Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects

Addendum to the Flood Risk Assessment (Revision B) (Clean)

Revision B
Deadline 3
May 2023
Document Reference: 14.31
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Title: **Sheringham Shoal and Dudgeon Offshore Wind Farm Extension Projects Environmental Statement** **Addendum to the Flood Risk Assessment (Revision B) (Clean)**		
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Glossary of Acronyms

AP	Annual Probability
DCO	Development Consent Order
DEP	Dudgeon Offshore Wind Farm Extension Project
DTM	Digital Terrain Model
EIA	Environmental Impact Assessment
ES	Environmental Statement
FEH	Flood Estimation Handbook
LiDAR	Light Detection and Ranging
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
m AOD	Metres Above Ordnance Datum
NPPF	National Planning Policy Framework
NSIP	Nationally Significant Infrastructure Project
NW	North West
OS	Ordnance Survey
PEIR	Preliminary Environmental Information Report
PPG	Planning Practice Guidance
ReFH2	Revitalised Flood Hydrograph model Version 2
SEP	Sheringham Offshore Wind Farm Extension Project
SuDS	Sustainable Drainage Systems

Glossary of Terms

Annual Probability	The probability of a rainfall or tidal event occurring within any one year. For example, an event of a 100 year return period has an AP of 1:100 or 1%.
Digital Terrain Model	Digital Terrain Model (also known as Digital Elevation Model) is a format for describing the topography of a terrain in a digital format. Often a digital terrain is formatted into a regular grid.
Dudgeon Offshore Wind Farm Extension Project (DEP)	The Dudgeon Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
DEP onshore site	The Dudgeon Offshore Wind Farm Extension onshore area consisting of the DEP onshore substation site, onshore cable corridor, construction compounds, temporary working areas and onshore landfall area.
Flood Defences	Artificial structures maintained to a set operational level designed to protect land people and property from Tidal and Fluvial flood sources to an established AEP threshold.
Flood Source: Fluvial	When flows within watercourses exceed the capacity of the watercourse causing out of bank flows.
Flood Source: Surface Water (Pluvial)	When rainfall causes overland flows which exceed the capacity of the drainage network, causing flooding to land that is normally dry.
Flood Source: Tidal	When high tide events overtop the shoreline to cause flooding to land behind.
Flood Zone 1	Low Probability - Land having a less than 0.1% annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map for Planning – all land outside Zones 2, 3a and 3b)
Flood Zone 2	Medium Probability - Land having between a 1% and 0.1% annual probability of river flooding; or land having between a 0.5% and 0.1% annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Flood Zone 3 (A)	High Probability - Land having a 1% or greater annual probability of river flooding; or Land having a 0.5% or greater annual probability of sea. (Land shown in dark blue on the Flood Map)
Flood Zone 3 (B)	Functional Floodplain - This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise:

	• land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or • land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding). Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)
Flood Zone Map	The Environment Agency has produced a mapping data set which covers England and provides the general extents of Flood Zones 1, 2, and 3. However the national data set available online does not differentiate between Flood Zone 3 (A) and 3 (B)
Horizontal directional drilling (HDD) zones	The areas within the onshore cable route which would house HDD entry or exit points.
Landfall	The point at the coastline at which the offshore export cables are brought onshore, connecting to the onshore cables at the transition joint bay above mean high water
LiDAR	Light Detection And Ranging is an accurate ground terrain model obtained by aerial survey. The typical vertical accuracy is +/- 150 mm, the horizontal spacing of survey points (resolution) is normally 0.5m in city centres, 1m in urban areas and 2m in rural areas.
Main River	Defined on the Main River map and relate to rivers on which the Environment Agency have powers to carry out flood defence works
Model Event	The Model Event is the AP storm or flow profile used within the modelling
Model Scenario	Each Model Scenarios considers a range of Model Events to assess the impact of the Scenario. Typical Model Scenarios are; Baseline, Post Development, Post Mitigation.
Onshore cable corridor	The area between the landfall and the onshore substation sites, within which the onshore cable circuits will be installed along with other temporary works for construction.
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substation.
Onshore Substation	Compound containing electrical equipment to enable connection to the National Grid.

Order Limits	The area subject to the application for development consent, including all permanent and temporary works for SEP and DEP.
Ordinary Watercourse	A watercourse which does not form part of a Main River
Sheringham Shoal Offshore Wind Farm Extension Project (SEP)	The Sheringham Shoal Offshore Wind Farm Extension onshore and offshore sites including all onshore and offshore infrastructure.
SuDS	Sustainable Drainage Systems, which are designed to manage surface water flows in order to mimic the Greenfield runoff from an undeveloped site.
The Applicant	Equinor New Energy Limited. As the owners of SEP and DEP, Scira Extension Limited and Dudgeon Extension Limited are the named undertakers that have the benefit of the DCO. References in this document to obligations on, or commitments by, 'the Applicant' are given on behalf of SEL and DEL as the undertakers of SEP and DEP.

1 Introduction

2. This **Addendum to the Flood Risk Assessment (Revision B)** [document reference 14.31] comprises an update to the assessment of flood risk, set out in the **Flood Risk Assessment** [AS-023]. It has been prepared following completion of additional work requested by the Lead Local Flood Authority (LLFA).

3. It aims to address concerns raised by key stakeholders with regards to flood risk both to and from SEP and DEP and also considers surface water drainage at the Onshore Substation. This Addendum provides clarification that flood risk continues to be appropriately considered as part of the DCO process.

2 Lead Local Flood Authority Comments

4. Comments on the Flood Risk Assessment (FRA) were received from Norfolk County Council, in their role as the Lead Local Flood Authority (LLFA), within their **Relevant Representation** [RR-064].

