current (HVAC) cables, buried underground.
Onshore substation	A compound containing electrical equipment required to transform and stabilise electricity generated by the Project so that it can be connected to the National Grid.
Ordinary Watercourse	Any watercourse that is not classed as a Main River is called an 'Ordinary Watercourses'. Lead Local Flood Authorities, District Councils and Internal Drainage Boards have the powers to carry out flood risk management work on Ordinary Watercourses.
The Applicant	North Falls Offshore Wind Farm Limited (NFOW)
The Project Or 'North Falls'	North Falls Offshore Wind Farm, including all onshore and offshore infrastructure.
Temporary construction compound	Area set aside to facilitate construction of the onshore cable route. Will be located adjacent to the onshore cable route, with access to the highway where required.

1 Introduction

1. This Technical Note has been produced by Royal HaskoningDHV on behalf of North Falls Offshore Wind Farm Limited (NFOW or 'the Applicant').

2. The aim of this Technical Note is to address the concerns highlighted by the Environment Agency regarding watercourse crossings at two locations (Watercourse crossing WX-22A and WX-23) proposed to be utilised for haul road crossings during construction of the North Falls Offshore Wind Farm Project (hereafter referred to as 'the Project') onshore cable route. The location of these two crossing points is shown on **Figure 1-1**.

3. The Environment Agency in their Relevant Representation **[RR-091]** expressed concerns regarding the potential for there to be an increase in flood risk to third parties as a result of the implementation of watercourse crossings located within Flood Zones 2 and 3.

4. Currently, the Applicant does not know if the crossings will be needed, and this will be determined during detailed design post-consent. For the purposes of the Environmental Statement (ES) Appendix 21.3 Flood Risk Assessment **[APP-121]**, submitted in support of the North Falls Development Consent Order (DCO) application, as a reasonable worst case it has been assumed that in-channel works to facilitate haul road crossings at these locations will be required.

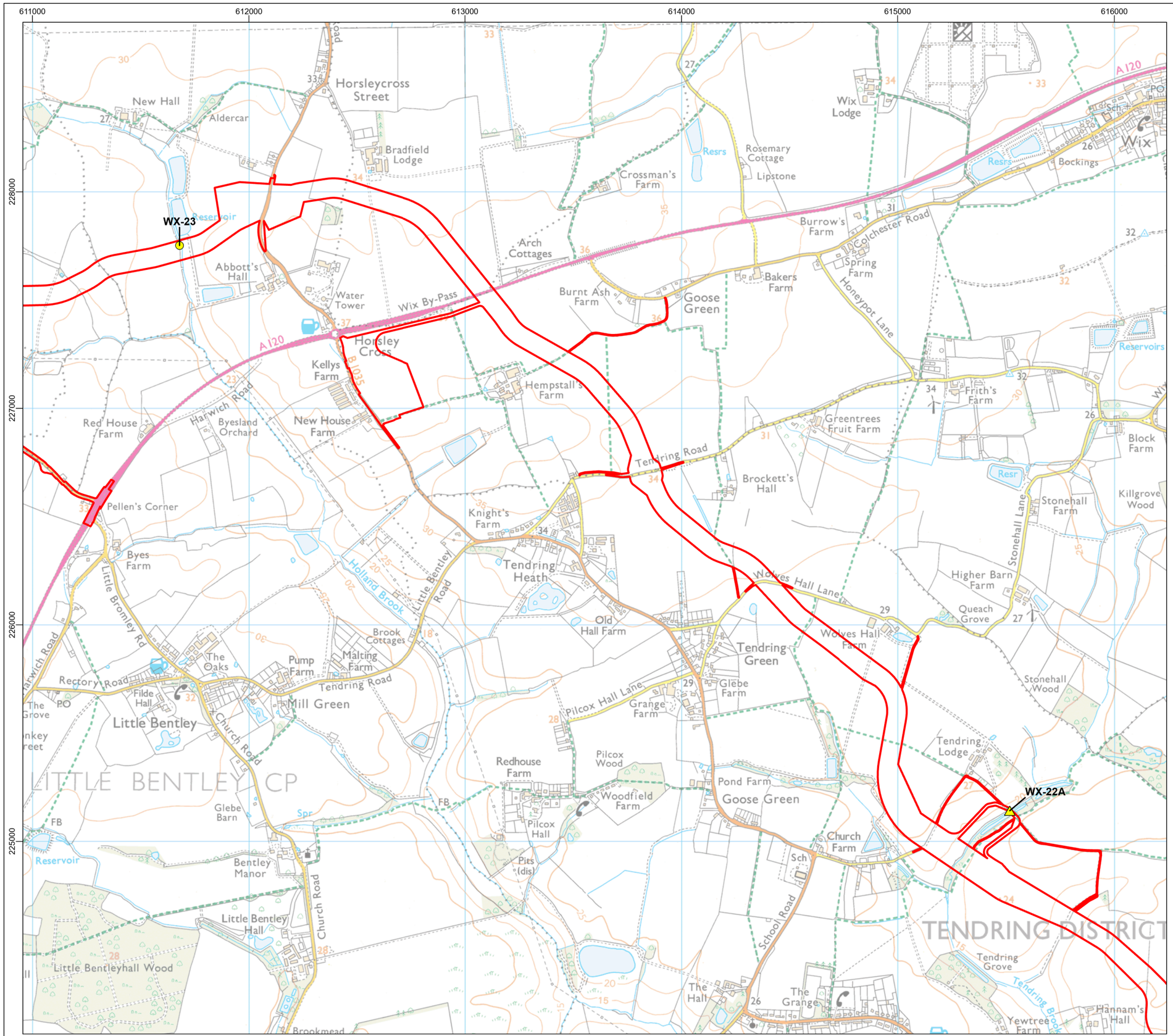
5. This Technical Note aims to address the concerns of the Environment Agency, providing clarification regarding the flood risk associated with these haul road crossings. This Technical Note demonstrates that this risk has been appropriately considered as part of ES Appendix 21.3 Flood Risk Assessment **[APP-121]** by discussing and demonstrating how the flood risk will not be exacerbated at each crossing.

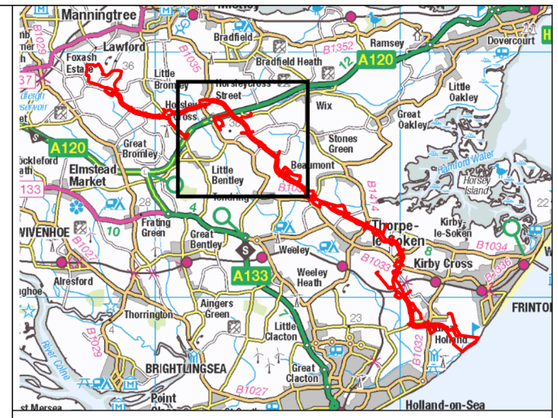
6. The information presented in this Technical Note is based on the methodology for assessing flood risk with respect to the Project set out in full in Section 1.3 of ES Appendix 21.3 Flood Risk Assessment **[APP-121]**. Detailed background information on the nature of the proposed works at the two locations in question (WX-22A and WX-23) is provided in Section 3, and a summary of the baseline data which informs the flood risk assessment is provided in Sections 4 and 5.

