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9. Water Environment

9.1 Introduction

9.1.1 This Environmental Statement (ES) chapter details the likely significant effects of the project in relation to water environment during construction and operation. The receptors covered within this chapter comprise surface water features including main rivers and ordinary watercourses, functional floodplain and surface water interests such as abstractions and discharges.

9.1.2 During construction, the project has the potential for effects on surface water receptors, such as through the excavation or disturbance of watercourses, for example where the underground cables cross or where a temporary access route would be installed. In the absence of good practice measures, construction activities that take place near watercourses can affect water quality or cause changes to water levels and flow. In addition, works would take place within the floodplain, which could affect floodplain capacity and flood flows.

9.1.3 During operation the permanent above ground features, such as the grid supply point (GSP) substation and the cable sealing end (CSE) compounds are located within Flood Zone 1, which is the lowest risk of the three categories of flood risk, as defined by the Environment Agency. In addition, it is assumed that there would be no permanent discharges to or abstractions from watercourses required on the project, therefore there would be limited effects from the project during operation.

9.1.4 This chapter has links with other topic chapters, in particular, ES Chapter 7: Biodiversity (**application document 6.2.7**), which assesses the effects of the project on aquatic species such as fish and eels; ES Chapter 10: Geology and Hydrogeology (**application document 6.2.10**), which assesses the effects on groundwater; ES Chapter 11: Agriculture and Soils (**application document 6.2.11**), which assesses the effects on the land drainage properties of soils and ES Chapter 12: Traffic and Transport (**application document 6.2.12**), which assessed the effects on water based navigation along the River Stour.

9.1.5 Cumulative effects between the project and other proposed developments as well as receptors affected by more than one source of direct environmental impact resulting from the same development are considered in ES Chapter 15: Cumulative Effects Assessment (**application document 6.2.15**).

9.1.6 This chapter is supported by the following appendix:

- Appendix 9.1: Water Environment Baseline (**application document 6.3.9.1**).

9.1.7 This chapter is also supported by the following figures, which can be found in the ES Volume 6.4: Figures (**application document 6.4**):

- Figure 9.1: Water Environment Features; and
- Figure 9.2: Water Framework Directive Waterbody Status.

9.1.8 This chapter also makes reference to the following documents:

- Flood Risk Assessment (FRA) (**application document 5.5**); and

- Water Framework Directive (WFD) Assessment (**application document 5.6**).

9.2 Regulatory and Planning Policy Context

National Policy Statement

9.2.1 Chapter 2: Regulatory and Planning Policy Context (**application document 6.2.2**) sets out the overarching policy relevant to the project including the Overarching National Policy Statement (NPS) for Energy (EN-1) (Department of Energy and Climate Change (DECC), 2011a). This is supported by NPS for Electricity Networks (EN-5) (DECC, 2011b).

9.2.2 EN-1 states that energy projects could have adverse effects on the water environment. Paragraph 5.15.2 of EN-1 states, '*Where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment as part of the ES or equivalent'*. The same paragraph is also included in the consultation draft EN-1 (Department for Business, Energy and Industrial Strategy (BEIS), 2021a) at paragraph 5.16.2.

9.2.3 Flood risk is also a consideration, and paragraph 5.7.4 of NPS EN-1 states, '*Applications for energy projects of 1 hectare or greater in Flood Zone 1 in England … and all proposals for energy projects located in Flood Zones 2 and 3 … should be accompanied by a FRA. … This should identify and assess the risks of all forms of flooding to and from the project and demonstrate how these flood risks will be managed, taking climate change into account'*. The consultation draft EN-1 (BEIS, 2021a) has similar wording, requiring a site-specific FRA for energy projects on Flood Zones 2 and 3.

9.2.4 EN-5 contains paragraph 2.4.2 relating to the water environment, which states '*the resilience of the project to climate change should be assessed in the Environmental Statement (ES) accompanying an application. For example, future increased risk of flooding would be covered in any flood risk assessment'*. The consultation draft of EN-5 (BEIS, 2021b) has additional wording around resilience to climate change but concludes with the same wording to paragraph 2.4.2 in the current version of EN-5 (DECC, 2011b).

9.2.5 Full consideration of the NPS can be found in the Planning Statement (**application document 7.1**).

Other Relevant Policy and Guidance

9.2.6 ES Appendix 2.1: Legislation, Policy and Guidance (**application document 6.3.2.1**) includes legislation and national policy relevant to the water environment. It also outlines key guidance documents that have been referenced when writing this chapter.

9.2.7 ES Appendix 2.2: Local Planning Policy (**application document 6.3.2.2**) lists the local policy potentially relevant to the water environment. The emerging Babergh and Mid Suffolk Joint Local Plan (2021) Policy LP29 and the adopted Braintree District Council Local Plan (2022) Policies LPP74, LLP75 and LLP76 are relevant to the water environment assessment. All of these policies advocate development in areas at low risk of flooding and the sustainable management of surface water runoff. Where development must be located in higher risk areas, it should be designed to be flood resilient and safe over the development lifetime, taking climate change into account. New development must not increase flood risk elsewhere, and the policies encourage incorporation of above ground, appropriate Sustainable Drainage Systems (SuDS) wherever possible.

9.3 Scope of the Assessment

9.3.1 ES Appendix 5.1: Scope of the Assessment (**application document 6.3.5.1**) outlines the scope of the assessment for water environment. This has been informed by the Scoping Opinion provided by the Planning Inspectorate (**application document 6.6**) on behalf of the Secretary of State, following the submission of the Scoping Report (**application document 6.5.1**).

9.3.2 The scope has also been informed through engagement with relevant consultees as summarised in ES Appendix 5.2: Response to Consultation Feedback (**application document 6.3.5.2**).

9.3.3 The Scoping Report (**application document 6.5.1**) proposed scoping out flooding from sewers and water mains, the sea and reservoirs and other artificial sources as it is assumed that the project would not require sewer connections and that it is located at a distance from the coast and any reservoirs. The Planning Inspectorate agreed that flooding from the sea and reservoirs could be scoped out of the assessment but requested further details about connections to the sewage network be provided as noted in ID 4.4.8 in the Scoping Opinion (**application document 6.6**).

9.3.4 ES Chapter 4: Project Description (**application document 6.2.4**) notes that no new connections are anticipated to the existing sewage network. The GSP substation would require a waste/foul water system (cesspools) that would be periodically emptied as required. Wastewater generated would be very limited, given the site would be unmanned and the wastewater would only come from use of facilities in the amenities buildings. Therefore, flooding from sewers is also scoped out of the assessment.

9.3.5 Effects on existing surface water abstractors and discharges have been scoped out of the assessment during the construction phase on the basis that water for trenchless crossings would be brought to the working area by tanker, and wastewater (outside of the main site compound) would be removed by tanker (where showing signs of contamination) or discharged to the land as described in ES Chapter 4: Project Description (**application document 6.2.4**). This was confirmed in ID 4.4.4 in the Scoping Opinion (**application document 6.6**).

9.3.6 Water quality effects during operation have been scoped out due to a lack of pathways to surface water receptors once the project is complete, as described in ID 4.4.3 in the Scoping Opinion (**application document 6.6**). Effects on hydromorphology have also been scoped out during the operational phase as watercourses would be reinstated once construction is complete, as confirmed in ID 4.4.5 in the Scoping Opinion (**application document 6.6**).