5. These included concerns with regard to the proposed surface water drainage from the Onshore Substation and the impact this would have on flood risk both to and from SEP and DEP, as well as requests for clarification on a number of flood risk matters related to the surface water hydraulic modelling at the Onshore Substation.

6. A summary of the main points of concern, taken from Paragraph 6.2 of Norfolk County Council's **Relevant Representation** [RR-064] are provided as follows:

> *At this stage, the LLFA has considered the outline surface water drainage design as set out in the Outline Operational Drainage Plan; as well as the Flood Risk Assessment (FRA); Onshore Sub-station Drainage Study; and accompanying Hydraulic Modelling. At this time, further evidence and clarification of information is required to demonstrate:*
>
> - *That the proposed development is in accordance with National Planning Policy Framework (NPPF) with regard to the risk of flooding. There is currently insufficient information to demonstrate that surface water arising from the development would not result in an increase of flood risk to the proposed development at the Onshore Sub-Station or elsewhere.*
>
> - *There is a lack of confirmation of where the surface water drainage proposals for the onshore sub-station will drain, site specific greenfield runoff rates and volumes, the comparable post-development runoff rate and volumes proposed to prevent an increased risk of flooding elsewhere.*
>
> - *The hydraulic modelling on which the FRA, which influences the proposed development design, and its associated drainage design requires updating and clarification.*

7. In addition, Paragraph 6.5 of their **Relevant Representation** [RR-064] notes the following:

> *The LLFA would remove its holding objection if the following issues are adequately addressed:*
>
> *1. An updated FRA and Drainage Strategy that confirms the proposed surface water discharge location for the onshore sub-station.*

2. The provision of the site-specific greenfield runoff rates and volumes, the comparable post-development runoff rate and volumes.

3. An updated hydraulic model that appropriately applies the latest climate change allowances and provides an assessment of the change is flood risk.

4. Adequate consideration of the surface water flood risk associated with discharging to the foul sewer in Swainsthorpe and the residual risks.

5. A maintenance and management plan detailing the activities required and details of who will adopt and maintain all the surface water drainage features for the lifetime of the development.

8. A meeting was held with Norfolk County Council (hereafter referred to as the LLFA) on 6th December 2022. During the meeting the Applicant confirmed that a single preferred solution for surface water drainage from the Onshore Substation has been selected, comprising a shallow infiltration solution and this will therefore remove the need for the option to drain into the Anglian Water foul sewer.
9. This was communicated to the Examining Authority via letter dated 13th January 2023 [AS-036] where the Applicant advised of its intent to request a non-material change to the DCO. Subsequently, the Examining Authority confirmed on 17th April 2023 their acceptance of the Applicant's request to make non-material changes to the application.
10. As noted in **12.3 Applicants Comments on Relevant Representations** [REP1-033 and REP1-034], in response to items 1, 2 and 3 listed above, the change request application will be supported by updated information, set out in the following section, which address these points.
11. Furthermore, the non-material change application has confirmed that the Applicant will progress solely with the option to use shallow infiltration drainage at the Onshore Substation, and therefore it is understood that points 4 and 5 listed above are resolved as they relate solely to the Anglian Water foul sewer option.
12. In addition, a number of clarifications have been requested by the LLFA, in a letter dated 20th March 2023, with regard to flood risk and surface water drainage. These have been addressed in a number of documents to be submitted at Deadline 3.
13. This **Addendum to the Flood Risk Assessment (Revision B)** [document reference 14.31] comprises a summary of the clarifications requested by the LLFA and should be read alongside the information provided in the supporting documents, set out in the following section.

3 Summary of Updated Documents

14. In the **Applicant's Response to the Examining Authority's First Written Questions** [REP1-036], the Applicant advised that a number of documents would be submitted at Deadline 2 to provide clarification on flood risk and drainage matters and to address the comments received from the LLFA. These were submitted and further clarifications have been sought by the LLFA, in their letter dated 20th March 2023. As a result, these have been considered within the updated documents, to be submitted at Deadline 3.

15. This **Addendum to the Flood Risk Assessment (Revision B)** [document reference 14.31] comprises a summary of the main flood risk aspects; however, it is also supported by information provided in the following documents:

- **Flood Risk and Planning Practice Guidance Technical Note** [REP1-062] (submitted at Deadline 1);
- **Annex 18.2.1: Onshore Substation Drainage Study (Revision C)** [document reference 6.3.18.2.1] (to be submitted at Deadline 3);
- **Annex 18.2.2: Onshore Substation Hydraulic Modelling Report (Revision B)**[document reference 14.34] (to be submitted at Deadline 3), formerly referred to as Annex 18.2.2 Onshore Substation Hydraulic Modelling Technical Note [APP-211]; and
- **Outline Operational Drainage Strategy (onshore substation) (Revision C)** [document reference 9.20] (to be submitted at Deadline 3), formally referred to as the **Outline Operational Drainage Plan (onshore substation)** [APP-307].

4 Policy and Guidance Updates

16. In their **Relevant Representation** [RR-064], the LLFA, highlighted a number of guidance documents that had been updated since the production of the **Flood Risk Assessment** [AS-023], as follows:

- Planning Practice Guidance (PPG) for Flood Risk and Coastal Change was updated in August 2022;
- Norfolk Local Flood Risk Management Strategy was updated in 2021 with an addendum; and
- Norfolk LLFA Statutory Consultee for Planning Guidance Document has been updated in 2022 (currently version 6) to take into account some of the recent National Planning Policy Framework (NPPF) updates and the Climate Change guidance updates.