7. This Technical Note is then sub-divided into two main sections: Section 6 which discusses the potential flood risk at haul road crossing at WX-22A, and Section 7 which discusses the potential flood risk at haul road crossing at WX-23.

8. Sections 6 and 7 are informed by a number of data sources including the information presented in ES Appendix 21.1 Geomorphology Baseline Survey **[APP-119]**.

Figure 1-1: Site location of WX-22A and WX-23 along the cable route





Legend

Onshore Project Area

Crossing Schedule

- Main River - Trenchless Crossing (Haul Road Crossing Potentially Required)
- Ordinary Watercourse - Trenchless Crossing (Haul Road Crossing Potentially Required)

0 0.25 0.5 1 km

N

Drawing Title

Site Location of WX-22A and WX-23

Rev	Date	Remarks	Drwn	Chkd
01	04/04/2025	First issue	FC	LA

Drawing Number	Figure Number
PB9244-RHD-ZZ-ON-DR-GS-0649	1-1

Scale	Plot Size	Datum	Projection
1:17,500	A3	OSGB36	BNG

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File ref: C:\Users\305050\OneDrive - Royal HaskoningDHV\E02 GIS\02_Shared\02_Figures\12_Examination\Deadline_4\WaterResources\WaterResources.aprx

2 Environment Agency Relevant Representation

9. Comments have been received from the Environment Agency as part of their Relevant Representation **[RR-091]**, dated 18th October 2024. This included concerns with regard to the flood risk at crossing WX-22A and WX-23. The relevant part of the Relevant Representation, related to these concerns, has been reproduced as follows:

"*Flood Risk Chapter 21: Water Resources and Flood Risk Appendix 21.3. We are pleased to note that all main rivers and the majority of ordinary watercourses will be crossed using HDD methods as set out in Appendix 5.1 Crossing Schedule, this is a mitigation of flood risk at the construction stage.*

However, at paragraphs 111 and 113 the Applicant confirms that haul road crossing and its associated flood risk will not be considered until the detailed design stage post consent. Similarly, at paragraphs 382 and 383 the Applicant advises that the flood risk for the remaining trenched crossings will be assessed post consent. As well at its responsibilities for Main Rivers the Environment Agency does have an interest in ordinary watercourses where there is associated fluvial Flood Zones 2 and 3a. We do not agree with the Applicant's approach. Trenched crossings and haul road crossings due to the potential to interfere with the flow of flood water can increase the risk of flooding to third parties.

As advised to the Applicant in response to their statutory consultation on 14 July 2023 the impacts on third parties should be presented to the Examining Authority for consideration to inform their role of assessing the principle of development and the acceptability of associated risks."

10. In this Technical Note, the Applicant has sought to respond to the points raised above, providing clarification with regards to flood risk at the potential haul road crossings and demonstrate that, should the crossings be required, they will not increase flood risk to off-site receptors.

3 Summary of Proposed Works

11. The Applicant notes that the Environment Agency's concerns relate to the proposed haul road crossing of two watercourses, which would be undertaken as part of the construction of the onshore cable route.

12. The Environment Agency's concerns relate to WX-22A where there is a proposed haul road crossing of the Tendring Brook, a Main River, and at WX-23 where there is a proposed haul road crossing of the Holland Brook, which is an Ordinary Watercourse at this location. These crossings would be required as part of the construction of the onshore cable route, and would be temporary, required during the construction period only.

13. Full details regarding haul road crossings at watercourses are set out in Section 5.7.3.1.5 of ES Chapter 5 Project Description **[APP-019]**. In summary, an appropriately sized culvert may be installed within the channel to facilitate haul road construction, with the haul road installed over the top of the culvert to maintain access along the onshore cable route. The culvert would be installed in the channel bed so as to avoid upstream impoundment and would be sized to accommodate reasonable worst-case water volumes and flow, i.e. with an equivalent or larger capacity than the existing structures.

14. The haul roads and associated culverts may remain in place for the duration of the cable duct installation and subsequent cable pull, i.e. up to 27 months as a worst case for the purposes of assessment (although in most cases, the duration is likely to be considerably shorter, with haul roads removed and channel beds reinstated once works in the relevant section of the onshore cable route are complete).

15. A series of mitigation measures have been identified to minimise the impact upon flood risk, channel morphology and ecological receptors during the proposed construction works at WX-22A and WX-23, in particular, to ensure there would be continued conveyance of flow along the Tendring Brook and Holland Brook. These measures are set out in the Outline Code of Construction Practice **[REP3-017]** to be secured by a Requirement of the draft DCO **[REP3-008]**.

4 Environment Agency Flood Map for Planning

16. As noted in Flood Risk Assessment (Updated NaFRA2 dataset) – Technical Note, **[9.47, (Rev 0)]** (submitted into the North Falls DCO Examination at Deadline 4), the Environment Agency recently published the updated NaFRA2 dataset in two releases, the first of these was on 28th January 2025 and the second release was on 25th March 2025.

17. This Technical Note considers both the old and new datasets with regard to potential flood risk.

18. The Environment Agency's Flood Map for Planning (which was updated as part of the March 2025 dataset) is available online[1].

19. It is important to note that the definitions for the Flood Zones remain unchanged from those previously used.

20. Each Flood Zone has an annual probability whereby it is classified as having the following chance of flooding from fluvial or tidal sources (i.e. from rivers or from the sea, respectively):

    - **Flood Zone 1**: Land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).
    - **Flood Zone 2**: Land assessed as having between a 0.1% - 1% (1 in 100 to 1 in 1000) annual probability of flooding from rivers or between 0.1% - 0.5% (1 in 200 to 1 in 1000) annual probability of flooding from the sea, and accepted recorded flood outlines.
    - **Flood Zone 3**: Land assessed 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%).

[1] https://flood-map-for-planning.service.gov.uk/ [Accessed: 10/04/2025]

5 Geomorphology Baseline Survey

21. A Site Walkover was carried out between the 22nd and 24th August 2022 to investigate the Main Rivers, Ordinary Watercourses and existing culverts in the varying catchments along the onshore cable route.

22. The survey was carried out by an experienced fluvial geomorphologist (PhD, MSc, BSc), who took a number of photographs and made observations at key points including at WX-22A and WX-23. This survey is summarised in ES Appendix 21.1 Geomorphology Baseline Survey **[APP-119]**.

23. Information from ES Appendix 21.1 Geomorphology Baseline Survey **[APP-119]** regarding Tendring Brook and Holland Brook has been included in this Technical Note.

24. Most of the watercourses surveyed were easily accessible, however it is noted that at WX-22A and WX-23 on the Tendring Brook and Holland Brook respectively there were limited access points and therefore the watercourses could not be viewed along their entire length. However, access to the watercourses was sufficient in the locations required to inform the assessment of flood risk.

25. The preceding weather conditions to the visits had been prolonged dry weather, where dry sections were recorded. These dry weather conditions were noted at both WX-22A and WX-23. Where the dry conditions occurred, the channel bed was inspected to allow for judgment on the likely flow types at each location.