9.3.7 The specific aspects that are scoped into the water environment assessment are:

- Watercourses (including main rivers, ordinary watercourses and land drains): Impacts on water quality and flows; and impacts on hydrology for construction only;
- Vulnerable infrastructure and communities: Impacts on fluvial flood risk from loss of functional floodplain (storage) and impediment on river and floodplain flows. Impacts on groundwater flood risk for both construction and operation; and
- Vulnerable infrastructure and communities: Impacts on land drainage routes (potential for severance), rainfall infiltration and runoff rates and surface water flood risk.

Project Engagement

9.3.8 National Grid has held several water thematic meetings with relevant organisations, including the Environment Agency and Essex County Council and Suffolk County Council in their roles as Lead Local Flood Authorities (LLFA), and have also engaged with the East Suffolk Internal Drainage Board

9.3.9 Discussions have covered the proposed scope and methodologies of the assessments, how the project would apply climate change allowances and good practice measures to reduce effects on water environment receptors included within the Code of Construction Practice (CoCP) (**application document 7.5.1**). The draft CoCP and the draft Construction Environmental Management Plan, which contains further details on the good practice measures proposed to reduce effects to the water environment, were issued to the Environment Agency, Essex County Council and Suffolk County Council. Their comments were considered as part of the updated version submitted as part of the application for development consent.

9.3.10 Discussions have informed the development of the FRA (**application document 5.5**). The draft FRA was issued to the Environment Agency, Essex County Council and Suffolk County Council and East Suffolk Internal Drainage Board and their comments were considered as part of the updated version submitted as part of the application for development consent. The Environment Agency confirmed that they have no objection to the findings of the FRA, and the LLFA provided minor comments that have been addressed in the submission. No comments were received from East Suffolk Internal Drainage Board on the FRA.

9.3.11 The draft WFD Assessment was issued to the Environment Agency and their comments were considered as part of the updated version submitted as part of the application for development consent (**application document 5.6**).

9.3.12 Further details on how consultation responses have informed the assessment can be found in ES Appendix 5.2: Response to Consultation Feedback (**application document 6.3.5.2**).

9.4 Approach and Methods

9.4.1 This section describes the methodology used to establish the baseline environment and the adopted approach to assessing the significance of potential effects on the water environment. A desk study has been undertaken to establish the baseline and inform the assessment of significant effects. This has been supported by information gathered during ecology site walkovers, in particular habitat surveys undertaken during 2021 and 2022. Details of these habitat surveys are provided in ES Appendix 7.1: Habitats Baseline Report (**application document 6.3.7.1**). Photographs and relevant field notes have been incorporated into the WFD Assessment (**application document 5.6**).

Data Sources

9.4.2 The baseline has been informed by a desk study which has drawn on the following key information sources:

- Anglian River Basin Management Plan (RBMP) (Environment Agency, 2015);
- Public records held by the Environment Agency, local and county councils in relation to details of private water supplies, water quality and pollution incidents;

- Catchment data explorer database of Cycle 2 WFD information (Environment Agency, 2022a);
- Internal drainage district map (East Suffolk Drainage Board, 2022);
- Water quality data archive (Environment Agency, 2022b);
- Long-term flood risk map for England (Environment Agency, 2022c);
- Flood Map for Planning (Environment Agency, 2021c);
- Main River map for England (Environment Agency, 2022d);
- Historic Flood Map (Environment Agency, 2022e); and
- Flood Estimation Handbook webservice (UK Centre for Ecology and Hydrology, 2022) defining surface water catchment areas and hydrological properties (e.g. rainfall, slopes, soil permeability).

9.4.3 Data was initially requested in 2021, with a further update requested in summer 2022. Data was requested from the Environment Agency, Suffolk County Council and Essex County Council (in their role as LLFA) and Braintree District Council and Babergh and Mid Suffolk District Council to provide information on the following to support the assessment:

- Consented discharges to surface waters and licensed abstractions from surface waters (provided by Environment Agency, 2022);
- Deregulated surface water abstractions (private water supplies) (provided by Babergh and Mid Suffolk District Council, 2022 and Braintree District Council, 2022);
- Information on historical flood events (provided by Environment Agency, 2022); and
- Flood water level and flood extent data from hydraulic models of the Rivers Stour, River Box, River Brett and the Belstead Brook (provided by Environment Agency, 2022).

9.4.4 All of the information received has been incorporated into the baseline environment description presented in Section 9.5 excluding information on private water supplies, which is presented in ES Chapter 10: Geology and Hydrogeology (**application document 6.2.10**).

Study Area

9.4.5 The study area for the water environment includes land and water features within the Order Limits and within a 500m distance of the Order Limits. The study area and the identified baseline surface water features are shown on ES Figure 9.1: Water Environment Features (**application document 6.4**). This is considered an appropriate study area based on professional judgement of similar projects and has been set following consideration of the distance over which likely significant effects can reasonably be expected to occur. The study area has been discussed as suitable in meetings with the Environment Agency and the LLFA.

Site Survey

9.4.6 No site surveys have been undertaken specifically for this assessment. However, as noted previously, the desk study reported in this chapter has been supported by information gathered during the ecology surveys.

Assessment Methodology

9.4.7 This section sets out the methodology used for assessing the effects on the water environment for those aspects scoped into the assessment, as set out within Chapter 9 of the Scoping Report (**application document 6.5.1**). The assessment is based on guidance set out in the Design Manual for Roads and Bridges LA 113 (Highways England *et al*, 2020g). This promotes assessment that is proportionate to the scale and nature of the proposals and that considers the sensitivity of the local water environment to change. In addition, various Construction Industry Research and Information Association (CIRIA) publications have been referenced, see ES Appendix 2.1: Legislation, Policy and Guidance (**application document 6.3.2.1**) for details. Local flood risk management guidelines published by Essex and Suffolk County Councils have also been referenced including:

- The Sustainable Drainage Design Guide for Essex (Essex County Council, 2020); and
- Sustainable Drainage Systems: a local deign guide (Suffolk Flood Risk Management Partnership, 2018).

Value/Sensitivity

9.4.8 Water environment receptors have been identified within the study area and the attributes and the services that these water bodies provide have been characterised using the baseline data collected during the desk study and ecological habitat survey. This information has been used to assign to receptors one of the value (sensitivity) categories defined in ES Appendix 5.4: Assessment Criteria (**application document 6.3.5.4**). These values are based on Table 3.70 of LA 113 (Highways England *et al.*, 2020g).

Impact Magnitude

9.4.9 The criteria for assigning impact magnitude, defined in ES Appendix 5.4: Assessment Criteria (**application document 6.3.5.4**), is drawn from Table 3.71 of LA 113 (Highways England *et al.*, 2020g). These consider the scale/extent of the predicted change and the nature and duration of the impact, with examples of each category of impact magnitude provided in the guidance.

Significance

9.4.10 Likely significant effects have been assessed using professional judgement considering the sensitivity (or value) of the receptors within the study area, and the magnitude of change (impact) likely to be caused by project activities. These factors are combined to give an overall significance of effect.

9.4.11 Significance has been derived using the matrix set out in Illustration 5.1 in Chapter 5: Environmental Impact Assessment (EIA) Approach and Method (**application document 6.2.5**). This has been supplemented by professional judgement, which where applicable, has been explained to give the rationale behind the values assigned. Likely significant

effects, in the context of the Infrastructure Planning (EIA) 2017, are effects of moderate or greater significance.