17. The Applicant notes that the updated PPG for Flood Risk and Coastal Change was also raised in the **Examining Authority's Written Questions 1** [PD-010] and the Applicant has provided a comprehensive response in **Flood Risk and Planning Practice Guidance Technical Note** [REP1-062] (submitted at Deadline 1). Key aspects from the **Flood Risk and Planning Practice Guidance Technical Note** [REP1-062] have been summarised in this **Addendum to the Flood Risk Assessment** [document reference 14.31].

4.1 Planning Practice Guidance for Flood Risk and Coastal Change

18. As noted in the **Flood Risk and Planning Practice Guidance Technical Note** [REP1-062], on 25th August 2022 the updated PPG for Flood Risk and Coastal Change was published. At the time of publication, it became live with immediate effect and with no transitional arrangements.

19. With regards to the programme for SEP and DEP, whilst the updated PPG was published on 25th August 2022, the DCO application was submitted to the Planning Inspectorate on 2nd September 2022. Therefore, the supporting documents to the DCO application, including the **Flood Risk Assessment** [AS-023], had been materially completed significantly prior to the updated PPG being published.

20. On this basis, the Applicant has undertaken a review of the updated PPG and produced both the **Flood Risk and Planning Practice Guidance Technical Note** [REP1-062] as well as this **Addendum to the Flood Risk Assessment (Revision B)** [document reference 14.31].

21. The updated PPG comprises a significant refresh to the guidance aiming to bring it in line with the latest flood risk policy set out in the NPPF.

22. The Applicant notes that whilst there was a suite of changes within the updated PPG, this was principally a matter of clarification related to changes that had previously been made to the NPPF and the provision of greater emphasis on key areas. These were not necessarily material changes to the technical guidance and content of the document.

23. The Applicant notes that many of the updates to the PPG had been expected for some time and brought it in line with the NPPF, which was last updated in July 2021. Furthermore, the **Flood Risk Assessment** [AS-023] considered all the planning policy and guidance documents relevant at the time of its production and acknowledged the interaction between them, as a suite of documents.

24. When assessing flood risk both to and from SEP and DEP, the Applicant has considered whether the updated PPG alters the conclusions of the **Flood Risk Assessment** [AS-023] with regard to all elements of SEP and DEP.

25. Following a review of the updated PPG the change considered to be of specific relevance to SEP and DEP relates to the clarification around the application of the Sequential Test.

26. A summary of how the Sequential Test has been considered for all sources of flood risk throughout the site selection process for SEP and DEP is provided in the **Flood Risk and Planning Practice Guidance Technical Note** [REP1-062].

27. A review of the remaining changes focusing on the key flood risk elements, noted these included amendments to definitions of flood zones, clarity on design floods, the application of climate change allowances and how the above are taken into account when assessing flood risk.

28. Many of the revisions do not alter the assessment of flood risk and as such no specific amendments or clarifications are required to the **Flood Risk Assessment** [AS-023].

29. With regards to the consideration of climate change allowances, following discussions with the LLFA at a meeting on 6th December 2022, minor updates to the surface water hydraulic modelling have been undertaken.

30. These are summarised in **Section 5** of this Addendum, as well as being presented in greater detail within **Annex 18.2.2: Onshore Substation Hydraulic Modelling Report (Revision B)** [document reference 14.34] (formally referred to as **Annex 18.2.2: Onshore Substation Hydraulic Modelling Technical Note** [APP-211]).

4.2 Norfolk Local Flood Risk Management Strategy Policy Review

31. As noted by the LLFA, a review of the original Local Flood Risk Management Strategy (2015) was undertaken in 2021, resulting in the publication of the addendum to the Local Flood Risk Management Strategy, entitled the Local Flood Risk Management Strategy Policy Review 2021. The date of publication of this document is unclear and therefore the Applicant notes the **Flood Risk Assessment** [AS-023] would have been materially complete prior to it being published. However, the Applicant acknowledges a review of the Local Flood Risk Management Strategy Policy Review 2021 is required to consider any implications on the assessment of flood risk.

32. The LLFA notes that since the adoption of the original Local Flood Risk Management Strategy in 2015, Norfolk has been subject to significant rainfall and widespread flooding (as well as droughts and heatwaves), as well as significant growth and development.

33. Furthermore, the LLFA also notes there have been changes in legislation including the publication of the revised National Flood and Coastal Erosion Risk Management Strategy for England.

34. On this basis the LLFA identified the need for a review to ensure it remained consistent and relevant. The existing policies were reviewed against new and emerging national strategies and policies. The LLFA notes that this resulted in three new policies and minor updates to the existing policies.

35. A review of the new and revised policies has been undertaken by the Applicant to understand their potential implication to SEP and DEP.

36. The policy review focused on a number of key areas as follows:

- Undertakings and Commitments;
- Ordinary Watercourse Regulation Policies; and
- Environmental Policies.

37. Within each of the above three key areas there are a series of policies identified as follows:

- UC1: Sustainability;
- UC2: Flood investigation;
- UC3: Flood Risk Asset Register;
- UC4: Critical Drainage Catchments ;
- UC5: Publishing flood risk information;
- UC6: Emergency Planning;
- UC7: Sustainable flood management;
- UC8: Risk based approach to prioritisation of resources;
- UC9: Designation of 3rd party structures or features;
- UC10: Planning;
- UC11: Securing Sustainable Drainage;
- UC12: Water Company liaison;

- UC13: Adapting to climate change;
- UC14: Flood resilience and adaption;
- OW1: Maintenance of Ordinary Watercourses;
- OW2: Enforcement;
- OW3: Consenting of works on Ordinary Watercourses;
- OW4: Culverting;
- E1: Nature conservation;
- E2: Protect habitats;
- E3: Water levels (habitats);
- E4: Ecological Potential;
- E5: River morphology;
- E6: Landscaping;
- E7: Heritage assets;
- E8: Towards Net Zero; and
- E9: Biodiversity and Environmental Net Gain.