6 Crossing location WX-22A

26. Watercourse Crossing 22A, also referred to as WX-22A, is located at the approximate grid reference TM 15526 25137.

27. The watercourse in this location currently has an existing bridge, farm access track and culvert in place.

28. The following section describes the flood risk at WX-22A by assessing it against the information in ES Appendix 21.1 Geomorphology Baseline Survey **[APP-119]**, the local topography of the area and both the previous and updated Flood Map for Planning.

6.1 Geomorphology Baseline Survey: WX-22A

29. WX-22A comprises a potential haul road crossing of the Tendring Brook.

30. In this location, the Tendring Brook is classified as a Main River and the channel length associated with the onshore cable route is a reach of the Tendring Brook between Tendring Green and Tendring, which is located in the headwaters / upper catchment of the watercourse.

31. The main channel is approximately 15m to 20m wide in the riparian zone which is located between two arable fields and there is dense scrubland located on the banks, as shown on the plates reproduced in Figure 6-1.

32. to access the channel it was approximately 1.5m to 2m wide and has a bankfull depth of approximately 0.5m to 1m. The banks on either side of the watercourse are very steep and considered to be almost vertical.

33. The flows found at WX-22A are typically sluggish and stagnant and semi-impounded upstream by the existing farm bridge and culvert structure, as seen in Figure 6-1 below. Furthermore, due to the nature of the topography there is little to no opportunity for channel floodplain connectivity.

Figure 6-1 *Plates 26 – 28 taken from ES Appendix 21.1 Geomorphology Baseline Survey **[APP-119]** showing the channel of the Tendring Brook*

34. It is noted that whilst the existing structure of the farm access / bridge is relatively large in size, the culvert passing through it is relatively small in size and likely to comprise a considerable constraint to flow down the Tendring Brook during a flood event.

35. In the event that a haul road crossing at WX-22A is progressed, it is noted that Plate 30 comprises the proposed crossing location, and this is discussed further in **Section 6.4**.

Figure 6-2 *Plate 29 – 30 taken from ES Appendix 21.1 Geomorphology Baseline Survey [APP-119] shows the banks of the Tendring Brook and the current access bridge and culvert at WX-22A*

6.2 Topography: WX-22A

36. As a topographic survey has not been undertaken at WX-22A the LiDAR Digital Terrain Model (ES) dataset has been used as an alternative.

37. LiDAR DTM is a raster elevation model which has a 1m spatial resolution and an error margin of +/- 0.15m. The LiDAR DTM overlain with the contour levels at WX-22A has been included as **Figure 6-3**.

38. At WX-22A the channel of the Tendring Brook is considered to have an elevation of approximately 18 metres above ordnance datum (mAOD).

39. The left bank (southern side) has elevations of 19mAOD, which increases to 23mAOD as the bank increases in height rapidly.

40. As a result, the bank is very steep sided, whilst also being covered by extensive vegetation forming trees and bushes. Beyond the steep sided bank, the land then becomes agricultural fields and the elevation of the land keeps increasing up to 28mAOD.

41. In addition, the left bank of Tendring Brook has an extended steep riverbank which comprises the land 5 metres above the channel, before the agricultural fields then begin.

42. In order for the agricultural fields located beyond the left bank to experience fluvial flooding, the watercourse would need to exceed its banks by a depth of approximately 5 metres above the main channel.

43. On the right bank (northern side) of Tendring Brook, elevations at the channel increase from 18mAOD to 19mAOD.

44. As the land on the right bank extends north across agricultural fields the elevation increases from 18mAOD to 24mAOD.

45. To the north of the agricultural fields there is one potential residential receptor (Tendring Lodge) which is situated at an elevation of 27mAOD or higher. This potential receptor is situated a minimum of 9m above Tendring Brook.

46. Furthermore, there is an extensive area of agricultural land that would be subject to flooding and flood storage, on both the left and right bank of the watercourse, prior to any flooding affecting the residential receptor.

Figure 6-3: LiDAR DTM with Contour Lines and Flood Map for WX-22A

615000 615250 615500 615750 616000

225500 225250 225000 224750

Stonehall Wood

Tendring Lodge

Tanzara

Watercress Bed

LODGE LANE

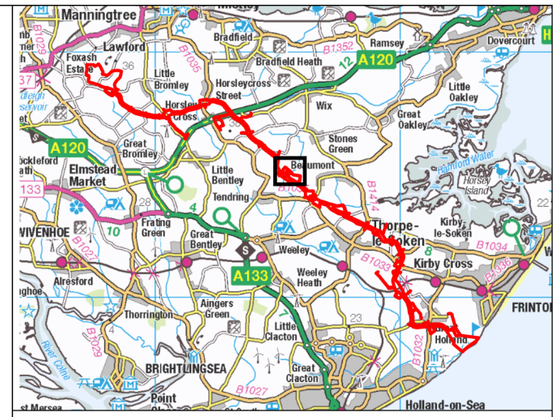
WX-22A

lss

FB

Path

Sks



Legend

- Onshore Project Area

Crossing Schedule

- Main River - Trenchless Crossing (Haul Road Crossing Potentially Required)

Flood Zones

- Flood Zone 3
- Flood Zone 2
- LIDAR DTM 1m Contour

LIDAR DTM (m)

- 14.01 - 15
- 15.01 - 16
- 16.01 - 17
- 17.01 - 18
- 18.01 - 19
- 19.01 - 20
- 20.01 - 21
- 21.01 - 22
- 22.01 - 23
- 23.01 - 24
- 24.01 - 25
- 25.01 - 26
- 26.01 - 27
- 27.01 - 28
- 28.01 - 29

0 50 100 200 Metres

N

Drawing Title

LIDAR DTM with Contour Lines and Flood Map for WX-22A

Rev	Date	Remarks	Drwn	Chkd
01	04/04/2025	First issue	FC	LA

Drawing Number	Figure Number
PB9244-RHD-ZZ-ON-DR-GS-0650	6-3

Scale	Plot Size	Datum	Projection
1:4,000	A3	OSGB36	BNG

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6.3 Environment Agency Flood Map for Planning: WX-22A

47. As highlighted in **Section 4**, the Flood Map for Planning has been updated in March 2025 and is available online. The previous Flood Map for Planning which has now been superseded and the updated Flood Map for Planning (March 2025) have been included on **Figure 6-4** to aid in a side by side comparison.

48. The updated Flood Map for Planning indicates that WX-22A is located in Flood Zone 2 and Flood Zone 3. The Flood Map for Planning also indicates that the area of Flood Zone 3 has reduced slightly at WX-22A when comparing the old flood extents with the new flood extents.