9.4.12 Overall significance is also concluded for each aspect of the water environment, taking into consideration the potential for the project to affect more than one attribute of a particular receptor.

Limitations of Assessment

9.4.13 As with all types of assessment of effects on the water environment, the assessment depends on the accuracy of data provided by third parties. It has therefore been assumed that data provided by third parties is accurate.

9.4.14 No quantitative assessments (modelling) and no water-quality sampling and analysis has been undertaken, as it is considered that sufficient baseline data are available to generally characterise the water quality of surface water receptors.

Key Parameters for Assessment and Assumptions

9.4.15 This section describes the key parameters and assumptions that have been used when undertaking the assessment presented within this ES chapter. The assumptions are based on information presented within ES Chapter 4: Project Description (**application document 6.2.4**) and include:

- Abstractions: It is assumed that no new consumptive surface water abstractions are required to facilitate construction of the project, nor during operation of the project;
- Discharges: Discharges from dewatering of opencut trenches to remove rainwater and minor groundwater seepages would be made to ground. At deeper excavations, for trenchless crossings, for example, of the River Stour, it is assumed that discharges would be subject to treatment to settle sediments, prior to discharge to ground not watercourses. Further details are provided in ES Chapter 4: Project Description (**application document 6.2.4**) and ES Chapter 10: Geology and Hydrogeology (**application document 6.2.10**);
- Operational drainage design for the GSP substation and CSE compounds: This would be in the form of soakaways and French drains;
- Trenchless crossing construction methodology: The project has committed to undertaking trenchless crossings at the River Box, River Stour, Sudbury Branch Railway Line and to the south of Ansell's Grove;
- Opencut crossings for the underground cables: It is assumed that all other watercourses in the cable section of the project (not listed above) would be crossed using opencut methods;
- Temporary access routes: Temporary clear span bridge crossings (e.g. bailey bridge) would be used for the temporary access route crossing at the River Stour, River Box and the River Brett. The temporary bridge at the River Stour would be of sufficient size and design to allow existing navigation of the river by non-motorised vessels to continue during construction. Temporary culverts would be used for the temporary access route crossings of ordinary watercourses;

- Reinstatement: All watercourses would be reinstated along construction temporary access routes, with the exception of locations where permanent access is required (for example at the GSP substation); and
- Ordinary watercourses and land drains in construction compounds and storage areas: it is assumed the land drainage function of these features would be maintained via temporary culverting to maintain flow paths where necessary.

Embedded and Good Practice Measures

9.4.16 This section outlines the relevant embedded and good practice measures that have been embedded into the design of the project and therefore the assessment has been undertaken on the assumption that these measures would be carried out. All assessment work has applied a precautionary principle, in that where limited information is available (in terms of the project design), a reasonable worst-case scenario is assessed.

Relevant Embedded Measures

9.4.17 The Register of Environmental Actions and Commitments (REAC) (**application document 7.5.2**) presents the embedded measures that have been identified through the environmental assessment as part of the iterative design and have been committed to as part of the application of the mitigation hierarchy, to avoid or reduce likely significant environmental effects to support a proportionate assessment. Embedded measures relevant to the water environment include:

- EM-P07: The GSP substation and the CSE compounds (the most vulnerable permanent project components) have been located outside of areas at medium and high risk of river flooding (Flood Zones 2 and 3);
- EM-E05: A trenchless crossing is proposed at the River Box. The drive pits would be located outside of Flood Zone 3 where practicable or would be managed in accordance with the flood risk action plan (W08 in the CoCP). On receipt of a severe flood warning, the Contractor would deploy suitable flood protection measures to safeguard work site personal and equipment;
- EM-G04: A trenchless crossing is proposed at the River Stour and beneath the Sudbury Branch Railway Line. The drive pits would be located outside of Flood Zone 3 where practicable or would be managed in accordance with the flood risk action plan (W08 in the CoCP). On receipt of a severe flood warning, the Contractor would deploy suitable flood protection measures to safeguard work site personal and equipment;
- EM-G05: The Order Limits have been widened at the crossing of the River Stour to accommodate soil storage outside of Flood Zone 3 where practicable or to allow placement of soil leaving gaps to avoid blocking floodplain flow paths.

Good Practice Measures

9.4.18 The CoCP (**application document 7.5.1**) sets out the standard good practice measures that would be undertaken during construction of the project if it is granted consent. These include measures to safeguard surface water quality during construction (e.g. W09 and W10) and measures to manage construction site runoff, land drainage and temporary works in the floodplain, to prevent increases in flood risk (e.g. W03 to W08). In addition, pylons would not be constructed within 8m of the top of bank of main rivers and new

400kV pylons would also not be located within 3m of an ordinary watercourse. This would reduce disturbance to river channels, banks and riparian corridors (W14).

9.4.19 In accordance with good practice measure GG01, any works with the potential to affect the floodplain or flow regime of a main river would be subject to consent under the Environmental Permitting (England and Wales) Regulations 2017. Similarly, works with potential to impede land drainage or the flow regime of any ordinary watercourse would be subject to consent under the Land Drainage Act 1991.

9.4.20 In accordance with good practice measures W18, where the temporary access routes and underground cables cross flood defence infrastructure associated with the River Stour (off Bures Road), crossing designs would avoid impacts on the defence foundations and construction works would be undertaken using methods that limit ground movement/settlement. In addition, in line with the requirements of the Environment Agency, should the potential for an impact to the flood defences be identified at the detailed design stage, then the flood defence would be monitored to establish a pre-construction baseline and for a period after completion of works to construct the crossings to enable detection of any effects on the structural integrity/condition of the assets during construction. The requirement for any such monitoring will be discussed with the Environment Agency as part of the application for a Flood Risk Activity Permit (W18).

9.5 Baseline Environment

Existing Baseline

Watercourses (Including Water Quality and Hydromorphology)

9.5.1 The Order Limits cross the following main rivers; the Belstead Brook (at three locations including the tributary known as the Spring Brook), the River Brett, the River Box and the River Stour (including an unnamed tributary to the River Stour). The Order Limits also cross the Henny Meadow Fleet, which is not main river within the Order Limits but becomes main river approximately 750m downstream of the Order Limits.

9.5.2 There are also numerous tributaries of these rivers, classified as ordinary watercourses. The watercourses generally flow in a north-west to south-east direction towards the Stour and Orwell Estuaries. Their catchments can be categorised as generally rural in their land use, with moderately sloping topography, receiving an average annual rainfall ranging from approximately 580mm to 600mm (UK Centre for Ecology and Hydrology, 2022).

9.5.3 The River Stour is navigable within the Order Limits. Unpowered craft (i.e. those that are paddled, rowed or sailed) are permitted to travel the whole length of the Stour Navigation, from Brundon Mill (Sudbury) to Cattawade (on the Stour Estuary). Powered craft, with certain specified exceptions, such as the River Stour Trust trip boats, are restricted to the stretch between Ballingdon Bridge (Sudbury) and Henny Street. The Environment Agency is the navigation authority for this section of the river. No other watercourses are navigable within the Order Limits.