38. The Applicant has reviewed the wording of each of the above policies and notes that SEP and DEP is in accordance with the above policies, where they are applicable.

39. As such, the Applicant concludes there is no impact on SEP and DEP, as a result of the above policy review, and therefore there is no change in the assessment of flood risk, or the conclusions set out in the **Flood Risk Assessment** [AS-023].

4.3 Norfolk LLFA Statutory Consultee for Planning Guidance Document

40. The Applicant notes that the LLFA indicated the current version of the Norfolk LLFA Statutory Consultee for Planning Guidance Document is Version 6.

41. An online review of the Norfolk County Council website, undertaken by the Applicant, has confirmed that the document is now Version 6.1 (dated October 2022). This version of the document has been reviewed as part of the production of this **Addendum to the Flood Risk Assessment (Revision B)** [document reference 14.31].

42. The Norfolk LLFA Statutory Consultee for Planning Guidance Document (Version 6.1) has been updated to reflect a number of changes, including the updated NPPF (2021) and guidance on the application of climate change allowances. However, a review of the document notes that the updates are principally clarifications to bring the document in line with other wider policy documents and does not result in fundamental changes to the guidance provided therein.

43. The **Flood Risk Assessment** [AS-023] considers both the updated NPPF (2021) and updated climate change allowances published by the Environment Agency in 2022. On this basis, there is no change in the allowances to be considered as part of the assessment of flood risk as a result of the updated information contained in the Norfolk LLFA Statutory Consultee for Planning Guidance Document (Version 6.1).

44. However, the Applicant notes the guidance in the Norfolk LLFA Statutory Consultee for Planning Guidance Document (Version 6.1) regarding the epochs to be considered when considering future climate change, which are of specific relevance to the surface water hydraulic modelling at the Onshore Substation. This has been considered within the context of the lifetime of the development and the appropriate allowance to be applied.

45. The Applicant notes that following discussions with the LLFA at the meeting on 6th December 2022 it was agreed that in the absence of detailed information related to the Decommissioning Phase an allowance of 45% for climate change would be applied.

46. Details of the revised climate change allowances, subject to consideration by the Applicant, are provided in **Annex 18.2.2: Onshore Substation Hydraulic Modelling Report (Revision B)** [document reference 14.34]. A summary of the additional work undertaken by the Applicant as well as the results with regard to the flood risk impact both to and from SEP and DEP is provided in **Section 5** of this Addendum.

47. As noted above, the Applicant requested a non-material change to the DCO at Deadline 2, as communicated to the Examining Authority via letter dated 13th January 2023 [AS-036], whereby the Applicant confirmed it will progress solely with the option to use shallow infiltration drainage at the Onshore Substation. Subsequently, the Examining Authority confirmed on 17th April 2023 their acceptance of the Applicant's request to make non-material changes to the application. This confirmed approach to surface water drainage has been considered in the context of the guidance provided in the Norfolk LLFA Statutory Consultee for Planning Guidance Document (Version 6.1).

48. The Applicant notes that the proposed use of infiltration for the surface water drainage at the Onshore Substation is considered to be in accordance with the preferred approach (i.e. top of the list of options) identified in the SuDS Drainage Hierarchy. Therefore, SEP and DEP is adopting best practice with regards to surface water drainage and is in accordance with the guidance in the Norfolk LLFA Statutory Consultee for Planning Guidance Document (Version 6.1).

49. Further details on the proposed surface water drainage solution are provided in the updated **Annex 18.2.1: Onshore Substation Drainage Study (Revision C)** [document reference 6.3.18.2.1] and **Outline Operational Drainage Strategy (onshore substation) (Revision C)** [document reference 9.20], formally referred to as the **Outline Operational Drainage Plan (onshore substation)** [APP-307].

5 Summary of Surface Water Drainage Considerations

50. In accordance with the assessment of flood risk in the **Flood Risk Assessment** [AS-023], the **Outline Operational Drainage Plan (onshore substation)** [APP-307], identified two viable options for the discharge of surface water from the Onshore Substation platform comprising:
    - Discharge to foul sewer; or
    - Discharge via infiltration.
51. As noted previously, the LLFA raised concerns in their **Relevant Representation** [RR-064], with regard to the proposed surface water drainage from the Onshore Substation platform and specifically the presentation of two options.
52. As noted above, the Applicant submitted a change application which removed the option to drain into the foul sewer, presenting the shallow infiltration solution only.
53. This confirmation of the proposed approach has been based on the results of supplementary groundwater monitoring, which also identified shallow granular zones suitable for infiltration. Subsequently, the Examining Authority has confirmed, on 17th April 2023, their acceptance of the Applicant's request to make the above non-material change to the application.
54. Details related to the confirmed surface water drainage solution are provided in the following documents:
    - **Annex 18.2.1: Onshore Substation Drainage Study (Revision C)** [document reference 6.3.18.2.1];
    - **Outline Operational Drainage Strategy (onshore substation) (Revision C)** [document reference 9.20], formally referred to as the **Outline Operational Drainage Plan (onshore substation)** [APP-307]; and
    - **Works Plans (Onshore) (Revision C)** [document reference 2.6] has been updated to remove Work No 21A/B (Permanent flood attenuation and drainage works) on Sheet No. 39 of 40.
55. The **Outline Operational Drainage Strategy (onshore substation) (Revision C)** [document reference 9.20] has been updated to reflect this change i.e. presenting a single surface water drainage solution.
56. In line with comments received from the LLFA, including in their letter dated 20th March 2023, a number of minor updates have been undertaken to the assessment of the surface water drainage design at the Onshore Substation to address their concerns and provide clarification.
57. The surface water drainage design utilises the Tekla® Tedds software which is based on the methods outlined in BRE Digest 365 and the Wallingford Procedure (Volume 4) to identify the anticipated volume of water to be managed during the 1 in 100 year event over the Onshore Substation and access road surface area.