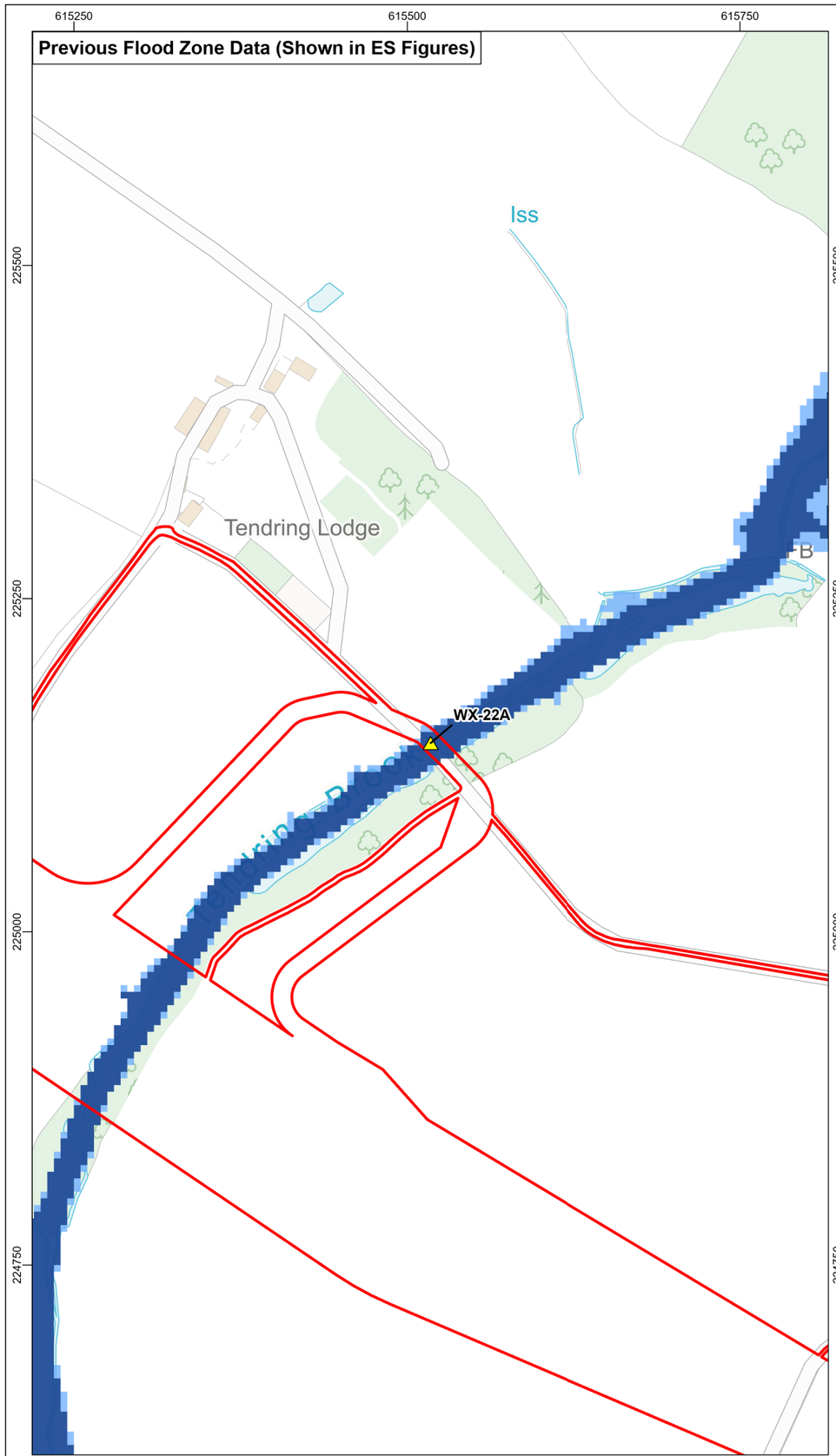
49. Additionally, at WX-22A the existing farm access track and culvert causes a constriction as the river flows downstream and appears to result in water backing up to the north of the culvert.

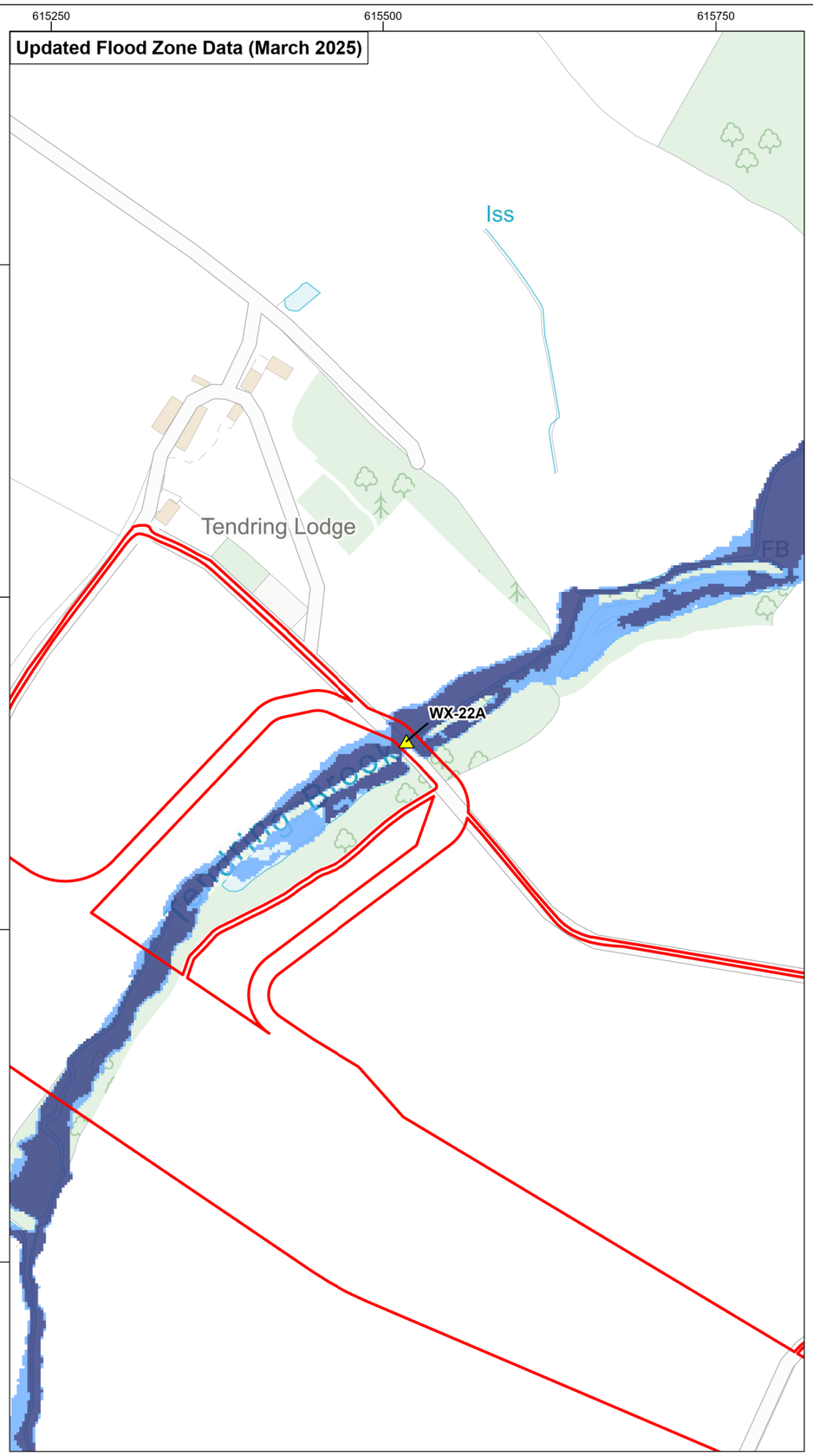
50. The mapping also appears to indicate that it takes into account the presence of the existing culvert and the bridge in this location and reflects this as there is a larger extent of Flood Zone 2 and Flood Zone 3 to the north of the existing culvert. The apparent reduction in the flood extent at the crossing is likely to be a result of the restriction in the flow as it flows through the culvert, the height of the access track above the channel, before the flood extent expands again once it has passed through the culvert.