9.5.4 Most of the study area is in a Drinking Water Safeguard Zone (surface water) as defined by the Environment Agency. A large zone (Ref. SWSGZ1024) covers the catchments of the Rivers Brett, Box and Stour and Henny Meadow Fleet. This is noted to be at risk from pesticides. The Belstead Brook catchment is included within zone SWSGZ1022 where the risk is also attributed to pesticides.

9.5.5 The main rivers within the Order Limits, are all included within the Anglian RBMP (Environment Agency, 2015). Baseline WFD status data (Environment Agency, 2022a) is summarised in Table 9.1. The waterbodies are shown on Figure 9.2: Water Framework Directive Waterbody Status (**application document 6.4**).

Table 9.1 – Summary of WFD Status (Cycle 2) (Environment Agency, 2020a)

Waterbody	Overall Status	Ecological Status	Chemical Status
Belstead Brook	Poor	Overall – Poor Biological – Poor Hydromorphology – Supports Good Physico-chemical – Moderate Specific Pollutants – High	Overall – Fail Priority Hazardous Substances – Fail Priority Substances - Good
River Brett (Old River Brett)	Moderate	Overall – Moderate Biological – Moderate Hydromorphology – Supports Good Physico-chemical – Moderate Specific Pollutants – High	Overall – Fail Priority Hazardous Substances – Fail Priority Substances – Good
River Box	Moderate		
River Stour (Lamarsh to R. Brett)	Moderate	Overall – Moderate Biological – Good Hydromorphology – Supports Good Physico-chemical – Moderate Specific Pollutants – High	Overall – Fail Priority Hazardous Substances – Fail Priority Substances – Good

9.5.6 As Table 9.1 shows, the waterbodies share similar quality characteristics. The Rivers Stour, Box and Brett all share a Moderate overall status and are failing with regard to chemical status. The Belstead Brook is currently (Environment Agency, 2022a) achieving Poor overall status and is failing regarding chemical status.

9.5.7 Reasons for not achieving Good status common to all these waterbodies are reported as point source pollution from wastewater treatment works; diffuse pollution due to poor agricultural and soil management; and physical modifications causing barriers to the movement of aquatic species. The RBMP sets out measures for the waterbodies to help them reach a target status of Good by 2027. These focus on improving wastewater treatment to reduce phosphate discharges, as well as measures to improve fish passage, for example the installation of fish passes. Further details are provided in the WFD Assessment (**application document 5.6**).

9.5.8 The Environment Agency also monitors a range of parameters that are indicators of water quality on the main rivers in the study area (Environment Agency, 2022b). Available data has been reviewed and is summarised in ES Appendix 9.1: Water Environment Baseline (**application document 6.3.9.1**), with monitoring locations illustrated in Figure 9.1: Water Environment Features (**application document 6.4**). The data indicates that, for most parameters, measured values are within typical ranges for achieving 'High' WFD status. The exception on all the watercourses is orthophosphate, which is recorded in concentrations that are indicative of nutrient enrichment.

9.5.9 The Rivers Box, Brett and Stour also support abstraction of water for a range of uses, including agricultural spray irrigation, and industrial processes. Abstractions and discharges influence the quantity and quality of water in the rivers. The data is presented in ES Appendix 9.1: Water Environment Baseline (**application document 6.3.9.1**) and are shown on Figure 9.1: Water Environment Features (**application document 6.4**). Watercourses in the study area receive, transport and dilute consented and informal discharges. There are multiple consented discharges from single and groups of domestic dwellings, involving small volumes (typically less than 5Ml/d) and several consents for larger volumes of discharges from wastewater pumping stations and treatment works.

9.5.10 In accordance with the criteria presented in ES Appendix 5.4: Assessment Criteria (**application document 6.3.5.4**), the water quality attributes of the Rivers Brett, Box and Stour and the Belstead Brook are assigned high sensitivity (value). This is because they are all named in an RBMP and have Q95 flows less than $1m^3/s$. The Henny Meadow Fleet and several ordinary watercourses in the study area are assigned medium sensitivity, as these watercourses are not named in the RBMP and, due to their catchment sizes, support Q95 flows generally exceeding $0.001m^3/s$. Some of the smaller ordinary watercourses are likely to meet the criteria for low sensitivity, as they support lower summer flows, or dry out, but a precautionary medium sensitivity has been assigned for the assessment.

9.5.11 With regard to their physical form, many of the watercourses in the study area have been subject to modifications for the purposes of land drainage and flood defence. The Rivers Brett, Box and Stour have a 'heavily modified' designation. The ordinary watercourses in the study area also serve a land drainage function and have a relatively low hydromorphological diversity, typically having uniform channel profiles and straightened channel forms. Further details are presented in the WFD Assessment (**application document 5.6)**.

9.5.12 The hydromorphological attributes of the watercourses in the study area are therefore assigned values of high sensitivity for the Belstead Brook (not designated as heavily modified), medium sensitivity for the other main river watercourses, and low sensitivity for the ordinary watercourses. This is because these primarily serve a land drainage function and have the least hydromorphological diversity.

Flood Risk and Land Drainage

9.5.13 Based on the online Flood Maps (Environment Agency, 2021c) the main sources of flood risk within the study area are the River Brett, River Box, River Stour and Belstead Brook, with areas of Flood Zones 2 and 3 (medium to high risk) associated with these watercourses and some of their larger tributaries. The widths of the floodplain areas within the development route vary from 30m for a River Stour tributary and up to 600m for the River Stour itself. The FRA (**application document 5.5**) concludes that the risk of flooding to the project, including along the construction temporary access route, from rivers is mainly low with small areas local to some watercourse crossings at higher risk.

9.5.14 As the project is classified as essential infrastructure, the floodplains of the watercourses in the study area are assigned very high sensitivity in line with the criteria presented in ES Appendix 5.4: Assessment Criteria (**application document 6.3.5.4**). However, most of the study area is at low risk of flooding from rivers (in Flood Zone 1), as shown on Figure 9.1: Water Environment Features (**application document 6.4**).

9.5.15 The Environment Agency has supplied information about existing flood defences within the study area. There are three defences, all situated on the banks of the River Stour: two of the defences are located upstream and downstream of the Order Limits, with one defence (asset ID 149771) located within the Order Limits. The defences comprise raised earth embankments that have an overall condition grade of 3 (Fair). No details on the standard of protection offered by these defences have been provided.

9.5.16 Flood risk from surface water runoff varies across the study area, with most areas at low risk from this source. Areas mapped as at higher risk closely align with watercourse corridors. Environment Agency data indicates that, in higher risk areas, the depths of surface water flooding are expected to be relatively shallow (less than 300mm). The land drainage regime is assigned medium sensitivity given its local significance, in line with the criteria presented in ES Appendix 5.4: Assessment Criteria (**application document 6.3.5.4**).

9.5.17 As presented within the Scoping Report (**application document 6.5.1**) and as detailed within the FRA (**application document 5.5**), flood risk from other sources such as tidal, sewers and groundwater are scoped out of the assessment. Further assessment of the project's interactions with groundwater aquifers is provided in ES Chapter 10: Geology and Hydrogeology (**application document 6.2.10**).

Future Baseline

9.5.18 With regard to flood risk and drainage, future baseline conditions have been forecast, drawing on current best practice guidelines (Environment Agency, 2022h), taking into account the likely impacts of climate change on rainfall intensities. These future conditions are considered to factor in climate change resilience into the project drainage design.