58. In accordance with comments from the LLFA, this has been subject to a hydraulic verification exercise using the MicroDrainage software and based on the use of the Flood Estimation Handbook (FEH) 13 rainfall data. Additionally, the verification exercise has also been undertaken utilising the CIRIA SuDS Manual (C753) methodology. The above design parameters are in line with the guidance provided in the Norfolk LLFA Statutory Consultee for Planning Guidance Document (Version 6.1).

59. In addition, as noted in the previous section and, following discussions with the LLFA, in the absence of information related to the Decommissioning Phase an allowance of 45% for climate change has been applied when undertaking the review of the surface water drainage design.

60. The **Outline Operational Drainage Strategy (onshore substation) (Revision C)** [document reference 9.20] confirms the proposed surface water drainage design can accommodate the necessary attenuation and storage of surface water during an extreme event, up to and including the 1 in 100 year plus 45% for climate change event.

61. As such, it is the conclusion of this **Addendum to the Flood Risk Assessment (Revision B)** [document reference 14.31] that following implementation of the surface water drainage system, as set out in the **Outline Operational Drainage Strategy (onshore substation) (Revision C)** [document reference 9.20], there will be no increase in flood risk either to or from the Onshore Substation.

6 Summary of Flood Risk Considerations

62. Comments were provided by the LLFA in their **Relevant Representation** [RR-064] with specific regard to the requirement for an update to the surface water hydraulic model for the Onshore Substation such that it applies the latest climate change allowances and provides an assessment of the change in flood risk.

63. As noted previously, a meeting was held with the LLFA on 6th December 2022 to obtain clarification on the required changes and updates. This included confirmation that in the absence of information related to the Decommissioning Phase an allowance of 45% for climate change should be applied. Revised hydraulic model scenarios have therefore been undertaken and presented in the updated **Annex 18.2.2: Onshore Substation Hydraulic Modelling Report (Revision B)** [document reference 14.34].

64. In addition, to address comments set out in their **Relevant Representation** [RR-064], minor updates were made to provide clarification on modelling parameters as well as the inclusion of additional information and figures.

65. Furthermore, to address queries raised by the LLFA in their letter dated 20th March 2023 related to the sensitivity testing undertaken within the hydraulic model, minor updates have also been made to the updated **Annex 18.2.2: Onshore Substation Hydraulic Modelling Report (Revision B)** [document reference 14.34] to provide additional clarification.

66. With regard to flood risk, both to and from SEP and DEP the 1 in 100 year plus 45% allowance for climate change has been assessed and the results presented in this **Addendum to the Flood Risk Assessment (Revision B)** [document reference 14.31] for clarity. However, further details and discussion can be found in **Annex 18.2.2: Onshore Substation Hydraulic Modelling Report (Revision B)** [document reference 14.34].

67. Figure 9-23 of the **Annex 18.2.2: Onshore Substation Hydraulic Modelling Report (Revision B)** [document reference 14.34] is reproduced below as **Figure 1**. The results from this modelling scenario demonstrate there is minimal interaction between the Onshore Substation platform and North West (NW) access road and the surface water flood extent during the 1 in 100 year plus 45% climate change allowance event.

68. The results also confirm that whilst the flood depth adjacent to the Onshore Substation platform varies, it is not of a sufficient depth to result in flooding to the Onshore Substation platform. In addition, it confirms that the NW access road can be designed such that there is continued conveyance beneath it.

69. On this basis neither the Onshore Substation platform nor the NW access road will result in flooding to SEP and DEP. Furthermore, they will not result in displacement of surface water flooding such that there would be an off-site impact on surface water flood risk.