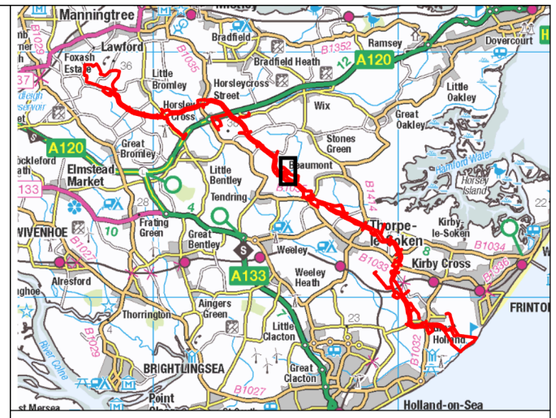
51. As seen in **Figure 6-4**, there are areas to both the north and the south of the watercourse which are shown as being at risk and located within Flood Zone 2 and Flood Zone 3, which appears to be as a result of naturally occurring topographical low points. However, as the banks increase the flood extent does not increase out into the wider area due to the steep topography as discussed in **Section 6.1** and **Section 6.2**.

52. Furthermore, as the outlines of Flood Zone 2 and Flood Zone 3 do not increase beyond the immediate channel and banks of the Tendring Brook this would mean that a significant depth of flooding would be required in the wider area prior to water reaching such a level for the nearest receptors to be affected. When combined with the topography of the land around WX-22A, the risk of this occurring is low.

Figure 6-4: Old and New Flood Maps for Planning from Rivers and Sea at WX-22A







Legend

Onshore Project Area

Crossing Schedule

Main River - Trenchless Crossing (Haul Road Crossing Potentially Required)

Flood Zones

Flood Zone 3

Flood Zone 2

0 50 100 200 Metres

N

Drawing Title

Old and New Flood Maps for Planning from Rivers and Sea at WX-22A

Rev	Date	Remarks	Drwn	Chkd
01	04/04/2025	First issue	FC	LA

Drawing Number	Figure Number
PB9244-RHD-ZZ-ON-DR-GS-0652	6-4

Scale	Plot Size	Datum	Projection
1:4,000	A3	OSGB36	BNG

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6.4 Discussion of Flood Risk at WX-22A

53. WX-22A is located in Flood Zone 2 and Flood Zone 3. However, as highlighted in **Section 6.1** and **Section 6.2**, the banks of the Tendring Brook are very steep in this location and as a result the flood extent is not expected to exceed the banks or immediate channel and there is no floodplain connectivity with the wider area.

54. In order for the banks to be exceeded and to affect the nearest flood receptor at Tendring Lodge, the flood level would need to increase by approximately 9m, however the chance of this occurring is considered to be low.

55. Additionally, the Environment Agency Flood Map for Planning indicates that the extent of the area affected by Flood Zone 2 and Flood Zone 3 at WX-22A will remain within proximity to the main channel.

56. Furthermore, at WX-22A there is an existing farm access track and culvert which causes a significant constriction as the river flows downstream and appears to result in water backing up to the north of the culvert.

57. As noted above, whilst the existing structure of the farm access / bridge is relatively large in size, the culvert passing through it is relatively small in size and is likely to comprise a considerable constraint to flow down the Tendring Brook during a flood event.

58. As such it is concluded that there is an existing constraint to flow down the watercourse and an existing flood risk in this location. If the haul road crossing at WX-22A were to be implemented, then the required culvert would be designed such that it would have an equivalent or larger capacity than the existing structure.

59. Therefore, it is concluded that there would be no increase in flood risk in this location, as a result of the potential haul road crossing, known as WX-22A.

60. As the need for the proposed haul road crossing has not been confirmed at this stage the following worst case scenario has been considered when considering WX-22A and the culvert design:

    - The crossing is currently approximately 4m wide and may need to be increased by 2m to make it 6m wide. The culvert will likely be rebuilt however this is not confirmed and will need to be subject to site investigation works.

61. Therefore, in the event that a new temporary culvert is constructed, the design will be developed to ensure that as a minimum it matches the capacity of the current culvert.

62. By incorporating a comparable size of culvert it will ensure that the culvert has the capacity for the fluvial flow at Tendring Brook and will ensure that the flood risk at WX-22A and in the immediate surroundings of WX-22A is not increased and will remain at its current level.

63. It should be noted that the expansion to the bridge and culvert will be assumed as temporary in nature and will be reinstated upon completion of the installation of the onshore cable route.

64. In the event of a blockage at the culvert, the flood event that would be required to affect the nearest receptor located to the northwest of WX-22A (Tendring Lodge) would need to result in flooding in excess of 9m. When combined with the fact that the flow at the channel is noted as intermittent to almost non-existent, it means the chances of this happening are considered to be low.

65. As such, it is concluded that the potential haul road crossing at WX-22A will not increase flood risk to off-site receptors.

7 Crossing location WX-23

66. Watercourse Crossing 23, also referred to as WX-23, is located at the approximate grid reference TM 11680 27755.

67. There is no existing crossing in this location, and the watercourse channel in this location has very little fluvial flow and is very overgrown with vegetation and bushes.

68. The following section describes the flood risk at WX-23 by assessing it against the information in ES Appendix 21.1 Geomorphology Baseline Survey **[APP-119]**, the local topography of the area and both the previous and updated Flood Map for Planning.

7.1 Geomorphology Baseline Survey: WX-23

69. WX-23 comprises a potential haul road crossing of the Holland Brook. Where the haul road crossing may occur, the watercourse is named as Holland Brook headwaters (Abbott's Hall) and is designated as an Ordinary Watercourse.

70. The channel form indicates that the upstream end of the reach has an asymmetrical cross section. The right side has a vertical slope of 1.5m to 1.75m with the left side having a gentler slope of approximately 1.0m.

71. The width of the channel is approximately 1m and has a bankfull depth of approximately 0.3m to 0.5m.

72. The bottom end of the reach has a heavily managed channel, as seen in Plate 2 of ES Appendix 21.1 Geomorphology Baseline Survey **[APP-119]** (included at Figure 7-1 below) and has evidence of desilting, dredging and vegetation clearance. At this section of the watercourse the channel width is approximately 1m and bankfull depth is approximately 0.3m.

73. The flows found at WX-23 are typically low velocity and nearly sluggish and stagnant. Locally, at the upstream end of the reach, in-channel woody material has led to the formation of a gently meandering thalweg and gentle riffles.

Figure 7-1 *Plate 1-2 taken from ES Appendix 21.1 Geomorphology Baseline Survey **[APP-119]** showing the channel at Holland Brook headwaters (Abbott's Hall)*

74. Slightly further downstream the channel is typically incised 1.5m to 1.75m below the adjacent floodplain and there is limited opportunity for channel-floodplain connection.