9.5.19 The majority of the project is within the Environment Agency's Combined Essex management catchment whilst the north-eastern extents of the Order Limits are within the East Sussex management catchment. For both management catchments, peak rainfall intensity is anticipated to increase between 20% (central estimate) and 40% (upper end estimate) in the design lifespan of the project (assumed to be at least 40 years; see ES Chapter 4: Project Description (**application document 6.2.4**) for details).

9.5.20 The implementation of future cycles of WFD management plans driving future improvements in the ecological and chemical quality of waterbodies has been considered when assigning value to water environment resources and receptors. However, future improvements in the hydromorphological quality of watercourses have not been presumed in assigning values as improvement in this attribute would require direct intervention, for example, implementation of river restoration projects, and no proposals for such works have been identified for the watercourses within the study area.

9.5.21 The effects of future proposed developments within the Order Limits that are anticipated to be built prior to construction of the project have also been considered (see Table 3.7 in ES Appendix 15.1: Cumulative Effects Baseline (**application document 6.3.15.1**) for the list of developments). Where these developments have potential to cause effects on the baseline attributes of watercourses in the Study Area, this has been accounted for in the assigned receptor values.

9.5.22 Two waste safeguarding allocations are located within the Order Limits, namely for a proposed anaerobic digestion plant at Hill Farm, Boxford, and a water recycling centre at

Hintlesham-wilderness Sewage Treatment Works (Suffolk policy WP18). The works associated with the reinforcement would not affect these safeguarding allocations.

9.6 Likely Significant Effects During Construction (Without Mitigation)

Introduction

9.6.1 This section sets out the potential for likely significant effects of the project on the water environment during construction. The assessment assumes that the relevant embedded measures in the REAC (**application document 7.5.2**) and the good practice measures in the CoCP (**application document 7.5.1**) are in place, and the results of the assessment then inform the need for any additional mitigation requirements during construction (see Section 9.8). The assessment has also been informed by the FRA (**application document 5.5**) and WFD Assessment (**application document 5.6**).

9.6.2 As described in ES Chapter 4: Project Description (**application document 6.2.4**), the assessment presented within this chapter is split into the 'main project' and the 'GSP substation. The main project includes the 132kV overhead line removal, proposed overhead line and underground cables (including the CSE compounds). The GSP substation includes works at the substation where this connects into the network and the minor works to the existing overhead lines.

9.6.3 The assessment presented in Sections 9.6 to 9.10 is based on the Proposed Alignment, which is the design that is shown on ES Figure 4.1: The Project (**application document 6.4**). However, it should be noted that both the temporary aspects of the project, including the location of temporary access route watercourse crossings, and the permanent aspects of the project, including pylon locations, are not fixed and could be located anywhere within the Limits of Deviation (LoD), as defined on the Work Plans (**application document 2.5**). The sensitivity testing in Section 9.11 considers whether there would be new or different effects should alternative locations be taken forward.

Main Project

Watercourses – Water Quality

9.6.4 Watercourse crossings would be required to provide temporary construction access to the working areas. In addition, the 132kV overhead line would need to be lowered over watercourses, the new overhead lines would need to be raised over watercourses and the underground cable would need to be installed beneath watercourses.

Temporary Access Route Crossings

9.6.5 Temporary access routes would be constructed throughout the Order Limits and would require temporary crossings over watercourses, as well as permanent access routes to the CSE compounds. The potential crossing locations based on the Proposed Alignment are listed in Appendix 2: Schedule of Watercourse Crossings and shown on Figure 2: Watercourse Crossings, which can both be found in the WFD Assessment (**application document 5.6**).

9.6.6 In accordance with good practice measure W17, temporary clear span bridge crossings would be used for the temporary access route crossing at the River Stour, River Box and the River Brett. These would be designed with soffits that are raised 600mm above the

flood level and would be set back 8m from the river's edge. This measure would avoid effects on these main rivers.

9.6.7 The temporary access route over the remaining watercourses would cross using temporary culverts. These could result in associated pollution risks linked to the generation of silted runoff and sedimentation, as well as pollution from construction plant (oils, hydrocarbons) and other materials. However, the risks would be reduced by the good practice measures described in the CoCP (**application document 7.5.1**) and the CEMP (**application document 7.5**).

9.6.8 There is also an associated risk of pollution from construction traffic using the temporary access routes, for example linked to silted runoff generated from mud deposits from vehicle tyres and other debris entering the watercourses. It is assumed that barriers would be used on each side of the temporary access route crossing to prevent vehicles driving off the crossing point into the watercourse and to prevent debris such as mud from falling into the watercourse, as described in ES Chapter 4: Project Description (**application document 6.2.4**).

Electricity Transmission Line Crossings of Watercourses

9.6.9 Watercourse crossings for the new overhead lines and for the removal of the 132kV lines would have negligible effects on the water quality of watercourses in proximity to the works, as no construction would be necessary within the channel or in bankside areas to string the lines between the new pylons, and no potentially silted or otherwise pollution runoff would be generated as a result of this activity bearing in mind the implementation of the good practice measures in the CoCP (**application document 7.5.1**).

9.6.10 In the underground cable sections of the project, several smaller ordinary watercourses, would be crossed by an opencut method. This activity carries a risk of pollution linked to the generation of silted runoff and sedimentation, as well as pollution from construction plant (oils, hydrocarbons) and other materials. However, good practice measures set out within the CoCP (**application document 7.5.1)**, would be followed and the contractor would comply with any conditions set out within the secondary consents and permits from the relevant authorities (Environment Agency for main rivers, and the LLFA for ordinary watercourses). These measures would reduce the potential for pollution incidents to occur.

9.6.11 The River Box and the River Stour would be crossed using a trenchless crossing technique (embedded measures EM-E05 and EM-G04 respectively). The trenchless crossings would avoid physical disturbance within the river channel and reduce disturbance in the riparian corridor, and so reduce the potential for water quality effects on these rivers. However, the technique is not without risk of pollution, associated with inadvertent releases of drilling fluids/muds. In accordance with good practice measure GH07, a hydrogeological risk assessment would be undertaken once the trenchless crossing method has been confirmed, to assess the risks on surface water quality associated with the construction method and to devise suitable drilling designs informed by ground investigation data.

General Construction Activities

9.6.12 The CSE compounds are located in the catchments of the River Box and the River Stour but are not situated in proximity to the watercourses.

9.6.13 Other construction activities with a risk of opening pollution pathways to water environment receptors include the dewatering of deeper excavations, as well as the establishment and use of construction compounds, where higher risk activities such as vehicle fuelling and storage of potentially polluting construction materials. These activities would be managed in accordance with the good practice measures described in the CoCP (**application document 7.5.1**) to reduce pollution risk.

9.6.14 Soil stripping and the subsequent stockpiling and storage of soil in working areas could also cause deterioration of surface water quality by generating silted or polluted runoff. It is assumed that soil stripping would be more limited in the overhead line sections (e.g. River Brett and Belstead Brook catchments), where the soil stripping would generally be limited to the pylon bases and the temporary access routes.

9.6.15 A larger soil stripped area is anticipated in the underground cable sections (River Box and Stour catchments), where an 80m working area would typically be required. However, the proposed trenchless crossings at the River Box and the River Stour would reduce the risk of working immediately adjacent to the channels.