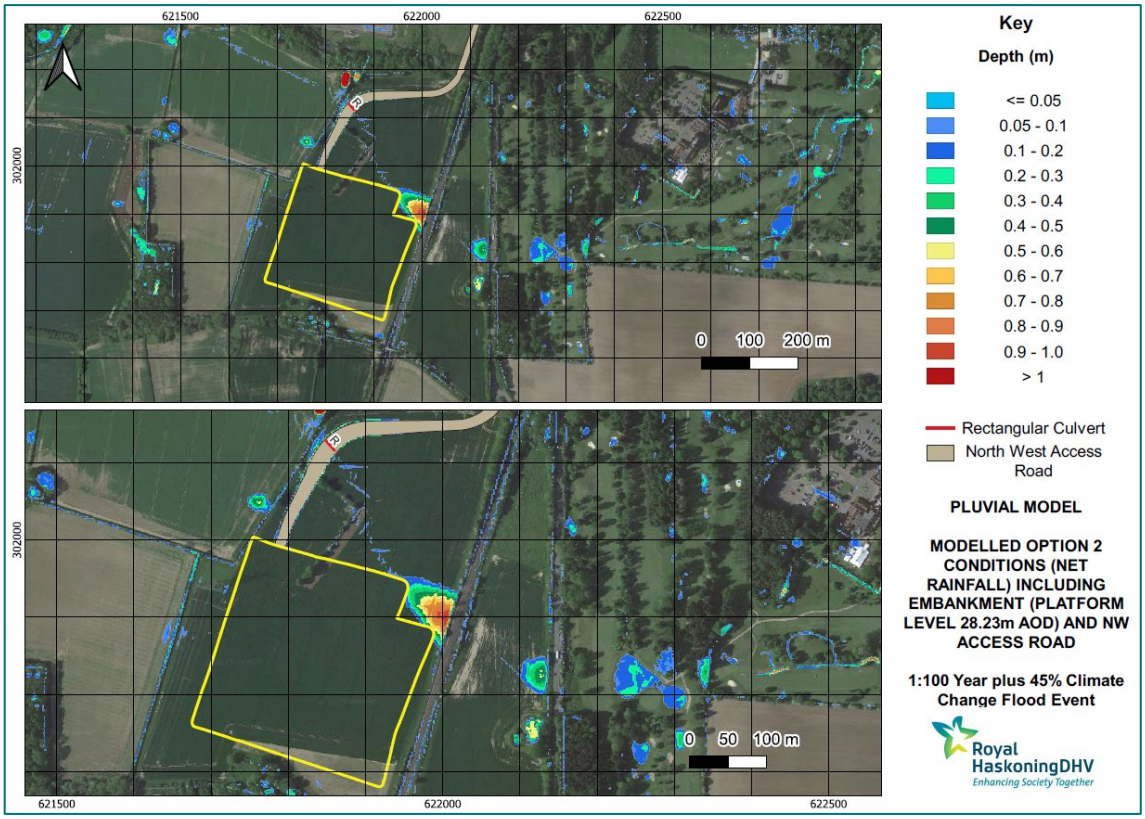

Figure 1: 1 in 100 year plus 45% for climate change with OnSS platform level set at 28.23m AOD and NW access road

70. In addition, to demonstrate there is no off-site impact as a result of SEP and DEP, a comparison of the Baseline scenario has been undertaken with the Post Construction (i.e. operational) scenario.

71. To demonstrate the change in maximum flood extent and depth, the 'Option 2 with Embankment and North West access road' results grid was subtracted from the 'Baseline' modelling results grid. This was to ensure the difference in flood extents and depths could be depicted more clearly. This exercise was undertaken for the 'worst case' scenario comprising the 1 in 100 year plus 45% for climate change allowance event.

72. Figure 9-24 of the **Annex 18.2.2: Onshore Substation Hydraulic Modelling Report (Revision B)** [document reference 14.34] is reproduced below as **Figure 2** and demonstrates the change in flood extent following the construction of the Onshore Substation platform and NW access road.

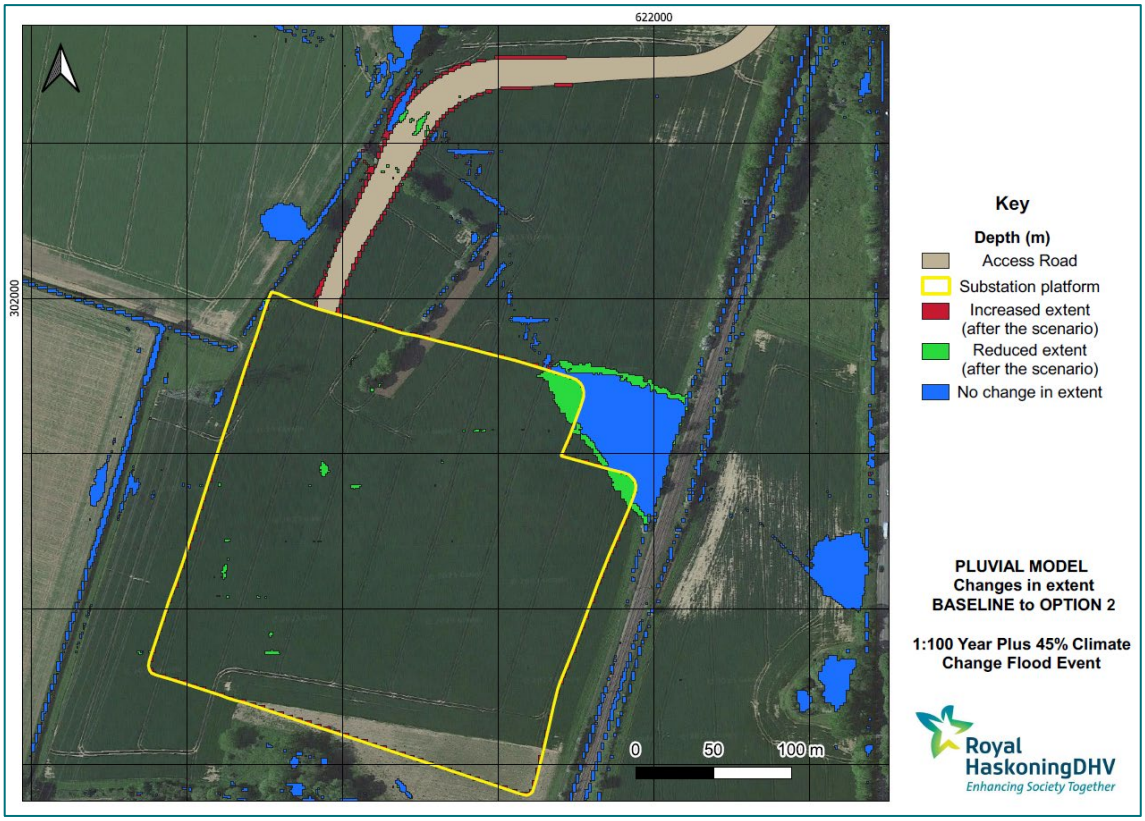

Figure 2: 1 in 100 year plus 45% for climate change comparison of changes in flood extent

73. While there is a reduction in the flood extent around the edge and within the footprint of the Onshore Substation platform, the results of the modelling indicate there is a slight change to the flood extent along the edges of the raised NW access road.