75. Furthermore, located downstream of WX-23 within the channel there is a constriction to flow, comprising an existing farm access and culvert, as shown on Plate 8 of ES Appendix 21.1 Geomorphology Baseline Survey **[APP-119]** and reproduced in Figure 7-2 below.

Figure 7-2 *Plate 8 - 9 taken from ES Appendix 21.1 Geomorphology Baseline Survey **[APP-119],** showing the channel at Holland Brook headwaters (Abbott's Hall)*

7.2 Topography: WX-23

76. As a topographic survey has not been undertaken at WX-23, the LiDAR Digital Terrain Model (DTM) has been used as an alternative.

77. LiDAR DTM is a raster elevation model which has a 1m spatial resolution and an error margin of +/- 0.15m. The LiDAR DTM overlain with the contour levels at 1m intervals for WX-23 has been included as **Figure 7-3**.

78. Where the haul road is anticipated to cross Holland Brook, the watercourse channel is indicated to have an elevation of 24mAOD. Along both banks of the watercourse there is a relatively steep incline as the elevation increases.

79. Along the left bank (located to the east) of the river channel, the elevation increases from 24mAOD at the channel up to 34mAOD along the B1034 which is located approximately 350m to the east.

80. Located approximately 340m to the south-east of Holland Brook there is one potential residential receptor which is Abbot's Hall. This is located at an elevation of 35mAOD, which is approximately 11m above Holland Brook.

81. Furthermore, there is an extensive area of agricultural land that would be subject to flooding and flood storage, on both the left and right bank of the watercourse, prior to any flooding affecting the residential receptor.

82. The right bank (located to the west) of the river channel increases steeply across the agricultural farm fields, reaching elevations of 30mAOD, which is approximately 6m above the channel.

83. As such, the LiDAR indicates that the topography either side of the Holland Brook channel is relatively steep, indicating limited opportunity for channel and floodplain connectivity.

84. Furthermore, given land on the right bank has lower elevations than land on the left bank water would flow away from the residential receptor (Abbot's Hall) identified above.

Figure 7-3: LiDAR DTM with Contour Lines and Flood Map for WX-23

611250 611500 611750 612000 612250

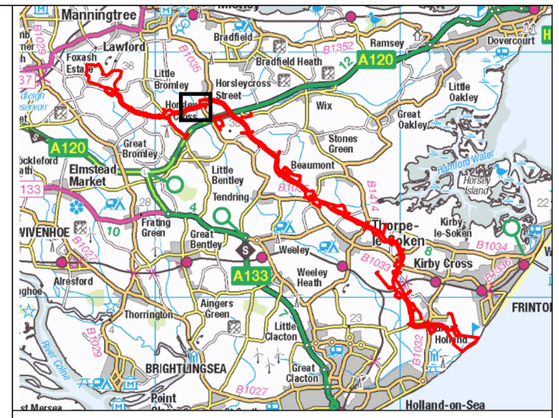
228250 228000 227750 227500 227250

WX-23

New Hall Cottages

B1035 CLACTON ROAD

A120



Legend

- Onshore Project Area

Crossing Schedule

- Ordinary Watercourse - Trenchless Crossing (Haul Road Crossing Potentially Required)

Flood Zones

- Flood Zone 3
- Flood Zone 2
- LIDAR DTM 1m Contour

LIDAR DTM (m)

- 22.01 - 23
- 23.01 - 24
- 24.01 - 25
- 25.01 - 26
- 26.01 - 27
- 27.01 - 28
- 28.01 - 29
- 29.01 - 30
- 30.01 - 31
- 31.01 - 32
- 32.01 - 33
- 33.01 - 34
- 34.01 - 35
- 35.01 - 36
- 36.01 - 37
- 37.01 - 38
- 38.01 - 39
- 39.01 - 40

0 50 100 200 Metres

N

Drawing Title

LIDAR DTM with Contour Lines and Flood Map for WX-23

Rev	Date	Remarks	Drwn	Chkd
01	04/04/2025	First issue	FC	LA

Drawing Number	Figure Number
PB9244-RHD-ZZ-ON-DR-GS-0651	7-3

Scale	Plot Size	Datum	Projection
1:4,000	A3	OSGB36	BNG

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File ref: C:\Users\305050\OneDrive - Royal HaskoningDHV\E02 GIS\02_Shared\02_Figures\12_Examination\Deadline_4\WaterResources\WaterResources.aprx

7.3 Environment Agency Flood Map for Planning: WX-23

85. As highlighted in **Section 4**, the Flood Map for Planning has been updated in March 2025 and is available online. The previous Flood Map for Planning which has now been superseded and the updated Flood Map for Planning (March 2025) have been included on **Figure 7-4** to aid in a side by side comparison.

86. The updated Flood Map for Planning indicates that at WX-23 the Flood Zone 3 extent remains in-channel.

87. The Flood Zone 2 extent expands slightly out of the left bank, which it is assumed is due to the LiDAR having similar elevations to the channel. However, as a result of the elevation increasing to 25mAOD on the left bank, Flood Zone 2 cannot extend past this point due to the topography.

88. When comparing the updated Flood Map for Planning with the superseded Flood Zone mapping, it indicates that Flood Zone 3 no longer exceeds its banks and remains in-channel.