9.6.16 In both overhead line and underground cable sections, the good practice measures described in the CoCP (**application document 7.5.1**), including W02 regarding the positioning of soil storage and refuelling activities away from watercourses, would manage runoff and reduce the potential for pollution via this pathway.

9.6.17 Once the project has been constructed, the working areas would be fully reinstated. Surface water drainage from the CSE compounds, as well as the permanent access routes would be at low risk of contamination and subject to settlement of silts/sediments, and in the main would be discharged via infiltration to ground. Construction phase pollution source-pathway links to water receptors would therefore be substantially reduced.

Assessment of Water Quality Effects

9.6.18 The overall change to water quality attributes (high to medium sensitivity), due to the construction of the overhead line and removal of the existing overhead lines is assessed to result in a negligible magnitude of change, accounting for the good practice measures secured via the CoCP (**application document 7.5.1**). Hence there would be a short term **neutral** effect which is **not significant**.

9.6.19 The good practice measures within the CoCP (**application document 7.5.1**) would reduce pollution risks associated with the generation of silted runoff and reduce the potential for a pollution incident during construction of the underground cable. At the River Stour and River Box (high sensitivity), the trenchless crossings reduce the magnitude of water quality effects to negligible, with a short term **neutral** effect. At these crossings, the risks of pollution due to break out of drilling muds would be reduced by using ground investigation data to inform the crossing designs, and any detriment to water quality would be temporary and localised, such that any adverse effect would be **not significant**.

9.6.20 The change to the water quality attributes of any smaller ordinary watercourses due to the underground cable crossings is assessed to be of small magnitude on receptors of medium sensitivity. Therefore, there would be a short term **minor** effect which is **not significant**. This assessment is also applicable to the effects on water quality linked to the temporary culverting of ordinary watercourses to facilitate construction access.

9.6.21 The CSE compounds are located in the catchments of the River Box and the River Stour but are not situated in proximity to the watercourses. At these locations potentially polluting construction activities would be managed in accordance with good practice measures described in the CoCP (**application document 7.5.1**). As such, there would be no likely pollution pathways to the River Stour or the River Box (assigned high sensitivity). There would therefore be no change, so a **neutral** overall effect on the water quality of these rivers is assessed, which would be **not significant**.

9.6.22 Implementation of the good practice measures within the CoCP (**application document 7.5.1**) would reduce pollution risks associated with construction traffic, dewatering of deeper excavations, drilling at trenchless crossings, soil stripping and the subsequent stockpiling and storage of soil in working areas. The change to water quality attributes of surface watercourses (assigned high – low sensitivity depending on the watercourse) is assessed to be small, with short term **minor** adverse effects that are **not significant**.

9.6.23 It is therefore assessed that overall, there would be no significant effects on water quality, or on the receptors (people) that rely on water quality in terms of drinking water supplies or for recreational use (water-based recreation activities such as boating).

Watercourses – Hydromorphology

Temporary Access Route Crossings

9.6.24 In accordance with good practice measure W17 in the CoCP (**application document 6.2.7**), the temporary access route crossings of the River Brett, Box and Stour would be crossed by clear span bridges. In addition, the temporary bridge at the River Stour would be of sufficient size and design to allow existing navigation of the river by non-motorised vessels to continue during construction. This good practice measure would reduce physical disturbance of these watercourses, effects on their flow regimes and hydromorphological quality, limiting change to local temporary disturbance within their riparian corridors.

9.6.25 Where culvert crossings are proposed on the remaining watercourses, effects on hydromorphology would be reduced by good practice measures including B09, which states that culverts would be appropriately sized to maintain natural riverine connectivity throughout the year, at both high and low flows. Culverts would be designed to maintain natural slope/water velocities and have buried inlet/outlets. In addition, W04 states that where watercourses are to be crossed by a culvert method, the culvert would be sized to reflect the channel width and the estimated flow characteristics of the watercourse under peak flow conditions and kept free from debris. These installation works would be timed to avoid flood flow conditions where practicable, or if periods of work were necessary when higher flow conditions could be expected, suitable pumping provision would be put in place, with standby pumps also made available.

9.6.26 As described in ES Chapter 4: Project Description (**application document 6.2.4**), it is assumed that where a temporary access route crossing is required that the relevant watercourse section would be dammed using sandbags for a section of approximately 10m. Water would be over pumped through a filter to the next section of watercourse downstream to enable a dry working area for culvert installation, thereby maintaining flows during construction. It is assumed that this would be for a short duration, for example two weeks during the installation of the temporary crossing.

9.6.27 The crossing designs and construction methods would follow the good practice measures set out within the CoCP (**application document 7.5.1**), and the designs would comply with any conditions set out within the secondary consents and permits from the relevant authorities (Environment Agency for main rivers, and the LLFA for ordinary watercourses). Once the project has been constructed, the working areas would be fully reinstated.

Electricity Transmission Line Crossings of Watercourses

9.6.28 It is assumed for the assessment, that in accordance with good practice measure W14 in the CoCP (**application document 7.5.1**) and based on the Proposed Alignment shown on ES Figure 4.1: The Project (**application document 6.4**), that the new pylons would not be constructed within 8m of the top of bank of main rivers or within 3m of ordinary watercourses. It is also assumed that pylons would not be situated within Flood Zones 2 and 3, based on the Proposed Alignment shown on ES Figure 4.1: The Project (**application document 6.4**). As a result of these measures there would be no effects on the flow regimes or planform of watercourses in these sections of the project.

9.6.29 The River Box and the River Stour would be crossed using a trenchless crossing technique (embedded measures EM-E05 and EM-G04 respectively). The trenchless crossings would avoid physical disturbance within the river channel and reduce disturbance in the riparian corridor, and so reduce the potential for effects on the flow regimes and hydromorphological quality of these rivers.

9.6.30 Where the underground cables cross a watercourse and an opencut method is proposed, the installation would be undertaken in a similar way to described above for the culvert installation. The construction activities are assumed to temporarily affect up to 100m for each watercourse for approximately eight weeks (see Appendix 2 in the WFD Assessment (**application document 5.6**)).

9.6.31 Downstream flows would be maintained during the works for example by overpumping to create a dry working area within which to lay the underground cables. The crossing designs and construction methods would follow the good practice measures set out within the CoCP (**application document 7.5.1)**, and the designs would comply with any conditions set out within the secondary consents and permits from the relevant authorities (Environment Agency for main rivers, and the LLFA for ordinary watercourses). Once the project has been constructed, the working areas would be fully reinstated.

Assessment of Effects on Hydromorphology

9.6.32 For the three main river watercourses to be crossed by clear span bridges, assigned as high sensitivity, the impact of the temporary access crossings is assigned negligible magnitude, with a **neutral** effect on flow regimes and channel forms that is **not significant**.

9.6.33 There would be temporary effects on the hydromorphology of the remaining watercourses, assigned as low sensitivity for their hydromorphological quality, that are crossed by the temporary access routes using culverts. However, the good practice measures in the CoCP (**application document 7.5.1**) and the design of the temporary access crossings would maintain downstream flow. This would result in an impact of small magnitude and short term **minor** adverse effects that would be **not significant**.

9.6.34 Trenchless crossings are proposed for the crossing of the River Box and River Stour (high sensitivity). Therefore, no change would be anticipated to the hydromorphology of these rivers as the channel would not be physically disturbed.