74. The reduction in flood extent can be attributed to the incorporation of the Onshore Substation platform within the model. By including it within the model, rainfall falling on the platform during an event does not contribute to the flooding as water from the impermeable or bound surfaces will be collected by the surface water drainage system to be implemented as part of SEP and DEP whilst the permeable or unbound areas will naturally infiltrate into the ground on the platform or adjacent to the NW access road.

75. A review of the results has confirmed the change in extent adjacent to the NW access road is very localised and does not extend beyond the immediate area and is related to a minor accumulation of surface water adjacent to the access road structure.

76. Upon review of this data, it is noted that the change in extent along the edges of the NW access road is a result of its representation within the model whereby surface water from the impermeable or bound surface of the access road is draining off the sides. However, the proposed drainage design for the Onshore Substation platform would capture this water within the surface water drainage system and therefore this flow would not exist.

77. It is also noted that there is no restriction of flow as a culvert below the NW access road has been included within the model. This is confirmed in **Annex 18.2.2: Onshore Substation Hydraulic Modelling Report (Revision B)** [document reference 14.34] which notes that the modelling included a 2.20m high culvert, primarily for modelling purposes. However, a review of the model results identified that during the 1 in 100 year (plus 45% for climate change) event the maximum water depth at the upstream extent of the culvert is likely to be approximately 0.23m. As such, a 2.20m high culvert would be considerably larger than that required to ensure the continued conveyance of surface water flow.

78. On this basis, it is concluded that the height of the culvert can be refined and reduced during the detailed design process to provide cover levels of between 0.3m and 1m from the top of culvert to the access road carriageway. This would ensure sufficient cover levels, appropriate to the type and nature of the vehicle loading in this location, whilst also maintaining surface water flow conveyance under the access road.

79. To provide greater clarity on the impact of the Post Construction scenario on surface water flood risk, the changes in depth have also been considered.

80. Figure 9-25 of the **Annex 18.2.2: Onshore Substation Hydraulic Modelling Report (Revision B)** [document reference 14.34] is reproduced below as **Figure 3**.

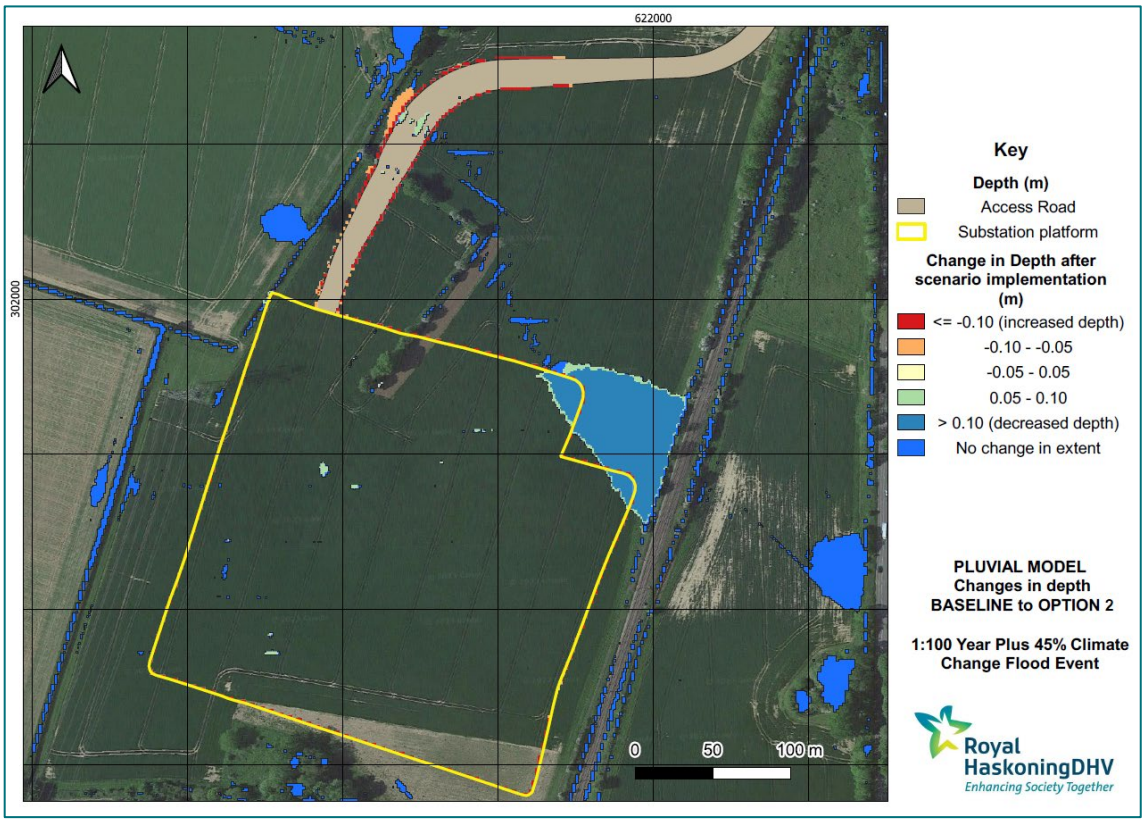

Figure 3: 1 in 100 year plus 45% for climate change comparison of changes in flood depth

81. A comparison between the Baseline and Post Construction results demonstrates that any flood water which is displaced by the proposed Onshore Substation platform is relatively minor and will not result in a significant off-site risk. Furthermore, it also demonstrates there is a slight reduction in the depth of water pooling against the railway embankment.