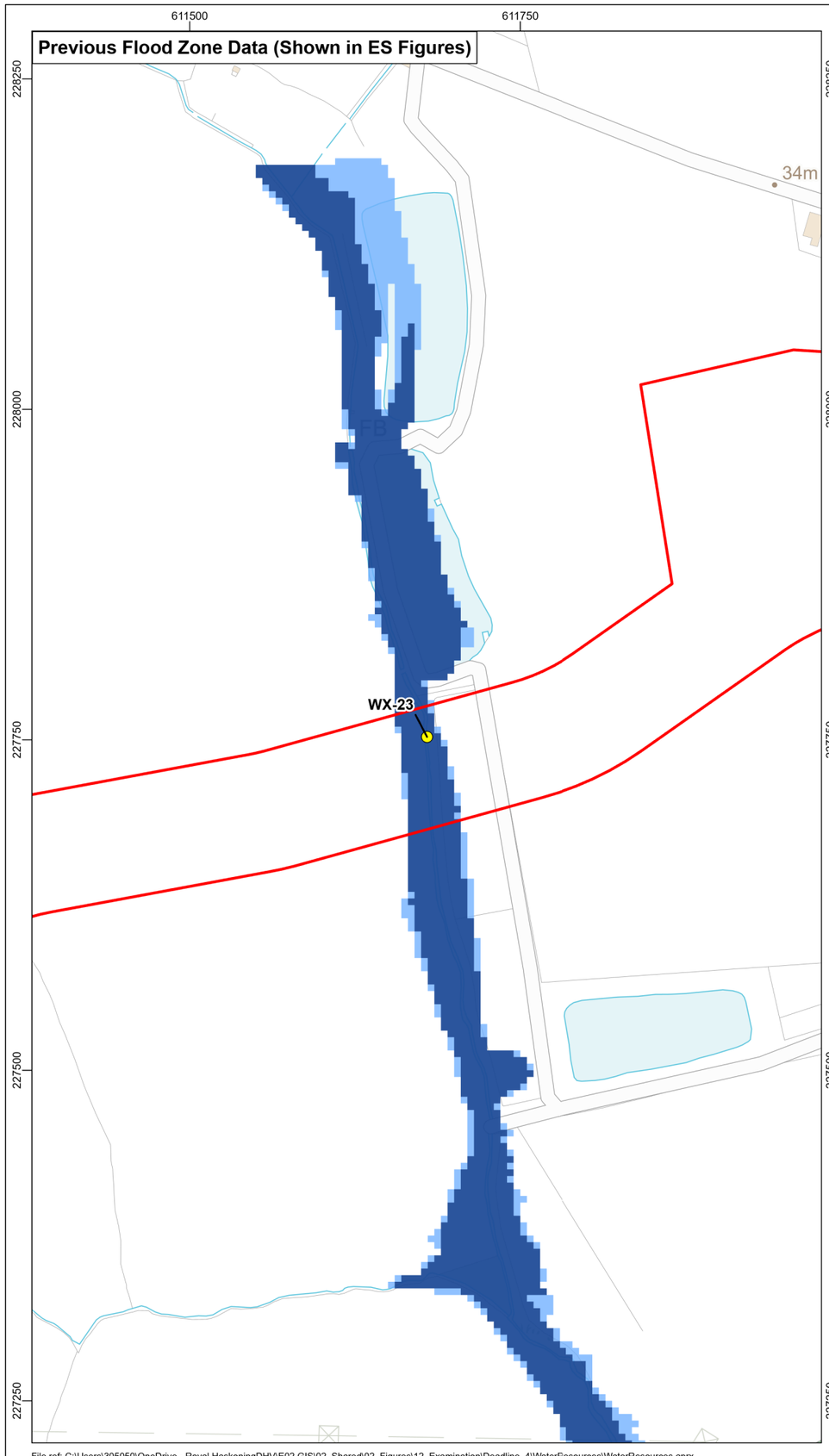
89. Furthermore, Flood Zone 2 on the right bank is reduced and only exceeds the channel on the left bank. This is as a result of the right bank having a slightly steeper immediate topography of 26mAOD, although the ground then drops away to lower elevations.

90. Located approximately 540m downstream of WX-23 is a point where the watercourse crosses beneath the A120, where the updated Flood Zone mapping indicates there is an existing area of Flood Zone 2 and 3 as a result of a constriction to flow provided by the presence of the A120.

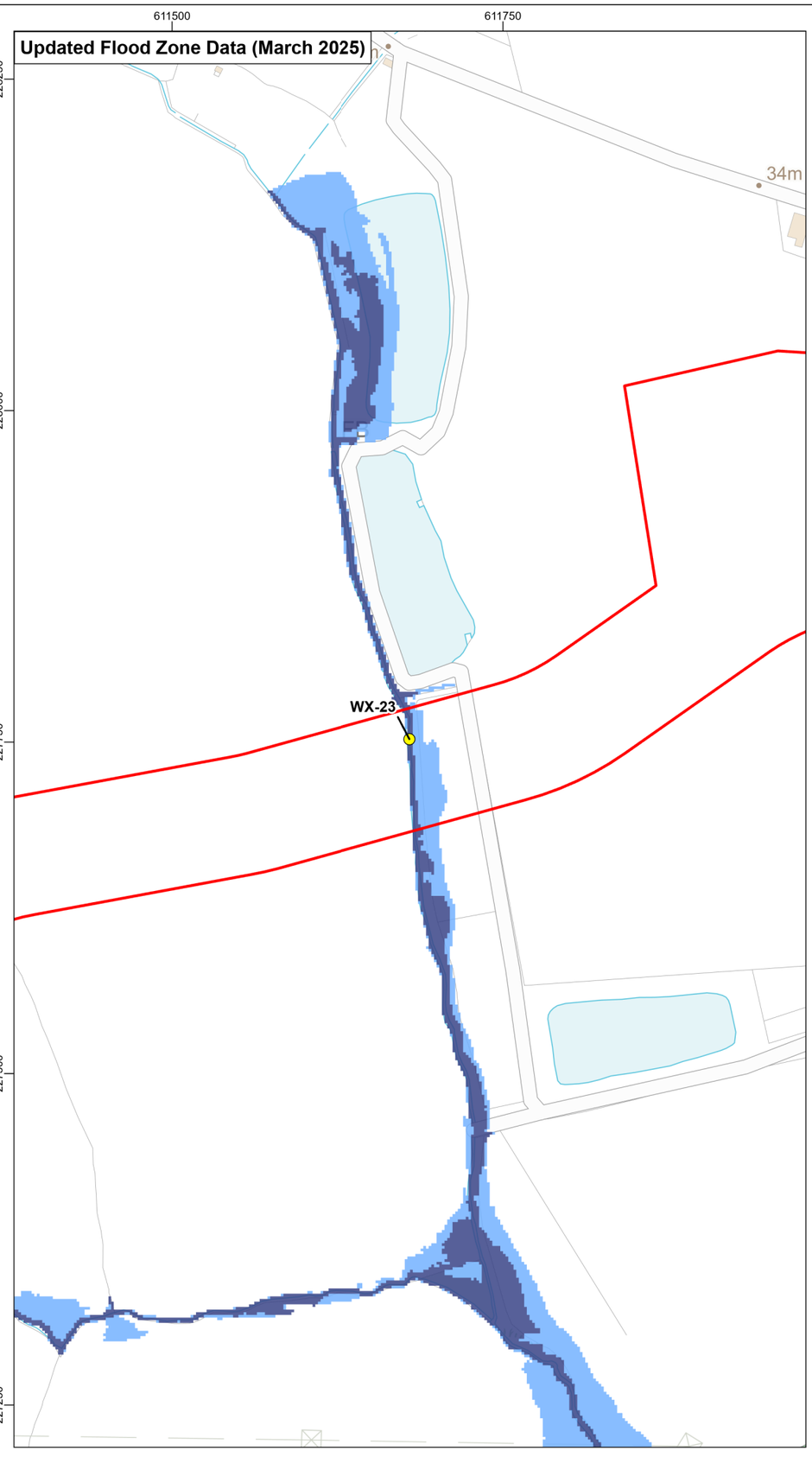
91. As the outlines of Flood Zone 2 and Flood Zone 3 do not increase beyond the immediate channel and banks of the Holland Brook this would mean that a significant depth of flooding would be required in the wider area prior to water reaching such a level that the nearest receptors would be affected. When combined with the topography of the land around WX-23, it is concluded that the chance of this occurring is low.