9.6.35 For the remaining opencut crossings of the other watercourses, assigned as low sensitivity for their hydromorphological quality, an impact of small magnitude is assessed, with short term **minor** adverse effects that are **not significant**.

Flood Risk and Land Drainage

9.6.36 Construction of the project would involve some works within Flood Zone 2 and 3, although the areas are relatively small given the size of the floodplain within the Order Limits and the embedded measures to use trenchless crossing at the River Box (EM-E05) and the River Stour (EM-G04). The CSE compounds would also constructed in Flood Zone 1 (EM-P07). The CSE compounds have a small impermeable footprint and surface water would be encouraged to infiltrate to ground.

9.6.37 Construction of the project would introduce new areas of temporary impermeable land cover. The temporary construction compounds are all located in Flood Zone 1 but other temporary works such as the temporary stone access routes and topsoil stripping would take place within Flood Zone 2 and 3. These activities could locally reduce rainfall infiltration rates, increase runoff rates and induce overland flow during construction and could contribute to localised changes to the land drainage regime, resulting in ponding of water or waterlogging of soils.

9.6.38 The drive pits of the trenchless crossings of the River Stour and railway line may also be situated in the floodplain. For the purposes of the ES, a worst case has been assumed that the drive pits are within the floodplain. However, the potential for this activity to increase flood risk during construction, through the creation of soil stockpiles and temporary works areas, would be reduced by embedded mitigation measure EM-G05. This embedded measure states that the Order Limits have been widened at the crossing of the River Stour to accommodate soil storage outside of Flood Zone 3 where practicable or to allow placement of soil leaving gaps to avoid blocking floodplain flow paths.

9.6.39 Good practice measures in the CoCP (**application document 7.5.1**) including W07, W08 and GG15, would also reduce effects on loss of flood storage and floodplain attributes during construction and protect the health and safety of construction personnel. Therefore, it is considered that the project would have a negligible magnitude of impact on the flood storage and floodplain flow attributes (of very high sensitivity). Considering the nature and footprint of the project, the effect would be short term **minor** adverse and **not significant**.

9.6.40 As described in good practice measure W16, pre-construction field drainage would be installed within the working area to help prevent possible waterlogging and to enable the landowner's current drainage systems to continue working throughout the period of construction. Landowners would be consulted on the design of the land drainage proposals and designs would address the need to reduce the risk of drains acting as pathways for contamination or cause flooding off-site. In addition, in accordance with good practice measure W07, the design of the temporary access routes would include surface water drainage measures so that they do not lead to a significant increase in flood risk. All construction compounds would be located in Flood Zone 1. Where this is not practicable, additional measures would be identified within a flood risk action plan.

9.6.41 Consequently, changes to the land drainage regime and rainfall infiltration and runoff patterns are assessed to be of negligible magnitude on receptors, which include local land uses and the project itself, ranging in sensitivity from medium to very high. Therefore, there would be a **neutral** effect. In addition, works affecting the land drainage regime would be temporary and localised, with land reinstated on completion of construction works. Considering the nature and footprint of the project, and using professional judgement, any adverse effect would be **not significant**.

GSP Substation

Watercourses – Water Quality and Hydromorphology

9.6.42 The GSP substation is located within the catchment of, but remote from, the River Stour. Potentially polluting construction activities associated with the construction of the GSP substation and associated works to connect this to the network, would be managed in accordance with good practice measures described in the CoCP (**application document 7.5.1**). As such, there would be no likely pollution pathways to the River Stour (high sensitivity). There would therefore be no change, so there would be a **neutral** overall effect on the water quality of the River Stour, which would be **not significant**.

9.6.43 There is an ordinary watercourse adjacent to the GSP substation site alongside the western boundary. The flow regime and water quality attributes of this watercourse (medium sensitivity) would be protected during construction by the good practice measures in the CoCP (**application document 7.5.1**). There would be a negligible magnitude of impact and a **neutral** overall effect on the water quality of this watercourse, which would be **not significant**.

Flood Risk and Land Drainage

9.6.44 The GSP substation would be constructed in Flood Zone 1 (EM-P07). There would be no construction activities taking place within Flood Zone 2 or 3, so no change to floodplain storage or flow routes, and consequently no change to baseline fluvial flood risk.

9.6.45 The GSP substation would be constructed on greenfield land, so changes to existing rainfall infiltration and runoff patterns would be induced. However, hard standing areas would be drained, typically using French drains, which are small ditches filled with granular material to allow rainwater to soak away. All remaining areas are likely to contain porous surfacing to allow surface water to naturally infiltrate without the need for formal drainage. The surface water drainage system would be designed in accordance with good practice measure W12 in the CoCP (**application document 7.5.1**).

9.6.46 The change to the land drainage regime is assessed to be of negligible magnitude on receptors of medium sensitivity. There would therefore be a **neutral** effect that would be **not significant**.

Summary of Construction Effects

9.6.47 During construction, in particular during construction of watercourse crossings for underground cables and for construction traffic access, there would be a risk of opening pollution pathways to water environment receptors, and for temporary effects on flow regimes and flood risk. Construction also has the potential to temporarily effect the land drainage regime. However, the watercourse crossings would be designed in accordance with good practice measures in the CoCP (**application document 7.5.1**), for example

W01, W02, W04, W11, W15, W16 and W17. The project would also comply with the consenting requirements for such works. Therefore, there are **no likely significant effects** expected in relation to the water environment, flood risk and land drainage during construction.

9.7 Likely Significant Effects During Operation (Without Mitigation)

Introduction

9.7.1 This section sets out the potential for likely significant effects on the water environment during operation. This assessment assumes that the relevant embedded measures are in place, and the results of the assessment then inform the need for any additional mitigation during operation (see Section 9.9).

9.7.2 As described in ES Chapter 4: Project Description (**application document 6.2.4**), the assessment presented within this chapter is split into the 'main project' and the 'GSP substation. The main project includes the 132kV overhead line removal, proposed overhead line and underground cables (including the CSE compounds). The GSP substation includes works at the substation where this connects into the network and the minor works to the existing overhead lines.

Main Project

Watercourses – Water Quality and Hydromorphology

9.7.3 As noted in ES Appendix 5.1: Scope of the Assessment (**application document 6.3.5.1**), operational effects on the water quality and hydromorphology attributes of watercourses within the study area have been scoped out as no pollution-source-pathway linkages have been identified and there is negligible potential for significant effects.

Flood Risk and Land Drainage

9.7.4 As noted in ES Appendix 5.1: Scope of the Assessment (**application document 6.3.5.1**), the only aspect scoped into the assessment of the effects on the water environment during operation are in relation to flood risk and land drainage.

9.7.5 In accordance with good practice measure W14, pylons would not be constructed within 8m of the top of bank of main rivers or within 3m of an ordinary watercourse. Once the underground cables have been installed, the land (including land drainage) would be reinstated in accordance with good practice measure AS05 in the CoCP (**application document 7.5.1**).

9.7.6 There would be a permanent impermeable footprint associated with the CSE compounds and their associated permanent access routes, which would be located outside of Flood Zone 2 and 3. The majority of the CSE compound surface cover would comprise stone chippings, and the permanent access routes would have permanent drainage. The impermeable footprint of these elements would be small, and any above ground operational infrastructure would incorporate appropriate surface water drainage measures in accordance with good practice measures W07 and W12 in the CoCP (**application document 7.5.1)**.