82. As previously noted, this is likely to be due to the rainfall falling directly onto the Onshore Substation platform being collected from the impermeable or bound surfaces by the surface water drainage system to be implemented as part of SEP and DEP whilst the permeable or unbound surfaces will naturally infiltrate into the ground on the platform. Overall, this results in a reduction in surface water reaching the low-lying area adjacent to the railway line.

83. The updated modelling exercise, incorporating the revised climate change allowances, does not result in a flood risk to SEP and DEP throughout the lifetime of the development.

84. Furthermore, there is no off-site impact as a result of SEP and DEP and therefore flood risk both to and from SEP and DEP continues to be in accordance with the policy set out in NPPF and the supporting guidance.

85. As such, the Applicant considers that the conclusions of the **Flood Risk Assessment** [AS-023] remain valid.

7 Conclusions

86. This **Addendum to the Flood Risk Assessment (Revision B)** [document reference 14.31] provides an update on the assessment of flood risk based on additional work undertaken by the Applicant.

87. It provides confirmation that flood risk both to and from SEP and DEP continues to be appropriately considered as part of the DCO process.

88. Comments have been received from Norfolk County Council, in their role as the Lead Local Flood Authority (LLFA), as part of their **Relevant Representation** [RR-064]. In addition, a number of further clarifications have been requested by the LLFA, in a letter dated 20th March 2023.

89. Their concerns focused on the proposed surface water drainage from the Onshore Substation and the impact this would have on flood risk both to and from SEP and DEP, as well as requesting clarification on a number of flood risk matters related to the surface water hydraulic modelling.

90. Following receipt of the **Relevant Representation** [RR-064] a meeting was held with the LLFA on 6th December 2022. During the meeting the Applicant confirmed that a single preferred solution for surface water drainage from the Onshore Substation has been selected, comprising a shallow infiltration solution and this will remove the option to drain into the Anglian Water foul sewer.

91. This was communicated to the Examining Authority via letter dated 13th January 2023 [AS-036] where the Applicant advised of its intent to request a non-material change to the DCO. Subsequently, the Examining Authority confirmed on 17th April 2023 their acceptance of the Applicant's request to make non-material changes to the application.

92. The LLFA noted a number of updates had been published for key policy and guidance documents and a summary of these has been provided within this Addendum.

7.1 Updated Policy and Guidance

93. Following a review of the updated policy and guidance documents, the Applicant concludes there is no impact on the assessment of flood risk to SEP and DEP. Therefore, there is no change in the assessment of flood risk or the conclusions set out in the **Flood Risk Assessment** [AS-023].

94. This **Addendum to the Flood Risk Assessment (Revision B)** [document reference 14.31] comprises a summary of the clarifications requested by the LLFA and should be read alongside the information provided in a number of supporting documents outlined in this Addendum.

7.2 Surface Water Drainage

95. The LLFA raised concerns in their **Relevant Representation** [RR-064], with regard to the proposed surface water drainage from the Onshore Substation platform and specifically the presentation of two options.

96. The Applicant confirms that the **Outline Operational Drainage Strategy (onshore substation) (Revision B)** [REP2-029] was previously updated to reflect the proposed approach to solely progress with the shallow infiltration solution for surface water drainage from the Onshore Substation.

97. In line with comments received from the LLFA a number of minor updates have been undertaken to the assessment of the surface water drainage design to address their concerns.

98. Following discussions with the LLFA, in the absence of detailed information relating to the Decommissioning Phase an allowance of 45% for climate change has been applied when undertaking the review of the surface water drainage design.

99. The **Outline Operational Drainage Strategy (onshore substation) (Revision C)** [document reference 9.20], to be submitted at Deadline 3, confirms the proposed surface water drainage design can accommodate the necessary attenuation and storage of surface water during an extreme event, up to and including the 1 in 100 year plus 45% for climate change event.

100. As such, it is the conclusion of this **Addendum to the Flood Risk Assessment (Revision B)** [document reference 14.31] that following implementation of the surface water drainage system, as set out in the **Outline Operational Drainage Strategy (onshore substation) (Revision C)** [document reference 9.20], there will be no increase in flood risk either to or from the Onshore Substation.

7.3 Flood Risk

101. Following consultation with the LLFA, revised hydraulic model scenarios were undertaken and presented in the updated **Annex 18.2.2: Onshore Substation Hydraulic Modelling Report** [REP2-055]. In addition, minor updates have subsequently been made to provide clarification on modelling parameters as well as the inclusion of additional information on sensitivity testing. This is presented in the updated **Annex 18.2.2: Onshore Substation Hydraulic Modelling Report (Revision B)** [document reference 14.34] (to be submitted at Deadline 3).

102. With regard to flood risk, both to and from SEP and DEP the 1 in 100 year plus 45% allowance for climate change has been assessed and the results presented in this **Addendum to the Flood Risk Assessment (Revision B)** [document reference 14.31] for clarity.

103. The results from this modelling demonstrate there is minimal interaction between the Onshore Substation platform and North West (NW) access road and the surface water flood extent during the 1 in 100 year plus 45% climate change allowance event.

104. The results also confirm that whilst the flood depth adjacent to the Onshore Substation platform varies, it is not of a sufficient depth to result in flooding to the Onshore Substation platform. Furthermore, SEP and DEP will not result in displacement of surface water flooding such that there would be an off-site impact on surface water flood risk.

105. Therefore, it is concluded that flood risk both to and from SEP and DEP continues to be in accordance with the policy set out in NPPF and the supporting guidance and the Applicant considers that the conclusions of the **Flood Risk Assessment** [AS-023] remain valid.