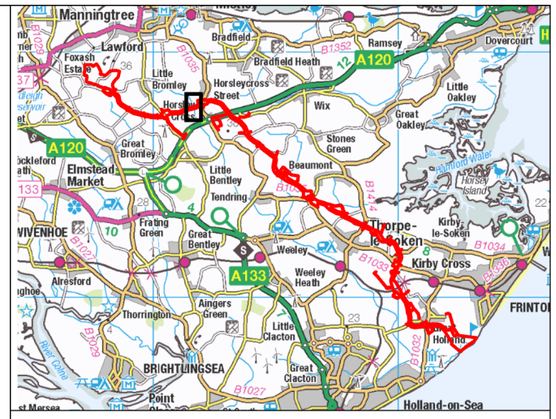
Figure 7-4: Old and New Flood Maps for Planning from Rivers and Sea at WX-23

Previous Flood Zone Data (Shown in ES Figures)



Updated Flood Zone Data (March 2025)





Legend

- Onshore Project Area

Crossing Schedule

- Ordinary Watercourse - Trenchless Crossing (Haul Road Crossing Potentially Required)

Flood Zones

- Flood Zone 3
- Flood Zone 2

0 50 100 200 Metres

N

Drawing Title

Old and New Flood Maps for Planning from Rivers and Sea at WX-23

Rev	Date	Remarks	Drwn	Chkd
01	04/04/2025	First issue	FC	LA

Drawing Number	Figure Number
PB9244-RHD-ZZ-ON-DR-GS-0653	7-4

Scale	Plot Size	Datum	Projection
1:4,000	A3	OSGB36	BNG

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7.4 Discussion of Flood Risk at WX-23

92. WX-23 is located in Flood Zone 2 and Flood Zone 3. However, as highlighted in **Section 7.1** and **Section 7.2** the Flood Zone 3 extent appears to be retained within the channel of Holland Brook, whereas Flood Zone 2 extends slightly eastwards out of the channel.

93. Ground elevations increase from 24mAOD at Holland Brook up to 35mAOD at Abbott's Hall, the nearest residential receptor.

94. In the event that flooding did occur, due to the topography of the ground and the fact that Abbott's Hall is elevated approximately 11m above the banks of the Holland Brook, other locations would be expected to experience flooding before Abbott's Hall.

95. As discussed in **Section 7.3**, approximately 540m downstream of WX-23, the A120 causes a restriction in flow.

96. In addition, in the intervening length of watercourse within the channel there is a constriction to flow, comprising an existing farm access and culvert, as shown on Plate 8 of ES Appendix 21.1 Geomorphology Baseline Survey **[APP-119]**.

97. As such it is concluded that there is an existing constraint to flow down the watercourse and an existing flood risk in this location. If the haul road crossing at WX-23 were to be implemented, then this would be designed such that it would have an equivalent or larger capacity than the existing downstream structure.

98. Therefore, it is concluded that there would be no increase in flood risk in this location, as a result of the potential haul road crossing, known as WX-23. This is on the basis it will include a new temporary culvert where the design will be developed to ensure that as a minimum it matches the capacity of the current downstream culvert.

99. By incorporating a comparable size of culvert it will ensure that the culvert has the capacity for the fluvial flow at Holland Brook and will ensure that the flood risk at WX-23 and away from WX-23 is not increased and will remain as existing. It should be noted that the haul road crossing will be temporary in nature and will be reinstated upon completion of the installation of the onshore cable route.

100. In the event of a blockage at the culvert, the flood event that would be required to affect the nearest receptor would need to involve flooding in excess of 10m. When combined with the fact that the flow at the channel is noted as intermittent to almost non-existent, the chances of this happening are considered to be low.

101. As such, it is concluded that the potential haul road crossing at WX-23 will not increase flood risk to off-site receptors.

8 Proposed Mitigation Measures

102. As noted in the preceding sections, several mitigation measures are proposed to ensure that any flood risk arising from the potential haul road crossings at WX-22A and WX-23, as part of the Project, are appropriately managed.

103. This is to limit the flood risk both to the Project and also to any potential off-site receptors i.e. properties and people.

104. These mitigation measures are set out in the Outline Code of Construction Practice **[REP3-017]** to be secured under a Requirement of the draft DCO **[REP3-008]**.

105. In accordance with the mitigation measures set out in the Outline Code of Construction Practice **[REP3-017]**, the relevant Construction Method Statement will consider the need for over pumping and if this is needed, then the capacity of this pump will at least match the capacity of the existing culverts on both watercourses, as this comprises a key constraining factor with regards to flow along the Main River and Ordinary Watercourse.

9 Conclusions

106. Comments have been received from the Environment Agency as part of their Relevant Representation **[RR-091]**, dated 18th October 2024. This included concerns with regard to the flood risk as crossings WX-22A and WX-23.

107. This Technical Note provides a summary of the assessment of the flood risk undertaken at WX-22A and WX-23 and aims to address the concerns raised by the Environment Agency.

108. The Applicant notes that the proposed construction works at WX-22A and WX-23 comprise the potential for a haul road crossing of the Tendring Brook (Main River) and the Holland Brook (Ordinary Watercourse). The proposed works are both to be temporary in nature.

109. A Site Walkover was carried out between 22nd and 24th August 2022 to investigate the Main Rivers, Ordinary Watercourses and culverts in the catchments along the onshore cable route. Information from ES Appendix 21.1 Geomorphology Baseline Survey **[APP-119]** regarding Tendring Brook and Holland Brook has been included in this Technical Note.

110. Furthermore, a review of LiDAR data for land adjacent to Tendring Brook, the Main River watercourse associated with WX-22A, indicates that ground elevation increases steeply away from the watercourse, and the nearest residential receptor located at Tendring Lodge to the north of WX-221 is located a minimum of 9m above the Tendring Brook.

111. A review of LiDAR data for land adjacent to Holland Brook, the Ordinary Watercourse associated with WX-23, indicates that ground elevation increases steeply away from the watercourse, with the nearest residential receptor located at Abbott's Hall to the southeast, located approximately 11m above the Holland Brook.

112. Given the difference in elevation at each of the watercourses and the nearest residential receptors (i.e. 9m for WX-22A and 11m for WX-23) this would mean that a significant depth of flooding would be required in the wider floodplain prior to the water reaching such a level that the nearest receptors could flood. Therefore, it is considered that the flood risk to the nearest residential receptors (Tendring Lodge and Abbott's Hall) is low.

113. Furthermore, the haul road crossing will be in the same location as the existing culvert located at WX-22A. At WX-23 whilst a new culvert would be required, there is also an existing downstream constriction to flow, comprising an existing farm access and culvert.

114. The new temporary culverts that would be installed at WX-22A and WX-23 to facilitate the haul road crossings would, at a minimum, have the same capacity as the existing culverts for the fluvial flow at either the Tendring Brook or Holland Brook and will ensure that the flood risk at both WX-22A and WX-23 is not increased as a result of the Project.

115. Notwithstanding the above, the Applicant has identified a series of mitigation measures to reduce the potential flood risk to off-site receptors during the proposed construction of the haul road crossings. These are detailed within the

Outline Code of Construction Practice **[REP3-017],** to be secured under a Requirement of the draft DCO **[REP3-008]**.

116. With these measures in place and given the understanding of the likely flood risk within the channel area, the Applicant concludes that at WX-22A and WX-23, the flood risk to nearby receptors, Tendring Lodge and Abbott's Hall, is likely to be low as a result of the surrounding topography and the installation of appropriately sized culverts with the capacity for an equivalent or improved flow.

117. In addition, once the onshore export cables have been constructed and the existing watercourse channel, and its capacity, reinstated there will be no change in the baseline flood risk to these receptors. This is on the basis the onshore export cables will be located entirely below ground and there will be no interaction with either the watercourse or the floodplain at both locations.

NORTH FALLS

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