9.7.7 Therefore, the change to flood risk and the land drainage regime (medium sensitivity) associated with all aspects of the overhead line and underground cables is assessed as **negligible** magnitude and any effects would be **not significant**.

GSP Substation

Flood Risk and Land Drainage

9.7.8 The GSP substation would be located outside of areas at medium and high risk of river flooding (defined by Flood Zones 2 and 3) (EM-P06). Surface water runoff from the GSP substation would be drained using appropriate SuDS techniques to meet the discharge requirements of the Essex LLFA as per good practice measure W12. The GSP substation would require a waste/foul water system (cesspools) that would be periodically emptied as required. Wastewater generated would be very limited, given the site would be unmanned and the wastewater would only come from use of facilities in the amenities buildings. The change to flood risk and the land drainage regime is assessed to be of negligible magnitude, resulting in a **neutral** effect that would be **not significant**.

Summary of Operational Effects

9.7.9 Flood risk and land drainage effects during operation have been avoided through design, locating vulnerable components, such as the GSP substation and the CSE compounds, in Flood Zone 1. In addition, in accordance with good practice measure W12, the drainage design would be in accordance with the requirements of the Essex County Council SuDS Design Guide (2020) and the Suffolk County Council SuDS Palette (2021) and the drainage infrastructure would provide the storage necessary to achieve discharges at greenfield rates. Therefore, there are **no likely significant effects** expected in relation to the water environment during operation.

9.8 Proposed Mitigation During Construction

9.8.1 The assessment has concluded that there are no likely significant effects in relation to water environment receptors during construction. Therefore, no mitigation measures have been identified beyond the good practice measures set out in the CoCP (**application document 7.5.1**) and the embedded measures summarised in Section 9.4.

9.9 Proposed Mitigation During Operation

9.9.1 The assessment has concluded that there are no likely significant effects in relation to water environment receptors during operation. Therefore, no mitigation measures have been identified.

9.10 Residual Significant Effects (With Mitigation)

9.10.1 The assessment has concluded that there are no likely significant residual effects in relation to water environment receptors during construction or operation.

9.11 Sensitivity Testing

Introduction

9.11.1 This section outlines alternative approaches to the assessment presented in Sections 9.6 to 9.10. It considers the alternative construction schedule, which is described in ES Appendix 4.2: Construction Schedule (**application document 6.3.4.2**) and also flexibility between the design and method set out within ES Chapter 4: Project Description (**application document 6.2.4**) and the Proposed Alignment shown on ES Figure 4.1: The Project (**application document 6.4**). Further details on the flexibility assumptions are outlined in Section 4.2 of ES Chapter 4: Project Description (**application document 6.2.4**).

Assessment of Alternative Construction Schedule

9.11.2 This chapter assumes the baseline construction schedule described in ES Appendix 4.2: Construction Schedule (**application document 6.3.4.2**) for the purposes of the assessment. Sensitivity testing considering the alternative scenario, which has a later start date due to the GSP substation being delivered pursuant to the Development Consent Order, has shown that there would be no new or different likely significant effects to those identified in the baseline construction schedule assessed in Sections 9.6 to 9.10 of this chapter.

Flexibility in Design

Flexibility in Trenchless Crossings

9.11.3 This chapter has assumed that the drill pits are located at either end of each trenchless crossing, as shown on ES Figure 4.1: The Project (**application document 6.4**). The assessment presented in Sections 9.6 to 9.10 assumes a reasonable worst case that the drill pits could be located within the floodplain. Varying the methodology or drill direction is not likely to result in additional significant effects to those identified in Sections 9.6 to 9.10 of this chapter, given that good practice measures in the CoCP (**application document 7.5.1**) and embedded design measures would be in place.

9.11.4 Discussions would also be held with the Environment Agency in relation to any required consents and permits, in accordance with GG01 in the CoCP (**application document 7.5.1**), which would include the approval of any further measures required.

Flexibility in Construction Method

9.11.5 This ES has assumed a worst case that piling would be required at all pylon locations. If the ground investigations identified that piling was not required at all locations, then this is not likely to result in new or different significant effects to those identified in Sections 9.6 to 9.10 of this chapter. Effects of piling on groundwater are addressed in ES Chapter 10: Geology and Hydrogeology (**application document 6.2.10**).

Flexibility within the Order Limits

9.11.6 The assessment presented within Sections 9.6 to 9.10 has assumed the Proposed Alignment shown on ES Figure 4.1: Proposed Project (**application document 6.4**). It should be noted that as described in ES Chapter 4: Project Description (**application document 6.2.4**), the Proposed Alignment is not fixed and could be subject to change

within the defined LoD within the parameters shown on the Works Plans (**application document 2.5**). Sensitivity testing has been carried out to determine the potential for likely significant effects should alternative locations within the parameters defined by the LoD be taken forward.

9.11.7 Embedded measure EM-P07 commits to locating the GSP substation and the CSE compounds outside of areas at medium and high risk of river flooding (defined by Flood Zones 2 and 3). Therefore, changes within the LoD to these features would not change the assessment presented in Sections 9.6 to 9.10.

9.11.8 The assessment presented within Sections 9.6 to 9.10 has assumed the indicative pylon locations shown on ES Figure 4.1: The Project (**application document 6.4**). Good practice measure W14 states that new pylons would not be constructed within 8m of the top of bank of main rivers (Belstead Brook and River Brett), or within 3m of an ordinary watercourse. Given this measure, the sensitivity testing has shown that there would be no new or different likely significant effects as a result of the pylons being placed in a different location, as they would remain set back from watercourses.

9.11.9 The assessment presented within Sections 9.6 to 9.10 has assumed the locations for temporary access routes and watercourse crossings in cable sections listed in Appendix 2: Schedule of Watercourse Crossings and shown on Figure 2: Watercourse Crossings, which can both be found in the WFD Assessment (**application document 5.6**). Sensitivity testing has been carried out to determine the potential for new or different significant effects should alternative crossing locations be chosen. Given the good practice measures set out in the CoCP (**application document 7.5.1**), the sensitivity testing has shown that there would be no new or different likely significant effects as a result of changes to the location of temporary access routes and watercourse crossings.

9.12 Conclusion

9.12.1 The assessment presented in Sections 9.6 to 9.10 has concluded that there are no likely significant residual effects in relation to water environment receptors during construction or operation. In addition, the sensitivity testing presented in Section 9.11 has shown that there would be no new or different significant effects through the application of either the alternative construction schedule scenario or through flexibility within the LoD.

9.12.2 In accordance with paragraph 5.7.4 of EN-1, an FRA has been submitted as part of the application for development consent (**application document 5.5**). The FRA documents that with the embedded and good practice measures included, the project would be resilient to climate change and that the project would be safe from flooding over its lifetime. In addition, the project would not cause any detrimental effects on flood risk to lands outside the Order Limits.

9.12.3 A WFD Assessment has been completed and submitted as part of the application for development consent (**application document 5.6**). The assessment concludes that the residual effects of project activities on WFD waterbodies would be negligible following implementation of the embedded and good practice measures. It also showed that there would be no effects allowing for flexibility within the LoD, due to the embedded measures regarding the trenchless crossings and clear span bridges for the temporary access route crossings of the main rivers. The assessment concludes that the project is compliant with the objectives of the WFD.

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